

THE DEVELOPMENT OF A COMPETENCY-BASED PROGRAMME FOR MANAGEMENT OF DISEASE OUTBREAKS

Linette Engelbrecht

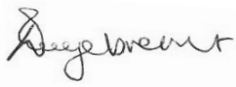


A thesis submitted to the Faculty of Health Sciences,
University of the Witwatersrand, in fulfilment of the requirements of the degree
of
Doctor of Philosophy

Johannesburg, 2024

DECLARATION

I, Linette Engelbrecht declare that this thesis, which is being submitted for the degree of Doctor of Philosophy at the University of the Witwatersrand, Johannesburg, is my own work. It has not previously been submitted for any degree or examination at any other university.

A handwritten signature in black ink, appearing to read 'Engelbrecht', is written on a light-colored rectangular background.

Signature:

This 20th day of March, 2024

HREC Protocol Number: M210603

DEDICATION

This dissertation is dedicated to every single person who survived COVID-19, to every single person living in the aftermath, despite their losses, and most importantly, this dissertation is dedicated to those who did not survive the pandemic.

PUBLICATIONS AND PRESENTATIONS

Engelbrecht, L., Schmollgruber, S., Crous, L. 2022. The Needs of Specialist Nurses during Disease Outbreak Events: A Scoping Review. Federation of Infectious Diseases Societies of South Africa. 4th Annual Conference. 4 November 2022. Durban: South Africa.

Engelbrecht, L., Schmollgruber, S., Crous, L. 2023. Experiences During In-depth Interviews: Flipping Roller's Funnel. Centring Ubuntu Healthcare in Society 5.0: A Transdisciplinary Agenda During COVID-19 and Beyond. 13th -15th September 2023. University of Pretoria, Groenkloof Campus: Pretoria.

ACKNOWLEDGEMENTS

It is with gratitude that I complete this process, which would have not been possible without the help of the following persons:

- My supervisors, Prof Shelley Schmollgruber and Dr Lizelle Crous for their academic guidance throughout the course of this thesis.
- The participants included in the study who were willing to share their experiences.

ABSTRACT

Purpose: The purpose of this study was to develop, a competency-based programme for the management of disease outbreaks.

Method: The study utilized an exploratory sequential mixed method approach, using both qualitative and quantitative methods to develop a competency-based program. This study was conducted in South Africa, Gauteng, whilst the country was experiencing the third COVID-19 wave (May 2021 – October 2021), the fourth COVID-19 wave (December 2021 – April 2022), and the fifth (May 2022 – July 2022), as well as the post-pandemic phase.

The study was conducted in three phases namely: Phase One: Exploratory phase, Phase Two- Development of the programme Phase Three- Validation of the programme. In phase one, a scoping review on the existing literature was conducted using the Joanna Briggs Institute methodological approach. Following this were individual in-depth interviews with purposively sampled healthcare professionals as well as professional nurses. Through reflexive thematic analysis themes were identified for inclusion in the Delphi-survey in the next phase. For the second phase, a Delphi-survey was developed based on the data from phase one. The Delphi-survey consisted of two rounds whereby categories were identified to be included in the competency-based curriculum. A curriculum, consisting of ten modules was developed using the *Backward* design. In phase three the curriculum matrix was validated by experts.

Results: A total of 62 publications were included in this study. Three categories and eight sub-categories were identified as needs of nurses during disease outbreaks. In-depth interviews with healthcare professionals resulted in the development of eight themes and 21 sub themes (challenges) of nurses. The in-depth interviews with nurses resulted in the development of 11 themes (challenges) of nurses. The results of the scoping review and in-depth interviews were used to develop a Delphi-survey. Experts in this two-round Delphi survey validated the domains and statements. The results of the Delphi-survey was used to develop a curriculum matrix consisting of ten modules, which was validated by three experts.

Conclusion: A competency- based curriculum was developed based on the challenges nurses experienced working through the COVID-19 pandemic. This program could contribute to the development of disease outbreak competent nurses.

Key words: Competency-based programme, disease outbreak, COVID-19, challenges, nurses.

TABLE OF CONTENTS

	Page
DECLARATION	ii
DEDICATION	iii
PUBLICATIONS AND PRESENTATIONS	iv
ACKNOWLEDGEMENTS	v
ABSTRACT	vi
TABLE OF CONTENTS	viii
LIST OF FIGURES	xvi
LIST OF TABLES	xvii
LIST OF ABBREVIATIONS	xx
GLOSSARY	xxi
 CHAPTER ONE: ORIENTATION TO THE STUDY	 1
1.0 INTRODUCTION	1
1.1 BACKGROUND OF THE STUDY	1
1.2 PROBLEM STATEMENT	5
1.3 RESEARCH QUESTION	5
1.4 AIM OF THE STUDY	6
1.5 OBJECTIVES OF THE STUDY	6
1.6 CENTRAL THEORETICAL STATEMENT	6
1.7 SIGNIFICANCE OF THE STUDY	6
1.8 PARADIGMATIC ASSUMPTIONS	7
1.8.1 Meta-theoretical Assumptions	7
1.8.2 Theoretical Assumptions	9
1.8.2.1 Theoretical definitions	10
1.8.2.2 Operational definitions	12
1.9 LAYOUT OF THE THESIS	14
1.10 SUMMARY	15
 CHAPTER TWO: REVIEW OF LITERATURE	 16
2.1 INTRODUCTION	16

2.2	EPIDEMIOLOGY OF DISEASE	17
2.2.1	Coexistence of Humans and Disease	17
2.2.2	Understanding Disease	18
2.2.3	A Fragile Ecosystem	19
2.3	DISEASE OUBREAK PREPAREDNESS	20
2.3.1	Disease Outbreak Management	22
2.3.2	The Cost of Disease Outbreaks	24
2.4	NURSES AS RESOURCE DURING DISEASE OUTBREAKS	25
2.4.1	The Expanding Role of the Nurse during Disease Outbreaks	28
2.4.2	Competence and Competency	28
2.4.3	Disease Outbreak Competencies of Nurses	30
2.4.4	Disease Outbreak Training Opportunities for South African Nurses	39
2.5	LEGISLATION, STRATEGIES AND GUIDELINES	41
2.5.1	International Health Regulation	41
2.5.2	National Legislation	41
2.5.2.1	Nursing in South Africa	43
2.6	ETHICAL CONSIDERATIONS DURING DISEASE OUTBREAKS	45
2.6.1	Ethical Theories	45
2.6.2	Ethical Principles	46
2.7	SUMMARY	47
	CHAPTER THREE: RESEARCH METHODS	48
3.1	INTRODUCTION	48
3.2	RESEARCH PARADIGM	48
3.2.1	Mixed Methods	48
3.2.2	Multi-phased Approach	49
3.3	METHODS	49
3.3.1	Exploratory Strategies	49
3.3.2	Sequential Strategies	50
3.3.3	Qualitative Research	50
3.3.4	Quantitative Research	51
3.4	CRITICAL REALISM AS THE RESEARCH PARADIGM	52
3.4.1	The Ontological Assumptions of Critical Realism	52
3.4.2	The Epistemological Assumptions of Critical Realism	53

3.4.3	Judgmental Rationality	54
3.4.4	The Relevance of Critical Realism in the Healthcare Environment	54
3.5	PHASE ONE: IDENTIFICATION OF THE NEEDS OF NURSES	56
3.5.1	Step One: Objective 1 – Scoping Review	56
3.5.2	Scoping Review Method	57
3.5.2.1	Research design	57
3.5.2.2	Research question	57
3.5.2.3	Inclusion and exclusion criteria	57
3.5.2.4	Literature search	58
3.5.2.5	Selection of publications	58
3.5.2.6	Data charting process	58
3.5.2.7	Synthesis and analysis of results	58
3.5.3	Step Two: Objective 2 – In-depth Interviews with Healthcare Professionals	59
3.5.3.1	Research design	60
3.5.3.2	Study population and sample	60
3.5.3.3	Preparation for the in-depth interviews	60
3.5.3.4	Pilot testing of the question guide	62
3.5.3.4.1	Planning for the in-depth interviews	64
3.5.3.5	Conducting of interviews	65
3.5.3.6	Reflexive thematic analysis	65
3.5.4	Step Three: Objective 3 – In-depth Interviews with Professional Nurses	66
3.5.4.1	Research design	66
3.5.4.2	Study population and sample	67
3.5.4.3	Preparation for the in-depth interviews	67
3.5.4.4	Conducting of interviews	68
3.5.4.5	Reflexive thematic analysis	69
3.5.5	Phase Two Step 1: Objective 4. Delphi Survey	70
3.5.5.1	Research design	70
3.5.5.2	Study population and sample	70
3.5.5.3	Development of Delphi-survey	71
3.5.5.4	Pilot study	72
3.5.5.5	Data collection	74

3.6	PHASE TWO: OBJECTIVE 5 DEVELOPMENT OF THE PROGRAMME	75
3.6.1	Development of the Curriculum	75
3.6.2	Identification of Modules	75
3.6.3	Designing of the Modules	76
3.7	PHASE THREE: OBJECTIVE 6 VALIDATION OF THE CURRICULUM MATRIX	76
3.7.1	Research Design	76
3.7.2	Study Population and Sample	76
3.7.3	Data Collection Method and Procedure	77
3.7.4	Data Analysis	77
3.8	THE APPLICATION OF CRITICAL REALISM IN THE STUDY	77
3.9	VALIDITY, RELIABILITY AND TRUSTWORTHINESS	80
3.10	ETHICAL CONSIDERATIONS	81
3.10.1	Permission to Conduct the Study	81
3.10.2	Informed Consent	81
3.10.3	Anonymity and Confidentiality	81
3.10.4	Safety and Security of Data	81
3.11	SUMMARY	82
	CHAPTER FOUR: SCOPING REVIEW	83
4.1	INTRODUCTION	83
4.2	THE SCOPING REVIEW	83
4.2.1	Review Objective and Question	83
4.2.2	Inclusion and Exclusion Criteria	83
4.2.3	Information Sources and Search Strategy	84
4.2.4	Selection of Sources	85
4.2.5	Data Extraction	86
4.2.6	Synthesis of the Data	87
4.3	RESULTS	107
4.3.1	Characteristics of the Publications	107
4.3.1.1	Publications per database	107
4.3.1.2	Countries of origin	107
4.3.1.3	Year of publication of sources	108

4.3.1.4	Nurse categories included in the sources	109
4.3.1.5	Methodologies represented in the sources	109
4.3.1.6	Data collection methods represented in the sources	110
4.4	BASIC CONTENT ANALYSIS	110
4.5	DISCUSSION OF FINDINGS	112
4.5.1	Characteristics of the Publications	112
4.5.2	Categories and sub Categories from the Content Analysis	114
4.5.3	Summary of Key Findings	115
4.6	SUMMARY	117
	CHAPTER FIVE: IN-DEPTH INTERVIEWS AND LITERATURE	118
	CONTROL	
5.1	INTRODUCTION	118
5.2	IN-DEPTH INTERVIEWS WITH HEALTHCARE PROFESSIONALS	118
5.2.1	Demographic Data of the Participants	119
5.2.2	Themes and Sub-themes	120
5.3	IN-DEPTH INTERVIEWS WITH NURSES	121
5.3.1	Demographic data of the participants	121
5.3.2	Themes and Sub-themes	122
5.3.2.1	Theme 1: Nursing resources	123
5.3.2.2	Theme 2: Clinical skills	125
5.3.2.3	Theme 3: Interpersonal skills	132
5.3.2.4	Theme 4: Intrapersonal skills	141
5.3.2.5	Theme 5: Physical challenges	145
5.3.2.6	Theme 6: Communication and information management	150
5.3.2.7	Theme 7: Community profiling and resources	155
5.3.2.8	Theme 8: Financial management	158
5.3.2.9	Theme 9: Preparation of the infrastructure	160
5.3.2.10	Theme 10: PPE management and precautionary measure	163
5.4	ALIGNMENT OF FINDINGS WITH SCOPING REVIEW RESULTS AND DELPHI STATEMENTS	166
5.5	APPLICATION OF CRITICAL REALISM (CAUSATION)	185

5.5	EXPERIENCES OF NURSES IN DISEASE OUTBREAK MANAGEMENT	185
5.7	SUMMARY	185
	CHAPTER SIX: TRIANGULATION AND DELPHI SURVEY	186
6.1	INTRODUCTION	186
6.2	DEVELOPMENT OF THE DELPHI SURVEY	186
6.3	SELECTION OF PARTICIPANTS	187
6.4	DELPHI STUDY – ROUND ONE	187
6.5	DEVELOPMENT OF DELPHI-SURVEY ROUND TWO	203
6.5.1	Participants in Delphi Round Two	222
6.5.2	Results of Round Two	222
6.6	SUMMARY	228
	CHAPTER SEVEN: DEVELOPMENT AND VALIDATION OF THE COMPETENCY-BASED CURRICULUM	229
7.1	INTRODUCTION	229
7.2	DEVELOPMENT OF THE CURRICULUM	229
7.2.1	Identification of Modules	229
7.2.2	Designing of the Modules	234
7.2.3	The Curriculum Matrix	235
7.3	THE CURRICULUM MATRIX	237
7.4	VALIDATION OF THE CURRICULUM	259
7.4.1	Development of a Validation Document	259
7.4.2	Selection of Experts	259
7.4.3	Validation Findings	261
7.4.4	Summary of the Results from the Curriculum Validation Phase	263
7.5	SUMMARY	263
	CHAPTER EIGHT: DISCUSSION, JUSTIFICATION, STRENGTHS, LIMITATIONS AND CONCLUSIONS	264
8.1	INTRODUCTION	264
8.2	PHASE ONE OF THE STUDY	264
8.2.1	Step One: The Scoping Review – Objective 1	264
8.2.2	Step Two: In-depth Interviews with Healthcare Professionals – Objective 2	266

8.2.3	Step Three: In-depth interviews with Nurses – Objective 3	266
8.3	PHASE TWO OF THE STUDY	271
8.3.1	Step One: Delphi-SURVEY – Objective 4	272
8.3.2	Step Two: Development of a Competency-based Curriculum – Objective 5	272
8.4	PHASE THREE OF THE STUDY	273
8.4.1	Step One: Validation Phase – Objective 6	274
8.5	LIMITATION OF THE STUDY	275
8.6	RECOMMENDATIONS	276
8.6.1	Recommendations for Clinical Practice	276
8.6.2	Multidisciplinary Education	276
8.6.3	Recommendations for Nursing Education	276
8.6.4	Recommendations for Further Research	277
8.7	CONCLUSION	277
	REFERENCES	278
	APPENDICES	
APPENDIX A	Classification of infectious diseases	310
APPENDIX B	Research methods of the study	312
APPENDIX C	Information sheet for In-depth Interviews	313
APPENDIX D	Participant consent sheet	315
APPENDIX E	Informed consent for audio-recording	316
APPENDIX F	Distress protocol	317
APPENDIX G	Demographic data sheet	319
APPENDIX H	Interview guide for in-depth interviews with Healthcare professionals	320
APPENDIX I	Delphi Round 1: Invitation, information and consent	321
APPENDIX J	Delphi Round 2: Invitation, information and consent	324
APPENDIX K	Ethical clearance certificate	327

APPENDIX L	Search strategy on PubMed	328
APPENDIX M	List of references of sources per category	330
APPENDIX N	Example of voice recordings with participants	347
APPENDIX O	Field notes of interviews	359
APPENDIX P	Participant verification codes – Delphi survey	363
APPENDIX Q	Validation tool for competency based disease outbreak management programme	368
APPENDIX R	Information letter and consent sheet for expert validation	374
APPENDIX S	Outline for validation of a disease outbreak management programme	376
APPENDIX T	Postgraduate approval of study title	381

LIST OF FIGURES

Figure 1.1	Map of South Africa	3
Figure 2.1	Presentation of the literature	16
Figure 2.2	Components of the disease outbreak management phases	23
Figure 2.3	Disease outbreak legislation	41
Figure 2.4	Ethical considerations during disease outbreak	45
Figure 3.1	The sequential phases of this study	50
Figure 3.2	The stratified ontology of the critical realist	53
Figure 4.1	Search terms	85
Figure 4.2	PRISMA ScR	86
Figure 4.3	Number of publications since 2005	108
Figure 4.4	Nurse categories included in the sources	109
Figure 4.5	Methodologies of publications included in the scoping review	109
Figure 4.6	Data collection methods	110
Figure 4.7	Publications per country	112
Figure 7.1	The content of the program after triangulation of the data	229
Figure 8.1	Contributions of ICU nurses	268
Figure 8.2	Contributions of ED nurses	268
Figure 8.3	Contributions of perioperative nurses	269
Figure 8.4	Contributions of nursing managers to the themes	270
Figure 8.5	Contributions of nurse educators	270
Figure 8.6	Contributions of the healthcare professionals	271

LIST OF TABLES

Table 2.1	Findings of studies relevant to staff-patient-ratios and disease outbreaks	25
Table 2.2	This provincial distribution of nursing manpower per province in South Africa	27
Table 2.3	Alignment of IPC core competencies in disaster nursing version 2.0 with generic competency framework for advanced nurse practitioners in South Africa	32
Table 2.4	Incident and disaster practice for emergency room nurses	39
Table 2.5	South African guidelines and strategies relevant to disease outbreak management	43
Table 3.1	Research methods according to the phases of the study	49
Table 3.2	Research phases, steps, and objectives	51
Table 3.3	The ontology of critical realism applied to disease outbreak nursing	55
Table 3.4	Application of the JBI Framework for content analysis	59
Table 3.5	The interview protocol stages	61
Table 3.6	Comparison between the first and revised questionnaire for healthcare professionals	63
Table 3.7	In-depth interview roster for healthcare professionals	64
Table 3.8	In-depth interview roster for nurses	68
Table 3.9	Participants included in the first Delphi round	71
Table 3.10	The comparison of original and revised statements included in the Delphi survey	72
Table 3.11	The application of Critical Realism in the study	77
Table 3.12	Quality criteria in this study	80
Table 4.1	Eligibility criteria	84
Table 4.2	Publications included in the scoping review	88
Table 4.3	Sources according to country and data base	107
Table 4.4	Categories and sub categories of the findings	110
Table 4.5	Results of the content analysis and basic statistical calculations	111

Table 4.6	Number of publications aligned with disease outbreaks	113
Table 5.1	Healthcare professional representation (n=8)	119
Table 5.2	Demographic data of healthcare professionals	119
Table 5.3	Themes and sub themes of nurse challenges according to healthcare professionals	120
Table 5.4	Professional nurses included in in-depth interviews	121
Table 5.5	Demographic data of professional nurses	121
Table 5.6	Theme 1: Nursing Resources	123
Table 5.7	Theme 2: Clinical Skills	125
Table 5.8	Theme 3: Interpersonal Skills	132
Table 5.9	Theme 4: Intrapersonal Skills	141
Table 5.10	Theme 5: Physical Challenges	145
Table 5.11	Theme 6: Communication and Information Management	150
Table 5.12	Theme 7: Community Profiling and Resources	155
Table 5.13	Theme 8: Financial Management	158
Table 5.14	Theme 9: Preparation of the Infrastructure	160
Table 5.15	Theme 10: PPE Management and Precautionary Measures	163
Table 5.16	The results of the scoping review, in-depth interviews, and potential items in the Delphi	167
Table 5.17	Potential Delphi statements	182
Table 6.1	Sections included in the Delphi-survey	186
Table 6.2	Participants included in the first Delphi round	187
Table 6.3	Demographic characteristics of expert panel of participants	188
Table 6.4	Score results and components in Delphi Round 1	190
Table 6.5	Comparison of statements and design of Delphi-survey 1 and Delphi-survey 2	205
Table 6.6	Score results of the domains in Delphi-survey Round Two	222
Table 6.7	Results of Delphi-Round 2	223
Table 7.1	Alignment of the results of the Delphi-survey with the Curriculum Matrix	230
Table 7.2	Credit allocation per module	236
Table 7.3	Validation results of the Curriculum Matrix	261

Table 8.1	Comparison of the Curriculum Matrix with the ICN Core Competencies in Disaster Nursing Version 2.0	273

LIST OF ABBREVIATIONS

CDC	Centres for Disease Control and Prevention
ED	Emergency Department
ICN	International Council for Nurses
ICU	Intensive Care Unit
IPC	Infection Prevention and Control
SANC	The South African Nursing Council
WHO	World Health Organization

GLOSSARY

Curriculum Matrix: Curriculum Matrix or a matrix map displays the program and learning outcomes, program objectives and learner activities as they are aligned for the whole curriculum in a transparent way.

Disease Outbreak: A disease outbreak is defined as the occurrence of a disease, or an unexpected increase of a confirmed disease or health-related behaviour not usually present in a specific geographical area or healthcare setting.

Disease Outbreak Management: Disease Outbreak Management refers to a planned continuous cycle of events, purposefully maintained by multiple role players to detect, prevent, treat and review environments, human and animal life, contagious or non-contagious diseases, which has the potential to cause, or has caused a disease outbreak with the specific focus on minimizing its effect on human and animal life and the environment.

Epidemic: Epidemic is described as the increase of a disease in a specific geographical area that is not aligned with the normal occurrence of the disease.

Frontline Worker: Frontline Worker was used in referral to military troops when referring to dangerous however important and essential work which puts people at risk. However, since the Covid-19 pandemic outbreak, the term has been adapted to refer to medical staff, including nurses.

Pandemic: Pandemic is described as an epidemic that occurs in more than one country, crossing international border. The geographical scale of an endemic determines if it can be referred to as a pandemic and not the severity of the disease.

Pandemic-ready nurse: Pandemic-ready nurse suggests that nurses display the ability to respond effectively to any healthcare crises.

Scope of Practice: Scope of Practice refers to the roles, responsibilities and activities of different levels of nurses in which they are regarded as competent and provides the milieu of their level of accountability.

Surge Capacity: Surge Capacity is the ability of an organization or country to comply with the increased demands of an abnormal situation.

CHAPTER ONE

ORIENTATION TO THE STUDY

1.0 INTRODUCTION

The COVID-19 pandemic demonstrated that the ability of a disease to spread globally *is only a plane ride away*, which not only reveals the vulnerability of humankind but also highlights the need for a disease outbreak-competent workforce. Disease outbreaks have resulted in more than 308 million reported global deaths in the last century (Bloom and Cadarette, 2019). This thesis intends to develop a competency-based programme on the management of disease outbreaks.

The rationale behind this study was the healthcare workforce and industry reaction to the COVID-19 pandemic in 2019. In every post endemic; -epidemic, and -pandemic phase, the healthcare workforce is expected to learn from mistakes and successes and address the challenges experienced in preparation for the next pandemic (World Health Organization, 2023a). For nurses, the COVID-19 pandemic was their first experience working during an infectious disease outbreak of this magnitude. Nurses are the major task force during an outbreak and are expected to demonstrate knowledge, leadership skills, and resilience during a health crisis (Baack and Alfred, 2013).

In South Africa, generic disease outbreak curricula for nurses have been included in disaster management modules in infection prevention and control and emergency nursing programmes. However, there is no programme based on previous experiences of healthcare professionals. Nursing educators should make use of this post-pandemic phase to provide opportunities for the last disease outbreak workforce to inform curriculum and programme developers on the content of such programmes.

This chapter presents an orientation and background to the study. The problem statement, purpose of the study, research objectives and significance of the study will be described. The researcher's assumptions will be discussed, and conceptual terms will be defined.

1.1 BACKGROUND OF THE STUDY

COVID-19 is an infection caused by the severe acute respiratory syndrome Coronavirus 2 or SARS-Cov-2 virus, and many countries are still challenged to manage different mutations of

the disease. At the time of this writing (4 February 2021), 2.27 million deaths and 104 million cases of Covid-19 have been reported globally. Other than COVID-19, the World Health Organization (WHO) also monitored Lassa fever, cholera, yellow fever, monkey pox, plaque, ebola, and anthrax outbreaks early in 2021 (World Health Organization, 2021a). The aforementioned is a reminder of the potential of other epi-or pandemic outbreaks to emerge if the diseases are not managed. It is estimated that most countries will experience a large-scale emergency every five years, including new diseases and seasonal diseases (World Health Organization, 2019a).

This study was conducted in South Africa whilst the country was experiencing the third COVID-19 wave (May 2021 – October 2021), the fourth COVID-19 wave (December 2021 – April 2022), and the fifth (May 2022 – July 2022), as well as the post-pandemic phase. A total of 45 344 deaths and 1.46 million confirmed cases were reported by South Africa. Similar to other countries, South Africa buckled under the demands of the COVID-19 pandemic due to a shortage of resources, including nursing resources.

South Africa is a multi-ethnic, religious and cultural country situated in the most southern point in Africa, often referred to as the ‘rainbow nation’, still experiencing the effects of a 48year *Apartheid* regime, which ended in 1994 after the first democratic election. South Africa has a population of 60 414 496, with a median age of 26.6 years, female life expectancy of 65.7 years, male life expectancy of 59.9 years. A total of 69% of the population is urbanized (Worldometer, 2023).

Further, the country is divided into nine provinces. Gauteng, with a population of 15 099 422, is the most densely populated province, followed by Kwa-Zulu Natal with a population of 12 423 907, Mpumalanga with a population of 5 143 324, Western Cape with a population of 7 113 776, Eastern Cape with a population of 6 676 691, Limpopo with a population of 5 941 439, North West Province with a population of 4 186 984, Free state with a population of 2 921 611, and Northern Cape with a population of 1 308 734 (Statistica, 2022). A map of South Africa is included in Figure 1.1.



Figure 1.1 Map of South Africa

The multi-ethnic profile of South Africa, confirmed during the 2022 census, consists of Black Africans = 49.1 million, Indian and Asian = 1.56 million, Colored = 5.34 million, and White = 4.639 million. The South African population density in 2021 was 48.96 inhabitants/km². A total of 83% of the population lives in formal dwellings, 12 % in informal dwellings, and 4.3% in traditional dwellings (Statistica, 2022). The 4 297 informal settlements in South Africa comprise 2 million households, the majority situated in Cape Town, eThekweni, and Johannesburg (Mail and Guardian, 2023). Informal settlements are known for their lack of infrastructure, e.g., pipeline water and sanitation, waste disposal, and pest control services. Control of the living environment is important in the prevention of disease outbreaks and is discussed in detail in chapter two.

The World Bank reported that South Africa has the highest inequitable income distribution coefficient in the world, with a Gini score of 0.67 representing the deviation in income distribution in a country (The Word Bank, 2022). This is significant as there is a direct association between poverty and compliance with precautionary measures, especially over extended periods of time (Dukhi, Manyapelo, Mokhele, *et al.*, 2021).

Most South Africans (77.9%) regard themselves as Christians, 4.4% as Traditional African, 1.6% as Muslim, 1% as Hindu, and 0.1% as Jewish. A total of 10.9% of the population do not associate themselves with any specific religion (Find Easy, 2023). This is important as the role

of religions in strengthening disease outbreak communication to community members has been acknowledged (Sisti *et al.*, 2023).

It was estimated that 7.8 million people will be living with HIV in South Africa in 2021, a total of 13% of the global HIV cases (World Health Organization, 2021b). According to the Institute for Health Metrics and Evaluation SA, the leading cause of death in South Africa is HIV/AIDS (Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome), TB (Tuberculosis), diarrheal diseases, lower respiratory tract infections, and neonatal disorders (Institute for Health Metrics and Evaluation SA, 2022). In 2022 54 00 people died of TB, of which 57% were living with HIV. It was estimated that South Africa has the highest incidence of multi-drug-resistant tuberculosis. In 2022, a total of 280 000 patients fell ill due to TB in South Africa (Tomlinson, 2023). A study conducted in 2023 confirmed a new multi-morbid disease cluster under South Africans, which includes HIV, hypertension, and anemia (Roomany, van Wyk, and Cois *et al.*, 2023). The vulnerability of the population, already challenged with complex disease profiles, combined with an infectious disease outbreak, exerts additional pressure on the healthcare system and healthcare workers.

The World Health Organization estimated that most countries will experience a large-scale emergency every five years, including new diseases and seasonal diseases (World Health Organization, 2019a). On 28 May 2023, South Africa had 4 076 463 confirmed COVID-19 cases; a total of 61 362 active COVID-19 cases; 3 912 506 recoveries; and a total of 10 595 deaths due to COVID-19 disease (Worldometer, 2023b).

During the pandemic, South Africa had a two-tiered, unequal healthcare system, with public hospitals serving 70% of the population compared to 30% in the private sector (The Conversation, 2023). South Africa could provide the citizens of the country with 400 public and 200 private healthcare facilities, with ten major teaching hospitals, and an estimated capacity of 3300 to 7000 intensive care (ICU) beds in the private and public hospitals combined (Cowan and Evans, 2020), and a total of 125 390 general hospital beds (Investec Focus, 2020). On 20 June 2020, the South African- Investec Focus projected a shortage of 20 000 ICU beds as well as 17 000 ventilators to manage the expected influx of infected patients (Investec Focus, 2020). Data collected between March 2020 and April 2021 indicated that South Africa had 169 678 COVID-19-related admissions, of which 6364 (3.8%) were healthcare workers. It is estimated that 60% of the South African population depends on traditional healers and cures available at well-established traditional healers' markets (The Conversation, 2023).

South Africa has a shortage of healthcare professionals and nurses with disease outbreak management skills. The WHO recommended ratio for medical practitioners is 30 per 10 000 people. In South Africa, the ratio was 3.2 medical practitioners per 10 000 people for the year before the COVID-19 outbreak (Investec Focus, 2020). In 2019, a total of 286 116 nurses were registered at the South African Nursing Council (SANC), and 112 161 registrations included an additional qualification (South African Nursing Council, 2019). During the COVID-19 pandemic, an online survey of South African Nurses concluded that only 47.4% of the 5 530 participating nurses indicated confidence in their own knowledge to manage during the pandemic and called for a focused approach to infection prevention and control training of nurses (Dukhi *et al.*, 2020).

On 5 May 2023, the Director General of the World Health Organization (WHO), Tedros Adhanom Ghebreyesus, declared the COVID-19 pandemic no longer a public emergency but cautioned that it is still regarded as a public threat after a global cumulative caseload of 765 222 932, and 6 921 614 reported deaths (World Health Organization, 2023a). As restrictions and COVID-19 caseloads diminished, every country focused on re-building sectors that have been severely impacted by the pandemic, including education, agriculture, trade and economics, and tourism. The health sector, although depleted of resources, had to recuperate and is currently focusing on public health responsibilities it was not able to fulfil during the pandemic. It is estimated that South Africa had a surgical backlog of 150 00 surgical procedures in 2021 due to the pandemic (Chu, Bertels, and Goliath, 2021) and a 29% reduction in pediatric cardiac surgeries (Aldersley, Brooks, Human *et al.*, 2023).

1.2 PROBLEM STATEMENT

Disease outbreaks have had a profound global impact, resulting in millions of deaths and revealing significant gaps in the capacity of health systems, especially in African countries. These gaps include insufficient resources for training Health Care Workers and a lack of dedicated programmes for disease outbreak event education, highlighting a pressing need for enhanced preparedness.

1.3 RESEARCH QUESTION

The overarching research question for this study was:

How can a disaster outbreak programme be developed based on healthcare professionals' experiences during the last pandemic?

1.4 AIM OF THE STUDY

The study aimed to develop a competency-based programme tailored for South African nurses to address their challenges in managing disease outbreaks, thereby enhancing their readiness and capacity to respond effectively to such events.

1.5 OBJECTIVES OF THE STUDY

Specific objectives for the study were:

- To conduct a comprehensive scoping review to identify the educational needs of nurses during outbreaks.
- To elicit the challenges experienced by nurses during the COVID-19 pandemic through in-depth interviews with a cohort of healthcare professionals.
- To elicit the challenges encountered by nurses during the COVID-19 pandemic through in-depth interviews with a group of professional nurses.
- To triangulate the data based on the information obtained in the study (a scoping review and in-depth interviews).
- To develop a programme based on the insights derived from the preceding steps.
- To assess the validity and effectiveness of the developed programme through validation by a panel of national experts.

1.6 CENTRAL THEORETICAL STATEMENT

Understanding the challenges of nurses during a disease outbreak provides insight into the content and design of a competency-based programme on disease outbreaks, which will best prepare nurses for disease outbreak events.

1.7 SIGNIFICANCE OF THE STUDY

The impact of infectious diseases on healthcare systems demands that nurses are competent in the management of disease outbreak events to enhance the surge capacity of a country. COVID-19 had and still has a negative impact on the Sustainable Development Goals (SDG). Goal Three refers to global good health and well-being, as it aims to end epidemics, Acquired Immunodeficiency Syndrome (AIDS), Tuberculosis (TB), malaria, neglected tropical diseases,

hepatitis, water-borne diseases and other communicable diseases by 2030 (World Health Organization, 2023a). The interconnectedness between the COVID-19 pandemic and every country's economy, health, agriculture, food, education, environment, social justice, and inequality is well documented. A disease outbreak-competent nursing workforce will contribute to a country's ability to meet SDG Goal Three in successfully managing disease outbreaks. This study is the first to determine the challenges South African nurses experienced during the recent pandemic in developing a competency-based programme on disease outbreaks for nurses.

1.8 PARADIGMATIC ASSUMPTIONS

Creswell (2022) describes a research paradigm as the beliefs and values of the researcher that influence how the research is approached and conducted and highlights how the researcher engages with the research process (Creswell, 2022). The paradigmatic assumptions of this study include the meta-theoretical and theoretical assumptions, which are discussed in the following section.

1.8.1 Meta-theoretical assumptions

This study's meta-theoretical and theoretical foundations stem from Fawcett's expanded nursing theory. Fawcett further developed her earlier work in 1984, elucidating the nursing paradigm through the concepts of a) Person, b) Environment, c) Health, and d) Nursing. Expanding upon these concepts, Fawcett refined them into theoretical assumptions within *Nursology*: a) Human Beings, b) Global Environment, c) Planetary Health, and d) Nursologist activities (Fawcett, 2022). In a proposal to rename nursing as *nursology* in 2015, Fawcett contended that this terminology better reflects nursing as a distinct discipline, encapsulates its evidence-based foundation as a "scholarly identity", and facilitates the differentiation between medicine and the art of nursing (Fawcett *et al.*, 2015).

- ***Human Being***

Human beings are multi-dimensional entities with needs that include the physical, social, and psychological dimensions, as well as the ability to make decisions related to their health and sickness and contribute to the survival of humankind. Human beings refer to all individuals, groups, communities, and nations, irrespective of culture, beliefs, religion, age, race, gender, or gender orientation, who either contribute or refrain from contributing to their own and global health (Fawcett, 2022). In this study, the nurses are acknowledged as complex human beings

with their own cultural and religious beliefs, as members of communities, and as personally challenged by the same potential and actual disease outbreak events in the communities they serve.

- ***Global Environment***

The global environment is described as the ‘external’ that surrounds the human being. Roper, Logan, and Tierney (2000) divided the global environment into a) *The local and global atmosphere*, which includes light, sound, organic and inorganic particles, dust, microorganisms, pollen, and the ozone layer. b) *The natural environment* includes trees, plants, weather, animal life, rain, sunshine and wind. c) *The built environment*, which includes housing structures, water reservoirs, waste management plants, markets, aeroplane interiors, air conditioning systems, water and waste systems in buildings, as well as pest control (Roper *et al.*, 2000). In this study, the global environment is regarded as the physical surroundings of all human beings that can either challenge or support health. The hospital-built environment can either be therapeutic or cause the patient harm. Crucial resources, e.g. quality water, electricity, functional sanitation, medical waste systems, and clean air, have become a luxury rather than a basic requirement in many communities and healthcare environments in South Africa.

- ***Planetary Health***

Planetary health is described as ‘life-in-action’ concerning the global environment, which either supports health or challenges health. Kuehnert, Fawcett, De Priest *et al* (2022) describe five environments established and controlled by human beings that contribute to planetary health and include: a) Cultural environment explained as life-ways of cultural populations, practices, beliefs, and values of populations reflected in their health behaviors. b) Socioeconomic environment that includes social health and economic stability, driven by income, education, gender, race and occupation; financial structures. c) Political environments include processes of decision making, policies, and politics. d) Educational Environments that include the population’s access to education and quality of learning. e) Healthcare environment that includes access to healthcare for all members of the population and quality of the care rendered (Kuehnert *et al.*, 2022). In this study, the researcher believes that the behaviours, attitudes, and beliefs, as well as the commitment of both the patient and nurse towards disease and treatment thereof, are embedded in their own social and cultural belief systems, and it is important to acknowledge as the South African population is a mosaic of cultures and religions. Financial aspects, e.g. cost of treatment, including the appropriation of healthcare resources,

political will to support and fund healthcare related projects (including the training of healthcare professionals), and contribution to planetary health.

- ***Nursologist Activities***

Practice skills traditionally regarded as inherent to nursing (nursology), are *awareness, openness, empathy, caring, touching, understanding, responsibility, trust, acceptance, self-recognition, and dialogue* (Paterson and Zderad, 1976). Soon thereafter, Donaldson and Cowley confirmed that nursing activities demand a deep understanding of human beings as well as diseases and are not just superficial performances of clinical procedures (Donaldson and Cowley, 1978). The scientific nursing process of assessment, nursing diagnosis development, planning, intervention, and evaluation of patients in collaboration with the multidisciplinary team is the centre of all nursing activities (Fawcett, 2022). Acknowledging the wholeness of humans, being conscious of them, and caring for human beings have previously been described as unique identifiers that separate nursing from other disciplines (Cowling, Smith, and Watson, 2008).

Assessing the *nursologist* activities of a disease outbreak nurse practitioner is a challenge as disease outbreak nursing is not acknowledged as a specialist nursing qualification within nursing (*nursology*) in South Africa. During the COVID-19 pandemic, nurses were expected to overstep the boundaries of their own scope of practice in an attempt to address the patient's needs. Having deep insight into the complex human beings and disease profiles, combined with consciousness and caring, has been described as the distinguishing factor that separates nursing from other disciplines (Cowling, Smith, and Watson, 2008).

For the purpose of this study, the disease outbreak nursing (*nursology*) activities (disease outbreak nursing) is concerned with precautionary responsibilities (continuous risk assessment), the preparation for and treatment of (clinical and non-clinical), the patient and communities risk and infected with an infectious disease, within a multidisciplinary framework, as well as the initiation and contribution to research initiatives related to the disease including the update of skills and activities, self-care and development of the nursing practitioner (*nursologist*).

1.8.2 Theoretical assumptions

The theoretical assumption in this study is based on the theoretical framework of The Adult

Learning Theory, also referred to as Andragogy Learning, described by Malcolm Knowles in 1968, as well as the Critical Realism Theory of education as described by Bhaskar in 1975. The characteristics of andragogic learning theory are based on the following assumptions as described by Livingston and Cummings-Clay in 2023:

- Adults learn differently from children;
- Adults have experiences and existing knowledge about the learning content;
- Continuous learning of adults is motivated by their needs and interests;
- Adults are autonomous learners and self-directed;
- Adults respond well to problem-based learning activities;
- Adults have the need to apply learned content to real life situations;
- Adults respond to the facilitation of learning and not teaching.

(Livingston and Cummings-Clay, 2023)

The critical realism approach to learning as well as andragogic learning theory, is interrelated in that the critical realists believe that:

- Learning and knowledge depend on social interaction and are imperfect and robust (Khazem, 2018). This refers to previous experiences, problem-based activities, and the immediate application of new content as described in andragogic learning.
- Science depends on social context and is a continuous process (Khazem, 2018). This refers to the social and work experiences of nurses as well as the immediate application of new knowledge (theory clinical integration) referred to in andragogic learning theory. Both andragogic and critical realism learning assumptions are applied throughout this study in the identification of challenges (learning needs) of nurses, as well as the development of the competency-based programme on disease outbreaks.

1.8.2.1 Theoretical definitions

The definitions below indicate the way in which the following terms are used in the context of the study.

Disease Outbreak: The occurrence of a disease or an unexpected increase of a confirmed disease or health-related behaviour not usually present in a specific geographical area or healthcare setting (World Health Organization, 2010a).

Disease Outbreak Management:	A planned continuous cycle of events, purposefully maintained by multiple role players to detect, prevent, treat, and review environments, human and animal life, and contagious or noncontagious diseases, which has the potential to cause or have caused a disease outbreak with the specific focus on minimizing its effect on human and animal life and the environment (Institute of Environmental Science & Research Limited; Updated 2012).
Epidemic:	The increase of a disease in a specific geographical area is not aligned with the normal occurrence of the disease (Centers for Disease Control and Prevention, 2015a).
Pandemic:	An epidemic that occurs in more than one country, crossing international borders. The geographical scale of an endemic determines if it can be referred to as a pandemic and not the severity of the disease (The International Epidemiology Association's Dictionary of Epidemiology, 2008).
Surge Capacity:	The ability of an organization or country to comply with the increase in demands of an abnormal situation (Hamele, Neymayer, Sweney, <i>et al.</i> , 2018).
Pandemic-ready nurse:	A nurse displays the ability to respond effectively to any healthcare crisis (Veenema, 2018).
Frontline worker	Frontline Worker was used in referral to military troops in "important and dangerous [positions]" doing "essential work that puts [them] at risk" (Oxford Advanced Learner Dictionary, 2020). However, since the COVID-19 pandemic outbreak, the term has been adapted to refer to medical staff, including nurses.

Scope of Practice	Scope of Practice refers to the roles, responsibilities, and activities of different levels of nurses in which they are regarded as competent and provide the milieu of their level of accountability (Health & Care Professions Council (HCPC), 2021).
Curriculum Matrix	Curriculum Matrix or a matrix map displays the programme and learning outcomes, programme objectives, and learner activities as they are aligned for the whole curriculum transparently (Al-Eyd, Achike, Agarwal, <i>et al.</i> , 2018).

1.8.2.2 Operational definitions

The explanations below indicate the way in which the following terms are measured in the study.

Challenges:	Challenges are described as tasks that demand a noticeable level of difficulty for an individual to perform (Oxford Advanced Learner's Dictionary, 2020). In this study, challenges refer to tasks that the nurses experienced as difficult to perform during a disease outbreak and include clinical and nonclinical tasks.
Competence:	Competence refers to the ability to perform a task well (Oxford Advanced Learner's Dictionary, 2020). In this study, competence refers to nurses' ability to perform tasks required by patients in a disease outbreak.
Competency:	Competency refers to skills (technical) an individual requires to perform a task (Oxford Advanced Learner's Dictionary, 2020). In this study, competency refers to the combined set of skills required to perform/ complete a task, e.g., chest compressions and rescue breathing during cardiopulmonary resuscitation (CPR).

Competent:	Competent refers to the performance of a skill to a certain level (Oxford Advanced Learner's Dictionary, 2020). In this study, nurses' competent levels are categorized as a) Novice, b) Advanced Beginner, c) Competent, d) Proficient, and e) Expert (Benner, 1984).
Nurse Manager:	Nurse Manager refers to a skilled nurse professional with the role of building and maintaining multi sectoral relationships, supporting and representing nursing staff on managerial and boardroom levels with the purpose of coordinating the healthcare facility (International Council of Nurses, 2019).
Nurse Educator:	Nurse Educator refers to the specialist field of nursing whereby a professional nurse focuses on the training and education of all levels of nurses and is registered as such by the South African Nursing Council (South African Nursing Council, 2020).
Perioperative Nurse:	A perioperative nurse is a professional nurse who has acquired the technical skills required in perioperative nursing, integrates inter professional education and aligns quality improvement strategies with quality surgical care within a multi-disciplinary environment (Vangie, 2022).
Intensive Care Nurse:	An intensive Care Nurse is a specialist professional nurse who cares for a critically ill patient in a complex technological environment, facilitating multi-disciplinary collaboration for holistic patient-centred care (South African Nursing Council, 2014).
Emergency Department Nurse:	Emergency Department Nurse refers to a specialist professional nurse who provides priority emergency care as the first responder in the pre-hospital and inter-hospital environment, managing life threatening patient problems (South African Nursing Council, 2020b).

Specialist Nurse:	A specialist nurse is a nurse who has in-depth knowledge and expertise in a specific area of nursing and a postgraduate diploma in the specific area (South African Nursing Council, 2021). For the purpose of this study, the specialists include intensive care nurses (ICU), perioperative nurses (OR), emergency department nurses, nursing educators, and nursing administrators.
Expert Nurse:	An expert has been defined as a person who has at least 20 years of practical experience in a specific field of study, working in a multicultural environment, and has portrayed advanced leadership skills that include research, teaching, and clinical/ practical technique (Grisham, 2008).
Programme Outline:	Programme Outline is an official document providing the framework of the programme. In this study, the programme outline provides information about the programme objectives, module outline, credit allocation, and an explanation of the stages of competence.

1.9 LAYOUT OF THE THESIS

The thesis is organized into the following chapter layout.

Chapter One:	Orientation of the study
Chapter Two:	Literature review
Chapter Three:	Research Methods
Chapter Four:	Scoping Review
Chapter Five:	In-depth interviews and literature control
Chapter Six:	Triangulation of data via Delphi Survey
Chapter Seven:	Development and validation of the competency-based curriculum
Chapter Eight:	Discussion of the study, justification, strengths, limitations and the conclusion

1.10 SUMMARY

In this chapter, an orientation to the study was given, and the background of the study, the research rationale, the research question and the objectives were detailed. The significance of the study was explained, the researcher's assumptions were discussed in detail, and the terms of reference were explained. In the following chapter, the literature review of the study will be discussed in greater detail.

CHAPTER TWO

REVIEW OF THE LITERATURE

2.1 INTRODUCTION

In this chapter a discussion topics that are related to the outbreak of diseases and nursing are discussed. The epidemiology and the epidemiology of disease, infectious disease classification, the disease process, and its interrelatedness with the ecosystem is included. Disease outbreak preparedness, the management of diseases and an overview of the cost implications of disease outbreaks is discussed. A detailed discussion of the role of the nurse, the competencies required and disease outbreak training opportunities in South African is included. Disease outbreak legislation and a discussion of legislation in South Africa is offered. Ethical considerations during disease outbreaks are covered with examples by referring to the COVID-19 pandemic. The diagram below demonstrates how this chapter will unfold. See figure 2.1.

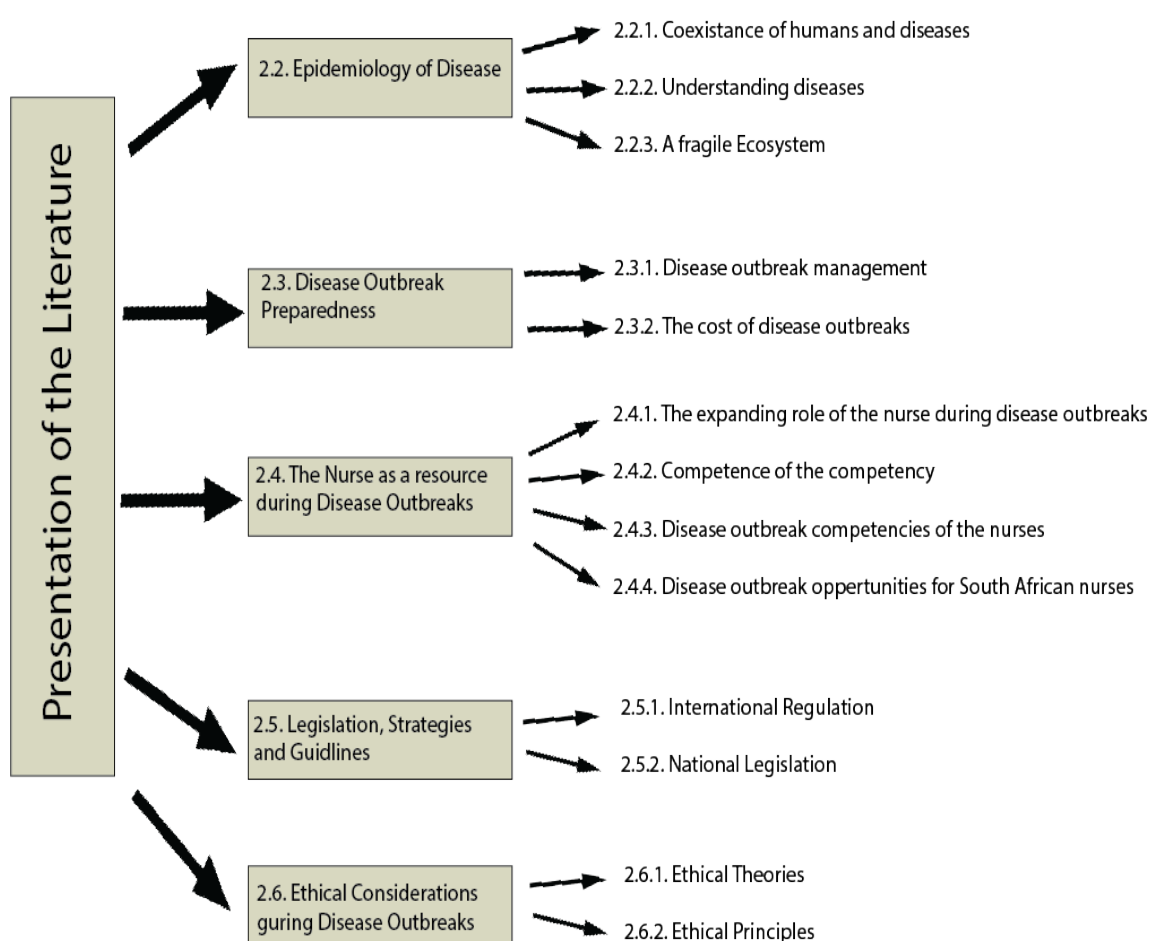


Figure 2.1: Presentation of the literature

2.2 EPIDEMIOLOGY OF DISEASE

The term *epidemiology* is defined as “the study of the occurrence and distribution of health-related states or events in specified populations, including the study of the determinants influencing such states, and the application of this knowledge to control the health problems” (Portia, 2008).

Both epidemiology of disease (disease specific information) and epidemiology as a discipline are the foundation of public health. Descriptive, analytical, and experimental epidemiological data is essential in disease research. Statisticians are essential in working high volumes of data, into a visual representation thereof presented in tables and charts for interpretation.

2.2.1 Coexistence of Humans and Disease

It is Winston Churchill who paraphrased **Santayana** in a 1948 House of Commons speech when he said that “those that fail to learn from history are doomed to repeat it” (Churchill, 1948). Our current understanding of diseases, disease processes, and cures rests on the shoulders of philosophers, theorists, historians, as well as scientists who, over centuries, dedicated their lives to the treatment of illness including the documentation and publication thereof. Although Tuberculosis has been cultured in mummified body remains dating back as early as 3400 B.C., the outbreak of Typhoid fever in 430 B.C. in Athens is the earliest recording of a pandemic to date (Saleem and Azher, 2013). Two nurses who contributed to our current understanding of infection prevention and disease outbreak management by meticulously documenting their experiences between 1887 and 1910 are Lize Lillington and Florence Nightingale. In the notes from Elize Jane Lillington, a district nurse from the United Kingdom in 1887, she describes the treatment of smallpox, typhoid, and scarlet fever. Her writings also included a detailed description of the nursing rules she had to abide by when nursing patients with infectious diseases (Royal College of Nursing, 2024). The most acknowledged nurse to date is Florence Nightingale (1820 – 1910), also referred to as ‘The Lady with the Lamp’, who devoted herself to the improvement of health and treatment of disease. In 2020, more than a century after her death, Heather Gilber compared Nightingale’s *Environmental Theory*, with Infection Prevention and Control principles described during the COVID-19 pandemic. Similarities included: hospital planning and design, environmental hygiene, the scope of practice of nurses, staff allocation, nursing observations, clinical procedures, patient triage, collaborative care, sanitation, immunization, public health responsibilities, IPC training and

education, research, epidemiology, as well as the description of the role of management and nursing leadership (Gilber, 2020). Florence Nightingale deserves to be acknowledged as the first disease outbreak specialist nurse.

The realization that a global approach is required to combat disease and promote health resulted in the establishment of The Centre for Disease Control and Prevention (CDC) in the United States in 1946. Two years later, The World Health Organization (WHO) was established within the United Nations Framework with the purpose, of improving the global health of all living beings, eradicating disease, and implementing structures to ensure sustainable resources, and research. Currently, a total of 149 countries are member states of the WHO. Both these organizations were instrumental in providing guidance and support during the last COVID-19 pandemic.

2.2.2 Understanding Disease

Understanding diseases is mankind's only defense against demise from infectious disease outbreaks. Disease is a broad term and is described as a state of *dis-ease* (an absence of ease, or comfort) rather than explaining what it is not, than what it is for humans, animal, and plant life (Nelson and Williams, 2014). Britannica defines disease or illness as 'Any harmful deviation from the normal structural or functional state' (Burrows and Scarpelli, 2024). A synthesized definition of a disease is the inability of a microbial-invaded or injured host to maintain homeostatic mechanisms.

Global standardization of diagnosing diseases is essential to ensure the statistical validity of the data provided by different countries. The International Classification of Disease (ICD-11) framework, first developed and often revised by the World Health Organization (WHO), provides a comprehensive, systematic coding framework to ensure that diagnoses; disease; and injury criteria are applied universally when diseases are reported. This online system allows for every healthcare professional and country to provide detailed information on diseases which is essential for a robust information system. This current edition allows practitioners to update their diagnostic skills; provides an improved version of diagnosing diseases in the primary healthcare setting; makes provision for bacterial resistance options, has an updated HIV section; includes rare diseases; has options listed for pre-and post-intervention evaluation strategies and; include traditional Medicine in Chapter 26 (World Health Organization, 2024a).

In diagnostic microbiology terms, the causative pathogen (bacteria virus, fungus, parasite, or prion), of a disease is described according to a complex formal taxonomy for microorganisms which consists of seven classification levels (Domain, Phylum, Class, Order, Family, Genus, Species and, Sub-species). Infectious diseases caused by the pathogen are described by referring to clinical symptoms, causative organism (based on microbiology), mode of transmission, and reservoir. A summary of this classification of infectious disease is presented in Appendix A.

Disease progression periods, are pathogen-specific, and depend on the interaction between the a) causative agent; b) the process of transmission; c) the host, and; d) the environment (Bonita, Beaglehole, Kjellstrom, 2019). The progression periods of a specific disease dictate diagnostic and surveillance strategies. The phases are included below.

- Phase 1: Incubation Phase: The pathogen enters the host via direct or indirect transfer through inhalation, indigestion, or absorption and starts to multiply. The host is unaware of the exposure and is asymptomatic.
- Phase 2: Prodromal Phase: The pathogen is colonized, establishes an intracellular lifestyle, and crosses host barriers resulting in multiplying in the host. The host starts to present with symptoms
- Phase 3: Illness Phase: The host presents with typical symptoms, and pathogen particles start to decrease. The host starts to be vulnerable to secondary infections.
- Phase 4: Convalescence Phase: The host recuperates and physical homeostasis is restored.

The host of an infectious disease has the potential to be contagious at any phase.

2.2.3 A Fragile Ecosystem

The relationship between humans, disease, animals, and the environment has been acknowledged through the ages, and yet we have not been able to manage it successfully. Since 1980, 75% of all new or emerging infectious diseases were zoonotic infections e.g. AIDS, SARS (Severe acute respiratory syndrome), MERS (Middle East respiratory syndrome), Nipah Virus, Avian influenza, EVD (Ebola virus disease), Influenza A virus (H1N1), and COVID-19 (World Health Organization, 2020a). Vector-borne diseases e.g. Malaria, Zika virus, Dengue, West Nile Virus, Chikungunya, and Yellow fever, account for 17% of all infectious diseases. The abovementioned causes over one billion human infections and more than one million deaths every year (World Health Organization, 2020a). The control of the physical

environment is crucial. An example of an outbreak caused by a compromised environment presented in 2019, when 1500 people were diagnosed with *campylo bacteriosis* in Askøy Norway, caused by water from a mountain reservoir that was damaged during unexpected heavy rainstorms in the same region (Hyllestad, Iversen, MacDonald *et al.*, 2020).

An example of three human activities that disrupt the balance between humans, the environment, and microorganisms are human migration, anti-microbial therapy misuse, and environmental exploitation, and is discussed below.

- According to the High Commissioner for Refugees, a total of 110 million refugees were listed globally by mid-2023. Disease prevention in refugee camps is challenging as refugees are usually physically compromised due to stress, exhaustion, and undernourishment. Outbreaks of Tuberculosis (TB), Human Immunodeficiency Virus (HIV), Hepatitis B and C, Measles and Diphtheria as well as polio are but a few that have been reported (Taha, Durham, and Reid, 2023).
- Human compliance with pharmaceutical treatment strategies limits the treatment options for infectious diseases. The WHO estimated that anti-microbial resistance (AMR) was responsible for 1, 27 million global deaths in 2019, which is caused by antibiotic misuse and overuse (World Health Organization, 2023).
- Economic activities supporting the livelihoods of humans, and threatening the environment (ecosystem) are mining, deforesting, oil extraction, and wetland drainage. Since the ice age, the earth has lost one third of its forests (Ritchie and Rosner, 2021), and half of its wetlands since 1900 (Davidson, 2014). Disease outbreak occurrences have changed due to the changing interaction between animals, plants, fungi, and bacteria (biotic) as well as changes in sunlight, air, water, and temperature (abiotic) (World Health Organization, 2020a).

With the global population reaching 8 045 311 447 on 9 January 2024, natural ecosystems are placed under more pressure (Worldometer, 2024).

2.3 DISEASE OUTBREAK PREPAREDNESS

Surge Capacity is defined as the ability of a country to manage a disease outbreak, and meet its non-disease outbreak responsibilities. Global initiatives and previous results of disaster preparedness audits are discussed below.

A study investigating the commitment of the African states to the SFDRR (Sendai Framework for Disaster Risk Reduction), was initiated in 2010 and concluded that 18% of the African countries reported no implementation of their DRR (Disaster Risk Reduction) strategy (van Niekerk and Coetzee, 2020). The same study also concluded that disaster mortality increased by 13 % in the periods 2015 – 2016 and 2017 – 2018. This was caused by the EVD outbreak in West Africa, landslides in Sierra Leone, flood losses due to El Nino, industrial disasters, Cholera outbreaks in refugee camps in Sudan, and droughts (van Niekerk and Coetzee, 2020). A SPAR (States Parties Self-assessment Annual Reporting Tool) survey conducted in 2020, indicated that only 25% of the countries included in the study could score an acceptable level for availability of resources and skilled healthcare workers (Kandel, Chungong, Omaar, *et al.*, 2020).

According to the Global Security Index in 2019, the average surge capacity score of all the countries was 40.2 out of a possible 100. In 2021 the average score of all the countries was 38.9, a decrease of 1.3. United States of America, Australia, and Finland were listed as the best prepared, with North Korea, Yemen, and Somalia listed as the least prepared. South Africa scored 45.8 points, 1.7 lower compared with the 2019 report. The Global Security Index report of 2021 concluded that all countries are 'dangerously unprepared' for any future epi- and pandemics and that healthcare systems have not been strengthened nor changed since the COVID-19 pandemic. More alarmingly the authors are of the opinion that no country has the capacity to manage any disease outbreak event larger than the COVID-19 pandemic (Bell and Nuzzo, 2021).

Measuring the pandemic preparedness of a country requires a comprehensive multi-phase approach, which involves numerous stakeholders in a complex healthcare system environment (Kandel *et al.*, 2020). Frameworks, scoring systems, and indicators have been developed to determine the surge capacity of a country or healthcare institution. A summary of the frameworks is presented.

- According to the WHO Hospital Preparedness for Epidemics Report, surge capacity is based on: a) human resources; b) equipment and supplies; c) specific skills and expertise in specialist areas, and d) management of resources (World Health Organization, 2014a).
- In 2015, The Sendai Framework for Disaster Reduction was adopted by 187 member states of the United Nations. In Africa, all 55 countries, under the leadership of the

Africa Union (AU), adopted the framework, adding five additional targets in 2018. The revised Sendai framework is referred to as the *Tunis Declaration in Accelerating the Implementation of the Sendai Framework for Disaster Risk Reduction and the Africa Regional Strategy for Disaster Risk Reduction (SFDRR)* in 2018. The SFDRR provides comprehensive guidelines to private sectors, governmental and non-governmental organizations, academic institutions, and local authorities in adopted countries, but is a non-legal binding framework. This framework includes a) Understanding disaster risks; b) Strengthening risk governance; c) Investment in disaster risk reduction; d) Enhancing disaster preparedness through training, and drills, and; e) Integration of priorities into education systems (United Nations, 2015).

- The Global Security Index focuses on: a) Prevention; b) Detection; c) Reporting; d) Rapid Response and; e) Health Systems (World Health Organization, 2014a).
- A study published in 2019, used the Epidemic Preparedness Index (EPI), to assess the national level preparedness of 188 countries, indicating that the likelihood of an isolated disease outbreak event becoming a global problem is *high*. The indicators used in the EPI are: a) economic resources; b) public health communication; c) infrastructure; d) public health systems and; e) institutional capacity (Oppenheim, Galivan, and Madhav, 2019).
- The State Party Annual Reporting (SPAR) process was initiated by the WHO and combined external evaluation tools, after-action reviews, and simulation exercises as indicators for disaster readiness (Global Health Security Agenda Team, 2024).

In South Africa, The National Department of Health published The Ideal Hospital Realisation and Maintenance Framework Manual (Version 2, August 2023), with quality indicators for public hospitals. A total of 16 criteria in the framework are relevant to disaster preparedness at the hospital level (South Africa (Republic), 2023). No audit results on the compliance of hospitals in South Africa have been published to date.

2.3.1 Disease Outbreak Management

The WHO reported approximately 1200 disease outbreak events between 2012 and 2017 in 168 countries, and an additional 352 disease events in 2018 (World Health Organization, 2020a).

The objective of disease outbreak management is to minimize the effect of the disease on the population involved through multidisciplinary collaboration and optimized utilization of available resources (Institute of Environmental Science and Research, 2012).

The oscillating reciprocity, and interdependency of the phases of the disease outbreak cycle is determined by the real-time epidemiological data that represents the disease cycle in a community. The phases of the disease management cycle are presented in figure 2.2. The phases are discussed below:

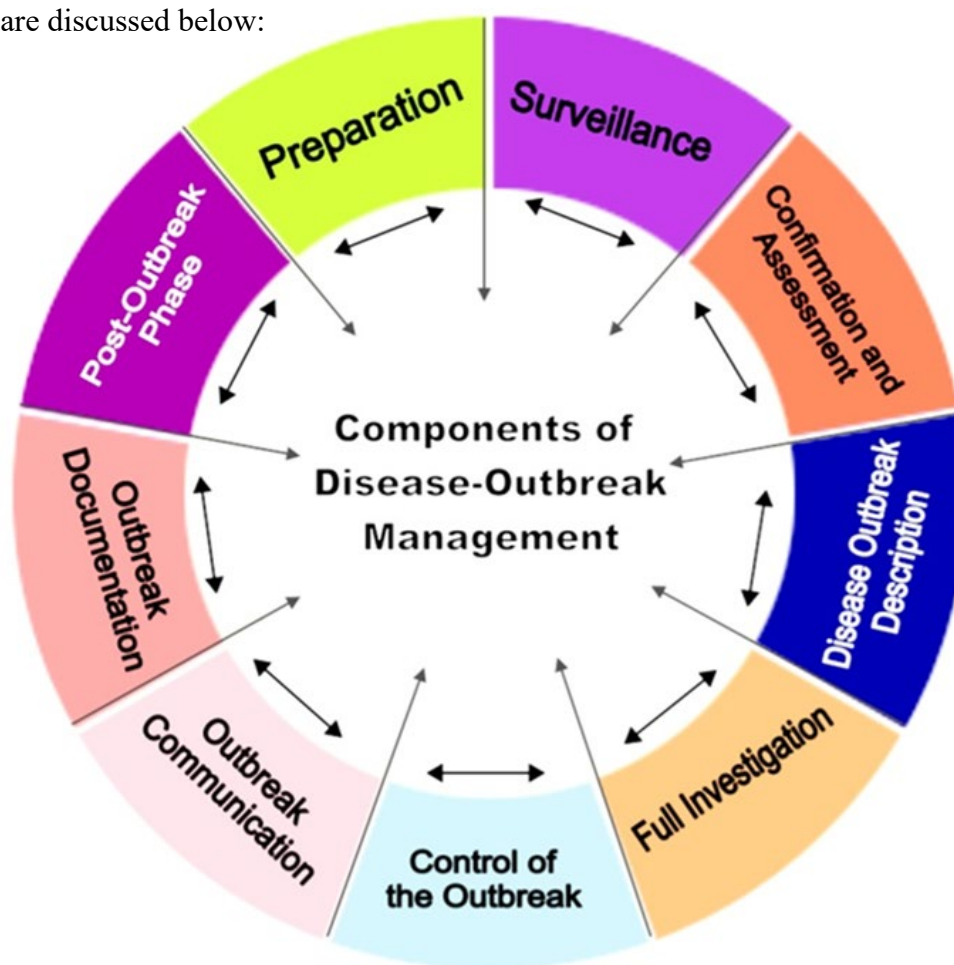


Figure 2.2: Components of Disease Outbreak Management Phases

The phases are discussed below:

Preparation includes the development of a disease outbreak response or strategy for the healthcare institution, including district provincial, and national level, and preparation of physical and human resources, including policies and procedure development. Preparation is a continuous process.

Surveillance refers to the generation and communication of continuous risk information to detect the potential for disease outbreaks and throughout disease outbreaks.

Confirmation and Assessment refers to the verification of an outbreak, activation of the resources referred to in the planning component as well as additional resources as required, and prioritization of initiatives. Contact tracing is activated.

Disease Outbreak Description is provided in epidemiological terms e.g. situation analysis, and descriptive epidemiology. Description of the index case and development of a unique disease definition is important for standardization of case reporting strategies. After the initial description, additional data is provided describing events for as long as the outbreak is active. Contact tracing is maintained throughout.

A full Investigation comprises of analytical epidemiological data, and laboratory and environmental investigations. Data collection strategies are enforced. Contact tracing is maintained throughout.

Control of the Outbreak is achieved through the successful treatment of the infected population, contaminated environment, and implementation of best clinical of treatment options at the time including surveillance strategies. Contact tracing is maintained throughout.

Outbreak Communication includes interdisciplinary communication, publication of research findings and treatment protocols, communication with the public, and use of different communication methods. Contact tracing is maintained throughout.

Outbreak Documentation is maintained through vigorous documentation and reporting strategies including paper based and electronic mediums.

The Post-Outbreak Phase is ill defined, but it is acceptable to regard the time frame from the declaration that the disease is over or that an area or country is 'disease-free' until the next outbreak. In this phase continuous surveillance is maintained.

2.3.2 The Cost of Disease Outbreaks

Between 1980 and 2013, a total of 219 countries reported more than 12 000 human infectious disease outbreaks. The estimated cost of the Ebola Virus outbreak in Guinea, Liberia, and Sierra Leone in 2015 was \$ 356 million (Bartsch, Gorham, Lee *et al.*, 2015). Due to the financial implications of COVID-19, the Global Preparedness Monitoring Board (GPMB) was

initiated by the WHO and World Bank. The objective of GPMB is to ensure global preparedness for disease outbreaks based on economic indicators. According to the GPMB report, healthcare emergency ecosystems are complex and ineffective if countries are inequitable, unaccountable, and divided (World Health Organization, 2021a). This implies that there is no immediate solution funded by only a few, but that every country (government), irrespective of income status has to commit to invest in their country's health, social and economic challenges during non-disease outbreak periods to be able to manage the burden of an outbreak.

2.4 NURSES AS RESOURCE DURING DISEASE OUTBREAKS

During the COVID-19 pandemic, The World Health Organization State of the World Nursing Report (2020) confirmed that 59% of the global health sector consists of nurses and is the largest occupational group of professionals (World Health Organization, 2020b). The International Council of Nurses estimates a 13 million shortage of nurses post the COVID-19 pandemic. It also reported the death of 3000 nurses, related to SARS-CoV-2. Most countries reported a 20% increase in non-retiring resignations of nurses post COVID-19, and a total of 4, 7 million nurses are expected to retire within the next 10 years (Buchan and Catton, 2023).

Standardized staff-patient ratios are a challenge due to differences in staff competence and patient acuity levels. Planning for staffing during disease outbreaks is even more complex due to the usual sudden influx of patients with high acuity levels. Studying the findings of research relevant to staff-patient ratios and infection prevention and control practices could guide the development of staff-ratio frameworks for disease outbreaks. Purposefully selected studies published between 1999 and 2023, relevant to disease outbreaks and staff-patient-ratio are presented in the table below. See Table 2.1.

Table 2.1 Findings of Studies relevant to staff-patient ratios and disease outbreaks.

Publication	Findings
Vicca, A.F. (1999). Nursing staff workload as a determinant of methicillin resistant <i>Staphylococcus aureus</i> spread in an adult intensive therapy unit. <i>Journal of Hospital Infection</i> . 1999. Vol.43.109–13. doi: 10.1053/jhin.1999.0246.	Nurse understaffing contributed to the increase of methicillin resistant <i>Staphylococcus aureus</i> in an ICU unit. This study was conducted over 19 months.

Harbarth, S., Sudre, P., Dharan, S., Cadenas, M., Pittet. (1999). Outbreak of <i>Enterobacter cloacae</i> related to understaffing, overcrowding, and poor hygiene practices. <i>Infection Control Hospital Epidemiology</i> . 1999 Sep; 20(9):598-603. doi: 10.1086/501677. PMID: 10501256.	Nurse understaffing in a neonatal intensive care unit, including over-crowding contributed to the outbreak of <i>Enterobacter cloacae</i> . Molecular studies identified 3 epidemic closed isolates.
Andersen, B.M., Lindemann, R., Bergh. K., Nesheim, B.I., Syversen, G., Solheim, N., Laugerud, F. (2002). Spread of methicillin-resistant <i>Staphylococcus aureus</i> in a neonatal intensive unit associated with understaffing, overcrowding, and mixing of patients. <i>Journal of Hospital Infections</i> . 2002 Jan; 50(1):18-24. doi: 10.1053/jhin.2001.1128. PMID: 11825047.	Untrained nurses (42%) and the use of non-permanent staff (62%) in a neonatal intensive care unit resulted in a methicillin-resistant <i>Staphylococcus aureus</i> outbreak in Oslo between March 1999 and June 1999.
Laster, K.B., Sloane, D.M., McHugh, M.D., Cimiotti, J.P., Rimsan, K.A., Martin, B., Alexander, M., Aiken, L.H. (2021). Evaluation of hospital nurse-to-patient staffing ratios and sepsis bundles on patient outcomes. <i>American Journal of Infection Control</i> . Vol. 49. (2021). 868-873.	Following the guidelines of a 1:4 ratio in New York, as well as SEP-1 Bundles, a patient has a 12% increase in in-hospital mortality when one (1) additional patient is assigned to every staff member.

These aforementioned studies highlight the importance of complying with the non-disease outbreak staffing ratios and skills-mix as a preventative measure to prevent potential disease outbreaks. In 2019, a study conducted in South Africa concluded that only 25% of the nurses working in intensive care units in the country had an additional ICU qualification (Joynt, Gopalan, Argent *et al.*, 2019).

In 2019, the International Council of Nurses (ICN) and the Saudi Patient Safety Center published a White Paper on nurse staffing levels. This document presented recommendations on staffing ratios rather than mathematical formulas and ratios. The recommendations are included below:

- Every healthcare provider should have a real-time data system providing staff, and patient acuity information;
- The nurse must have the authority to make decisions, based on the information;
- The nurse must be able to adjust staff allocations according to incidents;
- Nursing skill-mix as well as their competency and training must be monitored;
- Competency-based training must be prioritized;

- Further research on staff and patient performance should be encouraged.

(Saudi Patient Safety Center, 2019)

This approach to staffing ratios allows nurse autonomy to take control of quality patient care and self-governance rather than following rules and formulas that do not accommodate the dynamic nursing environment.

In South Africa, a total of 27 1047 qualified nurses were registered at SANC by the end of 2022 (South African Nursing Council, 2022a). There is no data available to confirm how many nurses are still practicing. The nursing workforce in Northern Cape, Mpumalanga, Eastern Cape, and North West are under a lot of pressure, followed by Western Cape, Free State, Gauteng, and Limpopo. The distribution of the nurses per province as well as the population ratio per nurse per province is included in Table 2.3.

Table 2.2: The provincial distribution of nursing manpower per province in South Africa (2022).

Province	Total Nurses per Province	Population per Nurse Ratio
Eastern Cape	2766	245:1
Free State	12792	228:1
Gauteng	70691	228:1
Kwa Zulu Natal	66180	174:1
Limpopo	27639	215:1
Mpumalanga	14731	320:1
North West	17587	238:1
Northern Cape	3548	369:1
Western Cape	30615	236:1
Total	27 1047	

(South African Nursing Council, 2022)

According to the South African National Health Act. 61 of 2003 Regulations Regarding Communicable Diseases. No 30681, all healthcare providers (hospitals) must employ one Infection Control Officer (nurse) for every 200 beds in the service, without specification of the qualifications of the officer (South Africa (Republic), 2003a). It is not clear how many IPC Officers are employed in South African Hospitals.

2.4.1 The Expanding Role of the Nurse During Disease Outbreaks

The ability to transform ill-defined environments into therapeutic or functional environments, as well as the manipulation of resources to complete a task, has been identified as an important competency of disaster nurses by the WHO as early as 2008 (World Health Organization, 2008). This was confirmed by the work of Carayon, Woolridge, Hose *et al* in 2018 who concluded that the ability of nurses to provide quality care in an ill-defined, unpredicted, environment depends on their ability to maintain, update, adjust, and apply their clinical, technical, and social skills (Carayon *et al.*, 2018).

During the last pandemic, nurses from all specialties were allocated to emergency and intensive care units due to staff shortages. These 'other nurses' could have been at Benner's competency stages 4 and 5 when working in their specialty, but possibly at stage two or three in disease outbreak nursing. Heiden, Bernild, Kikkenborg Berg *et al* (2023) described this unique situation by referring to all nurses as *novices*, during the first wave of COVID-19, as no one was competent in caring for patients infected with the SARS-CoV-2 virus (Heiden *et al.*, 2023). This 'other than ICU specialist' nurse could have progressed faster through Benner's stages compared to a novice nurse e.g. a first-year nursing student, through rapid-training programmes, although the focus was on the clinical performance of procedures and not knowledge integration during the outbreak.

Nurses are considered as the main contributors to the successful preventative management of infectious disease management and are also the primary developers of treatment protocols related to clinical safety during disease outbreak events (Buheji and Buhaid, 2020). This same study concluded that frontline workers are the primary enactors of resilience during an outbreak and have the ability to adjust other role-players' behavior (Buheji and Buhaid, 2020). Choi, Jeffers, and Logsdon, 2020 expanded on this and added that the preventative role of the nurse includes measures to prevent misinformation, over-information, patient panic, and service preparedness (Choi *et al.*, 2020).

2.4.2 Competence and Competency

Nurse competence depends on the ability of the nurse to successfully respond to the health needs of the society. The differentiation between *competence* and *competency* is explained by Fukada (2018) by referring to *competence* as having the ability to perform a task and

competency as the successful performance of the task (Fukada, 2018). A concept framework developed in 2011 described competence according to 3 theories: a) *Behaviorism* through performing a skill and being evaluated through demonstrations; b) the *Trait* theory referring to critical thinking skills, psychological processes as well as knowledge of the individual; and c) *Holism* referring to a combination of cognitive, situational, professional experience, values and ethics (Takase, Teraoka, Miyakoshi *et al.*, 2011).

Definitions of competence often describe *what* the nurse should do rather than *how* the task should be performed. Terminology often includes: ‘understanding’; ‘knowledge application’; ‘intrapersonal relationships’; ‘people-centered care’; ‘patient-centered care’; ‘collaboration’; ‘ethical guided practice’; ‘continuous learning’; ‘quality care’; and ‘being clinically relevant.’

Benner included the stages of clinical competence in 1984, in her work *From Novice to Expert* (1984), and described how the task is performed in every stage. The 5 stages are explained below:

Stage 1: Novice. The person has no knowledge or experience, displays no clinical confidence, and requires constant coaching to perform the task over an extended period of time.

Stage 2: Advanced Beginner. The person is referred to as ‘marginally’ acceptable during the performance of the task, with the knowledge that is being developed as the task is performed. The person had experience in a similar clinical context, is efficient in some aspect of the skill, requires occasional guidance, and performs in or outside an acceptable time frame.

Stage 3: Competent. The person has experience in similar clinical situations, performs with confidence in a coordinated fashion, and demonstrates efficiency. The person understands the challenge (problem) in abstract and analytical terms and plans deliberately to solve that problem and perform the task. The skill is completed within the acceptable time frame and she needs no support in completing the task.

Stage 4: Proficient. The person contextualizes the task within the holistic sphere and understands the value it brings to the whole. She can modify her performance to accommodate the unexpected based on previous experience and can identify critical indicators within the task based on the changing environment, which demands high-level decision-making skills.

Stage 5: The Expert. The person has a comprehensive understanding of the problem, is quick to assess a situation, has fluid and precise performance, and can perform within the unknown due to her ability to be highly analytical (Benner, 1984).

Another framework first described in 1982 by Howel (in Cannon, Feinstein, and Friesen, 2010) focused on thinking patterns as learning of a new skill takes place from being unconsciously incompetent to consciously competent, and is often referred to as the Conscious Competence Ladder. Nurse competence in disease outbreaks came under scrutiny during the last pandemic.

2.4.3 Disease Outbreak Competencies of Nurses

The ability of the nurse workforce to cope with the burden of infectious diseases comes under scrutiny during every disease outbreak event. In 2018, researchers reported that healthcare providers focus on quantitative nursing resources during a disease outbreak and not competency (quality) in infection prevention control, communicable disease outbreak management, and disaster preparedness (Hamele *et al.*, 2018). During the COVID-19 pandemic, similar findings were presented, and nurses themselves raised concerns about their working conditions and clinical skills on social media platforms. Included below are the results and conclusions of purposefully selective studies, conducted since 2011, related to nurse performance and training during disease outbreak events.

- In 2011, Fortaleza and Fortaleza (2011) reported that intensive care healthcare workers exhibited sub minimal knowledge of infectious disease management during the Influenza outbreak in Brazil (Fortaleza and Fortaleza, 2011).
- The infection prevention practices of Emergency Care Nurses were described as inconsistent in a study conducted in 2014, in Hong Kong, during the Middle East Respiratory Syndrome (MERS) outbreak, when it was observed that 40% of the Emergency Care Nurses did not comply with personal protective equipment (PPE). One-fourth (23%) of the participants in the study did not comply with standard hand hygiene practices and the risk perception of disease threats, under the nurses included in the study is minimal (Chacko and Comacho, 2016).
- In 2018, the State Party Annual Reporting (SPAR) survey indicated that most African countries either had little or non-sustainable capacity and resources in place to respond to health emergencies, including human resource training and development of health emergency management (Kandel *et al.*, 2020).

- Nurses in Africa are familiar with disease outbreaks and health disasters. Unfortunately, a study conducted in Ghana in 2017, highlighted that healthcare workers themselves are concerned about their disease outbreak knowledge and training, following an Ebola outbreak, resulting in recommended continuous training during outbreak-free times (Annan, Yar, Owusu *et al.*, 2017). This was confirmed in a study conducted later in Nigeria after an Ebola outbreak (Ughasoro, Esangbedo, and Udorah, 2019).
- A study conducted in Italy confirmed that inadequate nurse education and simulation drills contributed to the inability of the nurse workforce's capacity to render sustainable care for COVID-19 patients in Lombardy, Italy in 2020 (Grasselli, Pesenti, and Cecconi, 2020).

The International Council of Nurses (ICN) declared that nurses should understand diseases and disease outbreaks as well as utilitarian principles to be effective during a disease outbreak. The ICN developed a set of competencies for disaster nursing (International Council of Nurses, 2019). The alignment between the ICN competencies and the competencies for the advanced nurse practitioners, stipulated by SANC is presented in the table below. See Table 2.4.

Table 2.3: Alignment of ICP Core Competencies in Disaster Nursing Version 2.0 (International Council of Nurses, 2019), with Generic Competency Framework for Advanced Nurse Practitioners in South Africa (South African Nursing Council, 2014).

General Professional Nurse: Level I (ICP)	Advanced or Specialized Nurse: Level II (ICP)	Generic Competency Framework for Advanced Nurse Practitioners (SANC)
Any nurse who has completed a programme of basic, generalized nursing education and is authorized to practice by the regulatory agency of his/her country	Any nurse who has achieved the Level I competencies and is or aspires to be a designated disaster responder within an institution, organization or system	A specialist nurse is referred to as a nurse who has in-depth knowledge and expertise in a specific areas of nursing, and has a post graduate diploma in the specific area
Domain 1: Preparation and Planning	Domain 1: Preparation and Planning	
1.1 Maintains a general personal, family and professional preparedness plan	1.1 Participates with other disciplines in planning emergency drills/exercises at the institution or community level at least annually	2.1.2 Plans develops and implements needs-based programmes to promote health and well being
1.2 Participates with other disciplines in drills/ exercises in the workplace	1.2 Plans nursing improvement actions based on results of drill/ exercise evaluation	2.2.1 Gathers accurate and relevant objective and subjective data required for practice in specialty area through systematic Health and Nursing Assessment
		2.2.3 Organizes, synthesizes, analyses and interprets data from different sources to derive nursing diagnoses and determine a care plan
		2.3.1: Formulates an individualized comprehensive care plan with identified care outcomes based on nursing diagnoses, findings from a Nursing and Health Assessment, inputs from other health team members and Nursing Practice Standards

1.3 Maintains up-to-date knowledge of available emergency resources, plans, policies and procedures	1.3 Communicates roles and responsibilities of nurses to others involved in planning, preparation, response and recovery.	2.3.3 Establishes priorities for care in collaboration with other health care providers and healthcare users
1.4 Describes approaches to accommodate vulnerable populations during an emergency disaster or disaster response	1.4 Includes actions relevant to needs of vulnerable populations in emergency plans	2.4.4 Responds immediately and appropriately to emergency situations taking a leadership role and coordination of care for health care users with special care needs
	1.5 Incorporates Level I core competencies in Disaster Nursing in any basic nursing education programme or refresher course	3.2.3 Participates in unilateral and multidisciplinary teaching and learning
		4.6 Provides leadership in the development and implementation of Advanced Practice Education and professional development of learners and colleagues in the workplace
Domain 2: Communication	Domain 2: Communication	
2.1 Uses disaster terminology correctly in communication with all responders and receivers	2.1 Plans for adaptable emergency/ disaster communication systems	3.1.6 Plans for dealing with disasters in advanced Practice Area
2.2 Communicates disaster-related priority information promptly to designated individuals	2.2 Includes emergency communication expectations in all orientation of nurses to a workplace	2.1.3 Develops and uses follow-up systems to ensure that health care users receive appropriate services
		2.6.4 Communicates clear, consistent and accurate information verbally, or in written and electronic forms, that falls within the professional responsibility and maintain confidence in care
		2.6.5 Facilitates access to information or refers requests to the appropriate person

		2.6.6 Communicates and shares information including views of health care users, families with other health care team
2.3 Demonstrates basic crisis communication skills during emergency/disaster events	2.3 Collaborates with disaster leadership teams to develop event-specific media messages	2.2.4 Shares and documents findings accurately, complete and in a timely manner complying with Nursing Practice Standards in institutional policies
		2.6.1 Initiates, develops and discontinues therapeutic relationships using a range of advanced communication and interpersonal skills
		2.6.2. Maintains a relationship that respects the boundary between healthcare user and self
2.4 Uses available multi-lingual resources to provide clear communication with disaster-affected populations	2.4 Develops guidance on critical documentation to be maintained during disaster or emergency	2.3.5 Maintains current, accurate care plan and related records
2.5 Adapts documentation of essential assessment and intervention information to the resources and scale of emergency		2.4.2 Documents interventions and health care user responses accurately and in a timely manner
Domain 3: Incident Management	Domain 3: Incident Management	
3.1 Describes the national structure for response to an emergency or disaster	3.1 Participates in development of organizational incident plans consistent with national standards	1.1.6 Leads and participates in activities related to improving access to the range of services required for effective specialist services
3.2 Uses the specific disaster plan including chain of command for his/her place of education or employment in an event, exercise or drill.	3.2 Participates with others in post-event (actual or exercise) evaluation	2.5.1 Monitors and documents progress towards expected outcomes accurately and completely

		2.5.2 Evaluates progress towards planned outcomes, in consultation with health care users, families and/ or carers and health care team
3.3. Contributes observations and experiences to post-event evaluations	3.3 Develops action plans for improvement in nursing practice based on event assessment	2.5.3 Utilizes evaluation data to modify the care plan
		2.5.4 Provides necessary support to the team members according to the identified gaps in the care provided
3.4 Maintains professional practice within licensed scope of practice when assigned to an inter-professional team or an unfamiliar location	3.4 Includes emergency planning guidance when reassigning staff or including unfamiliar colleagues or volunteers	4.14 Maintains accountability and responsibility when delegating aspects of care to others
Domain 4: Safety and Security	Domain 4: Safety and Security	
4.1 Maintains safety for self and others throughout disaster/emergency event in both usual or austere environments	4.1 Implements materials that support nursing decision-making that maintains safety during disaster/ emergency events	3.1.2 Leads/ Participates in developing and adapting Nursing Practice Standards to the health care environment
4.2 Adapts basic infection prevention control practices to the available resources	4.2 Provides timely alternative infection prevention control practices applicable within limited resources	3.1.1 Promotes dissemination, use, monitoring and review of Nursing Practice Standards and best practice guidelines
4.3 Adapts regular assessment of self and colleagues during disaster event to identify need for physical or psychological support	4.3 Collaborates with others to facilitate nurses' access to medical and/or mental health treatment, as other support services as needed	1.1.4 Consults with or refers to appropriate others when encountering situations beyond own competence
4.4 Uses Personal Protective Equipment (PPE) as directed through the chain of command in a disaster/ emergency event	4.4 Explains the levels/ differences in PPE and indications for use to nurses and others	3.1.5 Complies with infection prevention procedures and challenges breaches in other practitioner's practice
4.5 Reports possible risks to personal or others' safety and security	4.5 Creates an action plan to address and correct/ eliminate risks to personal or others' safety and security	3.1.3 Uses appropriate assessment tools to identify actual and potential risks to safety and security, takes

		appropriate action and reports concerns where necessary to relevant authority
Domain 5: Assessment	Domain 5: Assessment	
5.1 Reports symptoms or events that might indicate the onset of an emergency in assigned patients/ families/ communities.	5.1 Assures that all nurses have up-to-date information on potential emergency events and the process for reporting them if observed	4.10 Acts as a resource in Advanced Practice Field for students, members of the health team, policy makers and the public
5.2 Performs rapid physical and mental health assessment of each assigned patient/ family/ community based on principles of triage and type of emergency/ disaster event	5.2 Develops event specific guidance on rapid physical and mental health assessment of individual patients/families/ communities based on available information	2.4.1 Implements a range of advanced procedures, treatments and interventions in accordance with the developed care plan and best practice standards
5.3 Maintains ongoing assessment of assigned patient/ family/ community for needed changes in care in response to the evolving disaster event	5.3 Includes principles of disaster/ emergency triage in all assessment courses taught in basic and continuing education programmes	
	5.4 Identifies event-specific vulnerable population(s) and actions needed to protect them	1.2.3 Acts in an advocacy role to protect Human Rights and questions violations of a health care user
Domain 6: Intervention	Domain 6: Intervention	
6.1 Implements basic first aid as needed by individuals in immediate vicinity	6.1 Assures that emergency plans and institutional policy include the expectation that basic first aid can be administered by all nurses	
6.2 Isolates individuals families/ clusters at risk of spreading communicable conditions to others	6.2 Includes organizationally specific guidance on implementation of isolation in an emergency	4.2 Adapts leadership style and approaches to situations specific to the advanced practice nurse
6.3. Participates in contamination assessments or decontamination of individuals when directed through the chain of command	6.3 Describes the range of exposures (chemical, biological, radiation, nuclear, explosive) and the exposure-related decontamination methods to be used	4.12 Scans practice environment and literature to identify emerging trends and issues

6.4 Engages patients, their family members or assigned volunteers, within their abilities, to extend resources during events	6.4 Plans for expanded patient, patient’s family or volunteer participation in extending resources in emergency/ disaster plan	2.3.2 Applies critical thinking and clinical reasoning skills underpinned by knowledge of the area of Advance practice nursing and other disciplines to the care planning process	
6.5 Provides patient care based on priority needs and available resources	6.5 Guides implementation of nursing reassignments within the organization’s emergency plan	4.15 Delegates activities to others, according to ability, level of preparation, proficiency and Scope of Practice	
6.6 Participates in surge capacity activities assigned (e.g. mass immunization)	6.6 Guides nursing participation in surge activities when required by event	4.8 Uses the change process to influence the introduction of innovations and adaptations to Advanced Practice Field	
6.7 Adheres to protocol for management of large numbers of deceased in respectful manner			
Domain 7: Recovery			Domain 7: Recovery
7.1 Assists an organization to maintain or resume functioning during and post event			7.1 Communicates nursing roles, responsibilities and needs to leadership throughout the recovery phase
7.2 Assists assigned patients/ families/ communities to maintain or resume functioning during and post event			7.2 Maintains up-to-date referral resource list and adds event-specific modifications as needed
7.3 Makes referrals for ongoing physical and mental health needs as patients are discharged from care			
7.4 Participates in transaction de-briefing to identify personal needs for ongoing assistance		3.2.1 Undertakes regular review of own practice by engaging in reflection, critical examination and evaluation and seeking peer review	
Domain 8: Law and Ethics	Domain 8: Law and Ethics		
8.1 Practices within the applicable nursing and emergency-specific laws, policies and procedures	8.1 Participates in development of emergency-specific policy and procedure guidance for nurses within the organization/ institution	4.7 Leads in the development, review and modification of institutional practice policies, procedures and protocols	

8.2 Applies institutional or national disaster ethical framework in care of individuals/ families/ communities	8.2 Participates in the development of disaster/ emergency frameworks for allocation of resources	4.13 Contributes to national policy and protocol development that relates the delegation of clinical responsibilities specific to advanced practice nurse
8.3 Demonstrates understanding of ethical practice during disaster response that is based on utilitarian principles	8.3 Develops guidance and support for nurses expected to apply utilitarian principles in practice during emergency and disaster response	4.17 Applies appropriate business skills to ensure quality and cost effectiveness of specialized services

In 2022, researchers in China developed the Competency Evaluation Index System for Front-line Nurses and included 4 indicators:

- Infectious Disease Knowledge;
- Infectious Disease Skills;
- Professional Abilities and;
- Comprehensive Quality.

(Bai, Gan, Yang *et al.*, 2022)

The South African Nursing Council included Major Incident and Disaster Practice as a subsection in the Competencies for Emergency Nursing document. Domain 1: Section. Two broad statements regarding disease outbreak competency are included. A direct extraction is included below in Table 2.4.

Table 2.4. Incident and disaster practice for emergency room nurses.

1.6 Major Incident and Disaster Practice
1.6.1 Recognize the fundamental approaches to major incident and disaster nursing, including nursing in a combat situation.
1.6.2 Display competencies related to preparedness, organization, and implementation of appropriate responses within an ethically challenging environment, whilst applying health policy and organizational and personnel planning for emergencies.

(South African Nursing Council, 2020b)

The disease outbreak management context is complex. Every post pandemic phase provides an opportunity for nurse educators to revise and amend training programmes and curriculums guided by the experiences and challenges of nurses.

2.4.4 Disease Outbreak Training Opportunities for South African Nurses

South Africa, a contributor to the Biodiversity and Infectious Disease Report of the WHO, supported the advanced practice role of nurses published in 2020 (World Health Organization, 2020a). To date, the South African Nursing Council (SANC) has not approved formal Disease Outbreak programmes for nurses in South Africa and has to rely on in-service training opportunities to revise disease outbreak skills. Traditionally general disaster management has

been included as a nursing management or quality improvement module in basic nursing programmes. In 2023, the first Infection Prevention and Control Post Graduate Diploma curriculum was approved by SANC. Disease Outbreak Management is presented as one module in this curriculum, developed by the University of the Witwatersrand.

Between 1989 and 1998, an accredited training programme named Communicable Disease Control Nurses was presented for nurses in community and district nursing in Mpumalanga province. This was an initiative between Australian and South African universities and the provincial government. Two programmes were designed to address technical and managerial aspects, required during an outbreak. It is believed that the Mpumalanga provinces' ability to manage the cholera outbreak in 2000 -2001 is a direct result of the successful implementation of this programme (Speare, Durrheim, Ogunbanjo *et al.*, 2003).

The NICD (National Institute for Communicable Diseases) in collaboration with NDoH, NHLS, University of Pretoria (UP), and CDC developed and facilitated the Field Epidemiology Training Programme for frontline nurses. This is a 3-month in-service training programme with a focus on data management, surveillance, and interpretation thereof when responding to outbreaks (National Institute for Communicable Diseases, 2024).

The Department of Clinical Microbiology and Infectious Diseases of the University of Witwatersrand offers a two year, online programme for professional nurses with a focus on microbiology and infection prevention and control (University of Witwatersrand, 2024).

During the COVID-19 pandemic, a group of researchers developed a training programme for professional nurses caring for critically ill patients in South Africa, based on their scope of practice requirements, literature review, and consultation with the NDoH (National Department of Health) (Jordan, Iwu-Jaj, Mokoka *et al.*, 2021). No follow up data after the implementation of the programme has been published to date.

2.5 LEGISLATION, STRATEGIES AND GUIDELINES

One of the many lessons learned during the COVID-19 pandemic is that global corporation is required in the prevention and management of disease outbreaks. Disease outbreak legislation of a country is developed to protect its citizens and assets based on the specific population and resource frameworks. International and national disease outbreak legislation relevant in South Africa is discussed below. The figure below indicated the presentation of the information.

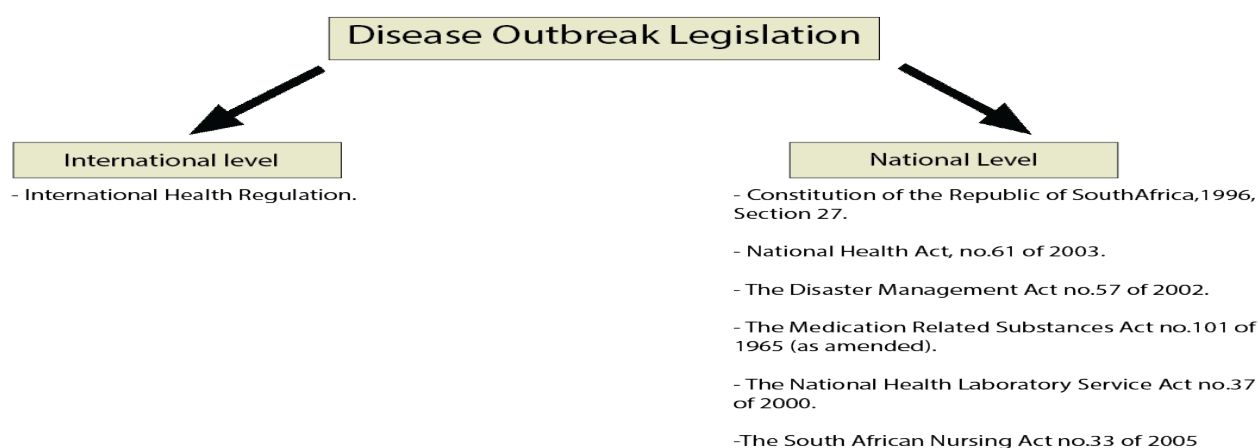


Figure 2.3: Disease Outbreak Legislation

2.5.1 International Health Regulation

The International Health Regulation (INR) is coordinated by the WHO, binding 196 member countries to detect, assess, and respond to any healthcare incident that could develop into a Public Health Emergency of Interest (PHEI) or Concern (PHEC), and provide support in the preparation for and management of disease outbreak events (World Health Organization, 2024a). South Africa is a member of the World Health Organization, United Nations, The Commonwealth, and BRICKS (An inter-governmental organization between Brazil, Russia, India, China, South Africa, Egypt, Ethiopia, Iran, and the United Arab Emirates) and is regarded as the leader in healthcare on the African continent.

2.5.2 National Legislation

- The Constitution of the Republic of South Africa, 1996, Section 27 states that every person has the right to health, food and water, social security as well as social assistance (South Africa (Republic), 1996).

- The following chapters in the National Health Act, no 61 of 2003 are relevant to disease outbreak management. The chapter number is presented in brackets. Responsibility for Health (1); Rights and Duties of Users (2); National, Provincial, and District Health Structures (3; 4; 5); Health Establishments (6); Human Resource Planning and Academic Health Complexes (7); National Health Research and Information (9) and, Health Officers and Compliance Procedures (10) (South Africa (Republic), 2003a). In the National Health Act, 61 of 2003, Regulation 27, the following chapters are included relevant to disease outbreaks. The chapter numbers are included in brackets: Communicable Disease Structures and Responsibilities of Health Establishments (2); Notifiable Communicable Diseases (3); Prevention and Control of Communicable Diseases by Health Authorities and Heads of Institutions (4); Mandatory Medical Examination, Isolation and Quarantine (5); Prevention of the Transmission of Communicable Diseases from Biological Agents and Vectors to Persons (6); Offences and Penalties (7) and, a list of reportable communicable and Non-communicable diseases (South Africa (Republic), 2003a).
- The Disaster Management Act no. 57 of 2002 as well as the Disaster Management Amendment Act no 16 of 2015, provides a comprehensive framework for the management of disasters including disease outbreak events (South Africa (Republic), 2002; South Africa (Republic), 2015).
- The Medication Related Substances Act no 101 of 1965, as Amended provides for the South African Health Products Regulatory Authority (SAHPRA), which regulates manufacturers, all products as well as medication (including vaccines), and devices used for the treatment of humans and animals as a regulatory authority (South Africa (Republic), 1965).
- The National Health Laboratory Service Act no. 37 of 2000, provides for the establishment of the National Health Laboratory Service (NHLS), affordable, quality laboratory services for the country as well as the National Institute for Communicable Diseases (NICD), National Institute for Occupational Health (NIOH), and the National Biobank (South Africa (Republic), 2000).

Regulation 178. Regulation Relating to the Registration of Microbiological Laboratories and the Acquisition, Importation, Handling, Maintenance and Supply of Human Pathogens (South Africa (Republic), 2003b) and; Regulations for Hazardous Biological Agents (South Africa (Republic), 1995).

2.5.2.1 Nursing in South Africa

The South African Nursing Act no 33 of 2005, including regulations, is administered by the South African Nursing Council (SANC). The objectives of SANC are to protect the public, provide quality nursing services, regulate quality nursing, and education, and maintain practice standards (South Africa (Republic), 2005).

- Regulations Regarding Scope of Practice for Nurses and Midwives. May 2020.
The regulation provides the scope of practice for the Professional Nurse, Staff Nurse, Auxiliary Nurse, as well as Midwives (South Africa (Republic), 2020).

Guidelines and strategies relevant to disease outbreak management in South Africa are presented in Table 2.5.

Table 2.5. South African guidelines and strategies are relevant to disease outbreak management.

Title	Sourced From
National Department of Health Strategic Plan 2020/2021	Department of Health. (2020). National Department of Health Strategic Plan 2020/2021-2024-2025. South Africa. ISBN: 978-0-621-48280-5 https://www.health.gov.za/wp-content/uploads/2020/11/dephhealthstrategicplanfinal2020-21to2024-25-1.pdf
National Department of Health. Infection Prevention and Control Strategic Framework. March 2020.	Department of Health. https://www.health.gov.za/wp-content/uploads/2020/11/practical-manual-for-implementation-of-the-national-ipc-strategic-framework-march-2020.pdf
National Department of Health. Practical Manual for Implementing of National Infection Prevention and Control	Department of Health. https://www.health.gov.za/wp-content/uploads/2020/11/practical-manual-for-

Infection Prevention Framework. March 2020.	implementation-of-the-national-ipc-strategic-framework-march-2020.pdf
National Department of Health. COVID-19 Disease: Infection Prevention Guidelines. Version 2 (21 May 2020).	Department of Health. https://www.nicd.ac.za/wp-content/uploads/2020/05/ipc-guidelines-covid-19-version-2-21-may-2020.pdf
National Department of Health. South African Antimicrobial Resistance National Strategy Framework 2018 – 2024.	Department of Health. https://knowledgehub.health.gov.za/system/files/elib/downloads/2020-03/AMR%20National%20Action%20Plan%202018%20-%202024.pdf
BRICS: Pandemic Prevention Preparedness Response and Recovery (3P2R) Framework is in development	Framework is in development
National Department of Health. Ideal Hospital Realisation and Maintenance Framework Version-2. April 2023.	Department of Health. https://www.google.com/search?q=How+to+reference+Ideal+Hospital+Framework+(1+April+2023)+Version+2+-+Measures+and+explanatory+notes+adopted+from+OHSC+tools&rlz=1C1GCEU_enZA844ZA848&oq=How+to+reference+Ideal+Hospital+Framework+(1+April+2023)+Version+2+-+Measures+and+explanatory+notes+adopted+from+OHSC+tools&gs_lcrp=EgZjaHJvbWUyBggAEEUYOdIBCTExOTE1ajBqN6gCCLACAQ&sourceid=chrome&ie=UTF-8
South African Nursing Council. Continuous Professional Development Framework for Nurses and Midwives in South Africa (nd).	South African Nursing Council. https://www.sanc.co.za/wp-content/uploads/2022/07/SANC-CPD-Framework_compressed.pdf

The South African legislative environment lends itself to comprehensive disease outbreak management when implemented with a focused approach to the prevention and management of diseases.

2.6 ETHICAL CONSIDERATIONS DURING DISEASE OUTBREAKS

Balancing risks, as well as the needs of the population often leads to strained relationships between the government and the population during and after disease outbreaks. At the time of this writing, the United Kingdom government, more specifically Boris Johnson (The Prime Minister during the start of the COVID-19 pandemic), his Chief Adviser, the Head of Communications as well as the Head of Ethics have to testify before a Public COVID-19 Enquiry Committee justifying their decisions and actions during the COVID-19 pandemic (Frayer, 2023). The ethical considerations during disease outbreaks is presented according to the diagram below. See Figure 2.4.

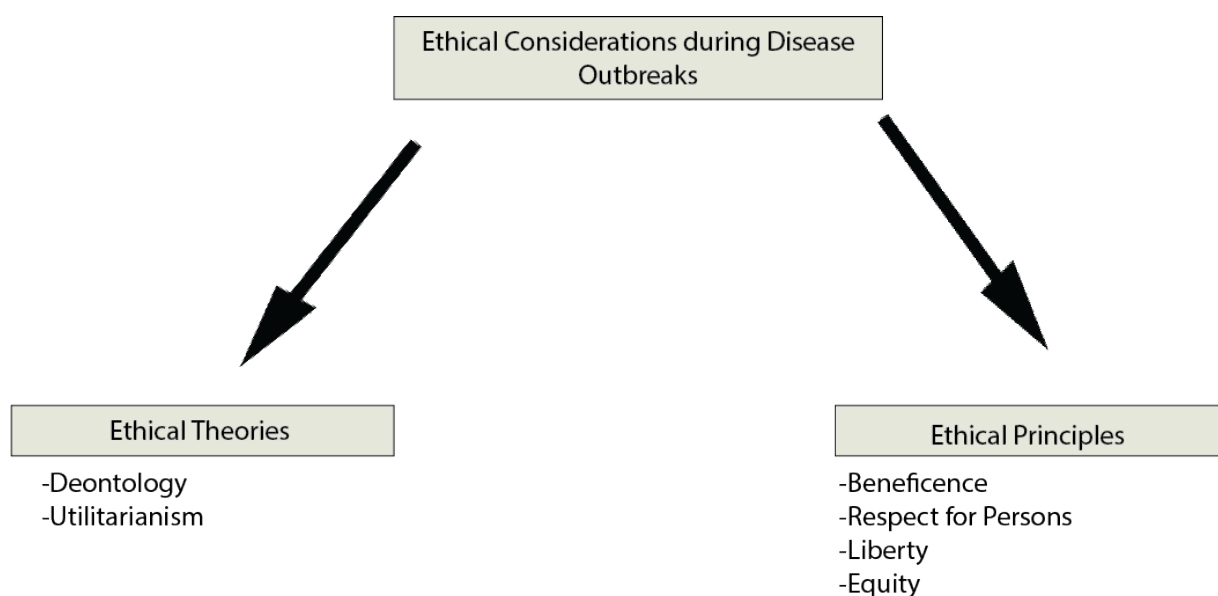


Figure 2.4: Ethical considerations during disease outbreaks

2.6.1 Ethical Theories

Ethical theories relevant to disease outbreaks, including examples are presented below.

- **Deontological theory** is applied when people are judged by their morals based on their ability to follow rules and regulations without taking into consideration their

circumstances (Singer, 2024). This was evident when the South African government deployed the South African National Defense Force (SANDF) during the highest Alert Level 5 Lockdown during the COVID-19 pandemic to enforce the time curfew rules, without taking into consideration citizens' living arrangements e.g. in a house or on the street.

- **Utilitarian theory** is applied when decisions are made after calculation of the consequences thereof, which will lead to the greater good of the masses (Singer, 2024). This was evident when hospitals canceled planned operating procedures during the COVID-19 pandemic to prevent unnecessary exposure of patients and staff, and to re-allocate operating room staff and resources to other units. The South African Government placed a ban on the trade of alcohol and cigarettes during COVID-19 to minimize alcohol related injuries in an attempt to lighten the burden of healthcare staff and to ensure optimal use of beds for COVID-19-infected patients.

2.6.2 Ethical principles

Ethical principles relevant to disease outbreaks, including examples are presented below.

- **The principle of beneficence** is to do good and no harm. The application thereof is evident when a nurse ensures that patients do not die alone in an isolation area when their families are not allowed in the hospitals.
- **Utility** is the consideration of proportionality, balancing the risk of benefits with the risk of harm when making decisions. This is experienced when lock-down levels are adjusted during certain stages of the pandemic, in an attempt to rescue the economy, and still ensure a level of precautionary behavior. Another example is the decision to use unregistered medication e.g., ZMapp, referred to as MEURI (Monitored Emergency Use of Unregistered and Experimental Interventions) during the 2014 Ebola outbreak (Sayburn, 2014).
- **Respect for Persons** is the acknowledgment of individuals and communities as humans with autonomy and is evident when involving community and religious leaders to contribute to the care and management of patients in a responsible manner during a disease outbreak. Noval Djokovic, an admitted *anti-vaxxer*, was refused entry into the Australian Open Tennis Tournament in 2022, and was deported (British Broadcasting Company, 2022).

- **Liberty** refers to social, political, and religious freedoms, is interrelated with the previous principle, and was under scrutiny when flight restrictions were imposed on all countries during the COVID-19 pandemic.
- **Equity** refers to the supply of resources and support to individuals and communities according to their individual needs. An example is when a Temporary Social Relief of Distress grant was offered to 10 million people in South Africa during the COVID-19 pandemic, who were of working age, unemployed or in informal employment, and who did not qualify for other grants. The shortage of resources e.g. oxygen, beds, and Personal Protective Equipment (PPE) resulted in inequitable clinical situations globally.

2.7 SUMMARY

Chapter two provided an overview of the complex disease outbreak environment. The management of disease outbreaks including legislation in South Africa relevant to disease outbreaks, ethical considerations, and the nurse as the most valuable human resource during an outbreak was discussed. The competencies of nurses as well as the opportunities to enhance the competencies within the South African nursing environment are presented. The methods applied in this research study are presented in Chapter Three.

CHAPTER THREE

RESEARCH METHODS

3.1 INTRODUCTION

This chapter describes the research methods used in this three-phase study to meet the study objectives. The purpose of this study was to develop a competency-based programme for nurses on disease outbreak management. Critical Realism as research paradigm is discussed. A summary of this chapter is included.

3.2 RESEARCH PARADIGM

Research design refers to the scientific plan of the researcher to best address the research problem logically (Polit and Beck, 2014). A multi phased mixed method, exploratory sequential design was used. This plan consist of various research methods used by the researcher to best address the research objectives. Mixed methods was used in this study to develop a programme for nurses on disease outbreak management.

3.2.1 Mixed Methods

The mixed method design was appropriate in this study, as it allowed the integration of data collected from both qualitative and quantitative research designs. The researcher could explore the research problem from different perspectives in an attempt to gain comprehensive insight into the problem. Mixed method design research has previously been described by Teddlie and Tashakkori (2009), Johnson, Onwegbuzie, and Turner (2004), and Ivankova and Sticks (2007). Patton explained that when numeric data (quantitative) as well as text-rich data (qualitative) is collected, a 'responsible' approach to the research question is displayed (Patton, 2002). Creswell supports the before mentioned statement but cautioned that mixed methods is the synergizing of qualitative and quantitative data with the purpose of integrating both data sets which provides insight into the research problem, and not merely the combination of two data sets to make meta-inferences (Creswell, 2022).

Informed by the work of Green and Thorogood (2014), the *breadth* of the data in this study was enhanced by including different data collection methods (scoping review, in-depth interviews, and Delhi-survey and validation techniques). The *depth* of the data was addressed by including different sources (literature, members of the multidisciplinary team, nurses, and

subject experts). The research methods used in the phases of this study are included in Table 3.1.

Table 3.1: Research methods according to the phases in this study

Phase	Method
Phase 1 Step 1: Scoping review	
Phase 1: Step 2: Interviews (Healthcare Professionals)	Qualitative
Phase 1: Step 3: Interviews (Professional Nurses)	Qualitative
Phase 2: Step 1: Triangulation through a Delphi survey	Quantitative
Phase 2: Step 2: Development of the programme	
Phase 3: Validation of the programme	Quantitative

3.2.2 A Multi phased Approach

The researcher interrogated the research question by exploring the experiences of a multi-layered workforce in an ill-defined environment, which justified a stratified approach. A multi-phased mixed method, exploratory sequential design was an appropriate answer to meet the research objectives. See a summary of the methods in Appendix B.

3.3 METHODS

3.3.1 Exploratory Strategies

Explorative research methods allow for insight into contexts not previously lensed and expose concepts worthy of further research. This depends on the ability of the researcher to include the adaption of strategies to best address the needs of the participants to enable them to answer the research questions. The accommodation of participants' features during the data collection process lends itself to the inclusion of additional data unknown to the researcher during the development of the study protocol (Creswell, 2022).

An exploratory approach was suitable for this study as the COVID-19 pandemic was most nurses' first experience of a disease outbreak of pandemic proportion. These new experiences lay undiscovered and dormant to be explored if challenged with the appropriate data collection methods (techniques). The techniques (methods) used in this study were a scoping review, in-

depth interviews, triangulation through the Delphi survey, and the development and validation of the programme.

3.3.2 Sequential Strategies

Integration of data occurs when data collection phases are followed in a specific order and the content of one phase is used to develop the next. Adhering to a planned order of events (data collection stages) based on the results of the previous stage has been referred to as *building* (Fetters, Curry, and Creswell, 2013). In this study, the data from one step or phase informs the next in that results from the scoping review helped to formulate the questions in the in-depth interviews. Qualitative data from phase one (in-depth interviews) as well as the results from the scoping review was triangulated through the Delphi survey the first step in phase two. The results of the before mentioned were used to develop the competency-based programme. In phase 3 of this study, the programme was validated by experts in the field of nursing. A detailed description of successional phases contributes to the rigor and validity of the findings. The sequential phases in this study are demonstrated in Figure 3.2.

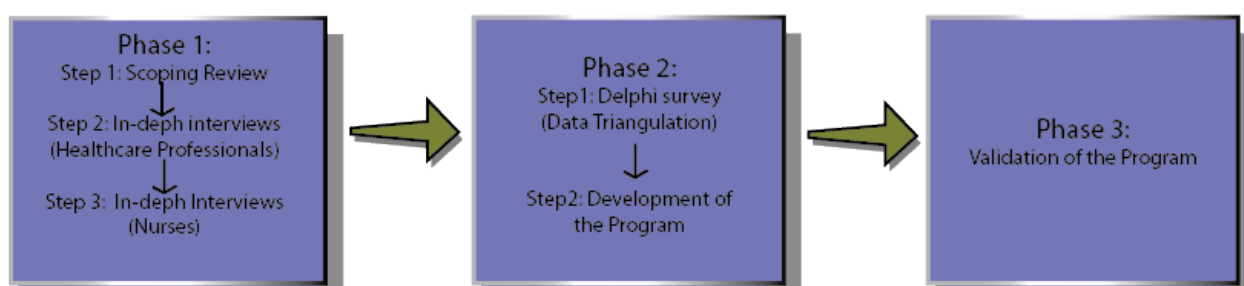


Figure 3.1: The sequential phases in this study.

3.3.3 Qualitative Research

Qualitative research explores the social experiences, views, and ideas of the population and individuals with data collection methods for the purpose of understanding. Qualitative research techniques allow participants to share individualized rich descriptive data about their experiences and can be shared without logic and justification. The data is often un-refined. Inductive methods are used during data analysis without pre-conceived ideas which contributes to the 'un-predictableness' of the results and un-biasness of the researcher (Ugwu and Eze,

2023). In this study, in-depth interviews were conducted with healthcare professionals as well as nurses.

3.3.4 Quantitative Research

Quantitative research methods allow for the confirmation of relationships between variables through a systematic standardized process (statistical analysis). This allows for the representation of the data in numerical values through tables, graphs, and charts (Cresswell, 2022). The quantitative methods in this study are the Delphi-technique and validation of the curriculum, developed for the competency-based programme.

The integration of the research phases methods and objectives are presented in Table 3.2

Table 3.2. Research phases, steps and objectives.

Phase	Step	Study objective (s)
Phase One: Identification of the needs of nurses	Step 1: Conduction of a Scoping review	To investigate the educational needs of nurses during outbreaks through a comprehensive scoping review.
	Step 2: Conducting in-depth interviews with healthcare professionals	To elicit the challenges nurses experienced during the COVID-19 pandemic, by conducting in-depth interviews with a group of healthcare professionals.
	Step 3: Conducting in-depth interviews with nurses	To elicit the challenges nurses experienced during the COVID-19 pandemic, by conducting in-depth interviews with a group of professional nurses.
Phase Two: Development of the programme	Step 1: Conducting a Delphi-survey	To triangulate the data based on the information obtained in the study (a scoping review, and in-depth interviews).
	Step 2: Programme construction	To develop a programme based on the data obtained in the previous step
Phase Three: Validation of the programme	Programme Validation	To validate the programme using a group of national experts.

3.4 CRITICAL REALISM AS THE RESEARCH PARADIGM

The philosophical assumptions of the researcher are developed by the researcher's worldview, which is formed by experience and socialization within the specific field of study. These assumptions reflect the researcher's view of reality (ontology) as well as how it is known (epistemology), values (axiology), methodological approach (methodology), and the presentation style of the work referred to as the rhetoric approach (Creswell, 2022).

The researcher believes that the complex phenomena being studied, demand a multi-phase approach, which contributes to the objectiveness of viewing the phenomena as comprehensively as possible, and that it can be achieved through a critical realist approach. This stance is supported by the previous work of Taylor, whereby he concluded that Critical Realism provides an opportunity for the researcher to explore and identify all aspects that could have contributed to the phenomena, and will allow the researcher the freedom to contextualize the phenomenon (Taylor, 2018).

Critical Realism originated from the 1975 work of Roy Bhaskar (in Williams, Rycroft-Malone, and Burton, 2017), who differentiated between objective reality as well as the individual's subjective reflection of the truth. Critical Realism combines the external world with the socially constructed world and acts as a mediator between positivism and constructivism on the Positivist – Constructivist Continuum whereby positivism is regarded as the generation of knowledge through scientific measuring and verification of experiences and events; and constructivism is the development of knowledge through the interceptions of experiences and, is subjective by nature. Contextualization of the two different worlds occurs when engaging with Critical Realism to explore a complex phenomenon (Williams, Rycroft-Malone, and Burton, 2017). Critical realists believe that a deep understanding of phenomena is achieved by exploring the core of the phenomena (Paprio, Malik, Punjabi *et al.*, 2013). This was acknowledged by Taylor when he stated that a Critical Realism approach allows for the exploration and identification of all aspects that could have contributed (caused) the phenomena (experience), and allows the researcher the freedom to contextualize the phenomenon if all the layers are known (Taylor, 2018).

3.4.1 The Ontological Assumptions of Critical Realism

Critical Realists believe that the knowledge humans have and the experiences they can recall represents the small superficial identity of a multi layered reality and is often referred to as the

‘tip-of-the-iceberg’. The critical realist’s belief of knowledge is explained below in three domains.

- Domain one: The Real Level represents the social and natural objects that exist irrespective if we are aware of it or understand it. Objects within this domain have interrelated structures that determine how the object will act as well as initiate change.
- Domain two: The Actual refers to the events that occur when the aforementioned is activated, is interactive, changes take place, and is not always observed.
- Domain three: The Empirical represents interaction with the above, as experienced and observed by humans, and is regarded as superficial.

The ontology of Critical Realism is demonstrated below in Figure 3.2.

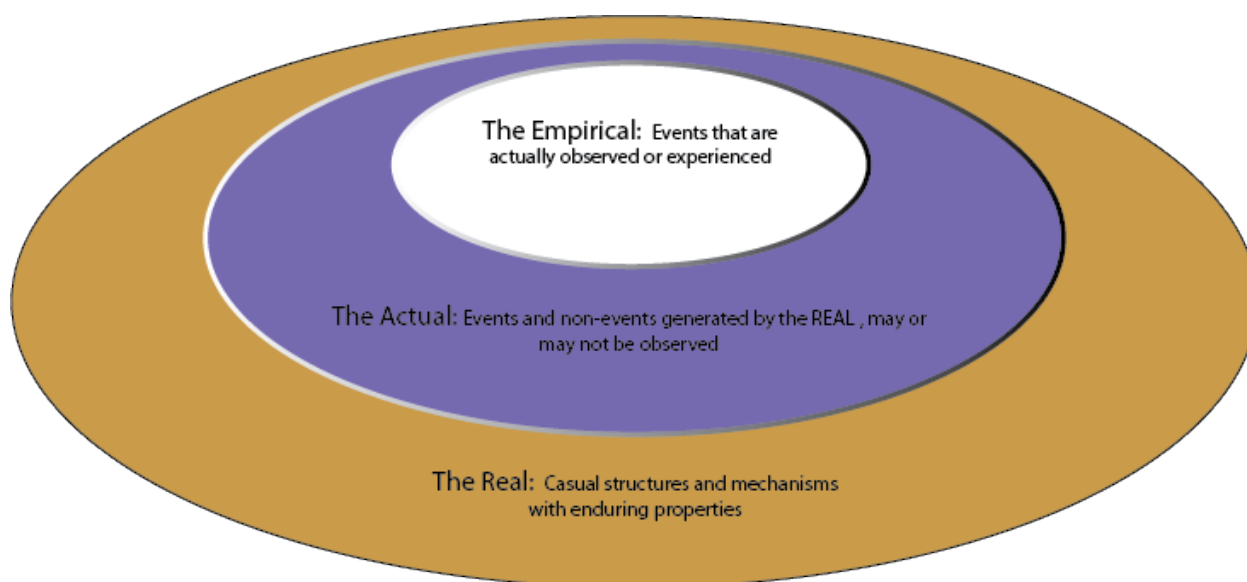


Figure 3.2: The Stratified Ontology of the Critical Realist (Saunders, Lewis, Thornhill *et al.*, 2019)

3.4.2 The Epistemological Assumptions of Critical Realism

Critical realists gain insight into phenomena by interrogating the empirical (superficial) layer of knowledge (experiences), through retrodution strategies. Retroductive reasoning allows for alternative exploration of the phenomena in an attempt to understand the underlying causal (core) of the phenomenon (Eastwood, Jalaludin, and Kemp, 2014). Retrodution reasoning depends on abductive reasoning and counterfactual thinking.

Abductive reasoning allows for “best-explanations”, making inferences based on the information available (context), rather than “superficial observations” of experiences in an

attempt to understand a phenomenon (Mirza, Akhtar-Danesh, Noesgraad *et al.*, 2014). In this study, it is applied through the development of the research objectives to best answer the research question as well as the expansion of questions during the data collection phase of the in-depth interviews e.g. 'What do you think could have caused this...'

Counterfactual thinking allows the individual to think through alternative scenarios and identifies elements that should have been present, or not, for the same or different phenomena (experiences) to occur. Counterfactual thinking asks the 'what might have been if...?' question and requires the participant to adopt a temporary observing role imagining phenomena (experiences) presented in different scenarios to determine what contributed to the initial phenomena (experience). In this study, it is applied through the expansion of questions during in-depth interviews e.g. 'What would have happened if?'

3.4.3 Judgmental Rationality

Judgmental rationality is regarded as the 'holy trinity' of Critical Realism and is defined as the motivation to decide on the most plausible reality when contradicting or competing accounts of the epistemic are presented (Wilkinson, Quaraushi, Irfan *et al.*, 2022). In this study, the data analysis did not provide any competing statements (epistemic). The findings of the scoping review, in-depth interviews as well as the comments and scores of the Delphi-survey were presented to the study supervisors, and the statements included in the Delphi-survey were supported by literature.

3.4.4 The Relevance of Critical Realism in the Healthcare Environment

Critical Realism attempts to find answers to a phenomenon in a complex real world by confronting the multi-faceted environment (Nelson and Williams, 2014). The current pandemic contributed complexity to an already uncertain global, challenged multi-role player healthcare environment. The aforementioned is also evident in the persistently challenged nature of the South African healthcare environment.

Researchers have been using a critical-realist approach in nursing studies since Sayer published his work in 1992 (in Wilson and McCormack 2006), wherein he admitted that a mix of methodologies is a necessity to evaluate programmes in healthcare and supported the use of Critical Realism in practice development studies (Wilson and McCormack 2006). Previously, palliative and Infection Prevention and Control nursing studies have been conducted based on

the critical realist methodology (Tolson, McIntosh, Loftus *et al.*, 2007; Nelson and Williams, 2014). This has been supported by the work of Clark whereby he concluded that a critical realist approach to nursing studies is relevant as it acknowledges a collaborative, multi-disciplinary partnership in both the theoretical and clinical domain. It allows for structure to guide skills in the expansion of practices including evaluation that reflects a realistic approach. A critical realist strives to understand the complex, diverse environment of nursing and embraces evidence-based practices (Clark, Lissel, and Davis, 2008).

Principles of Critical Realism related to healthcare research are also described by Reed when he refers to the critical realist approach as original methods to explain the expansion of nursing knowledge, and the inclusion of a continuous multitude of experiences to enhance nursing theory (Reed, 2006). The aforementioned also acknowledges the diverse beliefs, frame of references, and attitudes towards nursing care, illness, and cure, amongst nurses as well as patients (Reed, 2006). This is essential in the South African healthcare environment as the country is known for its multi-cultural-ethnic population, also referred to as the 'rainbow nation'.

The ontology of Critical Realism in relation to disease outbreak nursing is explained in Table 3.3 below.

Table 3.3: The Ontology of Critical Realism Applied to Disease Outbreak Nursing

Domain 1: The Real • Microorganisms exist • Nursology is a social construct	Domain 2: The Actual • Diseases develop and an outbreak is declared • Nurses develop disease outbreak knowledge and skills
Domain 3: The Empirical • Interaction between disease, patient, and the nurse • Knowledge and skills of the nurse are challenged	

In the *first domain* referred to as the Real Level: Micro-organisms are present irrespective of human knowledge of their existence. Nursology is a social construct focusing on caring for the diseased and precautionary measures.

In the *second domain* referred to as the Actual Level: Microorganisms cause diseases, known or unknown to us, and an outbreak is declared if the disease has been observed. Nurses have disease outbreak knowledge and skills, which are not challenged during non-disease outbreak times.

In the *third domain* referred to as the Empirical Level: There is an interaction between the disease (the patient) and the nurse. The nurse's competencies are challenged by caring for the patient.

3.5 PHASE ONE: IDENTIFICATION OF THE NEEDS OF NURSES

The purpose of phase one is to determine what the needs of nurses are during a disease outbreak event.

3.5.1 Step One: Objective 1- Scoping Review

Motivation to conduct a scoping review as the first phase in this study was based on the characteristics of scoping reviews as described by O'Brien, Levac, Colquhoun (2016), as well as Munn, Peters, Stern *et al* (2018). A scoping review allows the researcher to position the topic in the field of research at the time of data collection. It allows for contextualization of the publication landscape, as it identifies the researchers in the specific field, and identifies theories as well as concepts relevant to the topic. The identification of areas that have not been adequately addressed, as well as research saturated areas relevant to the topic, may be identified (O'Brien *et al.*, 2016; Munn *et al.*, 2018). In this study the researcher wanted to explore the research landscape relevant to the needs of nurses during disease outbreaks, identification of who and how studies are conducted and published, the findings thereof as well as the identification of areas relevant to the topic that has been overseen, or over-focused by researchers.

The philosophical lens of critical realism allows for the objective 'real' and subjective 'truth' of a concept which demands a deep understanding and contextualization of the phenomenon. The scoping review facilitates the above as it lends itself to the inclusion of a variety of publications from any source. This supports the re-contextualization of the topic explored.

3.5.2 Scoping review method

3.5.2.1 Research design

In this study, the Johanna Biggs Institute (JBI) Framework was followed as described by Peters in 2020 (Peters, Godfrey, McInrney *et al.*, 2020). In order to ensure transparency for the scoping review, an a priori protocol was developed and approved based on the JBI prioriframework (Peters *et al.*, 2020). The scoping review framework consists of: a research question; inclusion criteria; literature search; selection of studies; charting of the data; critical appraisal of the sources and; synthesis of the results. The results are presented in Chapter 4.

3.5.2.2 Research question

The following was question was developed: *‘What are the needs of nurses caring for patients during disease outbreak events?’*

3.5.2.3 Inclusion and exclusion criteria

Participants: All publications referring to the needs of nurses who cared for patients during a disease outbreak event were included. Due to the diverse nursing categories in different countries e.g. professional nurse, staff nurse, registered nurse, no differentiation was made between the categories of nurses. Publications from 1981 were included as AIDS (Acquired Immune Deficiency Syndrome) was first acknowledged as a disease in 1981. All publications must include ethical clearance from ethical bodies for conducting the research presented/published.

Concept: All publications that refer to a nurse e.g. a person who takes responsibility for the care of a patient during a disease outbreak. For the purpose of this dissertation, the term disease outbreak is defined as the occurrence or increase of a disease in an area or population where it is not expected and includes endemics, epidemics, and pandemics. The term need refers to the 'lack of' something that impacts the ability of the nurse to care for the patient.

Context: Disease outbreaks occurs globally. One of the objectives of this scoping review is to determine how research is conducted on the topic. Therefore, the publications must refer to a disease outbreak event. All countries are included. All areas of care (rural, clinics, or hospital-based) are included. All stages during the disease outbreak event are included.

Types of Evidence Sources: All sources are included and could include primary studies, reports, systematic reviews, guidelines, websites, and policy documents). Publications published in English are included.

3.5.2.4 Literature search

A three-step search strategy as described by the JBI institute was used (Peters *et al.*, 2020). The search strategy included the inclusion of the university librarian for technical support and access to the databases. An initial search was conducted in November 2021 to identify search words and data bases only using PubMed and CINAL to identify mesh terms subject headings and terms. The second search included a more comprehensive approach in PubMed, Medline, CINAL, Scopus, ProQuest, and Cochrane. The reference lists of the publications were reviewed for possible items to be included.

3.5.2.5 Selection of publications

Publications were selected by two independent reviewers by reviewing the titles, and abstracts. When the title and abstract complied with the inclusion criteria, the full article was read for eligibility. A third independent reviewer was available to assist if disagreements arise. It was not necessary to consult with the third reviewer. The outcomes of this search is presented in the PRISMA-ScR flow diagram.

3.5.2.6 Data charting process

Data from publications that was accepted for inclusion was extracted into a document developed by the researcher which includes the following headings: title; reference; year of publication; aim; sample size; qualification of study population; research methods; data collection methods; duration of the intervention; outcomes and ; key findings.

3.5.2.7 Synthesis and analysis of results

The following results are presented descriptively by basic frequency counts: sources per data base, sources per country, year of publication, sample size, qualification of the population, research methods, and data collection methods. The JBI framework for content analysis was used for basic content analysis of the findings (Pollock, Peters, Khalil *et al.*, 2023). See Table 3.4.

Table 3.4: Application of the JBI Framework for Content Analysis

JBI Framework for Content Analysis (2023)		Application
1	Immersion in the data	The transcribed data from the data chart inserted in the key findings column were read and re-read for understanding.
2	Open coding	All the key findings were listed, including the source reference number.
3	Development of a coding framework	The findings were presented to the study supervisors. Terms with similar meanings were clustered together.
4	Extracting and organizing	Initial categories were identified. Self-safety, Decision-making and learning skills, Adaptability skills, Communication management, People management, Psychological support, Disease and clinical skills related terms.
5	Categorization	Main and sub-themes were identified after reviewing the initial categories. See Table 4.5

Categories and sub-categories were presented in table format. The results of the scoping review are presented in Chapter Four.

3.5.3 Step Two: Objective 2- In-depth interviews with Healthcare Professionals

The objective of step two was to determine what the needs of nurses were during the COVID-19 pandemic according to healthcare professionals that worked alongside the nurses. The sensitive nature of the topic was confirmed during casual, pre-study conversations with members of the multidisciplinary team as well as the content displayed on social media regarding the experiences of nurses during the COVID-19 pandemic. This motivated the researcher to conduct in-depth interviews, to facilitate a safe (confidential and anonymous) environment for participants to share their experiences. A distress protocol was developed and available for all participants if needed. This interview therapeutic environment has previously been described by Roller and Lavrakas in 2015.

The researcher believes that the one-to-one discussions between interviewer and interviewee would result in depth and quality of information. Minichiello, Aroni, and Hays (2008) describe three sequential aspects that determine the outcome of the IDI as the relationship between interviewer and interviewee; the interview event, and, the analysis of the data, including skillful communication methods and well-constructed content-loaded questions (Minichiello *et al.*, 2008). All the interviews were conducted by the researcher.

3.5.3.1 Research design

The study design for this phase is exploratory, descriptive and qualitative.

3.5.3.2 Study population and sample

Healthcare professionals were purposefully chosen to represent a multidisciplinary team relevant to the treatment of a patient presenting with COVID-19. This group did not include nurses. Convenience sampling was applied.

The inclusion criteria for the healthcare professional group are presented below:

- The participant is part of a multidisciplinary team;
- The participant treated COVID-19 patients and;
- The participant worked with nurses in their area of specialty.

A total of eight (8) participants were included, which included two physiotherapists, five medical doctors and a paramedic. Verbal consent was obtained from all participants prior to the interview event, as well as confirmation of the date, time, and venue of the planned interview. None of the potential participants approached by the researcher declined the opportunity to participate in this research study.

3.5.3.3 Preparation for the in-depth interviews

Preparation for the in-depth interviews consisted of the development of specific documentation, collating of equipment, development of a protocol and a question guide.

- The documentation prepared for the in-depth interviews is included: (1) Participant Information Document (Appendix C); (2) Participant Consent Document (Appendix D); (3) Informed Consent for Audio-recording (Appendix E); (4) Distress Protocol (Appendix F); (5) Demographic Questionnaire (Appendix G); (6) Interview Guide for Healthcare professionals (Appendix H).

- The equipment prepared for the in-depth interviews is included: a) Notebook for field notes; b) Two black pens; c) Bottled water; d) Tissues; e) Audio-recorder and; f) Otter Ai (an audio-to-text transcription service powered by artificial intelligence, purchased via a subscription payment method), was used to transcribe all the recordings.
- The interview protocol was developed according to the stages below. See Table 3.5.

Table 3.5: The interview protocol stages.

No.	Stage	Purpose
1	Introduction	Introduction of the interviewer Stating the purpose of the interview Explaining the recording strategies Presenting of consent and anonymity documentation. Remind the participant of the distress protocol as well as the availability of the clinical psychologist Allow for questions Completion of the demographic questionnaire
2	General Information	Provide a short background and context
3	Awareness, attitudes/ behavior related to particular issues	Activation of the audio recorder. Stating the objectives of the interview Awareness question: Position the interviewee in a reflexive context e.g. as a member of the multi-disciplinary team treating SARS-CoV-19 patients.
4	Attitudes specific to the target objective and constructive suggestions for improvement	Presentation of the prepared questions as well as expansion and additional questions for clarity. Activation of distress protocol if required and support the participant.
5	Closure	Acknowledging the value of the participant's contribution, and ending of the interview.

- Development of the question guide

IDIs are the preferred data collection method of critical realists (Porpora, 2016; Wynn and Williams, 2020). It is believed that purposeful structured interview questions could provide realist-rich information which contributes to the validity and trustworthiness of the information. Questions included in in-depth interviews should reflect the underlying ontological and epistemological implications of critical realism, referred to as "ontology-adhering interview questions" and "realist-informed interview questions" and allow for retroductive data analysis (Brönnimann, 2021). Acknowledging the complexity of developing

such a framework, Brönniman included Bhaskar's layers (stratified) ontology of 1978, Archer's morphogenic approach of 1995 as well as the methodological realist principles of Wynn and Williams (2012) to provide a framework to question development that will expound occurrences (events), context (social structure) and effect (agency) (Brönnimann, 2021). Both Archer (1995) as well as Wynn and Williams (2012) agreed that the sequence of questions is important, and should move from the phenomenon of interest to the interactions that caused it and then to the interactions' source conditions.

The researcher prepared 3 questions to be included in the in-depth interview guide for healthcare professionals following a generalized to specific (funnel) approach. The funnel approach, as described by Roller (2020) concluded that the first question should be broad, followed by more specific topic-related questions (Roller, 2020). The three questions were:

Question 1: As a member of the multi-disciplinary team treating SARS-CoV-19 patients, can you elaborate on your experience working during the COVID-19 pandemic?

Question 2: In your opinion, what did the nurses find challenging whilst performing their professional duties during the COVID-19 pandemic?

Question 3: What contributed to the challenges or support they experienced whilst performing duties during the COVID-19 pandemic?

3.5.3.4 Pilot testing of the question guide

The researcher approached two participants (a paramedic and emergency doctor) for consent to participate in a piloting the interview question guide. Both the participants were provided with the prepared documents previously described. The interview area was selected to provide privacy. The interview protocol was followed as previously described in Table 5.1. In response to the first question, the participants first shared their own personal experiences, using highly emotive language. They found it difficult to progress further in the interview as they referred affectively back to the first question irrespective of the then current conversation. Both the participants declined the suggestion to stop the audio recording, as well as professional assistance available as per the distress protocol, and stated that they need to share their experiences. Both participants indicated that they have not attended debriefing sessions since the start of the COVID-19 pandemic for the following reasons: a) they were too tired to make the effort after a shift; b) they do not feel like sharing anything with someone who has not

experienced their situation is of any help; and c) no other opportunity was initiated by their team and employer.

These statements are significant and are acknowledged by the researcher. After consultation with the study supervisor, the sequence of the interview questions was changed by addressing the specific first and then moving to the general questions. A 'funnel-up' approach was initiated, in an attempt to meet the interview objectives. This required the participants to first reflect on the challenges they recall nurses encountered, and then allow the participants to share their own experiences, in an attempt to initiate a focused and structured response from the participants. See Appendix H. The participants were also informed of the type of questions at the beginning of the interview and assured that they would have an opportunity to share personal experiences. A comparison between the original and revised questionnaires is included in Table 3.6.

During the first interview, using the 'funnel-up' approach, the participant (013) responded to the questions in a structured manner and made use of the opportunity to reflect on her own experiences at the end of the interview. The interviewer (the researcher) experienced the 'funnel-up' interview guide as more acceptable.

Table 3.6: Comparison between the first and revised questionnaire for healthcare professionals.

Original Order of Questions		Revised Order of Questions	
1.	As a member of the multi-disciplinary team treating SARS-CoV-19 patients, can you elaborate on your experience working during the COVID-19 pandemic?	1.	In your opinion, what did the nurses find challenging whilst performing their professional nursing duties during the COVID-19 pandemic?
2.	In your opinion, what did the nurses find challenging/ acceptable whilst performing their professional nursing duties during the COVID-19 pandemic?	2.	What contributed to the challenges or support they experienced whilst performing duties during the COVID-19 pandemic?

3.	What contributed to the challenges or support they experienced whilst performing duties during the COVID-19 pandemic?	3.	As a member of the multidisciplinary team treating SARS-CoV-19 patients, can you elaborate on your experience working during the COVID-19 pandemic?

3.5.3.4.1 Planning for the in-depth interviews

Interviews were conducted between September 2022 and January 2023. An interview roster is included in Table 3.7.

Table 3.7: In-depth interview roster for healthcare professionals

Ref. No	Specialty	Date of Interview	Venue of Interview
EI 1-19	Paramedic	19/09/2022	Wits Medical Campus, Department of Nursing Education, Office
EI 2-21	Trauma and Emergency Medical Practitioner	21/09/2022	Wits Medical Campus, Department of Nursing Education, Office
013	Physiotherapist	20/01/2023	Physiotherapy Practice, Office
015	Specialist Physician	26/01/2023	Practice of the physician, Office
016	Medical Practitioner	27/01/2023	Wits Medical Campus, Department of Nursing Education, Office
021	Physiotherapist (Academic)	02/02/2023	Wits Medical Campus, Department of Nursing Education, Office
019	Anesthetist	08/02/2023	Hospital, OR office
023	Surgeon	19/04/2023	Wits Medical Campus, Department of Nursing Education, Office

All interviews were conducted by the researcher. Field notes were generated by the researcher immediately after every interview. Every recording was saved electronically and imported into Otter.ai for transcription. The transcribed data was exported and saved with the audio recording according to the interview number, and field notes in an electronic folder that is password protected.

3.5.3.5 Conducting of interviews

All interviews were conducted by the researcher. Field notes were generated by the researcher immediately after every interview. Every recording was saved electronically and imported into Otter.ai for transcription. The transcribed data was exported and saved with the audio recording according to the interview number, and field notes in an electronic folder that is password protected.

3.5.3.6 Reflexive thematic analysis

In order to answer the question, the reflexive thematic analysis framework described by Braun and Clark (2022) was used to analyze the data as it is applicable across different research paradigms, including a critical realism approach. Reflexive thematic analysis focuses on the role of the researcher during the analysis process and acknowledges the important contribution of researcher subjectivity as a resource rather than a problem during thematic analysis. It involves the interrogation of the researchers' role in the research study, choice of data collection methods, and insight into the problem as well as the results of the research events. The researcher's personal reflexivity has been discussed in Chapter One by referring to the theoretical assumptions of nursing. Functional reflexivity is described the explorative mixed methods approach to this study previously described. Disciplinary reflexivity is represented by including multidisciplinary participants and a detailed analysis of their contribution to the topic of this study. The researcher believes that the data provided by the participants are their perceptions and cannot be regarded as the absolute clear reality. Braun and Clark refer to this critical realist view of a dataset as a "mediated reflection of reality" (Braun and Clark, 2022).

The data was viewed in the context of the participant's experience at the time. In addition to the transcribed data, the researcher included field notes made after every interview to provide context at the time of the interview. Collaborative coding was used by presenting the audio and transcribed data to the study supervisors during the different phases of the data analysis

process. Reflexive statements of the researcher are included in the field notes in the Initial Coding document. The reflexive thematic phases are described in phases:

- Phase 1: Familiarizing with the data (Individual Transcripts)
- Phase 2: Initial coding
- Phase 3: Generating initial themes
- Phase 4: Developing and reviewing themes
- Phase 1: Familiarizing with the data (Individual Transcripts)

The eight transcripts were checked for detail and accuracy, by listening to the recordings whilst reading the transcripts. The transcripts as well as the field notes were read to familiarize the researcher with the in-depth interview event.

- Phase 2: Initial coding

Initial codes with numbers were assigned to the content of the eight transcripts. A total of 38 codes were developed. The coding was specific and in detail. Each interview with the codes and supporting statements are provided as well as the field notes generated by the researcher after each interview.

- Phase 3: Generating initial themes

Shared meanings were identified and coded to provide code ‘clusters’ to generate candidate themes.

- Phase 4: Developing and reviewing themes

Checking for relevance between themes for sense-making. Revision of themes by asking if the themes tell a convincing and compelling story about the important pattern across the data set in relation to the research question. A total of eight themes and 20 subthemes were developed.

3.5.4 Step Three: Objective 3 – In-depth interviews with professional nurses

In step three, interviews were conducted with professional nurses to determine what they experienced as challenging, working with patients during the COVID-19 pandemic.

3.5.4.1 Research design

The study design for this phase is exploratory, descriptive and qualitative.

3.5.4.2 Study population and sample

Nurses from different specialties were purposefully chosen to represent a multidisciplinary team relevant to the treatment of a patient presenting with COVID-19. Convenience sampling was applied.

The inclusion criteria for the non-nursing expert group are presented below:

- The participant is registered at SANC as a professional nurse.
- The participant cared for COVID-19 patients and;
- The participant worked in one of the following specialist areas: a) Emergency Department; b) ICU; c) Perioperative Area; and d) Nursing Management and; Nursing Education.

A total of twenty-eight (28) participants were included in the in-depth interviews and consisted of: a) ICU nurses x 6; b) Perioperative nurses x 6; c) Nursing Managers x 7; d) Emergency Department nurses x 4 and; e) Nursing Educators x 5. Convenience sampling was applied. Verbal consent was obtained from all participants prior to the interview event, as well as confirmation of the date, time, and venue of the planned interview. None of the potential participants approached by the researcher declined the opportunity to participate in this research study.

3.5.4.3 Preparation for the in-depth interviews

Preparation for the in-depth interviews consisted of the development of specific documentation, collating of equipment, development of a protocol and a question guide. The same documentation and equipment, as well as protocol developed and used for healthcare professionals were used. See 3.5.3.3

- *Development of the questionnaire*

The questions developed and included in the IDI interview guide for nurses were:

1. Can you elaborate on your disease outbreak training at the time before the outbreak of COVID-19?
2. How did you experience working during the COVID-19 pandemic?
3. What contributed to your experience whilst performing duties during the COVID-19 pandemic?

3.5.4.4 Conducting of interviews

Interviews were conducted between 9 July 2023 and 1 September 2023. An interview roster is included in Table 3.8.

Table 3.8: In-depth interview roster for nurses.

Reference	Specialty	Date of Interview	Venue
059	ICU	24/8/2023	Office on Wits Campus
060	ICU	24/8/2023	Office on Wits Campus
044	ICU	7/8/2023	Hospital Boardroom
046	ICU	7/8/2023	Hospital Boardroom
054	ICU	9/8/2023	Office in hospital ICU
052	ICU	10/8/2023	Coffee shop
056	Perioperative	14/8/2023	Empty theatre
055	Perioperative	11/8/2023	Office in the hospital
057	Perioperative	16/8/2023	Office on Wits Campus
051	Perioperative	7/8/2023	Hospital Boardroom
040	Perioperative	3/8/2023	Office on Wits Campus
031	Perioperative	24/7/2023	Empty theatre
027	Nursing Management	19/7/2023	Office on Wits Campus
039	Nursing Management	2/8/2023	Office on Wits Campus
036	Nursing Management	3/7/2023	Participant's office
037	Nursing Management	1/9/2023	Participant's office
025	Nursing Management	18/7/2023	Hospital Boardroom
030	Nursing Management	24/7/2023	Participant's Office
032	Nursing Management	26/7/2023	Participant's Office
038	Emergency Department	1/7/2023	Participant's house
048	Emergency Department	7/8/2023	Hospital Boardroom
047	Emergency Department	7/8/2023	Hospital Boardroom
045	Emergency Department	7/8/2023	Hospital Boardroom
058	Nursing Education	18/8/2023	Office on Wits Campus
053	Nursing Education	9/6/2023	Office on Wits Campus
043	Nursing Education	4/8/2023	Office on Wits Campus
042	Nursing Education	3/8/2023	Office on Wits Campus

041	Nursing Education	3/8/2023	Participant's office on Wits Campus

All interviews were conducted by the researcher. Field notes were generated by the researcher immediately after every interview. Every recording was saved electronically and imported into Otter.ai for transcription. The transcribed data was exported and saved with the audio recording according to the interview number, and field notes in an electronic folder that is password protected.

3.5.4.5 Reflexive thematic analysis

All interviews were conducted by the researcher. Field notes were generated by the researcher immediately after every interview. Every recording was saved electronically and imported into Otter.ai for transcription. The transcribed data was exported and saved with the audio recording according to the interview number, and field notes in an electronic folder that is password protected.

The reflexive thematic analysis phases were applied to determine what nurses experienced as most challenging during the COVID-19 pandemic.

- Phase 1: Familiarizing with the data (Individual Transcripts)

The transcripts of every group of nurses were checked for detail and accuracy, by listening to the recordings while reading the transcripts. The transcripts as well as the field notes were read to re-familiarize the researcher with the in-depth interview event.

- Phase 2: Initial Coding

In phase 2 initial codes were developed for every transcript. A total of 153 codes were generated. The codes in each group were combined and duplicates were removed. The initial total of 153 codes was reduced to 122 codes.

- Phase 3: Generating Themes of non-nursing and nursing interviews

The 122 codes of the nursing interviews and the 24 codes from the non-nursing interviews were presented to the study supervisors in a workshop. The codes were presented on wall charts to allow for rigorous analysis. Duplicate codes were removed, and themes were generated by combining codes. Themes and sub-themes were developed. A total of 64 statements were identified and included as an original statement list representing the challenges of nurses from the scoping review results and the in-depth interviews.

- Phase 4: Developing and Review Themes

A total of 10 themes with categories were developed from the original statement list and are presented below.

3.5.5. Phase Two Step 1: Objective 4- Delphi-survey

The first step in phase two of this study was to confirm and triangulate the data collected from the previous stages (scoping review, and in-depth interviews) through a Delphi survey. The results of this step determined what was used to develop the competency based programme in the second step in this phase.

Delphi method is a technique whereby participants are provided an opportunity to reach consensus about a topic as a group by rating statements resented in the form of questions (rounds). The results of each round is presented to the participants until consensus is reached. This technique is therefore characteristic of a multi staged iterative process that facilitates opportunities for the participants to reach consensus. The participants are allowed to change their rating of the statements and encouraged to provide comments (qualitative) about each statement, which is then presented in the next round for all the participants to view. Previous work on this process include that of Hasson, Keeney, and McKenna (2000) as well as Rowe and Wright (2011). The use of the Delphi survey in this study allowed for nursing experts to contribute to the development of a competency based programme for nurses on disease outbreaks from different geographical locations.

3.5.5.1 Research design

The study design for this phase is exploratory, descriptive and quantitative.

3.5.5.2 Study population and sample

Potential participants included in the first round of the Delphi survey were presented to a panel to address bias in the selection of the participants. The panel consisted of members of the Department of Nursing Education of The University of the Witwatersrand, and included specialist nurses in the field of nursing education, intensive care nursing, emergency care nursing, perioperative nursing and nursing management, as well as the two supervisors of this study.

Inclusion criteria to be nominated as a potential participant included:

1. A minimum of 20 years of experience in a specialist field
2. Be able to communicate in English
3. Registered with the South African Nursing Council
4. Holds a post graduate qualification as a specialist nurse
5. Be an active member of a specialist forum
6. Have contributed to, or have published in an academic journal relevant to the specialty
7. Have not participated in the previous focus group discussions
8. Have worked during the Covid-19 pandemic

A table with the participant code, geographical location and specialty is included below.
See Table 3.9.

Table 3.9: Participants included in the first Delphi round.

Code	Geographical Location	Specialty
D1	National: Private Healthcare Group	Trauma and Emergency Nursing. Disaster Coordinator
D2	Western Cape: Port Elizabeth: Nelson Mandela University	Academic in Critical Care Nursing
D4	Tshwane: University of Pretoria	Academic in Critical Care Nursing
D6	Gauteng: Private Nursing Education	Trauma and Emergency Nursing Disaster Coordinator
D9	Stellenbosch University	Academic in Perioperative Nursing
D10	Gauteng: University of the Witwatersrand	Academic in Critical Care Nursing
P1	Gauteng: University of the Witwatersrand	Academic in Critical Care Nursing

Each participant was allocated a code to enhance privacy and confidentiality.

A total of seven (7) experts were invited to participate in the Delphi-survey via e-mail and were provided with a participant information and consent document. See Appendix I.

3.5.5.3 Development of the Delphi-survey

Information collected from the scoping review and in-depth interviews were included in statements of the first Delphi-round.

Two additional sections 1 and 2 were included in the Delphi survey to allow participants to provide demographic data (section1) as well as a section where statements relevant to the preparation for and mode of delivery of the competency based programme is rated (section 2).

The survey was developed in REDCap (Research Electronic Data Capture) a web application where online surveys can be developed. The application allows for the generation of statistical information relevant to the participants' response per round. The researcher registered on the web via the University of the Witwatersrand and was assisted with the development of the survey by an e-learning developer of the university.

3.5.5.4 Pilot study

A pilot study was conducted with two subject experts. The researcher seemed the inclusion of the two participants appropriate based on their clinical experience, area of specialization as well as their nursing education academic background, and their previous experience with Delphi-surveys. Both the participants hold PhD qualifications in their respective specialty (Trauma and Emergency Nursing and Intensive Care Nursing). The two participants were not included in the previous data collection stages. Both the participants were invited to participate in the pilot study, and were provided with an information and consent document as well as the link to the survey once they consented. The instruction to the participants were: *Indicate if the following should be included in a competency based programme on the management of disease outbreaks by rating each statement.* Changes made to the original Delphi survey after the pilot study. A total of 82 statements were included in the Delphi-survey for Round 1. See Table 3.10.

Table 3.10: Comparison of original and revised statements included in the Delphi-survey.

Statement Number	Original Statement	Revised Statement
9-172	3: Connote is relevant nut need minor alteration	3: Connote is relevant but need minor alteration
9	Attend compulsory debriefing sessions prior to commencement of the programme	Attend compulsory debriefing sessions prior to commencement of the programme to allow for reflection of outbreak experiences
21	Design strategies to develop disease outbreak specialist	Design strategies to develop a disease outbreak specialist nurse

35	Develop basic ICU clinical skills of all categories of nurses	Develop basic skills in caring for the critically ill of all categories of nurses
45	Enhance clinical diligence	Strategies to enhance compliance to clinical routine and monotonous tasks over a long period of time
49	Communicate with limited resources	Communicate clinical information with available resources
59	Demonstrate ethical decision making skills	Develop ethical decision making skills
79	Demonstrate skills on how to cope with grief and loss	Develop skills on how to cope with grief and loss
83	Address non-compliance of healthcare providers during disease outbreaks	Develop skills to address non-compliance of healthcare providers during disease outbreaks
85	Demonstrate ethical reasoning skills	Develop ethical reasoning skills
95	Facilitate debriefing sessions during disasters	Attending of debriefing sessions during disasters
99	Demonstrate effective decision making skills	Develop effective decision making skills through intrapersonal intelligence strategies (personal judgments about own thoughts, emotions, strengths, and weaknesses, building mental models of making decisions of your own life)
115	Communicate with limited resources	Assess communication strategies with available resources
117	Communicate high volumes of information	Develop strategies for communicating high volumes of information
165	Perform purposeful monotonous tasks	Perform purposeful monotonous tasks during PPE management
169	Develop skills to address non-compliance to precautionary measures	Develop skills to address non-compliance to precautionary PPE measures

3.5.5.5. Data collection

- *Delphi round one*

In Invitation letters as well as an Information document and Consent documents were emailed to all the participants in Round 1. The participants were also informed of the invitations telephonically. All seven participants agreed and consented to participate in the Delphi-survey. The link to the instrument on REDCaP was mailed to every participant once they agreed to participate.

The revised survey consisted of 82 statements excluding the demographic data questions. The participants were provided with the following rating options:

Rating options:

- Connote not relevant
- Unable to assess connote relevance without connote revision or connote needs such revision that it would no longer be relevant
- Connote is relevant but need minor alteration
- Connote is very relevant and succinct

The participants were encouraged to comment in the comment-sections after each statement, including overall comments at the end of the survey. The comments and suggestions as well as the ratings were used to revise the survey for Round Two in consultation with the study supervisors.

Statements from Round 1 were synthesized and included in Delphi Round 2.

- *Delphi round two*

The survey for Round 2 was prepared as a Likert scale whereby the participants were required to use the following rating scale:

- 1 = not relevant and should be deleted
- 2 = item needs major revision
- 3 = relevant but need minor revision
- 4 = very relevant

A total of 63 statements were presented in 10 domains. A description of each domain was included.

Each of the participants who participated in Round One of this phase were invited again to complete Round 2. See Appendix J. The Likert tool was sent once they agreed to participate in Round 2. A total of five participants returned the completed tool. The comments and suggestions as well as the ratings were used to revise the content of the statements. All the statements were acceptable to the participants.

3.6. PHASE TWO: OBJECTIVE 5 DEVELOPMENT OF THE PROGRAMME

The decision to develop a competency-based curriculum CBC was motivated by the complexity of the disease outbreak environment (context) as well as the required knowledge, skills, and attributes (content) required by the nursing workforce to provide care. According to Kouwenhoven (2003), a CBC is:

- professional practice orientated;
- learner and learning-centered which includes individualized, flexible content engagement time for each student;
- built on the active involvement of the student with the content;
- provides a learning environment that promotes competency development;
- includes formative and summative assessment

(Kouwenhoven, 2003)

Earlier studies have also described CBC as an outcome and not input focused, self-directed by the student, and acknowledgment of prior learning (Smith and Keating, 1997). The characteristics of CBC as described above and the Adult Learning Theory of Knowles as well as the critical realist approach to learning, described by Khazem (2018) in chapter one were used to develop the curriculum.

3.6.1. Development of the Curriculum

Based on data from the Delphi-survey presented the competency-based curriculum was developed.

3.6.2 Identification of Modules

The results of the Delphi-survey aligned with the proposed modules were presented to the supervisors of the study. A consensus on the identification of modules was reached.

3.6.3 Designing of the modules

The backward design was used to design each module which included: a) identifying of results; b) deciding on the evidence; and c) learning experience (to meet the results. The backward design allows for the ‘purposeful task analysis’ as well as ‘planned coaching to meet a goal’ (Wiggins and McTighe, 2005). A total of ten modules were developed and are presented as the curriculum matrix.

3.7 PHASE THREE: OBJECTIVE 6- VALIDATION OF THE CURRICULUM MATRIX

3.7.1 Research Design

The results of the validation scores were calculated. This is the second quantitative phase in this study.

3.7.2 Study Population and Sample

The curriculum was validated by purposefully selected experts in the field of nursing education and disease outbreak management. Subject experts were included based on their experience in curriculum development and disease outbreak knowledge. All the experts were actively working during the COVID-19 pandemic.

- Motivation for the inclusion of the subject experts:

Expert 1: The participant holds an MSc degree in Occupational Health and Safety. The participant is the Head of the School of a private nursing education institution and has been in nursing education for the past 15 years. The participant has steered curriculum development projects on both undergrad and postgraduate levels and was coordinating students as well as nursing educators during the COVID-19 pandemic in seventeen private hospitals.

Expert 2: The participant holds an MSc degree in Nursing Education. Has specific experience in outbreak management of Hemorrhagic Viral Fever (Congo fever; Ebola; Lugo and COVID-19). The participant holds a postgraduate diploma in ICU- nursing and a postgraduate certificate in nephrology, as well as nursing education. The participant developed and facilitated training programme for nurses as well as multidisciplinary teams in both the private and public sectors during the COVID-19 pandemic. The participant is supervising MSc students at the University of The Witwatersrand.

Expert 3: The participant holds an MSc degree in Nursing Education, specializing in Infection Prevention and Control. The participant has 16 years of experience in the field of infection prevention and control and has developed and facilitated clinical workshops for coordinators in both the public and private sectors. The participant is currently employed as a project coordinator in the Clinical Microbiology and Infectious Diseases Department at the University of the Witwatersrand.

Each expert was provided with an information letter and consent document as well as a programme outline, curriculum matrix, and a validation document.

3.7.3 Data collection method and procedure

A validation document was developed to allow for feedback from the participants. The content of the curriculum was validated according to three design principles:

- Alignment which determines the degree by which the content of each module is aligned with the learning outcomes;
- Relevance is the degree to which the content is specifically related to the curriculum goal.
- Engagement is the degree of learner-centered approach and learner involvement with the content to meet the learning outcomes.

3.7.4 Data analysis

The percentage of the rating of each item was determined.

3.8 THE APPLICATION OF CRITICAL REALISM IN THE STUDY

The application of critical realism in this study is presented in the table below according to the characteristics described by Khazem *et al* (2018).

Table 3.11: The application of Critical Realism in the study.

	Characteristics of Critical Realism	Application in the Study
1.	Separates ontology (being) from epistemology	The researcher differentiated between the ontology (reality) and the participants' perception of that reality.

	(knowledge about being). The belief that the world exists independent of people's beliefs (Khazem <i>et al.</i>, 2018).	This was achieved by developing in-depth interview questions which allowed the participants to share their own experiences of their perceived reality freely. Inclusion of questions to explain what could have caused the experience. A detailed data trail is included in every phase of this study that enhances the trustworthiness of the findings.
2.	Allows for an in-depth investigation into a phenomenon from different angles, as reality is perceived as complex (Khazem <i>et al.</i>, 2018).	The multiphase, mixed method methodology allows for multidisciplinary data collection in a comprehensive manner, through scoping review, in-depth- interviews, as well as a Delphi-survey (for triangulation) and validation strategies. Multiple sources were accessed which included a literature review, nurses, healthcare professionals, as well as subject experts.
3.	Reality is interconnected between mechanisms and structures (interdisciplinary): An Open System (Khazem <i>et al.</i>, 2018).	A scoping review was conducted Data was collected from multiple participants using different methods. Participants in the study included: • Healthcare professionals who worked with and observed nurses • nurses from different specialties: ICU, Education, Peri-operative, Emergency Department, Management) • Nursing Experts The data from one stage determined the next sequentially

4.	The critical realist engages with retrodution which includes retroductive- and counterfactual thinking, by acknowledging an experience of a phenomenon and then working backward in an attempt to understand the phenomenon (Hobby, 2019).	The in-depth interview questions were formulated to allow participants to reflect on their experiences. Participants were probed to provide possible causes for their experiences through abductive reasoning and counterfactual thinking strategies. Retroductive activities are included in the curriculum.
5.	Health, education, and access to education are rights and freedoms and depend on the transformation of structures (Williams <i>et al.</i>, 2017).	The purpose of the study is to develop a competency-based programme that may result in the transformation of existing programmes to address the challenges nurses experienced. This programme is evidence-based. The curriculum is designed to allow relevance to nurses from all specialties
6.	The whole ontology includes the students themselves as part of the learning environment, and he argues that the learning environment is 'laminar or layered, having at least physical, biological, psychological, social and curricular dimensions' (Brown, 2009).	The curriculum is designed to accommodate the adult learning theory as well as interactive assessment activities which include theoretical, and clinical skills, communication strategies, managerial as well as the management of technology in a social construct which includes multi-disciplinary involvement.

3.9 VALIDITY, RELIABILITY, AND TRUSTWORTHINESS

The quality of a research study is measured by reliability and validity. Reliability refers to the degree of consistency and validity to the accuracy of the methods used in the study. Trustworthiness refers to the quality of the research in terms of confidence in the data that has been included, the interpretation thereof as well as the methods used in the study (Polit and Beck, 2014).

A description of how the quality criteria are applied in this study is presented below in Table 3.12.

Table 3.12: Quality criteria in this study

Quality Principle	Qualitative Phases (In-depth interviews)	Quantitative Phases (Delphi-survey and validation phase)
Truth value of evidence	Credibility: 1. A multidisciplinary participant approach 2. Inclusion criteria for the participant groups are included 3. Multiple data sources are included: scoping review, interviews, Delphi-survey and validation strategies) 4. Data was collected over a long period of time 5. The researcher trained in interviewing skills	Internal validity: 1. Data was triangulated by experts via a Delphi-survey 2. The programme was validated by experts in phase 3.
Applicability of evidence	Transferability: 1. The findings of each step is discussed in detail 2. A detailed description of each method is included 3. Findings are supported with existing literature	External validity: 1. The context of the study is described as background information. 2. Each phase is described in detail
Consistency of evidence	Dependability: 1. Continuous analysis of the information after each step to inform the next	Reliability 1. Each step is described in detail 2. Data is presented in tables and graphs.
Neutrality of evidence	Confirmability: 1. Findings were presented to supervisors through	Objectivity: 1. Participant codes were used 2. Calculated results are presented in tables and graphs.

	different phases of the study 2. Reflective notes (field notes) were included 3. Steps and decisions are described in detail 4. Findings were supported with existing evidence	

3.10 ETHICAL CONSIDERATIONS

3.10.1 Permission to Conduct the Study

Permission to conduct this study was obtained from the Human Health Ethics Committee (Medical). The study was unconditionally approved for a period of five years dated from 27 October 2021. The Clearance Certificate Number allocated to this study is M210603. See Appendix K. Permission from institutions was not required as all the participants contributed in their professional capacity and were not institutionally bound.

3.10.2 Informed Consent

Informed consent to participate in the study as well as consent for audio recording was obtained from the participants during the in-depth interviews, the Delphi-survey, and well as the validation phase. Consent was obtained from participants during the Delphi-survey as well as the curriculum validation phase. All participants were informed of their right to withdraw at any stage during the study.

3.10.3 Anonymity and Confidentiality

All participants were assured of confidentiality and anonymity in writing on the participation invitation/ information document. All data were collected by the researcher herself. The study design allowed for individual contribution of participants which increased the level of anonymity and confidentiality. No personal information was imported on documents with the participant's name as an identifier. All participants were allocated a participant code and referred to as such throughout the study and during workshops with the study supervisors.

3.10.4 Safety and Security of Data

All documents generated during the workshops e.g. flip-chart papers were placed in safe-keeping with the other hard-copy documents under lock and key, and secured by the study's

main supervisor for a period of 5 years. Electronic documents including the audio recordings are password protected and saved on a private offline operation system not accessible to the public nor via a login portal outside the mentioned offline operation system. The audio recordings on the mobile audio recording device were deleted after the recording was transferred to the operations system.

3.11 SUMMARY

This chapter provided a detailed description of the research methodology of this study including the research aim, objectives, and question of every phase. Critical Realism as the philosophical lens of the researcher was discussed as well as the application thereof in this study. Methods to ensure validity, reliability, and trustworthiness were included as well as the researcher's compliance to ethical considerations. The scoping review is described in Chapter Four.

CHAPTER FOUR

SCOPING REVIEW

4.1 INTRODUCTION

In this chapter, the findings of the first step of phase 1 is described. A brief overview of a scoping review as data collection method is described, the review question and outcomes is included. Identification of the sources of evidence and selection strategies is described as well as the data extraction method. Findings, discussions, and analysis of the data are included. The key findings of this review is presented in the summary.

4.2 THE SCOPING REVIEW

4.2.1 Review objective and question

In this study the researcher aimed to explore the research landscape relevant to the needs of nurses during disease outbreaks, identification of who and how studies are conducted and published, the findings thereof as well as the identification of areas relevant to the topic that has been overseen. The following question guided the review:

“What are the needs of nurses caring for patients during a disease outbreak event?”

4.2.2 Inclusion and exclusion criteria

The PCC mnemonic which refers to Population (participants), Concept and Context, as described by Peters et al was used to describe the criteria (Peters *et al.*, 2020).

Population (Participants): All publications referring to the needs of nurses who cared for patients during a disease outbreak event was included. Due to the diverse nursing categories in different countries e.g. professional nurse, staff nurse, registered nurse, no differentiation was made between the categories of nurses.

Concept: The term disease outbreak is defined as the occurrence or increase of a disease in an area or population where it is not expected, and includes endemics, epidemics and pandemics. The term need refers to the ‘lack of’ something that impacts on the ability of the nurse to care for the patient. Caring for a patient refers to the act of providing comprehensive evidence based support and treatment of the ill (affected by the outbreak) both physically and emotionally.

Context: All areas of care (rural, clinics or hospital based) were included. All stages during the disease outbreak event were included. The list of eligibility criteria is included in table 4.1.

Table 4.1: Eligibility criteria

Inclusion	Exclusion
Peer reviewed and non-reviewed publications, grey literature, guidelines, editorials and commentaries, reports, websites and policy documents	
Publications from 1981 ¹	
Publications published in English	Publications in other languages
Publications that focus on challenges of nurses whilst caring for patients in a disease outbreak event	
All patient care areas was included e.g. ICU, ward, Emergency Department, Perioperative areas.	

4.2.3 Information Sources and Search Strategy

The search strategy as described by the Joanna Briggs Institute was followed (Peters *et al.*, 2020). The data bases included were PubMed, Medline, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Scopus, ProQuest.

The initial search was conducted on 13 November 2021 on PubMed and CINAHL to identify Mesh terms, including subject headings and index terms that could be used in other databases. The search strategy for one searching event on PubMed, accessed on 15 November 2021 is included in Appendix L. At the time, South Africa was preparing for the fourth wave of COVID-19 infections. The second search was conducted on all the databases. The reference lists of the publications were used to identify possible publications that could be included. The last search was conducted on 25 April 2022, before the outbreak of the expected fifth COVID-19 wave in South Africa. The scoping review was conducted over a period of 6 months.

¹ Publications from 1981 were included as AIDS (Acquired Immune Deficiency Syndrome) was first acknowledged as a disease in 1981, and the uncertainty of the treatment of the disease as well as the extend of the disease at the time was not clear.

The initial limited search was conducted to identify search terms. The initial terms that were used were:

[Nurse Specialist - Education Needs - Outbreaks].

Text words from the titles accessed were used, to form the following search terms: [Knowledge – Nurse – Disease Outbreak].

Figure 4.1: Search terms

4.2.4 Selection of Sources

The selection of sources was conducted according to the following phases: a) Selection of relevant titles; b) Reading of relevant abstracts; c) Examination of full texts and; d) Presentation of the expected data to the study supervisors. The researcher checked the reference lists of the sources included in the review for potential additional publications. All potential publications were imported into Mendeley. An independent reviewer examined the sources (titles and abstracts) to determine their inclusion in this review. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for Scoping Reviews (PRISMA-ScR) were used to present the search of sources. The PRISMA-ScR for this scoping review is included in the figure 4.2.

The initial search produced 2876 publications which was retrieved from the following data bases: PubMed = 1149; ProQuest = 500; CINAL = 76; Scopus = 1141; Medline = 4; Cochrane = 6. A total of 24 duplicate publications were removed. Publications marked as ineligible by automation tools were 2110 and were removed. A total number of 742 publications were screened by reading the titles, and consisted of 715 publications from PubMed; 11 publications from ProQuest; 8 publications from Scopus, 8 publications from CINAL; and 0 publications from Medline. A total of 560 publications were excluded, after reading the abstracts. A total of 550 publications from PubMed; 2 publications from ProQuest; 2 publications from CINAL; and 5 publications from Scopus. The total number of publications sought for retrieval, and assessed for eligibility were 182. Of the 182 publications, 142 publications were excluded after reading the publication. Reasons for exclusions were: 131 publications described student challenges and; another 11 structural challenges. A total of 40 publications from the databases were included in this scoping review. The number of publications from other sources included 3 publications from websites; 4 publications from organizations and 37 publications from citation searches. A total of 44 publications were sought for retrieval and

assessed for eligibility. Twenty-two publications were excluded of which 5 publications discussed teaching strategies of student nurses and 5 publications focused on the non-nursing workforce. Another 12 publications were excluded as it focused on structural challenges only. Combined, the 40 publications from the databases and the 22 publications from other searches a total of 62 publications were included in this scoping review.

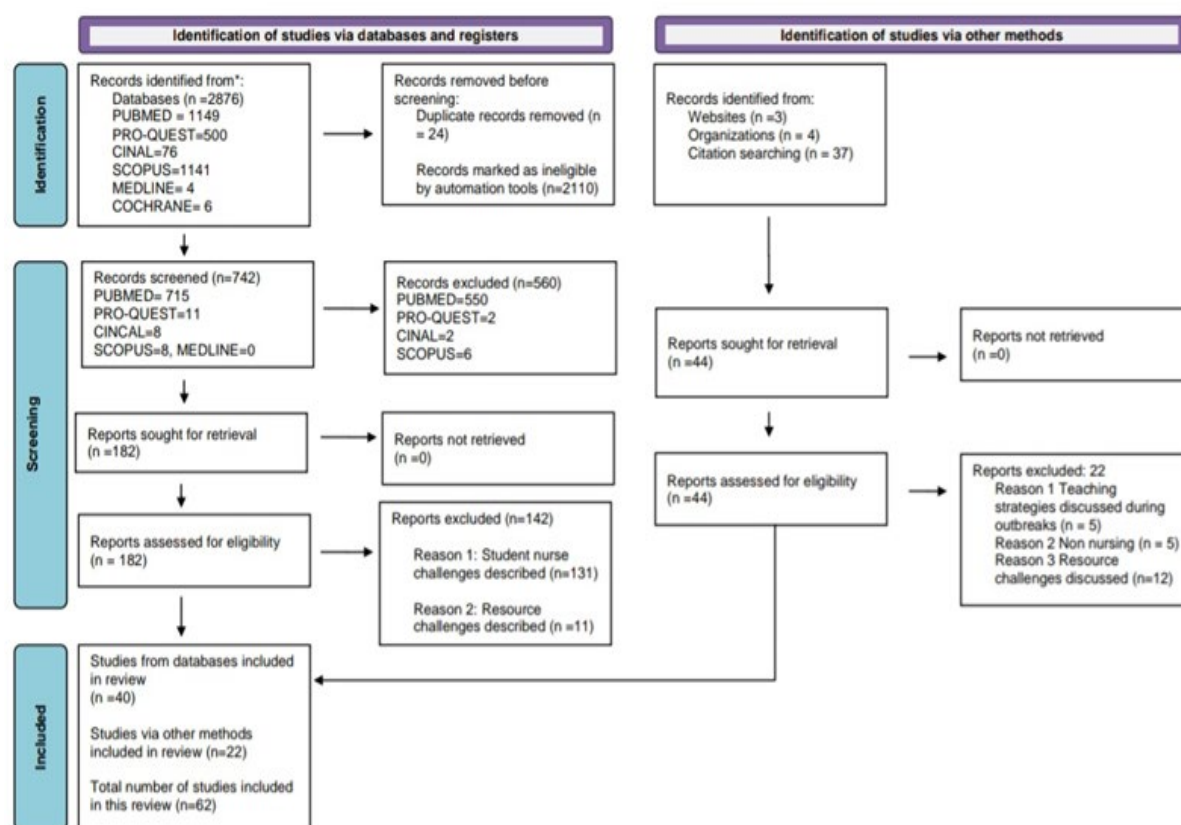


Figure 4.2: PRISMA ScR

4.2.5 Data Extraction

In preparation for bibliographic data extraction, an EXCEL document was developed to chart the data. The charting table included the following: Source number; Title; Reference Number; Year of Publication (YOP); Origin of Researchers; Aim; Sample Size; Participant Qualification; Type of Study (qualitative or quantitative), Data Selection Tools; Duration of the Intervention, Outcomes of the Studies and; Key Findings. The data was extracted independently and cross-checked with the main study supervisor. The extracted data is presented in Table 4.2.

4.2.6 Synthesis of the data

The extracted data presented descriptively as frequency counts and presented in tables and figures is: country of origin, data base, year of publication, nurse categories, and methodologies and, data collection methods. An inductive content analysis was conducted based on the JBI Framework for Content Analysis (2023).

Publications included in the scoping review are displayed below in **table 4.2**

Table 4.2 : Publications included in the scoping review						
No	Publication Reference	Year of Publication	Origin	Publication Aim	Population/ Sample	Publication Findings
1	Alsaahafi, A. J., & Cheng, A. C. (2019). Health care workers' awareness and infection control practices about Ebola virus disease in Hajj 2015. <i>Journal of Infection and Public Health</i> , 12(5), 720–725. https://doi.org/10.1016/j.jiph.2019.03.022	2015	Australia	To compare knowledge of EVD of HCW who performed Hajj, compared to those who did not.	1216	Low knowledge of self-safety, Pharmacological treatment, IPC practical training in procedures required
2	Ma, X., He, Z., Wang, Y., Jiang, L., Xu, Y., Qian, C., Sun, R., Chen, E., Hu, Z., Zhou, L., Zhou, F., Qin, T., Cao, X., An, Y., Sun, R., Zhang, X., Lin, J., Ai, Y., Wu, D., & Du, B. (2011). Knowledge and attitudes of healthcare workers in Chinese intensive care units regarding 2009 H1N1 influenza pandemic. <i>BMC Infectious Diseases</i> , 11. https://doi.org/10.1186/1471-2334-11-24	2011	China	To describe knowledge and Attitudes of critical care clinicians during the 2009 H1N1 influenza pandemic	733	Problem areas: Self-safety and that of families, IPC - in practice, Disease specific data, vaccine efficacy
3	Ruijs, W. L., la Hautvast, J., van Ijzendoorn, G., van Ansem, W. J., Elwyn, G., van der Velden, K., & Hulscher, M. E. (2012). How healthcare professionals respond to parents with religious objections to vaccination: A	2012	The Netherlands	To gain insight into the responding of HCP to parents with religious objectives to vaccination of their children	22	Vaccination decision-making process. Discussion skills of HCP needs attention.

	qualitative study. BMC Health Services Research, 12(1). https://doi.org/10.1186/1472-6963-12-231					
4	Almutairi, K. M., Alodhayani, A. A., Moussa, M., Aboshaiqah, A. E., Tumala, R. B., & Vinluan, J. M. (2016). Ebola outbreak preparedness and preventive measures among healthcare providers in Saudi Arabia. Journal of Infection in Developing Countries, 10(8), 829–836. https://doi.org/10.3855/jidc.6941	2016	Saudi Arabia	To identify the level of awareness, attitudes and practices among HCW in relation to precautionary measures to EVD	545	Managing of miss-information, Mode of transmission of EVD, but compliant with PPE description, application of knowledge is challenge
5	Alsubaie, S., Hani Temsah, M., Al-Eyadhy, A. A., Gossady, I., Hasan, G. M., Al-Rabiaah, A., Jamal, A. A., Alhaboob, A. A., Alshohime, F., & Somily, A. M. (2019). Middle East Respiratory Syndrome Coronavirus epidemic impact on healthcare workers' risk perceptions, work and personal lives. Journal of Infection in Developing Countries, 13(10), 920–926. https://doi.org/10.3855/jidc.11753	2019	Saudi Arabia	To evaluate perceived risk and anxiety levels of HCW regarding MERS	591	Self-safety, Psychological support (stress management).
6	Adongo, P. B., Tabong, P. T. N., Asampong, E., Ansong, J., Robalo, M., & Adanu, R. M. (2017). Health workers perceptions and attitude about Ghana's preparedness towards preventing, containing, and managing Ebola Virus Disease. BMC Health Services	2017	Ghana	To determine HCW's perceptions and attitudes about Ghana's preparedness toward preventing, containing and managing EBV	44	Self-safety, Transmission Precautions, PPE Effectiveness

	Research, 17(1). https://doi.org/10.1186/s12913-017-2225-0					
7	Fan, J., Hu, K., Li, X. (2020). A qualitative study on the vocational and psychological perceptions and issues of trans-disciplinary nurses during the Covid-19 outbreak. <i>Aging</i> , 12 (13), 12479 – 12492.	2020	China	To collect experiences and views of TN's at the forefront of the Covid-19 outbreak	44	Self-safety, Transmission Precautions, Effectiveness of PPE
8	Houghton, C., Meskeel, P., Delaney, H., Smalle, M., Glenton, C., Booth, A., Chan, X.H.S., Devane, D., Biestly, L.M. (2020). Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: a rapid qualitative synthesis (Review). <i>Cochrane Database of Systematic Reviews</i> . 4(CD013582). doi:1002/14651858CD013582	2020	Ireland	To identify barriers and facilitators to HCW's adherence with IPC guidelines for respiratory diseases.	20 Articles	IPC Practices and PPE, Protocol Management, Communication Skills, Time management to adhere to additional protocols
9	Shahid, H., Haider, M. Z., Taqi, M., Gulzar, A., Zamani, Z., Fatima, T., Khalid, Y., Ahmed, Z., Nadeem, H. A., & Anwer, F. (2020). COVID-19 and Its Psychological Impacts on Healthcare Staff – A Multi-Centric Comparative Cross-Sectional Study. <i>Cureus</i> . https://doi.org/10.7759/cureus.11753	2020	USA	To identify the psychological impacts of Covid-19 on healthcare staff	200	Self-rescue skills, IPC practices, communication of new info, measures to bust myths

10	Backes, M. T. S., Carvalho, K. M. de, Santos, E. K. A. dos, & Backes, D. S. (2020). New coronavirus: what does nursing have to learn and teach in times of a pandemic? Revista Brasileira de Enfermagem, 73, e20200259. https://doi.org/10.1590/0034-7167-2020-0259	2020	Brazil	To promote a theoretical reflective analysis of what nursing has to learn and teach to global society in times of Covid-19 pandemic, from the perspective of complexity thinking.	Not indicated	Complexity Thinking
11	Vatan, A., Güçlü, E., Öğütlü, A., Kibar, F. A., & Karabay, O. (2021). Knowledge and attitudes towards COVID-19 among emergency medical service workers. Revista Da Associacao Medica Brasileira, 66(11), 1553–1559. https://doi.org/10.1590/1806-9282.66.11.1553	2020	Turkey	To investigate the knowledge and attitudes of Emergency Medical Service employed who fight Covid-19 at the forefront	275	Handwashing techniques, environmental cleaning, PPE
12	Zafar, N., Jamal, Z., Khan, M.M. (2020). Preparedness of the Healthcare Personnel Against the Coronavirus Disease 2019 (COVID-19) Outbreak: An Audit Cycle. Frontiers in Public Health, 8(502). doi: 10.3389/fpubh.2020.00502	2020	Pakistan	Assessing preparedness of healthcare personnel and the effectiveness of an educational intervention	400	Transmission Precautions, People Management (visitors and families), PPE Management
13	von Strauss, E., Paillard-Borg, S., Holmgren, J., & Saaristo, P. (2017). Global nursing in an ebola viral haemorrhagic fever outbreak: Before, during and after deployment. Global Health Action, 10(1).	2017	Sweden	1. To investigate how returnee nursing staff experienced deployment. 2. How to better prepare and support staff for VHF outbreaks	44	Clinical Training, Workload re division, Leadership (Mental Health, Psychological Support, Coping Strategies)

	https://doi.org/10.1080/16549716.2017.1371427					
14	Elhadi, M., Msherghi, A., Alkeelani, M., Zorgani, A., Zaid, A., Alsuyihili, A., Buzreg, A., Ahmed, H., Elhadi, A., Khaled, A., Boughididah, T., Khel, S., Abdelkabir, M., Gaffaz, R., Bahroun, S., Alhashimi, A., Biala, M., Abulmida, S., Elharb, A., ... Amshai, A. (2020). Assessment of healthcare workers' levels of preparedness and awareness regarding Covid-19 infection in low-resource settings. American Journal of Tropical Medicine and Hygiene, 103(2), 828–833. https://doi.org/10.4269/ajtmh.20-0330	2020	Libya	To measure the leveled knowledge and preparedness regarding Covid-19	1572	Disease specifics, Transmission Precautions, Isolation techniques, Triage, PPE management
15	Al-Ashwal, FY., Kubas, M., Zawiah, M., Bitar, A.N., Saheed, R.M., Sulaiman, S.A., Khan, A.H., Ghadzi, S.M. (2020). Healthcare workers' knowledge, preparedness, counselling practices and perceived barriers to confront COVID-19: A cross-sectional study from a war-torn country, Yemen. PLoS ONE 15(12): e0243962. https://doi.org/10.1371/journal.pone.0243962	2020	Yemen	To evaluate knowledge, preparedness and counselling practices of HCW, To identify perceived barriers to manage and control Covid-19	514	Disease specific preparedness (Institutional and Personal)
16	Kassie, B. A., Adane, A., Tilahun, Y. T., Kassahun, E. A., Ayele, A. S., & Belew, A. K.	2020	Ethiopia	To determine knowledge and attitudes towards Covid-19 and	408	Knowledge was good: 78% score. Contributed to permanent

	(2020). Knowledge and attitude towards COVID-19 and associated factors among health care providers in Northwest Ethiopia. PLoS ONE, 15. https://doi.org/10.1371/journal.pone.0238415			associated factors amongst HCP in Northwest Ethiopia		awareness of epidemics and contagious disease management during non-disease outbreaks, self-safety, especially self-isolation when self is infected is problematic, religious believes for getting infected also problematic ('cursed').
17	Hu, X., Zhang, Z., Li, N., Liu, D., Zhang, L., He, W., Zhang, W., Li, Y., Zhu, C., Zhu, G., Zhang, L., Xu, F., Wang, S., Cao, X., Zhao, H., Li, Q., Zhang, X., Lin, J., Zhao, S., Du, B. (2012). Self-Reported Use of Personal Protective Equipment among Chinese Critical Care Clinicians during 2009 H1N1 Influenza Pandemic. PLoS ONE, 7(9). https://doi.org/10.1371/journal.pone.0044723	2012	China	To examine knowledge attitudes and self-reported behaviors and barriers to comply with PPE in ICU	650	General knowledge scored 77%. Practical application needs to be addressed (components of PPE, Hand hygiene).
18	Bell, S.A., Munro-Kramer, M.L., Eisenberg, M.C., Williams, G., Amarah, P., Lori, J.R. (2017). Ebola kills generations': Qualitative interviews with Liberian healthcare providers. Midwifery, 2(45), 44-49. https://doi.org/10.1016/j.midw.2016.12.005	2017	USA	To explore HCP's preparations and reactions to the EVD epidemic	58	Self-safety and Family Safety, EVD specific knowledge (Transmission methods), PPE and equipment management, FEAR, MANAGING STIGMATIZATION, SHIFTING CULTURAL PRACTICES.
19	Liu, Q., Luo, D., Haase, J.E., GUO, Q., Wang, X.Q., Liu, S., Xia, L., Liu, Z., Yang, J., Yang, B.X. (2020). The experiences of health-care	2020	China	To describe the experiences of HCP in early stages of the outbreak	13	Crises Management, Self-safety and family safety, FEAR, fatigue strategies

	providers during the COVID-19 crises in China: a qualitative study. Lancet Global Health, 8(e), 790-798. https://doi.org/10.1016/S2214-109X(20)30204-7					
20	Gümüş, K., & Başgün, A. (2021). Evaluation of the Knowledge of Operating Room Nurses of Preventive Practices for Protection Against COVID-19. Journal of Perianesthesia Nursing, 36(3), 300–304. https://doi.org/10.1016/j.jopan.2020.10.003	2021	Turkey	To describe the knowledge of OR nurses of Preventative practices for protection against Covid-19.	279	No use of algorithms and Guidelines, Transmission Methods, Environmental Cleaning
21	Leigh, L., Taylor, C., Glassman, T., Thompson, A., & Sheu, J. J. (2020). A Cross-Sectional Examination of the Factors Related to Emergency Nurses' Motivation to Protect Themselves Against an Ebola Infection. Journal of Emergency Nursing, 46(6), 814–826. https://doi.org/10.1016/j.jen.2020.05.002	2020	USA	To determine the factors motivating emergency nurses to protect themselves against EVD.	388	Response efficacy, self-efficacy, pro-activeness, disease specific info, FEAR
22	Pițigoi, D., Săndulescu, O., Ionescu, T., Nițescu, B., Nițescu, M., Streinu-Cercel, A., & Streinu-Cercel, A. (2018). Assessment of knowledge, attitudes and perceptions regarding Ebola disease in healthcare workers from a tertiary care hospital in Romania.	2018	Romania	To determine the K, A P of HCW regarding EVD in a hospital in Romania	157	Disease specific Transmission, self-safety, PPE, case management, prevention methods, treatment options, institutional preparedness

	Public Health, 164, 7-15. https://doi.org/10.1016/j.puhe.2018.07.002					
23	Tadesse, D. B., Gebrewahd, G. T., & Demoz, G. T. (2020). Knowledge, attitude, practice and psychological response toward COVID-19 among nurses during the COVID-19 outbreak in northern Ethiopia, 2020. New Microbes and New Infections, 38. https://doi.org/10.1016/j.nmni.2020.100787	2020	Ethiopia	To determine the K, P, A AND PSYCHOLOGICAL RESPONSE TOWARD Covid-19 among nurses during Covid-19 outbreak in northern Ethiopia	415	IPC Practices
24	Olowookere, S. A., Abioye-Kuteyi, E. A., Adepoju, O. K., Esan, O. T., Adeolu, T. M., Adeoye, T. K., Adepoju, A. A., & Aderogba, A. T. (2015). Knowledge, Attitude, and Practice of Health Workers in a Tertiary Hospital in Ile-Ife, Nigeria, towards Ebola Viral Disease. Journal of Tropical Medicine, 2015. https://doi.org/10.1155/2015/431317	2015	Nigeria	To determine the K, P, A of HCW in a tertiary hospital in Ile-Ife Nigeria, towards EVD	400	IPC Preparedness, IPC Practices, Disease specific information
25	Neupane, H. C., Shrestha, N., Adhikari, S., Angadi, S., Shrestha, B. K., & Gauli, B. (2020). Knowledge of health care professionals and medical students regarding covid-19 in a tertiary care hospital in nepal. Journal of the Nepal Medical Association, 58(227), 480–486. https://doi.org/10.31729/jnma.4995	2020	Nepal	To assess the K, P, A of HCP regarding Covid-19 in a medical college in Chitwan	181	40% correct on social distance, 60% correct cough etiquette. Periodical IPC practices

26	Khan, S., Khan, M., Maqsood, K., Hussain, T., Noor-ul-Huda, & Zeeshan, M. (2020). Is Pakistan prepared for the COVID-19 epidemic? A questionnaire-based survey. <i>Journal of Medical Virology</i> , 92(7), 824–832. https://doi.org/10.1002/jmv.25814	2020	Pakistan	To evaluate the basic knowledge of educational and HCW regarding Covid-19, its control and prevention	303	50% of nurses received any formal IPC training. IMPLEMENTATION of guidelines needs attention.
27	Al- Dossary, R., Alamri, M., Alboqawi, H., Al- Hosis, K., Aljeldah, M., Aljohan, M., Aljohani, K., Almadani, N., Alrasheadi, B., Falatho, R., Almazah, J. (2020). Awareness, Attitudes, Prevention and Preparations of COVID-19 Outbreak among Nurses in Saudi-Arabia. <i>International Journal of Environmental Research and Public Health</i> . 17(21):8269. https://doi.org/10.3390/ijerph17218269	2020	Saudi-Arabia	To examine awareness, attitudes, prevention and perceptions of Covid-19 outbreaks among nurses in Saudi-Arabia	500	PPE SCORE HIGHEST IN or NURSES
28	Peiró, T., Lorente, L., & Vera, M. (2020). The covid-19 crisis: Skills that are paramount to build into nursing programmes for future global health crisis. <i>International Journal of Environmental Research and Public Health</i> , 17(18), 1–14. https://doi.org/10.3390/ijerph17186532	2020	Spain	To assess the demands and resources of nurses during the Covid-19 pandemic in Spain	403	Low precautionary knowledge, high fear self-safety concern

29	Malik, U. R., Atif, N., Hashmi, F. K., Saleem, F., Saeed, H., Islam, M., Jiang, M., Zhao, M., Yang, C., & Fang, Y. (2020). Knowledge, attitude, and practices of healthcare professionals on covid-19 and risk assessment to prevent the epidemic spread: A multicenter cross-sectional study from Punjab, Pakistan. International Journal of Environmental Research and Public Health, 17(17), 1–13. https://doi.org/10.3390/ijerph17176395	2020	Pakistan	To evaluate KAP and the ability to assess risks associated with the outbreak	385	Disease specific Knowledge required. Practice significantly high.
30	Papagiannis, D., Malli, F., Raptis, D. G., Papathanasiou, I. v., Fradelos, E. C., Daniil, Z., Rachiotis, G., & Gourgoulialis, K. I. (2020). Assessment of knowledge, attitudes, and practices towards new coronavirus (SARS-CoV-2) of health care professionals in greece before the outbreak period. International Journal of Environmental Research and Public Health, 17(14), 1–14. https://doi.org/10.3390/ijerph17144925	2020	Greece	To assess the KPA's of HCP towards the new Coronavirus in Greece.	500	Practice concerns is handwashing techniques and willingness to vaccinate
31	Butsashvili, M., Triner, W., Kamkamidze, G., Kajaia, M., & McNutt, L.A. (2007). Knowledge and anticipated behavior of health care workers in response to an outbreak of	2007	USA	To assess the knowledge and anticipated behavior of HCW in response to an outbreak of pandemic influenza in Georgio	288	Disease specific information and self-safety

	pandemic influenza in Georgia. J Infect Development Countries, 1(3): 329-332.					
32	Lam, S.K.K., Kwang, E. W. Y., Hung, M, S, Y., Pang, S. M. C., Chiang, V. C. L. (2017). Nurses' preparedness for infectious disease outbreaks: A literature review and narrative synthesis of qualitative evidence. Journal of Clinical Nursing, 27e, 1244-1255. https://doi.org/10.1111/jocn.14210	2017	Hong Kong	To explore the core components that constitute nurses' preparedness in a epidemic event	7	Decision making skills, Problem solving skills, IPC silks, Disease Awareness
33	Labrague, L.J., Hammand, K., McEnroe-Petitte, D. M., Froda, D.C., Obeidat, A.A., Leocadio, M.C., Cayaban, A.R., Mirafuentes, E.C. (2018). Disaster preparedness among nurses: a systematic review of literature. International Nursing Review, 65, 41-53.	2017	USA	Exploring peer-review publications that measure nurse' preparedness for disease response	17	Bridging gap between disaster knowledge and preparedness, exercise simulations, drills, involvement in workplace disaster policies to position nursing role. To incorporate previous disaster experience
34	Lan, S.L., Kwang, W.Y.E., Hung, S.Y.M., Pang, S.M.C. (2016). Bridging the gap between guidelines and practice in the management of emergency infectious diseases: a qualitative study of emergency nurses. Journal of Clinical Nursing, 25, 9. 2895 5 2905. doi: 10.1111/jocn.13343	2016	Hong Kong	To explore the difficulties and strategies regarding guideline implementation among emergency nurses	12	Communication strategies to maintain consensus about policies inter organizational cross-departmental

35	Lau, P.Y., Chan, C.W.H. (2005). SARS (Severe Acute Respiratory Syndrome): reflective practice of a nurse manager. <i>Journal of Clinical Nursing</i> , (14), 28-34.	2005	Hong Kong	Describe the reflective practices of a nurse manager in Hong Kong in supporting frontline nurses to overcome the crises of SARS	1	Self- awareness, decision making skills, disease specific information, IPC, Ethical decision making, teaching skills, reflection
36	Hewlet, B., Hewlet, B. (2005). Providing Care and Facing Death: Nursing During Ebola Outbreaks in Central Africa. <i>Journal of Transcultural Nursing</i> , 16(4), 289 – 297. doi: 301.1177/104365960527835	2005	USA	Describe the experiences of nurses during an Ebola outbreak	14	Knowledge of biomedical cultural models of patients
37	Hou, Y., Zhou, Q., Li, D., Guo, Y., Fan, J., Wang, J., Shanxi, T. (2020). Preparedness of our Emergency Department during the coronavirus disease outbreak from the nurses' perspectives: A qualitative research study. <i>Journal of Emergency Nursing</i> , 46(6), 848–861.	2020	China	Describing the preparedness of the emergency department from the nurse' perspective	12	Collaboration strategies, independent learning skills, stress management, disease specific information, rapid diagnosis techniques
38	Sultan, M.A.S., Khorram-Manesh, A., Carlstrom, E., Sorensen, J.L., Al Sulayyim, H. J., Tauber, F. (2020). Nurses' Readiness for Emergencies and Public Health Challenges - The Case of Saudi Arabia. <i>Sustainability</i> , 12 (7874), 1-18. https://doi.org/10.3390/su12197874	2020	Saudi-Arabia	To assess the theoretical and practical readiness of emergency nurses	200	Application of theoretical knowledge, self-assessment strategies

39	Veenema, T.G., Loskiski, S.L., Newton, S.M., Seal, S. (2017). Exploration and development of standardized nursing leadership competencies during disasters. <i>Health Emergency and Disaster Nursing</i> , 4, 26-38.	2017	USA	To explore research on nurse leadership competencies during disasters	22	Disaster specific clinical skills, coordination, Ethics and Legal, Resource Coordination
40	Chung, J., Davies, N. (2016). A Review of Compassion Fatigue of Nurses During and After the Canterbury Earthquakes. <i>Australasian Journal of Disaster and Trauma Studies</i> . 20 (People in Disasters Special Issue)	2016	New Zealand	T review literature describing compassion fatigue during and after the Canterbury Earth Quake	32	Self-empowerment, mindfulness, coping mechanisms, resilience
41	Hamele, M., Neumayer, K., Sweney, J., & Bradley Poss, W. (2018). Always ready, always prepared-preparing for the next pandemic. <i>Translational Pediatrics</i> , 7(4), 344–355). https://doi.org/10.21037/tp.2018.09.06	2018	USA	Review	NA	IPC Protocols
42	Barfield, W. D., & Krug, S. E. (2017). Disaster preparedness in neonatal intensive care units. <i>Pediatrics</i> , 139(5). https://doi.org/10.1542/peds.2017-0507	2017	USA	Report	NA	NON-disaster drills and scenario's, Focus: IPC, Transmission Precautions, Labor practices, Bleeding, Multi-system Failure.
43	Langan, J. C., Lavin, R., Wolgast, K. A., & Veenema, T. G. (2017). Education for developing and sustaining a health care workforce for disaster readiness. <i>Nursing Administration Quarterly</i> , 41(2), 118–127.	2017	USA	Review	NA	Inter-professional Communication, Participatory Decision-making, Clinical Prevention of health, Professionalism

	https://doi.org/10.1097/NAQ.0000000000000225					
44	Joo, J. Y., Lui, M. F. (2021). Nurses' Barriers to caring for patients with Covid-19: A Qualitative Systematic Review. <i>International Nursing Review</i> , 68, 202-213	2021	Korea	To identify and synthesize qualitative studies of frontline nurses' experiences and challenges when caring for patients with Covid-19 in hospitals	9	Access to information, adaptability to change practices (new practices), self-care
45	Garbut, S.J., Peltier, J.W., Fitzpatrick, J.J. (2008). Evaluation of an instrument to measure nurses' familiarity with emergency preparedness. <i>Military Medicine</i> , 173(11), 1073-1077.	2008	USA	To assess nurses' self-reported level of familiarity with emergency preparedness	877	Communication and connectivity, Epidemiology, clinical decision making
46	Harthi, M.A., Thobiaty, A.A., Ahmari, A.W., Almalki, M. (2020). Challenges for Nurses in Disaster Management: A Scoping Review. <i>Risk Management and Healthcare Policy</i> , 13, 2627-2634	2020	Saudi Arabia	To assess the challenges nurses endure during a disaster	11	Information Management, Implementation of EBP, 'Disaster Management'
47	Said, N. B., & Chiang, V. C. L. (2020). The knowledge, skill competencies, and psychological preparedness of nurses for disasters: A systematic review. In <i>International Emergency Nursing</i> (Vol. 48). Elsevier Ltd. https://doi.org/10.1016/j.ienj.2019.100806	2020	China	To evaluate nursing preparedness to disasters in terms of knowledge, skills, competencies and psychological preparedness to disasters	12	CPR, Triage, Nurse Resilience, Role clarification, Multicultural working environment, Disaster Protocols, Psychological Skill Intervention, Psychological Crises Protocols Interventions, Coordination strategies, non-disaster drills

48	Amberson, T., Wells, C., & Gossman, S. (2020). Increasing Disaster Preparedness in Emergency Nurses: A Quality Improvement Initiative. <i>Journal of Emergency Nursing</i> , 46(5), 654-665.e21. https://doi.org/10.1016/j.jen.2020.05.001	2020	USA	To measure , explore and increase the preparedness level among emergency nurses at an acute care community hospital in Southern California	54	Triage, First Aid, Detection, Epidemiology, Clinical Decision Making, Isolation, Decontamination and Quarantine, Incident Command System. Special Population management, Identification of Psychological Issues, Communication, Reporting and Accessing Critical Resources, Personal and Professional Preparedness Plan, Surviving a Resource Constraint Environment
49	Annan, A. A., Yar, D. D., Owusu, M., Biney, E. A., Forson, P. K., Okyere, P. B., Gyimah, A. A., & Owusu-Dabo, E. (2017). Health care workers indicate ill preparedness for Ebola Virus Disease outbreak in Ashanti Region of Ghana. <i>BMC Public Health</i> , 17(1). https://doi.org/10.1186/s12889-017-4474-6	2017	Ghana	To assess the preparedness of HCWS regarding EVD and any emergency prone disease in Ghana.	101	IPC Measures, culture and myths associated with the disease
50	Buheji, M., & Buhaid, N. (2020). Nursing Human Factor During COVID-19 Pandemic. <i>International Journal of Nursing Science</i> , 10(1), 12–24. https://doi.org/10.5923/j.nursing.20201001.02	2020	Bahrain	To explore the effects of Covid-19 pandemic on nurses capacity of delivering services to infected patients with minimal risk	NA	IPC Practices, Knowledge of Human Factors, Self-care, Resilience, 'Personal Error Reduction Strategies', Risk Management, Situation Awareness Supporting strategies, Change

						Management Skills, Managing VSS Vulnerable System Syndrome
51	Karnjuš, I., Prosen, M., & Ličen, S. (2021). Nurses' core disaster-response competencies for combating COVID-19—A cross-sectional study. PLoS ONE, 16. https://doi.org/10.1371/journal.pone.0252934	2021	Slovenia	To determine the core disaster competencies of nurses when combating Covid-19	118	Planning strategies, triage, communication skills, pandemic ethics, resource management, Psychological preparedness, drills, first aid.
52	Aktas, F.O., Damar, H.T. (2020). Attitudes and Practices of Operating Room Nurses toward CODID-19 in Turkey. Healthcare Sciences and Services, 13(1), 167–174	2022	Turkey	To determine the attitudes and practices of operating room nurses in public hospitals	210	Precaution and Isolation technique management in OR were Lacking, 'Workflow' algorithms were requested
53	Lira, A. L. B. de C., Adamy, E. K., Teixeira, E., & Silva, F. V. da. (2020). Nursing education: challenges and perspectives in times of the COVID-19 pandemic. Revista Brasileira de Enfermagem, 73, e20200683. https://doi.org/10.1590/0034-7167-2020-0683	2020	Brazil	To determine the challenges and perspectives of nurse educators in times of Covid-19 Pandemic.	Not indicated	Mastering technology, flexibility, 'Redesign- Re-model-and Reconfigure' lesson plans in line with restrictions, managing student anxiety.
54	Gordon, J. M., Magbee, T., & Yoder, L. H. (2021). The Experiences of critical care nurses caring for patients with COVID-19 during the 2020 pandemic: A qualitative study. Applied Nursing Research, 59. https://doi.org/10.1016/j.apnr.2021.151418	2021	USA	To examine the experiences of critical care nurses caring for patients with COVID 19	11	Communication: Translating information into non-English, PPE donning and doffing
55	Fereidouni, A., Vizeshfar, F., Ghanavati, M., Tavako, R. (2021). Knowledge about the	2021	Iran	To determine the level of knowledge of Operating room	533	93% of nurses showed low level of awareness

	effects of electro surgery smoke among operating room nurses during COVID-19 pandemic: A cross sectional study. Perioperative CARE AND Operating Room Management. 24 (2021)100189. https://doi.org/10.1016/j.pcorn.2021.100189			nurses about the effects of surgical smoke during the Covid-19 pandemic		
56	Philips, N., Hughes, L., Vindrola-Padros, C., Petrella, A., Fern, L. A., Panel-Coates, F., Taylor, R. M., & Taylor, R. (n.d.). The impact of leadership on the nursing workforce during the COVID-19 pandemic Short heading: Nursing leadership during a pandemic. https://doi.org/10.1101/2021.05.18.21256802	2021	UK	To determine how the learning about protective factors from previous pandemics were implemented and the impact of this on nurses' experience	48	Communication of new information in short intervals, Decision Making skills, Re-deployment strategies, Information management was challenging
57	Fortaleza, C.R., Fortaleza, C.M.C.B. (2011). Knowledge and attitudes of healthcare workers from intensive care units regarding nosocomial transmission of influenza: a study on the immediate pre-pandemic period. The Journal of Venomous Animals and Toxins including Tropical Diseases, 17(2), 168 – 175. ISSN1678-9199	2011	Brazil	To quantify knowledge and identify attitudes of healthcare workers involved in intensive care units regarding the risk of nosocomial influenza transmission	10	31% had knowledge about transmission and incubation periods, Isolation Precautions is problematic, 31% only complied with vaccination strategies
58	Melander, S. (2021). Intensive care nurses' experiences of working during the COVID-19 pandemic: A Qualitative Metasynthesis. Umeå University: Sweden.	2021	Sweden	To describe intensive care nurses' experiences of working during the Covid-19 pandemic	18	Ventilation Methods, PPE Management, COVID-specific medication and vaccines, Specific

						transmission and clinical presentation
59	Chacko, B., & Camacho, M. (2016). An observational study to analyze compliance with infection control practices among ED nurses during outbreak of MERS-COV disease. <i>Journal of Emergency Medicine, Trauma and Acute Care</i> , 2016(2). https://doi.org/10.5339/jemtac.2016.icepq.13	2016	Qatar	To observe the compliance of Emergency Department Nurses with Infection Control practices	993	42.7% not compliant with PPE, 73.3% compliant with isolation indicators, 69.59% complaint with isolation technique, 76.74% complain with Hand Hygiene Practices
60	Ion, R., Craswell, A., Hughes, L., Johnston, A., Kilbride, L., Hubbard-Murdoch, N., & Massey, D. (2021). International nurse education leaders' experiences of responding to the COVID-19 pandemic: A qualitative study. <i>Journal of Advanced Nursing</i> , 77(9), 3797–3805. https://doi.org/10.1111/jan.14892	2021	Scotland	To explore the experiences of strategic leads for nurse education as the sought to respond to the Covid-19 pandemic	19	Crises -driven adaptability, Complex communication strategies, complex decision-making skills, Info technology' infrastructure compliance
61	Hancock, B., Catrambone, C., Mayer, K. M., Hoskins, J. L., Chierici, C., & Start, R. E. (2021). Leveraging Professional Governance During the COVID-19 Pandemic. <i>The Journal of Nursing Administration</i> , 51(3), 117–119. https://doi.org/10.1097/NNA.0000000000000990	2020	Chicago	To highlight how shared or professional governance was leveraged during this global pandemic	Report	Professional Governance: Structure, Philosophy, Effective Communication, Meaningful Decision making, Leadership, Accountability

62	Ughasoro, M. D., Esangbedo, D. O., & Udorah, I. M. (2019). Health-care workers' perspectives on preparedness of health-care facilities for outbreak of communicable diseases in Nigeria: A qualitative study. <i>American Journal of Tropical Medicine and Hygiene</i>, 100(4), 1022–1028. https://doi.org/10.4269/ajtmh.18-0404	2019	Nigeria	To ascertain the healthcare facility preparedness for a prompt and effective response to disease outbreaks	193	Handwashing, Emergency Drills, Interdepartmental Communication and Interpretation of Diagnostics

4.3 RESULTS

4.3.1 Characteristics of the Publications

A total of 62 publications were included in the data chart.

4.3.1.1 Publications per database

A total of 31 sources were extracted from PubMed. ProQuest provided 7, CINAL provided 2 sources, and 22 sources were included alternatively via hand searches. Scopus and Medline did not provide any eligible sources to be included in this review.

4.3.1.2 Countries of origin

PubMed provided sources from the USA (4); China (4); Saudi Arabia (3); UK (1); Brazil (1); Turkey (2); Pakistan (3); Sweden (1); Ghana (1); Ethiopia (2); Nigeria (2); Australia (1); The Netherlands (1); Libya (1); Greece (1); Yemen (1); Spain (1); Romania (1) and; Nepal (1).

ProQuest provided sources from the USA (2); China (1); Saudi Arabia (1) and Hong Kong (3). CINCAL provided sources from the USA (1); and New Zealand (1).

Hand-searched sources originated from USA (7); China (1); Saudi Arabia (1); UK (2); Brazil (2); Turkey (1); Sweden (1); Ghana (1); Nigeria (1); Qatar (1); Iran (1); Korea (1); Bahrain (1) and Slovenia (1). A table indicating the sources according to the country of origin and database is included below. See table 4.3.

Table 4.3: Sources according to country and database

Country	PubMed	ProQuest	CINCAL	Hand searched	Scopus	Total
USA	4	2	1	7	0	14
China	4	1	0	1	0	6
Saudi Arabia	3	1	0	1	0	5
UK	1	0	0	2	0	3
Brazil	1	0	0	2	0	3
Turkey	2	0	0	1	0	3
Pakistan	3	0	0	0	0	3
Hong Kong	0	3	0	0	0	3
Sweden	1	0	0	1	0	2
Ghana	1	0	0	1	0	2

Ethiopia	2	0	0	0	0	2
Nigeria	1	0	0	1	0	2
Australia	1	0	0	0	0	1
The Nederland	1	0	0	0	0	1
New Zeeland	0	0	1	0	0	1
Libya	1	0	0	0	0	1
Greece	1	0	0	0	0	1
Yemen	1	0	0	0	0	1
Spain	1	0	0	0	0	1
Romania	1	0	0	0	0	1
Nepal	1	0	0	0	0	1
Qatar	0	0	0	1	0	1
Iran	0	0	0	1	0	1
Korea	0	0	0	1	0	1
Bahrain	0	0	0	1	0	1
Slovenia	0	0	0	1	0	1
Total	31	7	2	22	0	62

4.3.1.3 Year of publication of sources

The timeline for this search ranged from 1981 until 25 April 2022. No publications relevant to the needs of nurses on disease outbreaks were found between 1981 and 2005. From 2005 until 2015, ten (10) publications were identified that address the needs of nurses during disease outbreaks. Between 2015 and 2019 the publications increased to nineteen (19). In 2020 twenty-six (26) articles were published, followed by eight (8) in 2021 and one (1) in 2022, taking into account that the last publication was sourced on 25 April 2022.

The number of publications included since 2005 is presented below. See Figure 4.3.

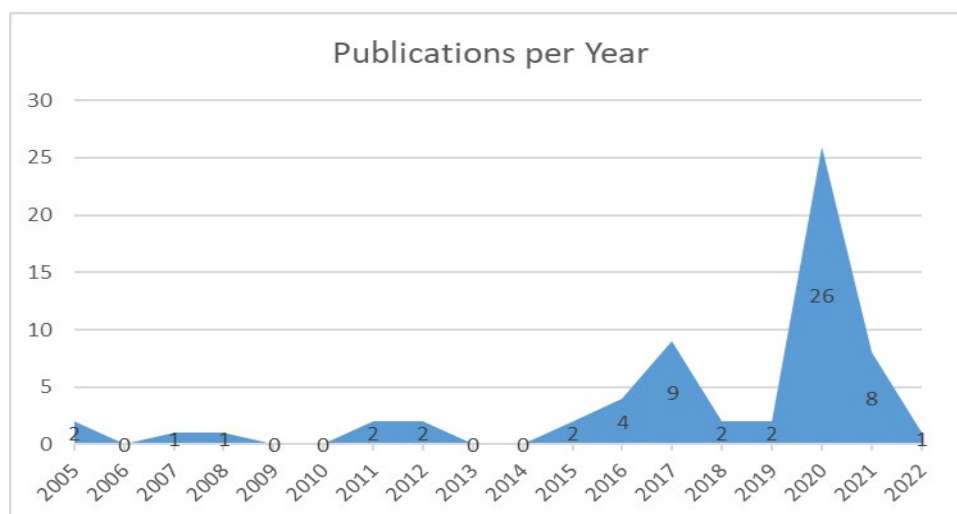


Figure 4.3: Number of publications since 2005 included.

4.3.1.4 Nurse categories included in the sources

A total of 23 publications in this search included nurses whose professional qualifications were not indicated. Healthcare workers participated in 16 studies. ICU- and ED Nurses each participated in 7 sources, followed by Nurse Managers in 4 and OR nurses in 3 publications. Nurse Educators were included in one publication. One transdisciplinary study was also included. See Figure 4.4.

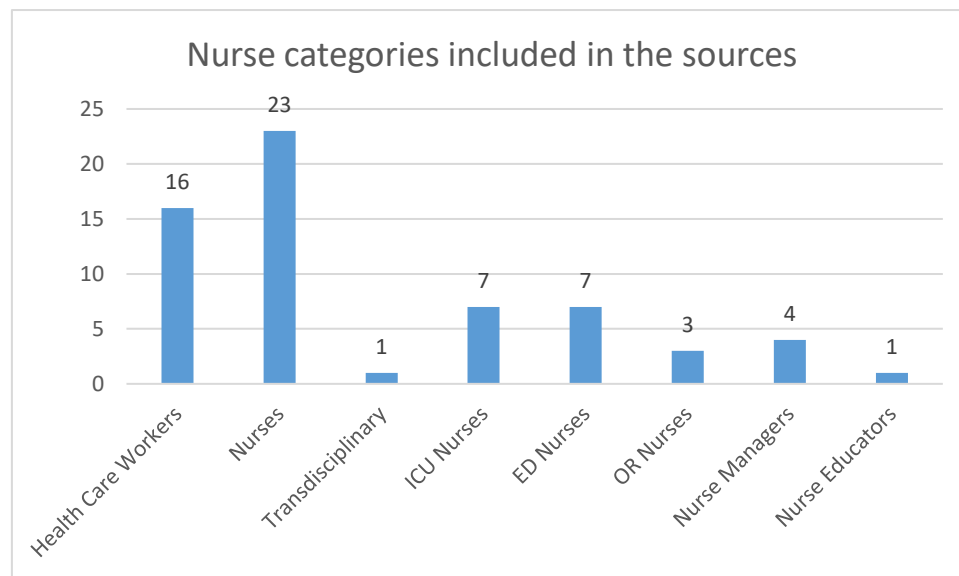


Figure 4.4: Nurse Categories included in the sources.

4.3.1.5 Methodologies represented in the sources

The methodologies presented in the sources are: 31 quantitative studies; 22 qualitative studies; 3 mixed methods and, 6 reports. See Figure 4.5

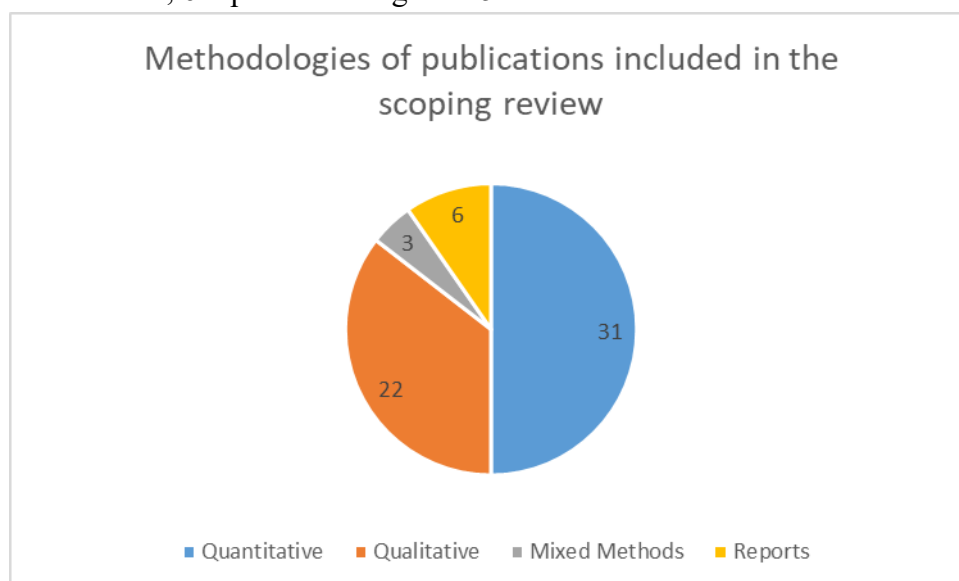


Figure 4.5: Methodologies of publications included in the scoping review.

4.3.1.6 Data collection methods represented in the sources

The data collection methods included self-administered questionnaires (25); surveys (7); interviews (10); focus groups (3); observation (2); literature reviews (12); reflective analysis (3); and discussions (2). See Figure 4.6.

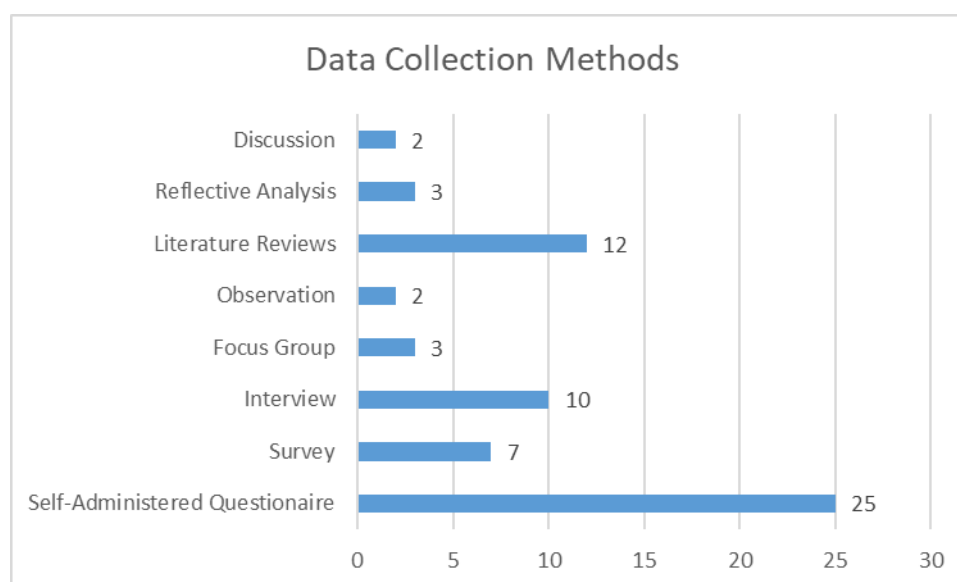


Figure 4.6: Data collection methods.

4.4 BASIC CONTENT ANALYSIS

An inductive content analysis was conducted based on the JBI Framework for Content Analysis (2023).

Table 4.4: Categories and sub categories of the findings

Category 1: Intrapersonal Needs	Category 2: Interpersonal Needs	Category 3: Disease-specific and Clinical Skills
Sub category: • Self-safety • Decision-making and learning skills • Adaptability skills	Sub category: • Communication management • People management • Providing psychological support	Sub category • IPC and clinical skills • Specific disease information

Each category and sub-category were coded for reference purposes. The related reference numbers supporting the categories were included. Basic statistical values were calculated for

every category and are included in Table 4.5. A document presenting the references of the publications per category is also included in Appendix M.

Table 4.5: Results of content analysis and basic statistical calculations

CATEGORY 1 Intrapersonal Needs 40%	Sub category	Code	Reference	No. of Publications
	Self-safety	1a	[1, 2, 5, 6, 7, 9, 15, 16, 18, 19, 22, 28, 31, 32, 35, 38, 40, 44, 48, 50, 51, 53, 57]	23(34%)
	Decision-making and learning skills	1b	[32, 56, 19, 49, 4, 33, 38, 47, 10, 15, 20, 22, 35, 60, 61, 39, 51, 37, 43, 45, 48, 50, 53]	23(34%)
	Adaptability skills	1c	[5,37,19,48,21,28,1,55,40,47,50,33,8,18,39,51,43,44,46,53,60,61]	22(32%)
	Total			68(100%)
CATEGORY 2 Interpersonal Needs 24%	Sub category	Code	Reference	
	Communication Management	2a	[13,16,21,28,3,4,9,8,34,45,48,51,61,54,62,22,43,46,56,60]	20(49%)
	People Management	2b	[50,18,49,33,42,47,51,62,12,13,36,37,39,48,56]	15(36%)
	Providing Psychological Support	2c	[5,13,47,48,51,53]	6(15%)
	Total			41(100%)
CATEGORY 3 Disease Specific and Clinical Skills 36%	Sub category	Code	Reference	
	Infection Prevention and Control Clinical Skills	3a	[15,22,24,21,28,18,9,23,25,26,31,42,49,50,39,47,45,55,57,58,62,35,41,13,48,12,14,52,11,17,27,30]	32 (53%)
	Specific Disease Information	3b	[1,58,15,48,42,2,18,21,24,29,31,35,37,13,14,6,7,20,11,12,17,54,59,8,47,51,25,22]	28(47%)
	Total			60(100%)

A total of four categories were identified which include: 1) Intrapersonal Needs, which scored the highest frequency at 40% include self-safety, decision making and learning skills and, adaptability skills; 2) Interpersonal Needs which scored the lowest at 24% include

communication management, people management and, providing psychological support; 3) Disease Specific and Clinical Skills that scored 36% and include infection prevention and control clinical skills and, specific disease information.

4.5 DISCUSSION OF FINDINGS

4.5.1 Characteristics of the publications

- A total of 62 publications relevant to the needs of nurses during disease outbreaks were included.
- A total of 31 sources were retrieved from PubMed.
- The USA published the most sources (14), followed by China which published a total of 6. A total of 7 sources originated from the African continent. In 2009 Michaud concluded that most of the infectious diseases occur in the sub-Saharan African region, and were confirmed 10 years later by 2019 by Mbaoussou, Ddumbi, Ngom, *et al* in 2019 (Michoud, 2009; Mbaoussou *et al.*, 2019). It was expected that most of the sources would originate from African researchers.

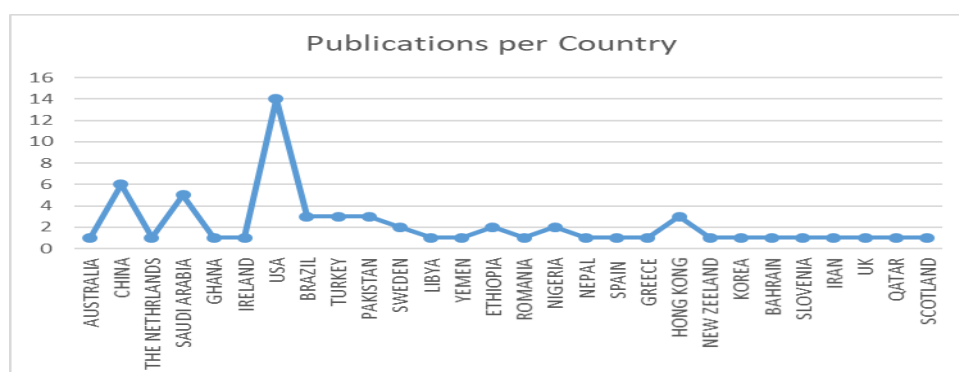


Figure 4.7: Publications per Country

- No publications relevant to the needs of nurses on disease outbreaks were found between 1981 and 2005. From 2005 until 2015, ten (10) publications were identified that address the needs of nurses during disease outbreaks. Between 2015 and 2019 the publications increased to nineteen (19). In 2020 twenty-six (26) sources were published, followed by eight (8) in 2021 and one (1) in 2022, taking into account that the review was conducted till 25 April 2022. Before 2020, limited studies addressed the needs of nurses during the abovementioned outbreaks, including the Zika outbreak in 2015, and the Ebola outbreak in 2014. However, extensive and educationally appropriate research

on the needs of nurses during disease outbreaks has not thoroughly been addressed in the past, despite disease outbreaks.

The table below aligns the number of sources relevant to the needs of nurses during an outbreak with the greatest disease outbreak of the same year. Research on the needs of nurses during outbreaks has increased dramatically during the outbreak of the COVID-19 pandemic. See Table 4.6.

Table 4.6: Number of publications aligned with disease outbreaks

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Disease Outbreak	HIV	HIV	HIV	HIV	HIV	HIV	HIV	HIV, MERS	HIV, MERS	HIV, Zika, Ebola	HIV, Zika	HIV, Zika, Ebola	HIV	HIV, Ebola	HIV	HIV, COVID-19	HIV, COVID-19	HIV, COVID-19
Number of publications	2	0	1	1	0	0	2	2	0	0	2	4	9	2	2	26	8	1

- Healthcare workers participated in 16 studies. ICU- and ED Nurses each participated in 7 sources, followed by Nurse Managers in 4 and OR nurses in 3 publications. Nurse Educators were included in one publication. One transdisciplinary study was also included. Due to the difference in nurse qualifications globally, it was challenging to align the qualifications of nurses included in the sources. Every nurse in the disease outbreak workforce is referred to as a 'nurse' and 'frontline worker'. During the last pandemic, nurses were reallocated to different areas often expected to perform duties outside their normal scope of practice. This challenges researchers when conducting studies on nurse category competencies during disease outbreaks.
- The methodologies presented in the sources are: 31 quantitative studies; 22 qualitative studies; 3 mixed methods and, 6 reports. Disaster preparedness is multilayered and complex.
- The data collection methods included self-administered questionnaires (25); surveys (7); interviews (10); focus groups (3); observation (2); literature reviews (12); reflective analysis (3); and discussions (2). Most of the data provided were obtained via self-administered questionnaires, interviews, focus groups, literature reviews, reflective analysis, and discussions, which lends itself to a high influx of subjective data. Only 2 studies included observation as a data collection method. Objective data on how the

nurses performed during disease outbreaks could address possible acquiescence and agreement bias that could have impacted on the results of studies.

4.5.2. Categories and Sub Categories from the Content Analysis.

A total of four categories were identified which include: 1) Intrapersonal Needs, which scored the highest frequency at 40%; 2) Interpersonal Needs which scored the lowest at 24% and; 3) Disease Specific and Clinical Skills that scored 36% and is presented in table 4.5.

- Sub categories included in Category One include: a) Self-safety mentioned in 23 publications; b) Decision making and learning skills mentioned in 23 publications and; c) Adaptability Skills mentioned in 22 publications.

Self-safety and decision making and learning skills is aligned with the ICN Competency Framework for Advanced or Specialist Nurse Level II: Domain 4: Safety and Security, no.4.1: *Implements materials that support nursing decision making that maintains safety during disaster/ emergency events* (International Council of Nurses, 2019).

Adaptability is aligned with the ICN Framework Domain 2: no. 21.1: *Plans for adaptable emergency/ disaster communication systems* (International Council of Nurses, 2019).

- Sub categories included in Category Two include: a) Communication Management mentioned in 20 publications; b) People Management included in 15 publications and; c) Providing Psychological Support included in 6 publications.

Communication Management is aligned with the ICN Framework Domain 2 and includes: 2.1) *Plans for adaptable emergency disaster communication*; 2.2) *Includes emergency communication expectations in all orientation of nurses to a workplace*; 2.3) *Collaborates with disaster leadership to develop event-specific media messages and*; 2.4) *Develops guidance on critical documentation to be maintained during disaster or emergency* (International Council of Nurses, 2019).

People Management is aligned with the ICN Framework Domain 1 and includes 1.1) *Participates with other disciplines in planning emergency drills/exercises at the institution or community level at least annually*; 1.3) *Communicates roles and responsibilities of nurses to others involved in planning, preparation, response and recovery*; Domain 2: 2.3) *Collaborates with disaster leadership teams to develop event-*

specific media messages; Domain 3: 3.2) Participates with others in post-event evaluation and, 3.3) Includes emergency planning guidance when reassigning staff or including unfamiliar colleagues or volunteers (International Council of Nurses, 2019).

Providing Psychological Support is aligned with the ICN Framework Domain 7: 7.1) *Communicates nursing roles, responsibilities and needs to leadership throughout the recovery phase; Domain 8: 8.3) Develops guidance and support for nurses expected to apply utilitarian principles in practice during emergency and disaster response (International Council of Nurses, 2019).*

- Sub categories included in Category Three include: a) Infection Prevention and Control Clinical Skills; b) Specific Disease Information.

Infection Prevention and Control Clinical Skills is aligned with the ICN Framework Domain 3: 3.3) *Develops action plans for improvement in nursing practice based on event assessment; Domain 4: 4.2) Provides timely alternative infection prevention control practices applicable within limited resources (International Council of Nurses, 2019).*

Specific disease information is aligned with the ICN Framework Domain 3: 3.3 *Develops action plans for improvement in nursing practice based on event assessment (International Council of Nurses, 2019).*

4.5.3 Summary of Key Findings

A summary of the findings that emerged for the review that was regarded as needs of nurses working during pandemics is discussed below:

- **Intrapersonal needs:** This category refers to the inner-self of the nurse, how emotions are experienced and expressed, self-communication and thought processes.
 - The perception of self-safety including the safety of others, especially family members of the nurse during an disease outbreak, which challenges the control of fear and panic is important when managing the infected patient who is vulnerable and dependent on the nurse' skills but at the same time also a threat to the nurse.
 - Decision making skills of nurses during disease outbreaks are often challenged with the 'unknown' factor of especially new diseases, which leads to a high level of uncertainty and self-doubt.
 - Knowledge of current disease outbreak evidence-base practices and preparation for disease outbreaks during non- disease outbreak times are essential.

- Continuous learning of new skills during non-disease outbreak times is essential as it will enhance the ability of nurses to adjust to rapid changing protocols during disease outbreak events.
- Providing nurses with evidence-based knowledge and skills during non-disease outbreak time periods will enhance nurses' ability to adapt to the occasional unimaginable situations during disease outbreaks.
- **Interpersonal needs:** This category refers to the dynamic interaction between people which includes one-to-one interaction or in groups. Three basic interpersonal needs are described as *inclusion*, *control* and *affection*.
 - Communication pathways during disease outbreak events are at times the only 'life-line' or the nurse working under extreme and unpredictable conditions. Information sharing between healthcare workers and nurses as well as patients is compromised depending on the physical barriers e.g. personal protective equipment.
 - Rapid changing, high volume information challenges communication strategies and alternative methods should be considered.
 - Communication mediums e.g. the use of electronic devices must be acknowledged as essential.
 - The allocation of people (nurses) during disease outbreaks needs careful consideration as non-disease outbreak allocation strategies is inadequate.
 - Availability of nurses to share the burden in disease outbreak times influences people management and reduces the hours expected from nurses to work as well as patient allocation.
 - Psychological support of nurses during the disease outbreak event is essential.
- **Disease specific and Clinical Skills:** This category refers to the competence of nurses to perform the skills required by infected patients during a disease outbreak.
 - Predicting the disease responsible for the next disease outbreak is challenging, however nurses should prepare for the 'most-likely' outbreak during non-disease outbreak times.
 - In every disease outbreak there is rapid disease specific communication
 - Clinical skills of nurses should be assessed during non-disease outbreak events.
 - Clinical skills should be included in training programmes for nurses during non-disease outbreak events.

4.6 SUMMARY

The chapter focused on Phase 1 step 1 of this study. The scoping review method was described in detail. Findings that emerged from the scoping review were presented. Three themes emerged from the publications that described the needs of nurses during disease outbreaks. The themes are: intrapersonal needs (self-safety; decision-making and learning skills and, the ability to adapt); interpersonal skills (communication management; people management and; providing psychological support); and disease specific clinical skills (infection prevention and clinical skills and specific disease information). The alignment of the findings with the International Council of Nurses' competencies were included. The findings of the review was discussed. In-depth interviews are discussed in Chapter Five.

CHAPTER FIVE

IN-DEPTH INTERVIEWS AND LITERATURE CONTROL

5.1 INTRODUCTION

In Chapter five, the second and third step in Phase 1, are described which includes in-depth interviews with healthcare professionals as well as nurses. The objective was to determine what the challenges were for nurses working during the COVID-19 pandemic. The two steps are described separately in the chapter. Demographic information of all the participants is provided. The themes and sub-themes that developed is supported with direct quotes as well as supporting literature. Key findings is presented as well as concepts that was included in the next phase of this study.

The approach to the presentation of the results is as follows:

- The demographic data of the healthcare professionals is presented in table format
- The eight themes and 21 sub themes provided by the healthcare professional group are presented in table format.
- The demographic data of the nurse participants is presented.
- The ten themes and 179 subthemes from the nurse participants combined with the findings of the professional healthcare providers are presented.
- Literature supporting the combined themes and subthemes are provided.
- The alignment of the categories of the scoping review and the themes and subthemes of the in-depth interviews are presented in table format.
- The development of possible statements for the Delphi-survey is presented in table format.
- The discussion of the causes of the challenges is presented.

5.2 IN-DEPTH INTERVIEWS WITH HEALTHCARE PROFESSIONALS

The results from the in-depth interviews conducted with healthcare professionals are presented. All participants were working alongside nurses during the COVID-19 pandemic. All interviews were conducted in English. A total of eight participants were included. Purposeful sampling applied (n=8). The healthcare professions represented in the group are pretested in Table 5.1.

Table 5.1: Healthcare professional representation (n=8)

Healthcare Professionals	F (%)	F (%)
Physiotherapist	2 (25.00)	
Medical Practitioner (General)	1 (12.50)	5 (62.50)
Medical Practitioner (Trauma and Emergency)	1 (12.50)	
Medical Practitioner (Physician/ Nephrologist)	1 (12.50)	
Medical Practitioner (Surgeon)	1 (12.50)	
Medical Practitioner (Anesthetist)	1 (12.50)	
Paramedic	1 (12.50)	

From Table 5.1 the majority (25%) of the participants were physiotherapists. The majority (62.5%) were medical practitioners with different specialist qualifications. The least (12.5%) represented profession was the paramedic group.

5.2.1 Demographic data of the participants.

The demographic data of the participants are included in Table 5.2

Table 5.2: Demographic data of healthcare professionals

Demographic information	F (%)
Gender	
Male	3 (37.50)
Female	5 (62.50)
Age group in years	
20 – 30	2 (25.00)
31 – 40	3 (37.50)
41 – 50	2 (25.00)
51 – 60	-
61 - 70	1 (12.50)
Years of experience	
2 – 5	2 (25.00)
6 – 10	2 (25.00)
11 – 15	2 (25.00)
16 - 20	-
21 – 25	-
26 – 30	1 (12.50)
31 - 35	-
36 - 40	1 (12.50)
Healthcare sector	
Public	4 (50.00)

Private	4 (50.00)

From Table 5.2 the majority (62.5%) of the participants were female. Most (37.5%) of the participants were between the ages of 31 to 40. A quarter (25%) of the participants had between 2 to 5 years and 6 to 10 years of professional experience, respectively.

5.2.2. Themes and sub themes

The themes and sub themes were developed through reflexive thematic analysis. An example of one transcription is included in the thesis (see Appendix N). Eight main themes with twenty-one sub themes are presented in Table 5.3.

Table 5.3: Emergent themes and subthemes

Themes	Sub-themes
Theme 1: Management of PPE	Miss appropriation of PPE
	PPE protocol non compliance
	Lack of PPE protocols
Theme 2: Clinical Skills	Lack of Resuscitation skills
	Lack of critical care skills
	Lack of experience to care for the intubated/ventilated patient
	High Patient documentation demands
	Reallocation of untrained staff
Theme 3: Knowledge of outbreak management	Unprepared workforce
	Un prepared hospital system
	In experienced hospital managers
Theme 4: Information management	Dissemination of information
	Lack of protocols
	Change in protocols
Theme 5: Physical demands	Tiredness
Theme 6: Communication strategies	Ineffective communication skills
Theme 7: Resource allocation	Lack of resources
Theme 8: Psychological support	Lack of psychological support
	No debriefing opportunities
	Psychological burnout

	Failure to manage fear

5.3 IN-DEPTH INTERVIEWS WITH NURSES

The results from the in-depth interviews conducted with professional nurses are presented. All participants were working during the COVID-19 pandemic. All interviews were conducted in English. A total of 28 participants were included. Purposeful sampling applied (n=28). The professional nurses represented in the group are pretested in Table 5.4.

Table 5.4: Professional Nurses included in in-depth interviews

Professional Nurses	F (%)
ICU Nurses	6 (21.43)
Perioperative Nurses	6 (21.43)
Nurse Managers	7 (25)
Emergency Department Nurses	4 (14.29)
Nurse Educators	5 (17.86)

From Table 5.4 a total of 25 % of the participants were nursing managers, ICU and perioperative nurse groups each represented 21.43%, nurse educators represented 17.86% and emergency department nurses represented 14.29% as the smallest group.

The group of participants were representative of the professional nurses caring for COVID-19 patients during the pandemic.

5.3.1 Demographic data of the participants

The demographic data of the participants are included in Table 5.5

Table 5.5: Demographic data of Professional Nurses

Demographic information	F (%)
Gender	
Male	2 (7.14)
Female	26 (92.86)
Age group in years	
20 – 30	3 (10.7)
31 – 40	7 (25)

41 – 50	5 (17.86)
51 – 60	10 (35.71)
61 - 70	3 (10.72)
Years of experience	
2 – 5	1(3.57)
6 – 10	4(14.29)
11 – 15	3(10.72)
16 - 20	4(14.29)
21 – 25	2(7.15)
26 – 30	4(14.29)
31 - 35	3(10.72)
36 – 40	2(7.15)
41 – 45	4 (14.29)
46 – 50	1(3.57)
Healthcare sector	
Public	9 (32.14)
Private	14 (50.00)
University	5 (17.86)

From Table 5.5 the majority (92.9%) of the participants were female. The majority (35.7%) of the participants were in the age group 51 to 60. The second largest (25%) were in the age group 31 to 40. The third largest (17.86%) were between 41 and 50. A total of 10.72% of the participants were between the ages of 61 to 70 and 20 to 30 years of age. Four groups scored equally and the highest (14.29%) in years of experience. The groups are between 6 and 10 years of experience, between 16 and 20 years of experience, between 26 and 30 years of experience and between 41 and 45 years of experience. Two groups scored second highest (10.72) in years of experience between 11 and 15 years, and 31 to 35 years of experience. A total of 7.15% of the participants had between 36 years and 45 years of experience. A total of 3.57% of the participants had between 46 and 50 years of experience. Half of the participants were from the private sector, 32.14% from the public sector and, 17.86% were employed by universities.

5.3.2. Themes and sub themes

The researcher aligned the themes and sub themes with the terminology used by the participants. The themes and sub-themes that emerged from the in-depth interviews with the

healthcare professionals and nurses are presented below. Field notes of 11 interviews are included in Appendix O.

5.3.2.1 Theme 1: Nursing Resources

Table 5.6: Theme 1: Nursing Resources

Sub Theme	ICU Nurses	ED Nurses	Peri - operative Nurses	Nursing Managers	Healthcare professionals	Nurse Educators
1. Shortage of disease outbreak experts	-	-	-	√	√	-
2. Unprepared disaster management	√	√	√	√	√	-
3. Staff shortage	√	√	√	√	√	-
4. High incidents of staff resignations	-	-	-	√	-	-
5. Extended working hours	√	-	-	√	-	-
6. High incidence of infected staff members	√	√	-	-	-	-
7. Nursing categories working outside the scope of practice	-	√	-	√	-	-
8. Staff refusing to work in COVID-19 wards	-	-	√	-	-	-
9. Job security under threat	-	-	√	√	-	-
Scores	4/9	4/9	4/9	7/9	3/9	0/9
	44.4%	44.4%	44.4%	77.7%	33.3%	0%

A total of 9 sub themes were included relevant to the availability of nurses as a human resource during a disease outbreak event. The contributions of each nursing group and healthcare professionals with supporting transcripts are discussed below, followed by supporting literature.

Nursing managers contributed 77.7% of the sub themes included.

A statement of a nursing manager referring to workload and delegation:

Voice 032.2: *“it was conflict management more than anything else, the staff was overworked” and*
“all of a sudden, I expected the ICU sister to look after twelve Patients”.

ICU nurses, ED nurses, and Perioperative nurses each contributed 44.4% of the sub themes included.

A statement of an ICU nurse referring to staff absenteeism due to illness and the effect it had on work allocation:

Voice 052.5: *“I mean if you think about it 150 staff went down sick at once that means you that's left on the floor must nurse eight vents or five vents - that's cruel”*

A statement of an Emergency Department nurse referring to the utilization of nonpermanent staff:

Voice 047.1: *“we were also dependent on a lot of staffing from the agencies’ and ‘every night to come on duty and you have new staff “*

A statement of a perioperative nurse referring to staff members not on duty:

Voice 051.4: *“in the same period of time about twenty staff members had COVID”*

A statement of a perioperative nurse referring to the nurses’ unpreparedness to manage an outbreak:

Voice 055.1: *“our nurses are not as informed as they should with outbreaks”, and “Because we were just blind leading the blind during COVID. We were caught napping. If I may say so”*

Healthcare professionals contributed to 33.3% of the sub themes included.

A statement of a healthcare professional (Physician) referring to staffing:

Voice 015.8: *“In a normal ICU it's one to one or two to one nurse per patient in a room. In the COVID ICU sometimes nurses are three or four or five patients that were ventilated, critically ill and it was totally overwhelming”*

Nursing educators did not comment on human resources as a challenge during the pandemic.

A focussed approach to frontline worker management during a disease outbreak and non-disease outbreak periods is supported by the work of Kuhlmann, Dussault, and Corella (2021), as well as Dinic, SantricMilcevic, and Tripcovic (2021) who concluded that healthcare workers

are three times more at risk to develop COVID-19 than any other member of the public, and that 8% of the COVID-19 infected cases then were frontline workers and referred to them as ‘second victims’ (Kulmann *et al.*, 2021; Dinic *et al.*, 2021). A study conducted by Nie, Su, Dong *et al* (2022) concluded that although most nurses are willing to work during disease outbreaks, they felt ill-prepared to effectively respond to outbreak demands. The study further suggests the importance of continuous training, retraining of skills, engagement of different modes of delivery of programmes as well as the maintenance of a safe working environment to support the frontline workforce (Nie *et al.*, 2022). Skill mixing and task shifting have been discussed by Bourgeault, Maier, Dieleman *et al* (2020) whereby flexibility of staff ratios was introduced when minimum staffing levels were suspended during the COVID-19 pandemic in Germany (Bibliomedpledge, 2020). Task shifting and upskilling were strongly recommended for consideration by MacKenzie in 2020, to adhere to the skills demand required during outbreaks (MacKenzie, 2020).

5.3.2.2 Theme 2: Clinical Skills

Table 5.7: Theme 2: Clinical Skills

Sub Theme	ICU Nurses	ED Nurses	Peri-operative Nurses	Nursing Managers	Healthcare professionals	Nurse Educators
1. High incidence of infected staff members	√	√	-	-	-	-
2. Adhering to routine precautionary measures for long periods of time	-	-	-	√	-	-
3. Fear of exposing others, family or self	√	√	√	√	-	√
4. Lack of senior management support (clinical)	√	√	-	√	-	-
5. Diverse categories of nursing workforce leading to diverse understanding of disease processes	√	-	√	-	-	-
6. Nursing categories working outside scope of practice	-	√	-	√	-	-
7. Self-doubt	√	-	-	√	-	√
8. Physical demands of working with PPE	√	√	√	√	√	√
9. Fast changing protocols/guidelines	√	√	√	√	√	√

10. Non-compliance of colleagues and students to regulations/ protocols	√	-	√	-	-	√
11. Unknown disease and treatment	√	√	√	-	√	√
12. Ergometric challenges of wards and venues	√	√	√	-	-	√
13. Increase patient load	√	√	√	-	√	-
14. Increase in patients dying	√	√	-	-	√	-
15. Protecting COVID-19 negative patients		√				
16. Providing non-outbreak related services				√		
17. Support for staff working outside their scope of practice	√	√		√		
18. Communication strategies with PPE	√	√	√	√	√	√
19. Breaking bad news to families		√			√	
20. Basic computer skills		√		√		√
21. Lack of technical equipment skills	√	√			√	
22. Lack of clinical skills of staff	√	√	√	√	√	-
23. Lack of staff's understanding of vaccination practices				√		
24. Lack of managerial and leadership skills of nurse managers			√		√	
25. Staff refusing to work in COVID-19 wards			√			
26. Training/ orientating non-nursing staff			√			
27. Lack of distribution of information	√	√	√		√	
28. Fast changing protocols/ guidelines	√	√	√	√	√	√
29. Communicating changing protocols	√			√		
30. PPE shortage	√	√	√	√	√	√
31. PPE appropriation	√	√	√	√	√	√
32. Donning and doffing of PPE	√	√	√	√	√	
33. Not addressing staff and doctors' non-conformity/non-compliance to protocols	√	-	√	-	-	-
34. Nurses expected to make ethical decisions e.g. allocation of ventilators and oxygen	√	√	√	√	-	-
35. Performing duties usually assigned to			√			

support staff e.g. cleaning and mopping						
36. Increase in patient documentation			√		√	
37. Trust in and knowledge of cultural/religious community practices to support patients				√		
38. Providing students with basic resources e.g. food						√
39. Supporting the scared student						√
40. Repeating Lecturers						√
41. Shortage of disease outbreak experts				√	√	
42. Recovery room management of the COVID-19 patient			√			
43. Anaesthetic management of the COVID-19 patient			√			
Scores	24/43	23/43	24/43	21/43	17/43	15/43
	55.8%	53.4%	55.8%	48.8%	39.5%	34.8%

A total of 43 sub themes were included relevant to the clinical skills of nurses during a disease outbreak event. The contributions of each nursing group and healthcare professionals with supporting transcripts are discussed below, followed by supporting literature.

ICU and perioperative nurses both contributed 55.8% to the sub themes included. Supporting statement of an ICU nurse referring to other nurse categories, not ICU experienced, assigned to ICU:

Voice 054.6: *“they were petrified to be with us” and “the way we saw it, it was like I would rather not have you there because I need to look after you as well as the patients”*

Supporting statement of perioperative nurses referring to the management of PPE and contaminated instrumentation:

Voice 057.3: *“And there was a lot of confusion also, about the donning and doffing. Because sometimes we don’t know if we do move off into the theatre before we go out”* and

Voice 056.3: *“at some point we did not know what to do with instruments post-op”*

Emergency Department nurses contributed 53.4% of the sub themes included. A statement of an emergency nurse referring to clinical skills required during the outbreak:

Voice 048.6: *“because all of a sudden, people were expected to perform duties and tasks that might not have ever had training for, or according to scope of practice”*

A statement of an emergency nurse referring to nurses working with PPE:

Voice 045.3: *“I think some of them didn’t manage. They came out and say I can’t do this”*

Nursing managers contributed to 48.8% of the sub themes included.

A statement of a nursing manager referring to the lack of clinical skills of other nursing managers:

Voice 036.1: *“but for those that have been in the position for too long, it was difficult for them because they need to lead by example. But I should say it was difficult for our people. Most of them I remembered opted out on the basis that they have weak immune systems”*

A statement of a nurse manager referring to what was expected of her as a nursing manager:

Voice 032.1: *“so everyone expect of you to be the expert, they were looking up to me for guidance”*

Nursing educators contributed 34.8% of the sub themes included.

A statement of a nursing educator referring to the lack of nurses to manage PPE.

Voice 041.2: *“So you would see someone in especially the hospital here that was in his hazmat suit to keep warm”*

A statement of a nursing educator referring to student’s lack of understanding of COVID-19 symptom management:

Voice 042.2: *“Others would have come into sessions knowing that they have some of the symptoms and still forced their way into your sessions”*

Nursing educators did not comment on the clinical skills (procedural) of trained nurses.

Healthcare professionals contributed 39.5% of the sub themes included.

Statements of a physiotherapist referring to nurses’ lack of clinical confidence in an ICU environment:

Voice 013.4: *“the patients were only turned when the physio was there”* and

Voice 013.5: *“nurses weren’t particularly comfortable with the suctioning of patients”*

Statements of a physician referring to the challenges of non-ICU nurses working in an ICU environment:

Voice 015.5: *“Medication problem because firstly they will not know medications”* and *“central lines was a problem and all the normal routine procedures were completed by unqualified staff”*

Many countries were forced to deploy non ICU nurses into critical care units in an attempt to address the nurse shortage during pandemics. According to Tsay, Kao, Wang *et al* (2020), Taiwan has initiated preparation programmes after the MERS outbreak, which resulted in a more prepared workforce during the COVID-19 pandemic (Tsay *et al.*, 2020). Non-ICU Nurses in the USA, allocated to ICU units acknowledged that the training they received in critical wards was not adequate (Hales, White, Eden *et al.*, 2020) and that more pressure is placed on qualified ICU nurses as they were expected to supervise the non-ICU nurses in their units (Fernandez, Lord, Halcomb *et al.*, 2020). Zang, Shi, Sun *et al* (2020) listed the following skills that were challenging for non-ICU nurses to cope with during the pandemic: airway management, deep vein catheters, proning of patients (Zang *et al.*, 2020), and palliative care, critical care, and ethical issues were listed by Kang and Shin (2020). A 2021 study conducted by Mohammadimehr concluded that the ability of nurses to integrate new knowledge into their existing clinical practices, ability to adapt (change management), creativity in finding solutions, stress management, inflectional control knowledge as well as awareness of subtle

changes in patients, pedagogical and interpersonal skills are crucial for nurses working during a disease outbreak period (Mohammadimehr, 2021).

Infections disease treatment regimens demand that repetitive tasks (e.g. donning and doffing of PPE, social distancing, and handwashing) are performed meticulously. These skills are often referred to as boring and contribute to mental- or psychological fatigue (Pravi and Farhana Fatima, 2017). The aforementioned also stated that if the meaning of repetitive tasks is well understood, it could be regarded as more of a challenge than boring (Pravi and Farhana Fatima, 2017). A study conducted in the United States of America concluded that conscientiousness, type of personality, and demographic traits were predictors of *virus-mitigating preventative health behaviour* during the COVID-19 pandemic (Choi, Martin, Cho *et al.*, 2022). A scoping review conducted by the University of Dublin concluded that organisational culture, nursing staff availability, workplace environment, managerial and inter-professional relationships, and the education level of the nurses contribute to non-compliance of nurses to infection prevention and control principles (McCauley, Kirwan, Matthews, 2021). Strategies to support own, and colleagues' compliance to perform repetitive clinical tasks over a long period of time is complex due to the multiple contributing factors and demands the attention of nurse leaders.

At the time of this writing (20 December 2023), 6 957 880 people died as a result of COVID-19, placing COVID-19 as the fifth deadliest disease outbreak to date (Worldometer, 2023b). The implications of caring for dying patients during the COVID-19 pandemic are well documented. A study conducted in Milan concluded that the following contributed to Italian nurses' experiences caring for the dead and dying during the COVID-19 pandemic: a) rapid increase in deaths; b) providing physical, emotional, and spiritual care for the dying patient; c) providing support to the families; d) care procedures after death; and e) psychological consequences caused by the before mentioned (Castaldo, Lusignani, Papini *et al.*, 2021). The study also recommended that healthcare nurse leaders should develop guidelines to support not only the patient and family members but also the nurse when faced with death and dying. A study conducted in Iran concluded that nurses are at risk of suffering from *complicated grief* especially during disease outbreak times, as they are exposed to a high rate of death and dying, without having time to adapt to the loss. Often nurses were expected to continue working due to staff shortages (Rahmani, Hosseinzadeh, and Gholizadeh, 2023). This unmanaged state of complicated grief may lead to maladaptive symptoms in the nurse (Wallace, Wladkowski, Gobson *et al.*, 2020). The unique situation whereby family members could not be physically

present during the death of their loved ones during the COVID-19 pandemic placed an extra responsibility on the nurse as the facilitator of digital communication between the patient and family members, which caused an increase in nurses' death anxiety, and decreased their satisfaction of life in general (Aydin and Fidan, 2022). Nurses' fear of being infected themselves whilst caring for the dead and dying highlighted their own vulnerability during the pandemic, and contributed to their stress (Aydin, and Fidan, 2022). Death and management of the dying is a complex concept, especially when caused by infectious diseases, due to the multi-facet implications thereof for the healthcare provider on both a personal, psychological, and professional level.

Technical skills of nurses

The WHO defines digital health as *'the use of digital, mobile, and wireless technologies to support the achievement of health objectives'* (World Health Organization, 2021c).

The Office of Nursing and Midwifery Services Director and Northern Ireland Practice and Education Council for Nursing (NIPEC) published their adapted version of the Nursing and Midwifery Digital Health Capability Framework in 2021 in which it is emphasised that digital health requires a nursing workforce that is competent in technical skills (managing devices), and understands the socio-technical dimensions of digital health. The framework consists of five domains: 1) Digital Professionalism; 2) Leadership and Advocacy; 3) Data and Information Quality; 4) Information-enabled Care; and 5) Technology. The framework allows nurses to increase responsiveness and quality care, improves access as well as patient-nurse relationships, and reduces inefficiencies. Additionally, the digitisation of data during disease outbreaks allows for surveillance data to be generated within a short period of time (Office of Nursing and Midwifery Services Director and Northern Ireland Practice and Education Council for Nursing and Midwifery, 2021).

A study conducted in Switzerland, in 2020 concluded that the utilization of a dedicated mobile health platform (mHealth) in clinical practice allows for time-saving communication crucial for clinical practice, and provides a *solid platform* to distribute validated information (Zamberg, Manzano, Posfay-Barbe *et al.*, 2020). A collaborative study between the University of Sheffield and Sydney acknowledged the importance of workplace design as well as protocols and training of healthcare workers to optimize the benefits of an electronic

communication system in the clinical environment (Ali, McDonald, and Clark-Derrington, 2023).

Technical skills of nurses during the COVID-19 pandemic came under scrutiny when every nurse was expected to manage specialised equipment e.g. ventilators, intravenous pumps, and invasive monitoring equipment, traditionally only used in intensive care units. The general nurse who is used as a workforce during disease outbreaks should be competent in the basic management of critical care equipment as well as its use in clinical decision-making. A study conducted in Egypt concluded that more than half of the nurses who participated in a study were not competent in acknowledging and reporting ventilator-related complications during the COVID-19 pandemic (Mehany, Ahmed, and Abdalfathah, 2020).

5.3.2.3 Theme 3: Interpersonal skills

Table 5. 8: Theme 3: Interpersonal skills

Sub Theme	ICU Nurses	ED Nurses	Peri-operative Nurses	Nursing Managers	Healthcare Professionals	Nursing Educators
1. Blame/ Bully of staff who contracted COVID- 19	√	-	-	-	-	-
2. Fear of exposing others, family or self	√	√	√	√	√	√
3. Lack of trust between staff members	√	√	√			
4. Lack of debriefing/ psychological support	√	√	-	-	√	- -
5. Lack of senior management support (clinical)	√	√	-	√	-	-
6. Diverse categories of nursing workforce leading to diverse understanding of disease processes	√		√			
7. Uninformed public / playing	√	√	√			

down/ mistrust COVID-19 regulations						
8. Failure to declare COVID-19 status by public and students		√				√
9. Nursing categories working outside scope of practice	-	√	-	√	-	-
10. Non-compliance of colleagues and students to regulations/ protocols	√	-	√	-		√
11. Extended isolation from family	√	-	√	-	-	-
12. Increase patient load	√	√	√	-	√	-
13. Increase in patients dying	√	√			√	
14. Experiencing loss and fear of family, colleagues, and friends dying	√	√	√	√	√	√
15. Protecting COVID-negative patients	-	√	-		-	-
16. Providing non- outbreak related services				√		
17. Staff being physically and verbally abused in triage area by patients		√				
18. Support for staff working outside their scope of practice	√	√		√		
19. Breaking bad news to families		√			√	
20. Lack of clinical skills of staff	√	√	√	√	√	-
21. Lack of staff's understanding of vaccination practices				√		
22. Lack of managerial and leadership skills of nurse managers			√			

23. Staff refusing to work in COVID-19 wards			√			
24. Training/ orientating non-nursing staff			√			
25. Communicating changing protocols	√			√	√	
26. Not addressing staff and doctors' non-conformity/non-compliance to protocols	√	-	√	-	-	-
27. Nurses expected to make ethical decisions e.g. allocation of ventilators and oxygen	√	√	√	√	-	-
28. Communication strategies with PPE	√	√	√	√	√	√
29. Trust in and knowledge of cultural/religious community practices to support patients				√		
30. Re-socialisation of self during post-pandemic phase				√		
31. Lack of support & clinical teaching for student clinical practice during COVID						√
32. Providing students with basic resources e.g. food						√
33. Supporting the scared student						√
34. Repeating Lecturers						√
Score	18/34	17/34	15/34	13/34	9/34	9/34
	52.9%	50%	44%	38.1%	26.4.6%	26.4%

A total of 34 sub themes were included that address the challenges experienced relevant to the interpersonal skills of nurses during a disease outbreak event. The contributions of each nursing

group and healthcare professionals with supporting transcripts are discussed below, followed by supporting literature.

ICU nurses contributed to 52.9% of the sub themes. A statement of an ICU nurse relevant to a staff member being bullied and blamed by colleagues after contracting COVID-19:

Voice 052.6: *“they bullied the first person who got it, in the first case, they bullied that girl so that she ended up resigning that was so horrible. She was the first person who got it and they all gave her grief because of that, it’s like it’s your fault, why but she was the first known case with us, so they made her the scapegoat”*

A statement relevant to insufficient staff debriefing and psychological support:

Voice 052.9: *“you cannot get people to debrief when the pandemic is finished, and put them in a room with a group of people that everybody knows. That’s not proper debrief, when you see the same person coming out of the unit and a patient has died again, and she is ready to crumble, that’s when you need to debrief not sixteen months down the line when the pandemic is gone. So it was poorly done”*

Emergency Department nurses contributed 50% of the sub themes included.

Statements referring to the lack of support from managers:

Voice 038.2: *“they were saying everybody’s scared. I am your employee and this is a nationwide or international outbreak. But I still need your support behind me. It must not be every man for himself”*

and

“you’ve got that fourteen days go and stay home. No one is even checking on you. So I felt emotional support was not rendered”

and

“And we were more working in terms of yes, I’m paying you and this is a disaster. This is an outbreak. What do you want us to do? There are no nurses there are no nurses to come and help”

A statement referring to communication barriers between staff and patients:

Voice 047.5: *“it was actually difficult to communicate with people from behind a mask. You were not always sure if they heard you correctly”*

Perioperative nurses contributed 44% of the sub themes included. Statements referring to the trust relationship between colleagues in the same team during the outbreak:

Voice 040.3: *“Teamwork was also a challenge as well, they will say no COVID won’t affect me. So imagine you’re trying to protect yourself, but your colleague doesn’t want to”* and

Voice 057.5: *“So you will find that they do things we can see is wrong, but you cannot correct it because some are your friends, we are just afraid to step on toes or we just want to favor them”*

Nursing managers contributed 38.1% of the statements included. A statement of a nursing manager referring to ethical decision-making:

Voice 037.6: *“the allocation of ventilators when you do not have enough. Lowering oxygen flow of all patients to ensure everyone gets some. Decisions were left for nurses to make. The doctors were too scared”*

A statement referring to the fear of exposing family members:

Voice 027.6: *“I was more scared for my family than myself”*

Voice 030.3: *“I was most afraid of taking the disease to my family”*

Healthcare professionals contributed 26.4% of the sub themes included. A statement from an anesthetist referring to the lack of disease outbreak training of staff:

Voice 015.2: *“the specialist nurses or nobody was trained, properly trained, so it was basically working in the dark”*

Nursing educators contributed 26.4% of the sub themes included.

A supporting statement of an educator referring to student support other than academic support:

Voice 043.3: *“And many of the students contracted the disease, and we had now to be counselors”*

The contribution of the community to manage disease outbreaks has been widely acknowledged especially during the Ebola outbreak in 2013-2016. A scoping review published in 2023 revealed that community involvement during the Ebola outbreak in sub-Saharan African countries improved the knowledge, attitudes, surveillance efforts, compliance rate to isolation as well as compliance to treatment regimens (Shadrack and Painstill, 2023). The World Health Organization advised that successful community involvement during an outbreak requires active involvement of community members, strong leadership, implementation, monitoring, and evaluation strategies. The WHO also advised that to gain the community's trust and collaboration, decentralization of power is essential, and a sharing of responsibilities is mandatory in culturally appropriate and sustainable outbreak management programmes. This implies that healthcare workers should have in-depth knowledge about the community involved, their religion, cultural practices as well as resources e.g. language, access to water and electricity, infrastructure, water and food sources, community and religious leaders, and hierarchical structure (World Health Organization, 2021a).

Inter-collegial Trust

Trust between the healthcare provider and the patient is often discussed worldwide. Trust between healthcare providers, however, is much more complex. A study conducted in Iran in 2021 by Hadi-Moghddan, Karimollahi, and Aghamohammadi concluded that there is a significant relationship between nurses' behaviour and trust in their supervisors, and is therefore important to address in disease outbreak management. Sutherland, Pecanac, LaBorde *et al* (2022) concluded that inter-provider trust is established over time, enhanced by sharing the same working location, as well as in-person contact with each other, and sharing documents. This process is facilitated by: a) Introduction; b) Communication; and c) Working Together (Sutherland *et al.*, 2022). The significance of the aforementioned is that nursing staff allocation during an outbreak is often unpredictable, staff is re-allocated to unfamiliar clinical areas, and is expected to work in collaboration with nurses they have not had the time to build a trusting relationship with.

Addressing non conformance

As early as 1992, Bridge and Baxter concluded that friendships in the workplace could lead to inter-role conflict between co-workers when non-conformance needs to be addressed (Bridge and Baxter, 1992). A study conducted in 2017 concluded that trust is the basis of a friendship, and it is this trust that will enable disclosure and address non-conformance. However, it does not enhance error disclosure (Hisiao-Yen and An-Tien, 2017). A study conducted in Finland resulted in the development of an ethical guideline for nurses' collegiality in 2017. Concept 3: Cooperation Strengthening Skills of the framework include: a) Recognition and acknowledgment of your colleagues' skills; b) Reciprocation of consultations on clinical matters; c) Sharing the responsibilities of decision making skills; and c) Intervention of colleagues' skills and actions is posing a threat to patient safety. Concept 4: Everyone is Responsible for Collegiality includes: a) Nurses are responsible by example; b) Nursing Managers should create structures to support collegiality; and c) Nurses should teach and foster collegiality (Kangasniemi, Arala, Becker *et al.*, 2017). An earlier study conducted on Iranian nurses in 2016 concluded that the four barriers to nurses reporting misconduct of colleagues include: a) preventing stigmatisation; b) consequences e.g. punishment, legal and organizational misconduct; c) lack of managerial support; and d) historical non-investment in the cause of a reported problem (Peyrovi, Nasrabadi, Valice, 2016). Based on the before mentioned findings, ethical maturity as well as managerial structure and support is crucial to addressing the non-conformance of colleagues.

Debriefing Opportunities

Debriefing is described as “a problem-focused coping strategy, where clinicians actively seek emotional support, information, and advice from others whilst reflecting on an incident” (Hunter, 2016). The term *hot debrief* is described as “one that is conducted immediately or soon after a critical incident” (Burgess, Irvine, Wallymahmed, 2010). This implies that psychology experts should be well informed about the challenges of the healthcare workers, and be available as soon as an incident occurs. The term *cold brief* is described as “a debrief session that is delayed at a later stage” (Burgess *et al.*, 2010).

The value of debriefing nurses during disease outbreaks has been acknowledged by Berchtenbreiter, Innes, Watterson *et al* (2023) when they concluded that short debriefing (*hot debriefs*) are more effective in the prevention of self-blame than *cold debriefing* sessions, in

the prevention of post-traumatic stress syndrome (PTSD) in nurses (Berchtenbreiter *et al.*, 2023). Additionally, anxiety amongst frontline workers is exacerbated due to the constant demand to manage the death and dying of patients as well as personal losses during the pandemic. Coping with these demands over a long period of time demands a focused approach (Berchtenbreiter *et al.*, 2023). Earlier, another study referred to clinical debriefing as planned and structured 'Time-Out Sessions', led by clinical staff who have received debriefing skills training. It is also mentioned that the 'Time-Out Sessions' should be facilitated before the end of each shift (Cooper, Winton, Farrington-Exley, 2020).

Communication Strategies

Crisis communication is described as a three stage concept namely a) Pre-Crisis; b) Crisis Response; and c) Post Crisis Communication. The pre-crisis stage focuses on planning as well as preparation. Crisis Response Communication focuses on the implementation of policies and procedures as well as the adaptation of communication strategies, based on healthcare workers' and patients' reactions to the information. During the post crisis stage follow up information as well as crisis response information is shared in preparation for the next disease outbreak (Haupt, 2020). In 2022, Su, Zang, and McDonnell published their definition of crisis communication as "health officials' abilities to effectively, efficiently, and empathetically communicate and collaborate with key stakeholders in times of, with the ultimate goal of controlling and containing emergency events and in turn, protecting personal and public health" (Su *et al.*, 2022). During the COVID-19 pandemic healthcare providers not only experienced a huge influx of information but also rapid changes in information especially treatment regimens regularly which demanded a focused communication strategy (Argenti, 2020). Communication challenges experienced by healthcare workers due to PPE constraints were discussed by Diaz-Agea, Orcajada-Munoz, Leal-Costa *et al* (2022), as well as the utilization of technology to overcome the challenges. Communication strategies to implement during disease outbreaks include messaging that is a) transparent, b) evidence-based, c) people-centered, d) empathetic in tone, e) consistent, and f) comprehensive (Su *et al.*, 2022).

Ethical Reasoning

A systematic review conducted in 2022 concluded that nurses felt compassion toward their patients' suffering as well as desperation and anxiety due to the challenging clinical environment which did not always support the care their patients require. The study also

concluded that nurses felt vulnerable and alone, questioning their professional identity which led to low morale and increased stress levels (Silverman, Kheirbek, and Moscou-Jackson, 2021). Oh and Gastmans (2023) concluded that the shortage of ventilators, and PPE, and allocating ill-qualified nurses to care for sick patients as well as the chaotic environment led to the moral distress nurses experienced as they were forced to make decisions and practice outside the norm, and that nurse leaders should be more aware of the effect of an unmanageable working environment on human resources (Oh and Gastmans, 2023).

Continuation of Care during a Crisis

Categories of care incidents during the COVID-19 pandemic according to Stocking, Sandrock, Fitall *et al* (2021) is: a) Delayed and misdiagnosis including diagnostic errors due to cognitive and anchoring biases; b) Human factors whereby routine care is ignored due to exhaustion of healthcare workers and only life-saving procedures are prioritised; c) Lack of IPC training of staff which leads to severe staff shortages of shifts, causing lack of basic routine care; d) Changes in workflow design whereby 'medical-distancing' has been incorporated in an attempt to protect the healthcare workers, which leads to less direct contact with patients and failure to provide basic non-life threatening care; e) Insufficient surge capacity planning; and f), The role of technology, where although it was used successfully e.g. telemedicine, patients were easily under diagnosed (Stocking, Sandrock, Fitall *et al.*, 2021). Strategies for continuous non disease outbreak related care of patients should be included in the planning of disease outbreak events (surge capacity).

Resocialisation Strategies

Resocialization after a traumatic event has often been researched in the context of war and hostage situations. Cognitive Behaviour Therapy (CBT) has been described to be effective with a focus on self-awareness as well as lifestyle changes (Sumari and Duff, 2022). The same publication also provides guidance on how the nurse should support the patient during this process. Little is known about how nurses perceive the experience of re-integrating into society after the COVID-19 pandemic. Nurses carried a huge responsibility during the pandemic and were praised, but also easily criticised and at times even verbally abused. A study published in Indonesia described the *dehumanization* of frontline workers in their own communities during the COVID-19 pandemic (Nurul, 2021). Combining the aforementioned with possible miss trust in communities, friends, and family members to comply with COVID-19 precautionary

measures, re-socialisation in the post-pandemic phase as a nurse can be a frightening experience, and also relates to intrapersonal challenges included as theme 4.

5.3.2.4 Theme 4: Intrapersonal skills

Table 5.9: Theme 4: Intrapersonal skills

Sub Theme	ICU Nurses	ED Nurses	Peri-operative Nurses	Nursing Managers	Healthcare Professionals	Nurse Educators
1. Blame/ Bully of staff who contracted COVID-19	√	-	-	-	-	-
2. Fear of exposing others, family or self	√	√	√	√	√	√
3. Lack of trust between staff members	√	√	√			
4. Lack of debriefing/ psychological support	√	√			√	-
5. Uninformed public / playing down/mistrust COVID-19 regulations	√	√	√			
6. Failure to declare COVID-19 status by public and students		√				√
7. Self-doubt	√			√		√
8. Non-compliance of colleagues and students to regulations/ protocols	√	-	√	-		√
9. Extended isolation from family	√	-	√	-	-	-
10. Increase in patients dying	√	√			√	
11. Experiencing loss and fear of family members, colleagues, and friends dying	√	√	√	√	√	√
12. Staff being physically and verbally abused in triage area by patients		√				
13. Psychological effects of empty streets (feeling isolated)		√				
14. Felt sacrificed			√			
15. Nurses expected to make ethical decisions e.g. allocation of ventilators and oxygen	√	√	√	√	-	-

16. Re-socialisation of self during post pandemic phase				√		
Score	11/16	10/16	8/16	5/16	4/16	5/16
	68.7%	62.5%	50%	31.2%	25%	31.2%

A total of 16 sub themes were included that address the challenges experienced relevant to the intrapersonal needs of nurses during a disease outbreak event. The contributions of each nursing group and healthcare professionals with supporting transcripts are discussed below, followed by supporting literature.

ICU nurses contributed 68.7% of the sub themes included. A statement of an ICU nurse referring to feelings of self-doubt:

Voice 060.2: *“You don’t know whether your expertise matches up to how to manage COVID, whether your education in itself is enough”*

A statement of an ICU nurse referring to managing her emotions:

Voice 052.8: *“and then obviously, the emotional aspect of it as people die in front of us like suffering dying, wasn’t like we are letting them die with dignity”*

ED nurses contributed 62.5% of the sub themes included. A statement of an ED nurse referring to fear:

Voice 038.3: *“And they were just falling like flies in your hands. Yes, we are in the nursing profession. These things happen. People do die but the way they were dying”*

A statement referring to the lack of trust of the public:

Voice 048.3: *“so they did not trust us to say the least a certain group that tried to get in by force”*

A statement of an ED nurse referring to feelings of isolation and loneliness whilst driving to work, and the streets are empty and quiet:

Voice 047.3: *“It looked like a ghost town”* and

“you felt it’s almost like in a movie”

Perioperative nursing contributed to 50% of the sub themes included. A statement shared by a nursing manager and perioperative nurse, about perioperative nurses feeling sacrificed when allocated to scrub for a COVID positive patient:

Voice 027.7: *“they did not want to go and scrub there. They felt we were putting them at risk as managers”*

A statement referring to doctors who do not comply with COVID-19 regulations, which leads to a lack of trust in them:

Voice 057.4 *“There were a lot of doctors who you see that they go in and out of the theatre. Even if the theatre has been marked the COVID theatre in progress”*

Nursing Managers contributed 31.2% of the sub themes included. A statement of a nursing manager who experienced challenges to socialize after the pandemic:

Voice 025.7: *“It took me such a long time to bounce back into my social aspect of being human. You know, I didn’t want contact with people, I didn’t want to talk to people. I just wanted to be on my own. And it took me a long time to almost integrate back into pre- COVID society”*

A statement of a nursing manager referring to fear and anxiety of the unknown:

Voice 025.5: *“And the fear and anxiety of if I contracted it, am I gonna live” and “You know that fear and anxiety because you don’t have the knowledge. You don’t have the information”*

The healthcare professionals contributed 25% of the sub themes included. A statement of a paramedic referring to the lack of debriefing opportunities:

Voice EI1-19: *“I think the company I worked with, recognized the nurses were*

Burnt out, but they did not realize how to respond to it. You can call this number and make an appointment”

Statements of a trauma doctor referring to her experiences working with ED nurses during the outbreak:

Voice EL2-21: *“I saw them change and it was absolutely heartbreaking. There was no actual team spirit anymore, and none of them actually wanted to be there”* and

“Because these were good nurses clinically, because I knew them, and we had managed many things, be it communicable disease to trauma together, and we had done it beautifully. And then all of a sudden they were barely present. I couldn’t ask them to do anything, and if I did it was not worth it”

Nursing Educators contributed to 31.2% of the sub themes included. A statement referring to feelings of self-doubt:

Voice 058.2: *“But what I can say is that it brought a little bit of self-doubt in terms of am I able to actually teach the students using the now online teaching”*

A statement referring to the anxiety of getting infected as well as mistrust in students.

Voice 042.2: *“Others would have come into sessions knowing that they have some symptoms and still forced their way into our sessions”*

Emotional Intelligence is defined as 'the capability to perceive, facilitate, understand and manage one's own and others' emotions' (Mayer, Carus, and Salovey, 2016). Emotional resilience is 'the mental and behavioural process of promoting personal resources and protecting oneself from detrimental impacts of diversity', also referred to as 'mental toughness' by managing the immediate environment, and developing and protecting variables to build resilience (Fletcher and Sarkar, 2016). Although the aforementioned concepts are used interchangeably, the link between emotional intelligence and emotional resilience is described as complex, and psychologists acknowledge that further research needs to be conducted to understand this relationship (Difabria and Saklofske, 2018).

According to Howard Gardner intelligence is "the ability to respond successfully to new situations and the capacity to learn from one's past experiences" (Gardner, 2000). Intrapersonal intelligence is defined as 'the capacity to understand oneself, to appreciate one's feelings, fears, and motivations'. Gardner defines intrapersonal intelligence as the ability to have "an effective working model of ourselves, and to be able to use such information to regulate our lives" (Gardner, 2000). This is also often referred to as the ability to be 'self-smart'. A study conducted in Turkey found that there is a correlation between intrapersonal intelligence, emotional contagion, and caring behaviours of nurses. Additionally, they concluded that a high level of intrapersonal intelligence protects individuals who experience negative emotions e.g. grief, death, dying, and loss on a daily basis from burnout, compassion fatigue, and emotional contagion (Asku, Ayar, Kuşlu, 2023). An earlier study conducted in 2019 concluded that the intrapersonal intelligence of nurses is demonstrated through the ability to prioritize, translate new research findings into practice, rational decision making, problem solving skills, self-esteem maintenance as well as clinical competence (Guerrero, Banson, Pingue-Raguini *et al.*, 2019).

5.3.2.5 Theme 5: Physical Challenges

Table 5.10: Theme 5: Physical Challenges

Sub Theme	ICU Nurses	ED Nurses	Peri-operative Nurses	Nursing Managers	Healthcare Professionals	Nurse Educators
1. Staff shortage	√	√	√	√	√	-
2. Extended working hours	√			√		
3. Adhering to routine precautionary measures for long periods of time				√	√	
4. Fear of exposing others, family or self	√	√	√	√	√	√
5. Lack of senior management support (clinical)	√	√	-	√	√	-
6. Failure to declare COVID-19 status by public and students		√				√
7. Physical demands of working with PPE	√	√	√	√	√	√
8. Fast changing protocols/guidelines	√	√	√	√	√	√

9. Non-compliance of colleagues and students to regulations/ protocols	√	-	√	-		√
10. Ergometric challenges of wards and venues	√	√	√	-	√	√
11. Increase patient load	√	√	√	-	-	-
12. Staff being physically and verbally abused in triage area by patients		√				
13. Psychological effects of empty streets (feeling isolated)		√				
14. Lack of staff's understanding of vaccination practices				√		
15. PPE shortage	√	√	√	√	√	√
16. PPE appropriation	√	√	√	√	√	√
17. Donning and doffing of PPE	√	√	√	√	√	
18. Performing duties usually assigned to support staff e.g. cleaning and mopping			√			
19. Re-socialisation of self during post pandemic phase				√		
20. Repeating Lecturers						√
Score	12/20	13/20	11/20	12/20	10/20	9/20
	60%	65%	55%	60%	50%	45%

A total of 20 sub themes were included that address the challenges experienced relevant to the physical needs of nurses during a disease outbreak event. The contributions of each nursing group and healthcare professionals with supporting transcripts are discussed below, followed by supporting literature.

ICU nurses contributed to 60% of the sub themes included. A statement referring to the challenging working environment:

Voice 052.6: *“and we all went down bum-bum-bum, because they closed the windows, the windows were sealed closed, and they switched off the air-cons so there was no air flowing and it was just after that all 150 went down, two died of that lot”*

A statement referring to the physical challenges of working with PPE:

Voice 054.3: *“the most posed memory if it is being saturated with sweat slapback*

in a hazsuit and being in it and the actual physicality of being on your feet and not coming out of the suit for 12 hours”

Emergency Department nurses contributed 65 % of the sub themes included.

A statement referring to ergometric challenges experienced in an ED is:

Voice 038.5: *“I need to go right around the coffee shop before I get the emergency trolley. We had no emergency bell just a nursing bell”*

A statement referring to the challenge to protect oneself with different PPE items whilst donning and doffing:

Voice 049.2: *“it makes us very unsure, whether you’re doing the right thing, or you not doffing the right piece”*

Perioperative nurses contributed 55% to the sub themes included. Statements referring to the effect of facial masks are:

Voice 051.1: *“the most challenging thing was when we had to wear the mask and work with the mask twenty-four-seven’ and ‘you wouldn’t breath well you will feel like your chest you are getting claustrophobic”*

Nursing Managers contributed 60% to the sub themes included. A statement referring to the sensory compromise experienced whilst working with PPE is:

Voice 025.6: *“we wore this PPE and you couldn’t recognize who’s who. I am a nurse, I believe in human touch, I want to touch my patient we can’t communicate, you can’t hear they’ve got masks on ventilators screaming, you can’t hear the telephone. It was chaos”*

A statement referring to long working hours of nursing managers is:

Voice 027.2: *“So we’ll be at the hospital from six o’clock in the morning sometimes five o’clock because patients that are coming to the clinic become very sad because they want to beat the ques”*

Non-nurse professionals contributed to 50% of the sub themes included.

Statements from a physician referring to the timing and coordination of managing personal PPE are:

Voice 015.3: *“much time was spent trying to get dressed and undressed and not caring for patients”*

A statement from a trauma doctor referring to the physical effect is:

Voice EL2. 2.1: *“But I think by that point people were tired. We were just tired of it”*

Nursing Educators contributed to 45% of the sub themes included. A statement referring to physical demands due to the division of classes into smaller groups:

Voice 058:5: *“And sometimes it can be exhausting to be repeating the same content over and over again”*

Based on the original work of Demerouti, Bakker, Nachreiner *et al* in 2001, the two dimensions of the JD-R Model (Job Demand-Resource Model) are; a) job demands that refer to all physical and mental efforts at work and include emotional, physical, and social demands, workload, time frames, pressure demands, recipient contact, and role conflict and; b) job resources that refer to the physical, mental, social, and organisational aspects associated with aspects that are useful to achieve work goals, as well as aspects that counteracts job demands and costs (Demetrouti *et al.*, 2001). Bakker and Demetrouti later described the two dimensions as a dual process and direct correlation by explaining that chronic job demands deplete the mental and physical resources that lead to health problems of workers. To counteract these demands, the work resources need to increase in the form of a focused job-secure structure (Bakker and Demetrouti, 2007).

Historically, nursing has always demanded high physical input to provide quality nursing care, and physical work overload is a key job demand in nursing which includes extended working hours, excessive standing and walking, bending, stretching, and lifting, being exposed to

diseases, chemicals as well as other infrastructure and technological work related injuries (Broetje, Jenny, and Bauer, 2020).

The findings of a study conducted in 2022 in Iran concluded the physical demands and injuries that occurred in nurses during the COVID-19 pandemic included sweating from wearing PPE, development of rashes, painful face, and facial bruising, allergic reaction on hands, scalp itching, extremity oedema, bladder pain due to delay of urination caused by the timeous doffing procedure, dry mouth, hoarseness due to extended wearing of facial PPE, hearing problems due to layered PPE, and increase in the risk of sharp injury e.g. needle stick injuries due to blurred vision caused by facial PPE (Oral, Aydin, and Kirici, 2022).

A multi-country study conducted by the Worldbank in Kenya, Columbia, and three provinces in South Africa (Kwa-Zulu Natal, Western Cape, and Eswatini), between 1 March 2020 and 28 February 2021 concluded that the incidence of COVID-19 infections in healthcare workers was higher than that of the general population at all the study sites (Worldbank, 2022). The share of infections that occurred among healthcare workers was: Kenya = 3.2%; Eswatini = 2.5%; Columbia = 1.86%; Western Cape = 3.37%; and Kwa Zulu Natal = 4.66%. The share of COVID-19-related deaths among healthcare workers was: Kenya = 1.78%; Eswatini = 1.49%; Columbia = 0.32%; Western Cape = 0.91%; and Kwa-Zulu Natal = 3.66% (Wang, Zeng, Kabubei *et al.*, 2023).

Ergometric Challenges during Outbreaks

Ergometrics refers to the science of measuring and analysis of physical activity of individuals whilst performing a task. A retrospective study on healthcare worker compensation data indicated that 4000 healthcare worker working days were lost during COVID-19, within the study timeframe, due to musculoskeletal injury whilst caring for decedents. Additionally, the tasks had to be performed whilst protecting your own PPE, and included the manual lifting of descendants, maintaining a non-neutral posture, moving heavy objects, pushing and pulling whilst transporting the deceased (Lee, Roy, Power *et al.*, 2022).

During COVID-19, healthcare workers were expected to prone patients who presented with Adult Respiratory Distress Syndrome (ARDS). This procedure usually requires five to seven healthcare workers depending on the size of the patient. Challenges whilst executing this procedure include patient injury, dislocation of supporting devices, and compromising healthcare worker PPE. The procedure required three manoeuvres: a) Lateral Repositioning;

b) Rotation from supine to side lying; and c) Lowering from side to lying position (Wiggerman, Zhou, and Kumpar, 2020). Ergometric studies on the lateral repositioning of patients, required by proning indicated that pull forces exceed the recommended values when one person is attempting it on a patient weighing 55kg, compared to an acceptable pull force value required by a 77kg patient with the assistance of a friction-reducing device (Wiggerman, Zhou, McGann, 2020).

5.3.2.6 Theme 6: Communication and Information Management

Table 5.11: Theme 6: Communication and Information Management

Sub Theme	ICU Nurses	ED Nurses	Peri-operative Nurses	Nursing Managers	Healthcare Professionals	Nurse Educators
1. Blame/ Bully of staff who contracted COVID- 19	√	-	-	-	-	-
2. Lack of trust between staff members	√	√	√			
3. Lack of debriefing/ psychological support	√	√			√	-
4. Unprepared in disaster management (11)	√			-	√	-
5. Diverse categories of nursing workforce leading to diverse understanding of disease processes	√		√			
6. Uninformed public playing down / mistrust COVID-19 regulations	√	√	√		√	
7. Failure to declare COVID-19 status by public and students		√				√
8. Fast changing protocols/guidelines	√	√	√	√	√	√
9. Non-compliance of colleagues and students to regulations/ protocols	√	-	√	-		√
10. Staff being physically and		√				

verbally abused in triage area by patients						
11. Breaking bad news to families		√			√	
12. Basic computer skills		√		√		√
13. Lack of staff's understanding of vaccination practices				√		
14. Lack of managerial and leadership skills of nurse managers			√		√	
15. Staff refusing to work in COVID-19 wards			√			
16. Lack of guidelines and protocols to manage non-hospital institutions e.g. old age homes in the beginning of the outbreak			√			
17. Training/ orientating non-nursing staff			√			
18. Lack of distribution of information	√	√	√		√	
19. Communicating changing protocols	√			√	√	
20. Not addressing staff and doctors' non-conformity/non-compliance to protocols	√	-	√	-	-	-
21. Nurses expected to make ethical decisions e.g. allocation of ventilators and oxygen	√	√	√	√	-	-
22. Increase in patient documentation			√		√	
23. Communication strategies with PPE	√	√	√	√	√	√
24. Trust in and knowledge of cultural/religious community practices to support patients				√		
25. Re-socialisation of self during post pandemic phase				√		

26. Repeating Lecturers						√
Score	13/26	11/26	14/26	8/26	10/26	6/26
	50%	44%	56%	30.7%	38.4%	23%

A total of 26 sub themes were included that address the challenges experienced relevant to communication and information management during the disease outbreak event. The contributions of each nursing group and healthcare professionals with supporting transcripts are discussed below, followed by supporting literature.

ICU nurses contributed 50% of the sub themes included. A statement from an ICU nurse relevant to the rate of protocols changing:

Voice 054.1: *“It was awful, we would like get memos, it changed from shift to shift” and “we actually never go to know like a formalized ok guys now, this is how we’re going to do things. It changes without us even half the time we even didn’t even have time to read the memo”*

ED nurses contributed 44% of the sub themes included. A statement from an ED nurse referring to communication challenges whilst wearing PPE:

Voice 048.5: *“it was actually difficult to communicate with a patient’ ‘and there were a lot of misunderstandings between us”*

A statement referring to technological challenges:

Voice 048.7: *“we also had a big problem in the beginning we were doing everything by hand on forms, and then we switch over to tablet electronic systems and not everybody was up to date with the electronic system”*

Perioperative nurses contributed 56% to the sub themes included. A statement relevant to the failure to distribute information:

Voice 056.7: *“we had to rely on media most of the time’ and ‘you have to actually keep yourself updated, because I think also with the hospital management, they will also not show of what is happening”*

Statements relating to an experience interpreted as a lack of caring:

Voice 051.3: *“There was no time even like to call us maybe even if it's not one-on-one or maybe in your group to say, how are you doing”*

Nursing managers contributed 30.7% of the sub themes included. A statement referring to the lack of information, during the first wave with regard to the management of non-hospital institutions:

Voice 036.1: *“everybody focused on hospital and hospitalization. Yes, and for us at home, we actually dealt with people over the age of sixty-five there was no support”* and
“so we developed our own plan. We developed our own plan because there really wasn't anything”

A statement referring to the challenge of communicating a lot of information to many staff members within a short period of time:

Voice 037.2: *“the day we were bombarded by policies and procedures to supposedly help us but I think at the end of the day it only made matters worse, in the sense of you had to communicate this to now like 450 nurses, if you can try and imagine how to get 450 nurses trained back that overnight. It's impossible”*

Non-nurse professionals contributed 38.4 % of the sub themes included. A statement referring to the lack of distribution of information in a healthcare facility:

Voice 019.4: *“but in a private hospital the emphasis is on getting the work done. It's not on academic input. So, yes that was a big problem that there wasn't enough information”*

Nursing educators contributed 23% of the sub themes included. A statement referring to the facilitation of lectures to smaller groups of students because of venue capacity restrictions:

Voice 058.5: *“And sometimes it can be exhausting to be repeating the same content over and over again. And sometimes you feel that the ones you started with did not benefit much or they benefited more because it was still fresh and hands-on”*

A statement referring to the lack of communication from students:

Voice 041.4: *“And students didn’t want to tell anyone they were ill, they stayed in the residence which they shouldn’t have. We had a lot of complications there”*

In addition to the previous discussion on interpersonal challenges during disease outbreaks, the importance of a focused well organised communication strategy during an outbreak is described in a study conducted in the hospitals of the Department of Medicine at New York University Grossman School of Medicine. Shaye et al concluded that “efficient communication within and among the four hospitals was vital and strengthened our ability to respond in each unique system of care; hospitals should ensure they have multimodal communication strategies for leadership and frontline Staff” (Shaye, Reich, Bosworth, *et al.*, 2023). The modes of communication referred to included: emails, video conferences, and town hall meetings. Slack was used to communicate site specific information. Timing of distribution of information was also identified as crucial as decisions were based on real-time data. Changing clinical protocols were communicated on daily specialty specific meetings, and existing protocols were updated as such (Shaye *et al.*, 2023).

A literature review conducted in China referred to communication strategies during a disease outbreak event as *crisis communications strategies* which include a) communication based on scientific facts; b) people-centred strategies (cognitive, affective, and behaviour-specific); and c) comprehensive and consistent information nested in international collaboration. The development of a specific communication and information-sharing strategy during a disease outbreak event has been described as one of the main functions of healthcare provider managers (Su *et al.*, 2022).

Challenges experienced with communication during the COVID-19 pandemic were categorised in the study conducted in Spain. PPE was listed as one of the main barriers to effective communication as it blocked non-verbal gestures. The study indicated that certain

patients were more affected by communication barriers which included the elderly, deaf patients, patients cared for with non-invasive ventilation devices, and patients in the process of being weaned from invasive ventilation support. The study concluded that communication challenges were managed more effectively if the main nurse was ‘mirrored’ as it led to improved organizational strategies. This study also described challenges in collegial care between healthcare workers as non-verbal communication gestures were hidden under PPE, which resulted in them focusing more on their colleague's eyes for understanding as it was the only feature visible behind the eye and face protection (Diaz-Agea *et al.*, 2022).

5.3.2.7 Theme 7: Community Profiling and Resources

Table 5.12: Theme 7: Community Profiling and Resources

Sub Theme	ICU Nurses	ED Nurses	Peri-operative Nurses	Nursing Managers	Healthcare professionals	Nurse Educators
1. Lack of guidelines and protocols to manage non-hospital institutions e.g. old age homes in the beginning of the outbreak				√		
2. Identification of structural resources (venues and space)				√		
3. Trust in and knowledge of cultural/ religious community practices to support patients				√		
4. Training/ orientation of non-nursing staff				√		
Score	0	0	0	4/4	0	0
	0%	0%	0%	100%	0%	0%

A total of four sub themes were included in community profiling and resources. The contributions of each nursing group and healthcare professionals with supporting transcripts are discussed below, followed by supporting literature.

All four sub themes were provided by nursing managers.

A statement referring to the lack of support guidelines for care homes at the beginning of the outbreak:

Voice 036.1: *“everybody on hospital and hospitalization. Yes, and for us at home, we actually dealt with people over the age of 65 there was no support”*

A statement referring to the importance of understanding the community’s culture as well as resources:

Voice 037.4: *“The other thing I can talk about is the community in Lenasia that is Different I think from what I've heard from other communities”* and

“So, we’ve got drivers, ok. And the drivers will take scripts to patients home with medication for COVID patients. So, the community engagement was very, very good” and

“Doctor Sulliman. So they can help us to create with doctors a recovery center as well as an extension to our hospital” and

“So they got community people in to help. And it wasn’t critical patients but it was patients still requiring oxygen and monitoring, so that we could actually extend to that site to get the acute people in hospital”

Community engagement refers to the collaborative involvement between an organization, and individuals with a specific community to achieve a collective goal (World Health Organization, 2020). Community resilience refers to “the sense of self-responsibility and agency that community members wield in addressing their challenges” (Frimpong and Paintsil, 2022). Community Health Workers (CHW) are defined as “lay persons trained to assist in the communication and provision of health services particularly underserved populations” (Boyce and Katz, 2019). It is further concluded by the before mentioned authors that Community Health Workers can disseminate and communicate healthcare information as the trusted voice in a culturally appropriate way as they are part of the community being served supporting the formally trained healthcare worker, and forms an essential part of identification as well as informing at-risk communities (Boyce and Katz, 2019).

In 2011 the World Health Organization (WHO) published a training guide during the Influenza outbreak, acknowledging the valuable contribution of including the CHW in all the phases of

disease outbreak management (World Health Organization, 2011a). During the Ebola epidemic which was confirmed in 2013, in Liberia, Guinea, and Sierra Leone, a qualitative multi-country study was conducted to determine the impact of Ebola on maternal, newborn, and child health (MNCH) services. The study concluded that the CHWs experienced a lot of resistance but were more accepted over time, and therefore underscored the early initiation of HCW strategies (Miller, Milson, Johnson *et al.*, 2018). Healthcare workers were trained and supported to be 'contact-tracers', 'active case finders', and initial 'care takers' waiting for health services to respond. A second community structure that successfully contributed to the coordination of health services was the facilitation of community-watch committees also referred to as 'Ebola-task forces'. These committees consisted of community members, religious leaders, women, and youth leaders, and could quickly coordinate responses and alert healthcare services of at-risk communities. The study further concluded that communities should be acknowledged as partners in the fight against diseases and not only victims and that there should be a deliberate effort to establish collaborative relationships between community workers and formal healthcare workers during outbreak-free times (Miller *et al.*, 2018)

Profiling of the community, served by the healthcare provider, forms part of strategic risk planning to enable the provider to accommodate the existing and potential health challenges it has to manage. When planning to develop a collaborative, co-created outbreak response community profiling also includes the identification of resources e.g. buildings, other existing medical and healthcare facilities, educational facilities, religious and cultural facilities, recreational facilities, commercial facilities, workspaces water, sanitation, transport, roads and food supply characteristics, identification of vulnerable groups within the community as well as the identification of skills of community members not usually involved in the healthcare sector, that can be valuable during an outbreak. Community profiling is further described in four phases namely a) Inventory study and features; b) Review social and economic as well as disease characteristics; c) Identification of community attitudes and; d) Summarizing of the findings (Center for Urban Transportation Research, n.d.).

Marston, Renedo, and Miles (2020) state that community members and especially community leaders are valuable during outbreaks as they are constantly updated with rumours, ideas, and challenges in the community at coal face level that can impact the successful management of the outbreak (Marston *et al.*, 2020).

The Independent Panel for Pandemic Preparedness and Response developed a strategy for future community involvement programmes. This includes a) The centralization of communities and civil societies in the design, planning, implementation, and assessment of preparedness and response; b) Prioritization and sustainment of community engagement including during non-outbreak times; c) Bi-directional risk communication through formal channels to allow for meaningful communication between the healthcare provider and community leaders; d) Focusing on community resilience to overcome structural inequities (The Independent Panel for Pandemic Preparedness and Response, 2021)

5.3.2.8 Theme 8: Financial Management

Table 5.13: Theme 8: Financial Management

Sub Theme	ICU Nurses	ED Nurses	Peri- operative Nurses	Nursing Manager s	Healthcare professional s	Nurse Educator s
1. PPE shortage	√	√	√	√	√	√
2. Equipment shortages/ pumps, ventilators, oxygen supplies	√	√		√	√	
3. Financial implication of the outbreak of healthcare providers				√		
4. Job security under threat			√	√		
5. Providing students with basic resources e.g. food						√
6. PPE appropriation	√	√	√	√	√	√
Score	3/6	3/6	3/6	5/6	3/6	3/6
	50%	50%	50%	83%	50%	50%

A total of six sub themes relevant to financial impact and resources were included. The contributions of each nursing group and healthcare professionals with supporting transcripts are discussed below, followed by supporting literature.

ICU nurses contributed to 50% of the sub themes. A statement referring to the shortage of equipment:

Voice 052: *“Lack of PPE, lack of air, lack of pumps”*

ED nurses contributed to 50% of the sub themes included. A statement referring to the shortage of equipment:

Voice 038.4: *“I don’t have enough emergency trolleys. I don’t even have enough Ambu bags”*

Perioperative nurses contributed 50% of the sub themes included.

A statement referring to the availability of overtime opportunities to supplement your income:

Voice: 040.6: *“and then economic as well. You don’t get extra money as you don’t do that time anymore”* and
“So there were reduced income as well”

Nursing managers contributed to 83% of the sub themes included. A statement referring to the cost of preparing staff members and supplying PPE:

Voice 036.2: *“so it was a vast spike in finances to get them ready”* and

Voice 025.3: *“an overwhelming part of it was not just the resources in terms of ICU beds, it was terrible, the main medication started running out. PPE started to run out, we would limit people going into those areas so that we could save on PPE”*

Healthcare professionals contributed 50% of the sub themes included. A statement referring to the availability of equipment in the wards;

Voice 016.3: *“the wards aren't well prepared for resuses”* and
“The wards weren’t equipped”

Nursing educators contributed 50% of the sub themes included. A statement referring to a healthcare worker wastage of PPE due to inappropriate usage:

Voice 41.2: *“so you would see someone in especially the hospital here that was in his hazmat suit to keep warm”*

Although clinical nurses are not directly involved in the financial management of diseases, but rather the 'end-users' of resources, nursing managers play a crucial role in the financial planning and allocation of resources as well as projecting the surge capacity of the service in relation to patient and disease demands of the community it serves. Secure financial resources during a disease outbreak have a direct impact on the successful management of the ability of the healthcare provider to contain the disease which leads to fewer infections, fewer deaths, and normal service delivery disruptions.

A study conducted in 2022 investigated the cost of treating a COVID-19 patient in a South African public hospital, as well as the cost drivers. The study concluded that therapeutic agents, management of complications, diagnostic tests, respiratory support, Personal Protective Equipment (PPE), hygiene and Infection Prevention and Control (IPC) strategies, medical devices, beds, linen, and human resources were the main drivers of the costs treating patients suffering from COVID-19 (Edoka, Fraser, and Jamieson *et al.*, 2022).

A study conducted in Iran listed the following factors as hospital economic indicators that have to be closely monitored during a disease outbreak: a) Average Length of Stay (ALOS); b) Bed-Turnover –Rate (BTR); c) Bed-Turn-over Distance Rate (BTIR); d) Hospital Mortality rate (HMR); e) Physician-to-bed-ratio and; f) Nurse-to-bed-ratio. The study concluded that the aforementioned factors are indicative of a hospital's performance capacity during a disease outbreak event (Ahangar, Mohammed, and Tehrani-Banihashemi *et al.*, 2023).

5.3.2.9 Theme 9: Preparation of the Infrastructure

Table 5.14 Theme 9: Preparation of the Infrastructure

Sub Theme	ICU Nurses	ED Nurses	Peri-operative Nurses	Nursing Managers	Healthcare professional	Nurse Educators
1. Unprepared in disaster management	√				√	
2. Ergometric challenges of wards and venues	√	√	√			√
3. Protecting COVID negative patients		√				

4. Providing non-outbreak related services				√		
5. Lack of managerial and leadership skills of nurse managers			√		√	
6. Identification of structural resources (venues and space)			√	√		√
Score	2/6	2/6	3/6	2/6	2/6	2/6
	33.3%	33.3%	50%	33.3%	33.3%	33.3%

A total of 6 sub themes were included. ICU nurses contributed 33% to the sub themes included. The contributions of each nursing group and healthcare professionals with supporting transcripts are discussed below, followed by supporting literature.

A statement referring to the lack of bed space to accommodate equipment is:

Voice 059.2: *“so now the space to actually mobilize our equipment to maneuver around the patient, it was limited”*

ED nurses contributed 33% to the sub themes included. A statement referring to the impractical physical layout of the trauma unit is:

Voice 038.5: *“I need to go right around the coffee shop before I get the emergency trolley. We had no emergency bell just a nursing bell”*

Perioperative nurses contributed 50% to the sub themes included. A statement referring to the lack of infrastructure planning:

Voice 055.5: *“we didn't have a specialist specific theatre for COVID patients, because of the influx of patients”* and *“and it was never COVID only you know, patients were interchangeable, as compared to Rahima. They had a specific theatre where they do COVID patients only with a proper exit and everything not in contact with the main theatre”* and *“so if you plan something like that in your theatre department, you should have a*

good idea of your infrastructure and the flow, patient flow, and staff flow”

Nursing managers contributed 33% to the sub themes included. A statement referring to the separation between COVID patients and usual disease-related areas.

Voice 039.8: *“so it wasn’t possible to have that differentiation between COVID And the usual services”*

A statement referring to the importance of demarcated areas when planning services:

Voice 036.4: *“I think what taught me is that structural availability should have been there from the start, and not only like a disease outbreak plan”* and

Voice 037.3: *“so now you had a casualty section where you had patients screening and you had patients on ventilators”* and

“Dr Sulliman. So they came and helped us to create with doctors a recovery Center as well as an extension of our actual hospital”

Healthcare professionals contributed 33.3% to the sub themes included. A statement from a surgeon referring to a multi-disciplinary approach to infrastructure preparation is;

Voice 023.2: *“I think it is the whole hospital infrastructure, maintenance like everyone needs to be involved”*

Nursing Educators contributed 33% of the sub themes included.

A statement referring to a shortage of venues to accommodate students and COVID-19 regulations is:

Voice 058.4: *“Because I feel that even though there are things that you can teach remotely, but there are still things that need you to be with a student face-to-face. So part of preparation would be adequate space to accommodate the number of students the department has”*

To comply with the need for additional beds during the COVID-19 pandemic, nursing managers in collaboration with hospital and infrastructure managers had to adapt existing and create new treatment areas. The biggest challenge was to create COVID-19-free units as other

non-pandemic-related diseases also had to be accommodated, and the patients had to be protected from contracting COVID-19 as a healthcare associated infection.

Sood and Perl (2016) previously described the healthcare environment as complex as the same environment that is intended to keep patients safe, also can be the source of environmental contamination resulting in healthcare-associated infections e.g. *Acinetobacter*, *Pseudomonas*, and *Staphylococcus Aureas*. Their study also concluded a focused multi-disciplinary approach to healthcare environmental care (Sood and Perl, 2016).

A scoping review conducted in 2022 concluded that most hospitals in Europe invested in non-permanent flexible structures with additional heating, ventilation, and air conditioning systems. Spain, Portugal, and Italy also included existing structures which included rehabilitation facilities, public halls, and hotels to accommodate patients (Ndayishimiye, Sowada, Dyjach, *et al.*, 2022). The United Kingdom also included mobile modular systems to extend permanent structures (Hospital Times, 2020).

A study conducted in Groote Schuur Hospital in Cape Town South Africa describes the multidisciplinary approach to assess existing structural resources and patient pathways to best address the high patient influx during the COVID-19 pandemic (Mendelson, Booyens, Boutall *et al.*, 2020).

5.3.2.10 Theme 10: PPE Management and Precautionary Measures

Table 5.15: Theme 10: PPE Management and Precautionary Measures

Sub Theme	ICU Nurses	ED Nurses	Peri-operative Nurses	Nursing Managers	Healthcare professionals	Nurse Educators
1. High incidence of infected staff members	√	√				
2. Adhering to routine precautionary measures for long periods of time				√	√	
3. Fear of exposing others, family, or self	√	√	√	√	√	√
4. Diverse categories of the workforce leading to a diverse understanding of disease processes	√		√			
5. Physical demands working with PPE	√	√	√	√	√	√
6. Fast-changing protocols and guidelines	√	√	√	√	√	√

7. Noncompliance of colleagues and students to regulations and protocols	√		√			√
8. Extended isolation from my family	√		√			
9. Lack of clinical skills of the staff	√	√	√	√	√	
10. PPE shortage	√	√	√	√	√	√
11. PPE appropriation	√	√	√	√	√	√
12. Donning and doffing of PPE)	√	√	√	√	√	
13. Not addressing staff and doctor's non-compliance/non-compliance to protocols	√		√			
14. Financial implications of the outbreak on the healthcare provider				√		
15. Communication strategies with PPE	√	√	√	√	√	√
Score	13/15	9/15	12/15	10/15	9/15	7/15
	86.6%	60%	80%	66.6%	60%	46.6%

A total of 15 sub themes related to PPE and precautionary measures were included in this theme. The contributions of each nursing group and healthcare professionals with supporting transcripts are discussed below, followed by supporting literature.

ICU nurses contributed 86.6% to the sub themes included. A statement referring to the challenges of addressing personal needs when wearing PPE:

Voice 059.8: *“it was a challenge because we needed to get out of PPE to go to the bathroom”*

A statement referring to the delay in patient care due to PPE challenges:

Voice 046.3: *“not to immediately storm in with a resuscitation and without protecting yourself first”*

ED nurses contributed 60% to the sub themes included. Statements referring to adherence to precautionary measures to protect non-infected patients:

Voice 045.1: *“for us, it was very important to protect the ones that were*

negative, the ones that did not have COVID because most of our patients were compromised”

Perioperative nurses contributed 80% to the sub themes included. Statements referring to staff not adhering to precautionary measures include:

Voice 040.3: *“that you can please not come in contact with a patient without a N95 without proper visor, without gloves without wearing actually your proper PPE. With regarding circulating nurses, they gave us the same attitude” and “There are a lot of doctors who you see that they go in and out of theatre. Even if the theatre has been marked the COVID theatre in progress”*

Nursing Managers contributed 66.6% of the sub themes included. Statements referring to maintaining precautionary measures day after day:

Voice 039.2: *“The drill every day when you come back home, you have to Sanitize”*

Healthcare professionals contributed 60% of the sub themes included. A statement of an anesthetist referring to PPE management is:

Voice 019.1: *“we never really got good at it” and; “we struggled with the protocols” and “people ended up cutting corners”*

A statement of a surgeon referring to the incorrect disposal of PPE is:

Voice 023.1: *“So, you know, and I think like once there was a point in time that there was a big pile of disposable gowns in big piles just outside the theatre during the pandemic. Used gowns”*

Nursing Educators contributed to 46.6% of the sub themes included. A statement referring to the challenges of teaching with PPE is:

Voice 058.6: *“And you find that now you try to adjust to breathing through the mask and seeing through the visor, especially when you are doing procedures”*

A study conducted in 2020 concluded that the procurement, storage, and distribution of PPE is an essential phase in PPE management as effective PPE management resulted in an estimated 60%-95% reduction rate of COVID-19, and Ebola infections in healthcare workers (Kim, Hegde, LaFiura *et al.*, 2021). Unfortunately, the NIOSH (National Institute for Occupational Safety and Health) concluded that 60% of the imported respirators they sampled in the United States of America did not comply with NIOSH standards (Andrews, Powers, Cichowicz *et al.*, 2020). A 2020 study conducted in China concluded that inappropriate size, the complexity of usage, quality of PPE, the high number of PPE items required, monotonous practices during donning and doffing procedures, non-standardization of demarcated clean and contaminated areas, absence of stability devices in doffing areas as well as mirrors contributed to non-compliance of healthcare workers (Fan, Jiang, Hu *et al.*, 2020). A study conducted in 2021 concurred that healthcare workers modify and adjust ill-designed PPE items they are provided with to allow for them to address overheating, heavy facial protections, and fit-for-all body-type designs. This practice increased their risk of exposure to COVID-19 (Houghton, Meskell, Delaney *et al.*, 2021).

A Medical PPE Ecosystem was developed in 2021 in an attempt to provide structure to role players in their management of PPE. The elements of the Ecosystem include: Innovation and Development; Standards, Quality and Testing; Manufacturing; Procurement and Delivery; and Usage and Disposal (Global Fund, 2021).

5.4 ALIGNMENT OF FINDINGS WITH SCOPING REVIEW RESULTS AND DELPHI STATEMENTS

The alignment of the results of the scoping review and in-depth interviews as well as the relevant number of the possible Delphi statement is presented in Table 5.16.

Table 5.16: The results of the scoping review, in-depth interviews and potential items in the Delphi survey

Category 1: Nursing resources	Scoping Review	In-depth Interviews						Delphi-survey Round 1
Sub Themes		ICU Nurses	ED Nurses	Peri-operative Nurses	Nursing Managers	Healthcare Professionals	Nursing Educators	Item Number
Shortage of disease outbreak experts		-	-	-	√	√	-	8
Unprepared disaster management	√	√	√	√	√	√	-	6,7,8,9,10,11,12,13
Staff shortage	√	√	√	√	√	√	-	9
High incidents of staff resignations		-	-	-	√	-	-	9,11
Extended working hours	√	√	-	-	√	-	-	9,11
High incidence of infected staff members		√	√	-	-	-	-	9,11,18,77-85
Nursing categories working outside scope of practice		-	√	-	√	-	-	12,13,14,15,16,30
Staff refusing to work in COVID-19 wards		-	-	√	-	-	-	14,15,16,17,18,20,31,43
Job security under threat		-	-	√	√	-	-	6-13,19
Scores		4/9	4/9	4/9	7/9	3/9	0/9	
		44.4%	44.4%	44.4%	77.7%	33.3%	0%	
Category 2: Clinical skills	Scoping Review	In-depth Interviews						Delphi-survey Round 1
Sub Themes		ICU Nurses	ED Nurses	Peri-operative Nurses	Nursing Managers	Healthcare Professionals	Nursing Educators	Item Number
High incidence of infected staff members		√	√	-	-	-	-	7,11,14,17,18,20

Adhering to routine precautionary measures for long periods of time		-	-	-	√	-	-	14, 20, 18, 25
Fear of exposing others, family or self	√	√	√	√	√	-	√	50, 51, 52, 31
Lack of senior management support (clinical)		√	√	-	√	-	-	9, 48, 71, 11
Diverse categories of nursing workforce leading to diverse understanding of disease processes	√	√	-	√	-	-	-	9, 13, 15, 26, 28, 30, 65,
Nursing categories working outside scope of practice		-	√	-	√	-	-	8, 11, 12, 13, 14, 15, 16, 18
Self- doubt		√	-	-	√	-	√	50, 47, 48, 46, 43, 14
Physical demands of working with PPE	√	√	√	√	√	√	√	50, 51, 52, 53, 17, 18, 20, 25, 72 - 85
Fast changing protocols / guidelines	√	√	√	√	√	√	√	19, 22, 29, 48, 49, 47, 56, 57, 58
Non-compliance of colleagues and students to regulations/ protocols	√	√	-	√	-	-	√	14, 20, 25, 28, 29, 30, 31, 32, 39
Unknown disease and treatment	√	√	√	√	-	√	√	14, 15, 16, 18, 20, 21, 36, 54 – 61, 72 - 85
Ergometric challenges of wards and venues	√	√	√	√	-		√	53, 69 - 71
Increase patient load	√	√	√	√	-	√	-	6, 9, 12, 14, 15, 16, 63, 65, 69, 70
Increase in patients dying	√	√	√	-	-	√	-	21, 19, 27, 37, 36
Protecting COVID-19 negative patients			√					69, 70, 71, 72 - 85
Providing non-outbreak related services					√			69, 70, 71 - 85
Support for staff working outside their scope of practice		√	√		√			8, 11 - 18

Communication strategies with PPE	√	√	√	√	√	√	√	38, 54, 60
Breaking bad news to families	√		√			√		54, 55, 59, 60, 23, 21
Basic computer skills			√		√		√	54
Lack of technical equipment skills	√	√	√			√		24
Lack of clinical skills of staff	√	√	√	√	√	√	-	14 – 30, 72 - 85
Lack of staff's understanding of vaccination practices	√				√			25, 29
Lack of managerial and leadership skills of nurse managers	√			√		√		6 – 13, 14 – 30, 31 – 42, 43 – 49, 54 – 61, 62 – 65, 66 – 68, 70, 72 - 85
Staff refusing to work in COVID-19 wards				√				8, 9, 14, 15, 16, 19, 31, 43
Training/ orientating non-nursing staff				√				34, 65, 63, 62
Lack of distribution of information		√	√	√		√		54 - 61
Fast changing protocols/ guidelines	√	√	√	√	√	√	√	54 - 61
Communicating changing protocols	√	√			√			54 - 61
PPE shortage		√	√	√	√	√	√	66 – 68, 85, 80
PPE appropriation	√	√	√	√	√	√	√	17, 72 – 74, 75 – 77
Donning and doffing of PPE		√	√	√	√	√		14, 17, 76, 77, 81
Not addressing staff and doctor's' non-conformity / non compliance to protocols		√	-	√	-	-	-	25, 32, 39, 43, 83
Nurses expected to make ethical decisions e.g. allocation of ventilators and oxygen	√	√	√	√	√	-	-	40, 43, 47

Performing duties usually assigned to support staff e.g. cleaning and mopping				√				30, 19, 41, 49, 65, 68
Increase in patient documentation				√		√		54, 56, 38, 24
Trust in and knowledge of cultural / religious community practices to support patients					√			62 - 65
Providing students with basic resources e.g. food							√	11, 13
Supporting the scared student							√	11, 13, 28, 45, 49
Repeating Lecturers							√	13,49, 68, 81
Shortage of disease outbreak experts					√	√		8, 9
Recovery room management of the COVID-19 patient				√				18, 19, 29
Anaesthetic management of the COVID-19 patient				√				18, 19 29
Scores		24/43	23/43	24/43	21/43	17/43	15/43	
		55.8%	53.4%	55.8%	48.8%	39.5%	34.8%	
Category 3: Interpersonal skills	Scoping Review	In-depth Interviews						Delphi-survey Round 1
Sub Themes		ICU Nurses	ED Nurses	Peri-operative Nurses	Nursing Managers	Non-Nursing group	Nursing Educators	
Blame/ Bully of staff who contracted COVID- 19		√	-	-	-	-	-	31
Fear of exposing others, family or self	√	√	√	√	√	√	√	31
Lack of trust between staff members		√	√	√				32

Lack of debriefing/ psychological support		√	√	-	-	√	- -	33
Lack of senior management support (clinical)		√	√	-	√	-	-	35
Diverse categories of nursing workforce leading to diverse understanding of disease processes	√	√		√				9, 19, 25, 28, 30, 34
Uninformed public / playing down / mistrust COVID-19 regulations		√	√	√				43, 44, 45
Failure to declare COVID-19 status by public and students			√				√	25, 28, 39, 40, 43, 51, 61
Nursing categories working outside scope of practice		-	√	-	√	-	-	12, 13, 15, 34, 41, 32
Non-compliance of colleagues and students to regulations/protocols		√	-	√	-		√	25, 28, 32, 39, 40, 43, 51, 61
Extended isolation from family		√	-	√	-	-	-	45, 46, 50, 51
Increase patient load	√	√	√	√	-	√	-	6, 9, 12, 14, 15, 16, 63, 65, 69, 70
Increase in patients dying	√	√	√			√		19, 21, 27, 36, 37
Experiencing loss and fear of family members, colleagues, and friends dying	√	√	√	√	√	√	√	31, 50, 51, 52
Protecting COVID-negative patients		-	√	-		-	-	69, 70
Providing non-outbreak related services					√			69, 70

Staff being physically and verbally abused in triage area by patients			√					11, 31, 33, 42, 43, 50
Support for staff working outside their scope of practice		√	√		√			12, 13,14,15,16,30
Breaking bad news to families			√			√		21, 23, 54, 55, 59, 60
Lack of clinical skills of staff		√	√	√	√	√	-	8, 9, 12, 14, 15, 16, 20, 29, 30
Lack of staff's understanding of vaccination practices					√			20, 27, 31
Lack of managerial and leadership skills of nurse managers				√				6 – 49, 54 – 61- 68, 70, 72 - 85
Staff refusing to work in COVID-19 wards				√				14 -18, 20
Training/ orientating non-nursing staff				√				34, 62, 63, 65
Communicating changing protocols		√			√	√		58
Not addressing staff and doctor's' non-conformity / non compliance to protocols		√	-	√	-	-	-	25, 32, 39, 43, 83
Nurses expected to make ethical decisions e.g. allocation of ventilators and oxygen		√	√	√	√	-	-	40, 43, 40
Communication strategies with PPE		√	√	√	√	√	√	38, 77, 85
Trust in and knowledge of cultural / religious community practices to support patients					√			6, 62, 63,64, 65

Re-socialisation of self during post pandemic phase					√			42, 44
Lack of support & clinical teaching for student clinical practice during COVID							√	12, 13, 28, 49
Providing students with basic resources e.g. food							√	11, 13
Supporting the scared student							√	13, 28
Repeating Lecturers							√	13, 49, 68, 81
Score		18/34	17/34	15/34	13/34	9/34	9/34	
		52.9%	50%	44%	38.1%	26.4%	26.4%	
Category 4: Intrapersonal skills	Scoping Review	In-depth Interviews						Delphi-survey Round 1
Sub Themes		ICU Nurses	ED Nurses	Peri-operative Nurses	Nursing Managers	Non-Nursing group	Nursing Educators	
Blame/ Bully of staff who contracted COVID- 19		√	-	-	-	-	-	11, 43, 45
Fear of exposing others, family or self	√	√	√	√	√	√	√	31, 72 - 85
Lack of trust between staff members		√	√	√				32
Lack of debriefing/ psychological support	√	√	√			√	-	33
Uninformed public / playing down / mistrust COVID-19 regulations		√	√	√				31, 35
Failure to declare COVID-19 status by public and students			√				√	25, 28, 39, 40, 43, 51, 61
Self- doubt	√	√			√		√	14, 43, 46, 47, 48, 50

Non-compliance of colleagues and students to regulations/ protocols		√	-	√	-		√	14, 20, 25, 28, 29, 30, 31, 32, 39
Extended isolation from family		√	-	√	-	-	-	45, 46, 50, 51
Increase in patients dying	√	√	√			√		19, 21, 27, 36, 39
Experiencing loss and fear of family members, colleagues, and friends dying	√	√	√	√	√	√	√	31, 50 - 52
Staff being physically and verbally abused in triage area by patients			√					11, 31, 33, 42, 43, 50
Psychological effects of empty streets (feeling isolated)			√					43, 44, 45
Felt sacrificed				√				43, 44, 45
Nurses expected to make ethical decisions e.g. allocation of ventilators and oxygen	√	√	√	√	√	-	-	43, 47, 40
Re-socialisation of self during post pandemic phase					√			42, 44
Score		11/16	10/16	8/16	5/16	4/16	5/16	
		68.7%	62.5%	50%	31.2%	25%	31.2%	
Category 5: Physical Challenges	Scoping Review	In-depth Interviews						Delphi-survey Round 1
Sub Themes		ICU Nurses	Trauma Nurses	Perioperative Nurses	Nursing Managers	Non-Nursing group	Nursing Educators	
Staff shortage	√	√	√	√	√	√	-	9
Extended working hours	√	√			√			11, 9
Adhering to routine precautionary measures for long periods of time	√				√	√		14, 18, 20, 25

Fear of exposing others, family or self	√	√	√	√	√	√	√	31, 50 - 52
Lack of senior management support (clinical)		√	√	-	√	√	-	4, 8, 9, 11, 71
Failure to declare COVID-19 status by public and students			√				√	25, 28, 39, 40, 43, 51, 61
Physical demands of working with PPE	√	√	√	√	√	√	√	11, 72 - 85
Fast changing protocols / guidelines	√	√	√	√	√	√	√	14, 19, 24, 28, 38, 49, 54, 58, 61
Non-compliance of colleagues and students to regulations/ protocols	√	√	-	√	-		√	14, 20, 25, 28 – 32, 39
Ergometric challenges of wards and venues	√	√	√	√	-	-	√	51, 53, 69 - 71
Increase patient load	√	√	√	√	-	√	-	6, 9, 12, 14, 15, 16, 63, 65, 69, 70
Staff being physically and verbally abused in triage area by patients			√					11, 31, 33, 42, 43, 50
Psychological effects of empty streets (feeling isolated)			√					43 - 45
Lack of staff's understanding of vaccination practices	√				√			25, 29
PPE shortage		√	√	√	√	√	√	66, 67, 68, 79, 80, 85
PPE appropriation	√	√	√	√	√	√	√	17, 78
Donning and doffing of PPE	√	√	√	√	√	√		18, 77, 78, 81, 82
Performing duties usually assigned to support staff e.g. cleaning and mopping				√				19, 30, 41, 49, 65, 68
Re socialisation of self during post pandemic phase					√			42, 44
Repeating Lecturers							√	13, 49, 68, 81

Score		12/20	13/20	11/20	12/20	10/20	9/20	
		60%	65%	55%	60%	50%	45%	
Category 6: Communication and Information Management	Scoping Review	In-depth Interviews						Delphi-survey Round 1
Sub Themes		ICU Nurses	ED Nurses	Peri operative Nurses	Nursing Managers	Non-Nursing group	Nursing Educators	
Blame/ Bully of staff who contracted COVID- 19		√	-	-	-	-	-	31
Lack of trust between staff members		√	√	√				32
Lack of debriefing/ psychological support	√	√	√			√	-	33
Unprepared in disaster management	√	√			-	√	-	5, 9, 71
Diverse categories of nursing workforce leading to diverse understanding of disease processes	√	√		√				9, 13, 15, 26, 28, 30, 65
Uninformed public / playing down / mistrust COVID-19 regulations		√	√	√				31, 35
Failure to declare COVID-19 status by public and students			√				√	25, 28, 39, 40, 43, 51, 61
Fast changing protocols / guidelines	√	√	√	√	√	√	√	19, 22, 29, 47 – 49, 56 - 58
Non-compliance of colleagues and students to regulations/ protocols		√	-	√	-		√	14, 20, 25, 28 – 32, 39

Staff being physically and verbally abused in triage area by patients			√					11, 31, 33, 42, 43, 50
27. Breaking bad news to families	√		√			√		21, 23, 54, 55, 59, 60
Basic computer skills			√		√		√	54
Lack of staff's understanding of vaccination practices	√				√			25, 29
Lack of managerial and leadership skills of nurse managers	√			√		√		6 – 49, 54 – 68, 72 – 85
Staff refusing to work in COVID-19 wards				√				14 – 18, 20
Lack of guidelines and protocols to manage non-hospital institutions e.g. old age homes in the beginning of the outbreak				√				62 – 65
Training/ orientating non-nursing staff				√				65
Lack of distribution of information		√	√	√		√		54 – 61
Communicating changing protocols	√	√			√	√		54 – 61
Not addressing staff and doctor's' non-conformity / non compliance to protocols		√	-	√	-	-	-	25, 32, 39, 43, 83
Nurses expected to make ethical decisions e.g. allocation of ventilators and oxygen	√	√	√	√	√	-	-	43, 47, 40
Increase in patient documentation				√		√		24, 38, 54, 56
Communication strategies with PPE	√	√	√	√	√	√	√	38, 77, 85

Trust in and knowledge of cultural / religious community practices to support patients					√			34, 62 - 65
Re socialisation of self during post pandemic phase					√			42, 44
Repeating Lecturers							√	
Score		13/26	11/26	14/26	8/26	9/26	6/26	
		50%	44%	56%	30.7%	34.6%	23%	
Category 7: Community Profiling and Resources	Scoping Review	In-depth Interviews						Delphi-survey Round 1
Sub Themes		ICU Nurses	ED Nurses	Perioperative Nurses	Nursing Managers	Healthcare Professionals	Nursing Educators	
Lack of guidelines and protocols to manage non-hospital institutions e.g. old age homes in the beginning of the outbreak					√			62 - 65
Identification of structural resources (venues and space)					√			69 – 71
Trust in and knowledge of cultural/ religious community practices to support patients					√			62 - 65
Training/ orientation of non-nursing staff					√			65
Score		0	0	0	4/4	0	0	
		0%	0%	0%	100%	0%	0%	
Category 8: Financial Management	Scoping Review	In-depth Interviews						Delphi-survey Round 1
Sub Themes		ICU Nurses	ED Nurses	Perioperative Nurses	Nursing Managers	Healthcare Professionals	Nursing Educators	
PPE shortage		√	√	√	√	√	√	66 – 68, 79, 85

Equipment shortages/ pumps, ventilators, oxygen supplies	√	√	√		√	√		66 - 68
Financial implication of the outbreak of healthcare providers					√			66 - 68
Job security under threat				√	√			6 - 13
Providing students with basic resources e.g. food							√	11, 13
PPE appropriation	√	√	√	√	√	√	√	17, 72 - 85
Score		3/6	3/6	3/6	5/6	3/6	3/6	
		50%	50%	50%	83%	50%	50%	
Category 9: Preparation of the Infrastructure	Scoping Review	In-depth Interviews						Delphi-survey Round 1
Sub Themes		ICU Nurses	ED Nurses	Peri-operative Nurses	Nursing Managers	Healthcare Professionals	Nurse Educators	
Unprepared in disaster management	√	√				√		71
Ergometric challenges of wards and venues	√	√	√	√			√	69 – 71
Protecting COVID-negative patients			√					69, 70
Providing non-outbreak related services					√			69, 70
Lack of managerial and leadership skills of nurse managers	√			√		√		71
Identification of structural resources (venues and space)	√			√	√		√	69, 70
Score		2/6	2/6	3/6	2/6	2/6	2/6	
		33.3%	33.3%	50%	33.3%	33.3%	33.3%	

Category 10: PPE and Management Precautionary Measures	Scoping Review	In-depth Interviews						Delphi-survey Round 1
Sub Themes		ICU Nurses	ED Nurses	Perioperative Nurses	Nursing Managers	Healthcare Professionals	Nurse Educators	
High incidence if infected staff members		√	√					9, 11, 18, 72 - 85
Adhering to routine precautionary measures for long periods of time	√				√	√		14, 18, 20, 25
Fear of exposing others, family or self	√	√	√	√	√	√	√	31, 50 - 52
Diverse categories of workforce leading to diverse understanding of disease processes	√	√		√				9, 13, 15, 26, 28, 30, 65
Physical demands working with PPE	√	√	√	√	√	√	√	17, 18, 20, 25, 50 - 52, 72 - 85
Fast changing protocols and guidelines	√	√	√	√	√	√	√	1, 9, 22, 29, 47 - 49, 56 - 58
Non compliance of colleagues and students to regulations and protocols		√		√			√	14, 20, 25, 28 - 32, 39
Extended isolation from my family	√	√		√				45, 46, 50, 51
Lack of clinical skills of the staff	√	√	√	√	√	√		14 - 30, 72 - 85
PPE shortage	√	√	√	√	√	√	√	66 - 68, 85, 80
PPE appropriation	√	√	√	√	√	√	√	17, 72 - 74, 75 - 77
Donning and doffing of PPE	√	√	√	√	√	√		14, 17, 76, 77, 81
Not addressing staff and doctor's non-conformity/ non compliance to protocols		√		√				25, 32, 39, 43, 83

Financial implications of the outbreak on the healthcare provider					√			10, 66 - 71
Communication strategies with PPE	√	√	√	√	√	√	√	38, 85, 77
Score		13/15	9/15	12/15	10/15	9/15	7/15	
		86.6%	60%	80%	66.6%	60%	46.6%	

The potential items of the Delphi survey is listed below with the allocated Delphi-statement for alignment. See Table 5.17

Table 5.17. Potential Delphi statements

Section 2: Human Resources during a Disease Outbreak	
6	Assessment of nursing resources during non-disease outbreak periods
7	Identification of nursing shortages during non-disease outbreak periods
8	Strategies to develop disease outbreak specialists pre-, during-, and post disease outbreak periods
9	Strategies to develop a disaster management workforce pre-, during-, and post outbreak periods
10	Financial planning for disease outbreaks
11	Identification of strategies to protect nurses as workforce (physically, physiologically) pre-, during-, and post disease outbreak period
12	Identification of strategies to train all categories of nurses in basic life supporting procedures
13	Role clarification of the nursing educator during a disease outbreak
Section 3: Clinical confidence during outbreaks	
14	Building clinical confidence of all nursing categories (in the pre-, during, and post pandemic phase)
15	Development of basic ICU clinical skills of all nurse categories (in the pre-, during, and post pandemic phase)
16	Management of basic ICU equipment including IV pumps, transducers, ventilators, airway management equipment
17	Appropriation of PPE
18	Maximum PPE level training, including donning, doffing, and disposal of PPE for all categories of staff and volunteers
19	Change management strategies
20	Enhancing clinical diligence
21	Managing death and dying
22	Communication strategies with limited resources
23	Communication of sensitive information
24	Navigating technology
25	Address non-conformity to policies and procedures
26	Community profile including culture, resources and skills

27	Ethical decision making
28	Role and support of students during a disease outbreak
29	Development of, and revision of existing protocols and guidelines
30	Role clarification and merging of nursing categories during an outbreak
Section 4: Interpersonal Skills	
31	Human behaviour and self-preservation during an outbreak(intimidation, bullying, miss-trust, fear)
32	Building of inter collegial trust
33	Facilitation of debriefing sessions
34	Role clarification during disease outbreaks (medical and community)
35	Establishment of pre-outbreak community trust and involvement
36	Care for the terminally ill
37	Coping with grief and loss
38	Communication strategies during disease outbreaks
39	Addressing non compliance
40	Ethical demands during disease outbreaks
41	Caring during a crises
42	Re-socialization into society after an outbreak
Section 5: Intrapersonal Skills	
43	Handling of disappointments, intimidation, feelings of defeat, blame, fear, loss, and feelings of being sacrificed, loss of trust, and guilt
44	Societal reintegration after a disaster
45	Facilitation of debriefing sessions during disasters
46	Self-care and self-compassion strategies during disasters
47	Decision making skills
48	Change management
49	Learning opportunities during an outbreak
Section 6: Physical demands of an outbreak	
50	Self-care strategies during disasters
51	Staff support strategies (physically) during disasters
52	PPE management(donning, doffing and disposal)
53	Ergometrics in the health care environment

Section 7: Communication and information management	
54	Inclusive communication strategies during outbreaks
55	Communication strategies with limited resources
56	Communication of high volumes of information
57	Communication to high number of people
58	Communication of rapid changing information
59	Communication of sensitive information
60	Caring through communication
61	Facilitation of debriefing opportunities
Section 8: Community profiling and resource identification	
62	How to conduct a community profile
63	Identification of community resources
64	Supporting the vulnerable during an outbreak
65	Training of volunteers
Section 9: Financial Management	
66	Financial planning for an outbreak
67	Strategies to prevent wastage
68	Allocation of resources
Section 10: Preparation of Infrastructure	
69	Scenario based multidisciplinary identification of infrastructure utilization during an outbreak
70	Scenario based patient and staff movement pathways
71	Establishment of an Infrastructure and Resources Committee with representation of nursing management, HOD of departments, Head of technical services, Head of infrastructure and buildings, Head of emergency services in the area, community leaders (religious, cultural).
Section 11: PPE Management and Precautionary Measures	
72	Infection prevention and control principles
73	Types of precautionary measures
74	Standard precautions
75	Conditional trust in PPE based on evidence based practice
76	PPE per item: purpose, donning, doffing and disposal

77	Practical demonstrations and competence sessions
78	Strategies to protect the integrity of your PPE
79	Procurement and safe keeping of PPE
80	PPE in low-resource settings
81	Strategies to enforce purposeful repetitive behavior
82	Teaching strategies for all levels of healthcare workers
83	Strategies to manage non-compliance
84	Strategies to enhance physical health
85	Trouble shooting

5.5 APPLICATION OF CRITICAL REALISM (CAUSATION)

The answer to Question Two: *‘What contributed to the challenges or support nurses experienced whilst performing duties during the COVID-19 pandemic?’* was imbedded in the answers provided by the participants to question one. The complex inter connectedness of the cause and effect (direct and indirect) phenomenon of the challenges experienced by nurses is acknowledged. The sub themes listed under each challenge (theme) represents the cause of the challenge.

5.6 EXPERIENCES OF NURSES IN DISEASE OUTBREAK MANAGEMENT

All of the 28 nursing participants referred to their lack of experience and training with regard to disease outbreaks and referred back to their basic training at the beginning of their nursing careers. One nurse educator (054) referred to his experiences during community nursing and one nursing manager (036) completed two certificated programme in infection prevention and control.

5.7 SUMMARY

This chapter presented the results of the in-depth interviews with healthcare professionals and nurses. Themes and sub-themes were presented after a thematic analysis was conducted. Possible statements for inclusion into the Delphi survey were developed. Triangulation of the data is presented in the next chapter when the results of the Delphi survey is presented.

CHAPTER SIX

TRIANGULATION AND DELPHI SURVEY

6.1 INTRODUCTION

The first step in phase two is to confirm and triangulate the data collected from the previous stages (scoping review, and in-depth interviews) through a Delphi survey. The results of this step will determine what is included in the competency based programme in phase two of this study.

The development of the Delphi survey is presented, the demographic data of the participants as well as the results from the first Round. A comparison between the Delphi Round One and Round Two statements is provided as well as the results of Round Two.

6.2 DEVELOPMENT OF THE DELPHI-SURVEY

Information collected from the scoping review and in-depth interviews were included in statements of the first Delphi-round. Two additional sections 1 and 2 were included to allow participants to provide demographic data (section 1) as well as a section where statements relevant to the preparation for and mode of delivery of the competency based programme is rated (section 2). The survey therefore consists of twelve sections. The sections and the total amount of statements included per section is included in Table 6.1.

Table 6.1 Sections included in the Delphi survey

Section	Title	Statements per Section
Section 1	Demographic Data	8
Section 2	Preparation for and Mode of Delivery of the Programme	5
Section 3	Human Resources During a Disease Outbreak	7
Section 4	Clinical Practice During Disease Outbreaks	17
Section 5	Interpersonal Skills During a Disease Outbreak	12
Section 6	Intrapersonal Skills During Disease Outbreaks	7
Section 7	Physical Demands During a Disease Outbreak	4
Section 8	Communication and Information Management During a Disease Outbreak	8

Section 9	Community Profiling and Resource Identification	4
Section 10	Financial Management	3
Section 11	Preparation of the Infrastructure	3
Section 12	PPE Management and Precautionary Measures	12
Total Statements: 90		

6.3 SELECTION OF PARTICIPANTS

A total of seven participants were purposefully chosen to participate in the Delphi-survey. Table 6.2 provides information of the participants' geographical location as well as specialty.

Table 6.2: Participants included in the first Delphi round.

Code	Geographical Location	Specialty
D1	National: Private Healthcare Group	Trauma and Emergency Nursing. Disaster Coordinator
D2	Western Cape: Port Elizabeth: Nelson Mandela University	Academic in Critical Care Nursing
D4	Tshwane: University of Pretoria	Academic in Critical Care Nursing
D6	Gauteng: Private Nursing Education	Trauma and Emergency Nursing Disaster Coordinator
D9	Stellenbosch University	Academic in Perioperative Nursing
D10	Gauteng: University of the Witwatersrand	Academic in Critical Care Nursing
P1	Gauteng: University of the Witwatersrand	Academic in Critical Care Nursing

Each participant was allocated a code to enhance privacy and confidentiality.

The experts were invited to participate in the Delphi-survey via e-mail and were provided with a participant information and consent document.

6.4 DELPHI STUDY - ROUND ONE

The demographic data of the participants is presented below in Table 6.3.

Table 6.3: Demographic characteristics of expert panel of participants

Demographic information	F (%)
Gender	
Male	1 (14.29)
Female	6 (85.71)
Age group in years	
30 – 40	1 (14.29)
41 – 50	3 (42.86)
51 – 60	2 (28.57)
61 - 70	1 (14.29)
Years of experience	
10 - 20	2 (28.57)
21 - 30	4 (57.14)
31 - 40	1 (14.29)
Academic Qualification	
MSc Degree	4 (57.14)
PhD Degree	3 (42.86)
Sector of Employment	
Academic	5 (71.43)
Clinical Area	2 (28.57)

From Table 6.3 the majority (85.71%) of the participants were female, and a total of 14.29% were male. The majority (42.86%) of the participants were in the age group 41 to 50 years of age, followed by (28.67%) the age group 51 to 60 years of age. The age groups 20 to 40 and 61 to 70 were represented by 14.29% each. The majority (37.14 %) of the participants had between 21 and 30 years of experience, second highest (28.57%) were between 10 and 20 years of experience and the least (14.29%) has between 31 and 40 years of experience. The majority (57.14%) holds MSc degrees and a total of 42.86% holds PhD degrees. The majority are employed in the academic sector (71.43%) and a total of 28.57% were employed in the clinical sector.

The score results and comments (recommended statements) provided by the participants is presented Table 6.4. A total of 78 statements were revised.

An agreement rate of 70% was regarded as acceptable. The following statement failed to get score a 70% agreement rate from the participants:

- Section 2, number 2: Present the programme as contact sessions (68%).

Statements that scored 100% agreement rate are:

- Section 4, number 12: Address healthcare worker non conformity to policies and procedures.
- Section 5, number 2: Develop strategies to build inter collegial trust.
- Section 5, number 4: Explain the role and responsibility of healthcare providers and members of the community during disease outbreaks.
- Section 6, number 5: Develop effective decision making skills through intrapersonal intelligence strategies (personal judgements about own thoughts, emotions, strengths and weaknesses, building mental models for making decisions of your own life.
- Section 7, number 3: Demonstrate competence in PPE management (donning, doffing and disposal).
- Section 9, number 1: Conduct a community profile.
- Section 10, number 2: Identify strategies to prevent wastage of resources.
- Section 10, number 3: Identify strategies to allocate resources.
- Section 11, number 1: Develop strategies to best utilize the existing infrastructure during a disease outbreak.
- Section 11, number 3: Establish and Infrastructure and Resource Committee with representatives of nursing management, nursing, technical services, infrastructure and buildings, area community services, and community leaders.
- Section 12, number 8: Manage PPE in low-resource settings.
- Section 12, number 10: Plan strategies to facilitate learning opportunities for healthcare workers on PPE management and precautionary measures

Table 6.4 Score Results and Comments in Delphi-Round 1

Section two: Preparation for and mode of delivery of the programme

	Section 2: Preparation for and Mode of Delivery of the Programme	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
1	Attend compulsory debriefing sessions prior top commencement of the programme to allow for reflection of outbreak experience	4	4	4	4	4	4	3	27	96%
2	Present the programme as contact sessions	3	1	4	3	4	3	1	19	68%
3	Present the programme as on-line sessions	3	4	4	4	4	3	1	23	82%
4	Present the programme as a combination of contact and on-line sessions	4	4	4	4	4	3	3	26	93%
5	Assess competence via a portfolio of evidence	3	1	4	4	4	4	3	23	82%
	Section Totals	17	14	20	19	20	17	11	118	84%

Note: 1= Connote is not relevant; 2=Unable to assess connote relevance without connote revision or connote needs such revision that it would no longer be relevant; 3= Connote is relevant but need minor alteration; 4= Connote is very relevant and succinct

Comments of participants: Recommendations were submitted by participants and is presented below.

Section 2: Preparation for and Mode of Delivery of the Programme		
	Original Statement	Recommended Statement
2	Present the programme as contact sessions	<i>The programme is presented in hybrid format (D10)</i>
3	Present the programme as on-line sessions	
4	Present the programme as a combination of contact and on-line sessions	
5	Assess competence via a portfolio of evidence	<i>Assess competence via a semi-structured portfolio of evidence (D10)</i>

Section 3: Human Resources during a disease outbreak

	Section 3: Human Resources During a Disease Outbreak	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
1	Assess nursing resources during non-disease outbreak periods	4	1	4	4	4	4	3	24	86%
2	Design strategies to develop a disease outbreak specialist nurse	4	1	4	4	4	2	3	22	79%
3	Design strategies to develop a disaster management workforce	4	4	4	4	4	4	3	27	96%
4	Discuss the financial implications of disease outbreak strategies	4	4	4	4	4	4	3	27	96%
5	Discuss strategies to protect nurses as workforce (physically)	3	4	4	4	4	4	3	26	93%
6	Design strategies to develop all categories of nurses in basic life supporting procedures	4	2	4	4	4	4	4	26	93%
7	Clarify the role of the nursing educator during a disease outbreak	4	1	2	4	4	3	3	21	75%
	Section Totals	27	17	26	28	28	25	22	173	88%

Note: 1= Connote is not relevant; 2=Unable to assess connote relevance without connote revision or connote needs such revision that it would no longer be relevant; 3= Connote is relevant but need minor alteration; 4= Connote is very relevant and succinct

Comments of participants: Recommendations were submitted by participants and is presented below.

Section 3: Human Resources During a Disease Outbreak		
	Original Statement	Recommended Statement
1	Assess nursing resources during non-disease outbreak periods	Combine section heading with this statement: <i>Human Resources During Both Outbreak and Non-Outbreak Periods (D9)</i>
2	Design strategies to develop a disease outbreak specialist nurse	<i>Establish the need for the development of disease outbreak specialist nurses (D10)</i>
3	Design strategies to develop a disaster management workforce	<i>Design strategies to develop a future disaster management workforce (D10)</i>

4	Discuss the financial implications of disease outbreak strategies	<i>Discuss the cost implications of disease outbreak plans (D10)</i>
5	Discuss strategies to protect nurses as workforce (physically)	<i>Discuss measures to protect nurses as workforce (physically) (D10)</i>
7	Clarify the role of the nursing educator during a disease outbreak	<i>Clarify the contribution of the nurse educator during a disease outbreak (D10)</i>

Section 4: Clinical practice during disease outbreaks

	Section 4: Clinical Practice During Disease Outbreaks	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
1	Develop strategies to build clinical confidence of all nursing categories	4	3	4	4	4	3	3	25	93%
2	Develop basic skills in caring for the critically ill of all categories of nurses	4	4	4	3	4	3	4	26	93%
3	Management of equipment in the critical care environment	4	4	4	4	4	4	2	26	93%
4	Identify appropriate Personal Protective Equipment (PPE) for a disease outbreak	4	3	4	4	4	4	3	26	93%
5	Training in maximum PPE level management including donning, doffing, and disposal thereof for all categories staff and volunteers	3	3	4	4	4	4	4	26	93%
6	Develop change management strategies	3	4	4	4	4	2	3	24	86%
7	Strategies to enhance compliance to clinical routine and monotonous tasks over a long period of time	3	4	3	4	4	4	3	25	93%
8	Manage death and dying	3	4	4	4	4	4	4	27	96%
9	Communicate clinical information with available resources	3	4	4	4	4	4	4	27	96%
10	Communicate sensitive information	3	4	4	4	4	4	4	27	96%

11	Demonstrate Skill to navigate technology	4	1	4	4	4	4	4	25	93%
12	Address healthcare worker non-conformity to policies and procedures	4	4	4	4	4	4	4	28	100%
13	Profile communities according to culture, religion, resources, and skills	4	1	3	4	4	4	3	23	82%
14	Develop ethical decision making skills	3	4	3	4	4	3	4	25	93%
15	Clarify the healthcare student's role an support during a disease outbreak	3	4	4	4	4	4	3	26	93%
16	Develop and revise existing protocols and guidelines	3	4	3	4	4	4	4	26	93%
17	Clarify the roles and responsibilities of nursing categories during an outbreak	4	1	4	4	4	4	4	25	93%
	Section Totals	59	56	64	67	68	63	60	437	92%

Note: 1= Connote is not relevant; 2=Unable to assess connote relevance without connote revision or connote needs such revision that it would no longer be relevant; 3= Connote is relevant but need minor alteration; 4= Connote is very relevant and succinct

Comments of participants: Recommendations were submitted by participants and is presented below.

Section 4: Clinical Practice During Disease Outbreaks		
	Original Statement	Recommended Statement
1	Develop strategies to build clinical confidence of all nursing categories	<i>Develop plans to empower and strengthen clinical confidence of the multi-disciplinary team (D9 and D10)</i>
2	Develop basic skills in caring for the critically ill of all categories of nurses	<i>Develop basic skills in caring for the critically ill of all categories of nurses within their scope of practice (D9)</i>
3	Management of equipment in the critical care environment	<i>Management of equipment in the critical care environment e.g. storage, cleaning, disinfection and operate. (D10)</i>
4	Identify appropriate Personal Protective Equipment (PPE) for a disease outbreak	<i>Identify appropriate Personal Protective Equipment (PPE) according to specific modes of disease transmission (D10)</i>
6	Develop change management strategies	<i>Develop a plan to support staff to adjust to change (D9 and D10)</i>
7	Strategies to enhance compliance to clinical routine and monotonous tasks over a long period of time	<i>Measures to enhance compliance to routine and burdensome tasks over a long period of time (D10)</i>
8	Manage death and dying	<i>Manage the process of death and dying (D10)</i>
9	Communicate clinical information with available resources	<i>Communicate clinical information with available resources e.g. paper base; wats-up and e-mails (D10)</i>

10	Communicate sensitive information	<i>Develop skills to communicate sensitive information to family members e.g. the death of a loved one (D10)</i>
11	Demonstrate skills to navigate technology	<i>Demonstrate skills to navigate a range of technology e.g. electronic data capturing programmes (D10)</i>
12	Address healthcare worker non-conformity to policies and procedures	<i>Address and manage healthcare worker non-conformity to policies and procedures (D10)</i>
13	Profile communities according to culture, religion, resources, and skills	<i>Conduct situation analysis of a community according to culture, religion, resources and skills (D10)</i>
14	Develop ethical decision making skills	<i>Develop problem solving and ethical decision making skills (D10)</i>
15	Clarify the healthcare student's role and support during a disease outbreak	<i>Determine the healthcare student's role and support during a disease outbreak (D10)</i>
17	Clarify the roles and responsibilities of nursing categories during an outbreak	<i>Determine the roles and responsibilities of nursing categories during a disease outbreak (D10)</i>

Section 5: Interpersonal skills during disease outbreaks

	Section 5: Interpersonal Skills During Disease Outbreaks	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
1	Clarify human behavior and self-preservation during and outbreak (intimidation, bullying, miss-trust, and fear)	4	4	4	3	4	4	4	27	96%
2	Develop strategies to build inter collegial trust	4	4	4	4	4	4	4	28	100%
3	Facilitate debriefing sessions	3	4	3	4	4	4	3	25	89%
4	Explain the role and responsibility of healthcare providers and members of the community during disease outbreaks	4	4	4	4	4	4	4	28	100%
5	Develop strategies to build community trust and involvement in care during a non-disease outbreak period	4	4	4	3	4	4	3	26	93%
6	Care for the terminally ill	3	4	4	3	4	4	3	25	89%

7	Develop skills on how to cope with grief and loss	4	4	4	4	4	4	3	27	96%
8	Utilize communication strategies during disease outbreaks	4	4	4	4	4	3	3	26	93%
9	Develop skills to address non-compliance of healthcare providers during disease outbreaks	4	4	4	3	4	4	4	27	96%
10	Develop ethical reasoning skills	3	4	4	4	4	4	3	26	93%
11	Maintain level of care of patients during a crises	3	3	4	3	4	3	4	24	86%
12	Socialization in communities after an outbreak	3	4	4	3	4	4	3	25	89%
	Section Totals	43	47	47	42	48	46	41	314	93%

Note: 1= Connote is not relevant; 2=Unable to assess connote relevance without connote revision or connote needs such revision that it would no longer be relevant; 3= Connote is relevant but need minor alteration; 4= Connote is very relevant and succinct

Comments of participants: Recommendations were submitted by participants and is presented below.

Section 5: Interpersonal Skills During Disease Outbreaks		
	Original Statement	Recommended Statement
1	Clarify human behavior and self-preservation during an outbreak (intimidation, bullying, miss-trust and fear)	<i>Explain human behavior and self-preservation during a disease outbreak (intimidation, bullying, miss-trust and fear) (D10)</i>
3	Facilitate debriefing sessions	<i>Facilitate frequent de-briefing sessions for healthcare workers (D3) and (D10)</i>
5	Develop strategies to build community trust and involvement in care during a non-disease outbreak period	<i>Develop plans to enhance community trust and involvement in care during a non-disease outbreak period (D10)</i>
6	Care for the terminally ill	<i>Care for the terminally ill under varied circumstances (D10)</i>
7	Develop skills on how to cope with grief and loss	<i>Develop personal skills on how to cope with grief and loss (D10) (D4)</i>
8	Utilize communication strategies during disease outbreaks	<i>Utilize different communication techniques before, during and after a disease outbreak (D9) and (D10)</i>
9	Develop skills to address non-compliance of healthcare providers during disease outbreaks	<i>Develop skills to address non-compliance of healthcare providers during disease outbreaks</i> Adding a separate statement: <i>Develop skills to support 'buy-in' of healthcare providers during disease outbreaks (D4)</i>
10	Develop ethical reasoning skills	<i>Develop ethical reasoning skills for multi-disciplinary decision-making (D10)</i>

11	Maintain level of care of patients during a crises	<i>Maintain continuity acceptable level of care of infected and non-infected patients during a crises (D9) and (D10)</i>
12	Socialization in communities after an outbreak	<i>Re-develop socialization skills in communities after an outbreak (D4) and (D10)</i>

Section 6: Intrapersonal skills during disease outbreaks

	Section 6: Intrapersonal Skills During Disease Outbreaks	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
1	Develop skills to handle disappointments, intimidation, feeling of defeat, fear, loss feelings of being sacrificed, loss of trust, and guilt	4	4	4	3	4	4	4	27	96%
2	Develop strategies to re-integrate into society after a disaster	4	2	4	3	4	4	4	25	89%
3	Attending of debriefing sessions during disasters	3	4	4	3	4	4	4	26	93%
4	Maintain self-care and self-compassion during disasters	4	4	3	4	4	4	4	27	96%
5	Develop effective decision making skills through intrapersonal intelligence strategies (personal judgements about own thoughts, emotions, strengths and weaknesses, building mental models for making decisions of your own life)	4	4	4	4	4	4	4	28	100%
6	Demonstrate effective change management skills	4	4	2	4	4	4	3	25	89%
7	Identify learning opportunities during an outbreak	4	4	3	4	4	4	3	26	93%
	Section Totals	27	26	24	25	28	28	26	184	97%

Note: 1= Connote is not relevant; 2=Unable to assess connote relevance without connote revision or connote needs such revision that it would no longer be relevant; 3= Connote is relevant but need minor alteration; 4= Connote is very relevant and succinct

Comments of participants: Recommendations were submitted by participants and is presented below.

Section 6: Intrapersonal Skills During Disease Outbreaks		
	Original Statement	Recommended Statement
1	Develop skills to handle disappointments, intimidation, feeling of defeat, fear, loss feelings of being sacrificed, loss of trust, and guilt	<i>Develop skills to handle disappointments, intimidation, feelings of defeat, fear, loss, feelings of being sacrificed, loss of trust, and guilt before and during disease outbreak events (D4)</i>
3	Attending debriefing sessions during disasters	<i>Participate in frequent debriefing sessions during disasters (D10) (P1)</i>
4	Maintain self-care and self-compassion during disasters	<i>Healthcare workers develop skills to maintain self-care and self-compassion during disasters (D2)</i>
6	Demonstrate effective change management skills	<i>Demonstrate skills in delivering of effective change management skills (D10)</i>
7	Identify learning opportunities during an outbreak	<i>Reflect on learning opportunities during an outbreak (D10)</i>

Section 7: Physical demands during a disease outbreak

	Section 7: Physical Demands During a Disease Outbreak	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
1	Develop strategies of the healthcare worker to maintain and enhance physical health during an outbreak	4	4	3	4	4	4	4	27	96%
2	Identify the physical demands of patient care during a disease outbreak	4	4	4	3	4	4	4	27	96%
3	Demonstrate competence in PPE management (donning, doffing and disposal)	4	4	4	4	4	4	4	28	100%
4	Identify ergonomic challenges in the healthcare environment	4	4	4	3	4	4	3	26	92%
	Section Totals	16	16	15	14	16	16	15	108	96%

Note: 1= Connote is not relevant; 2=Unable to assess connote relevance without connote revision or connote needs such revision that it would no longer be relevant; 3= Connote is relevant but need minor alteration; 4= Connote is very relevant and succinct.

Comments of participants: Recommendations were submitted by participants and is presented below.

Section 7: Physical Demands During a Disease Outbreak		
	Original Statement	Recommended Statement
1	Develop strategies of the healthcare worker to maintain and enhance physical health during an outbreak	<i>Develop strategies to enhance self-care mindfulness during a disease outbreak (D4)</i>
2	Identify the physical demands of patient care during a disease outbreak	<i>Identify the effects of physical demands of patient care during disease outbreaks (D10)</i>
3	Identify ergonomic challenges in the healthcare environment	Identify ergonomic challenges in the healthcare environment e.g. ward-layout and air-conditioning (D10)

Section 8: Communication and information management during a disease outbreak

	Section:8 Communication and Information Management During a Disease Outbreak	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
1	Communicate inclusively during a disease outbreak	4	4	3	4	4	4	3	26	93%
2	Assess communication strategies with available resources	3	4	3	4	4	4	3	25	89%
3	Develop strategies for communicating high volumes of information	3	4	3	4	4	4	3	25	89%
4	Communicate to numerous people during a disease outbreak	4	4	4	4	4	4	3	27	96%
5	Communicate vast changing information	3	4	3	4	4	3	3	24	86%
6	Communicate sensitive information	3	4	4	4	4	4	4	27	96%
7	Care through communication	3	4	3	4	4	4	4	26	93%
8	Facilitate debriefing opportunities	3	4	3	4	4	4	4	26	93%
	Section Totals	26	32	26	32	32	31	27	206	92%

Note: 1= Connote is not relevant; 2=Unable to assess connote relevance without connote revision or connote needs such revision that it would no longer be relevant; 3= Connote is relevant but need minor alteration; 4= Connote is very relevant and succinct

Comments of participants: Recommendations were submitted by participants and is presented below.

Section 8: Communication and Information Management During a Disease Outbreak		
	Original Statement	Recommended Statement
1	Communicate inclusively during a disease outbreak	<i>Communicate inclusively using different mediums during a disease outbreak (D10)</i>
2	Assess communication strategies with available resources	<i>Access communication mediums with available resources (D10)</i>
3	Develop strategies for communicating high volumes of information	<i>Develop plans for dealing with high volumes of information (D10)</i>

4	Communicate to numerous people during a disease outbreak	<i>Communicate to a variety of peoples during a disease outbreak (D10)</i>
5	Communicate vast changing information	<i>Communicate large volumes of changing information (D10)</i>
6	Communicate sensitive information	<i>Sharing of sensitive information to family members (D10)</i>
7	Care through communication	<i>Demonstrate care through various communication methods (D10)</i>
8	Facilitate debriefing opportunities	<i>Facilitate sufficient and regular debriefing opportunities after an event for healthcare workers (D10 and (D4))</i>

Section 9: Community profiling and resource identification

	Section 9: Community Profiling and Resource Identification	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
1	Conduct a community profile	4	4	4	4	4	4	4	28	100%
2	Identify community resources	4	4	3	4	4	4	4	27	96%
3	Develop strategies to support the vulnerable during a disease outbreak	4	4	4	4	4	4	4	28	100%
4	Train volunteers during a disease outbreak	3	4	2	4	4	4	4	25	89%
	Sections Totals	15	16	13	16	16	16	16	108	96%

Note: 1= Connote is not relevant; 2=Unable to assess connote relevance without connote revision or connote needs such revision that it would no longer be relevant; 3= Connote is relevant but need minor alteration; 4= Connote is very relevant and succinct

Comments of participants: Recommendations were submitted by participants and is presented below.

Section 9: Community Profiling and Resource Identification		
	Original Statement	Recommended Statement
1	Conduct a community profile	<i>Conduct and compile a community profile (D10)</i>
2	Identify community resources	<i>Identify physical and material resources, strengths and limitations in the community (D2) (D10)</i>
3	Develop strategies to support the vulnerable during a disease outbreak	<i>Develop measures to manage and support vulnerable persons during an outbreak e.g. the elderly (D10)</i>
4	Train volunteers during a disease outbreak	<i>Develop volunteers from the community to perform non-medical tasks during a disease outbreak (D4) (D10)</i>

Section 10: Financial management

	Section 10: Financial Management	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
1	Identify the financial implications if a disease outbreak	4	4	4	4	4	4	3	27	96%

2	Identify strategies to prevent wastage of resources	4	4	4	4	4	4	4	28	100%
3	Identify strategies to allocate resources	4	4	4	4	4	4	4	28	100%
	Section Totals	12	12	12	12	12	12	11	83	99%

Note: 1= Connote is not relevant; 2=Unable to assess connote relevance without connote revision or connote needs such revision that it would no longer be relevant; 3= Connote is relevant but need minor alteration; 4= Connote is very relevant and succinct

Comments of participants: Recommendations were submitted by participants and is presented below.

Section 10: Financial Management										
	Original Statement	Recommended Statement								
1	Identify the financial implications if a disease outbreak	<i>Identify the cost of a disease outbreak (D10)</i>								
2	Identify strategies to prevent wastage of resources	<i>Identify plans to prevent wastage of financial resources (D10)</i>								
3	Identify strategies to allocate resources	<i>Identify plans to allocate financial resources (D10)</i>								

Section 11: Preparation of the Infrastructure

	Section 11: Preparation of the Infrastructure	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
1	Develop strategies to best utilize the existing infrastructure during a disease outbreak	4	4	4	4	4	4	4	28	100%
2	Identify people movement pathways	3	4	4	4	4	4	4	27	96%
3	Establish and Infrastructure and Resource Committee with representatives of nursing management, nursing, technical services, infrastructure and buildings, area community services, and community leaders	4	4	4	4	4	4	4	28	100%
	Section Totals	11	12	12	12	12	12	12	83	99%

Note: 1= Connote is not relevant; 2=Unable to assess connote relevance without connote revision or connote needs such revision that it would no longer be relevant; 3= Connote is relevant but need minor alteration; 4= Connote is very relevant and succinct

Comments of participants: Recommendations were submitted by participants and is presented below.

Section 11: Preparation of the Infrastructure		
	Original Statement	Recommended Statement
1	Develop strategies to best utilize the existing infrastructure during a disease outbreak	<i>Develop measures to best utilize the existing infrastructure during a disease outbreak (D10)</i>

2	Identify people movement pathways	<i>Identify safe pathways for the movement of the living, dying, and deceased (D10)</i>
3	Establish and Infrastructure and Resource Committee with representatives of nursing management, nursing, technical services, infrastructure and buildings, area community services, and community leaders	<i>Establish and Infrastructure and Resource Committee with representatives of nursing management, nursing, technical services, infrastructure and buildings, area community services, and community leaders to coordinate, communicate, monitor and plan activities (D10)</i>

Section 12: PPE Management and precautionary measures

	Section 12: PPE Management of Precautionary Measures	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
1	Revise infection prevention and control principles	4	1	3	4	4	3	4	23	82%
2	Revise the concept precautionary measure	4	1	2	3	4	3	3	20	71%
3	Apply standard precaution	3	4	2	3	4	4	4	24	86%
4	Identify the indications and limitation of each PPE item	4	4	4	3	4	4	3	26	93%
5	Demonstrate competence in PPE management	3	4	4	4	4	4	3	26	93%
6	Protect the integrity of your PPE	4	4	3	3	4	4	4	26	93%
7	Strategies to procure and store PPE	4	4	4	3	4	4	4	27	96%
8	Manage PPE in low-resource settings	4	4	4	4	4	4	4	28	100%
9	Perform purposeful monotonous tasks during PPE management	4	4	1	3	4	4	2	22	78%
10	Plan strategies to facilitate learning opportunities for healthcare workers on PPE management and precautionary measures	4	4	4	4	4	4	4	28	100%
11	Develop skills to address non-compliance to precautionary PPE measures	4	4	3	4	4	4	4	27	96%
12	Develop strategies to support and enhance the	3	4	4	4	4	3	4	26	93%

	physical health of healthcare providers									
	Total	45	42	38	42	48	45	43	303	90%

Note: 1= Connote is not relevant; 2=Unable to assess connote relevance without connote revision or connote needs such revision that it would no longer be relevant; 3= Connote is relevant but need minor alteration; 4= Connote is very relevant and succinct

Comments of participants: Recommendations were submitted by participants and is presented below.

Section 12: PPE Management and Precautionary Measures		
	Original Statement	Recommended Statement
1	Revise infection prevention and control principles	<i>Review and revise infection prevention and control principles as appropriate (D10)</i>
2	Revise the concept precautionary measure	<i>Review and revise precautionary measure as appropriate (D10)</i>
3	Apply standard precaution	<i>Review and revise standard precaution (D10)</i>
4	Identify the indications and limitations of each PPE item	<i>Verify the indications and limitations of each PPE item e.g. re-using of face masks(D10)</i>
5	Demonstrate competence in PPE management	<i>Demonstrate competence in the use of PPE management as appropriate (D10)</i>
6	Protect the integrity of your PPE	<i>Protect the integrity of your PPE in-use (D10)</i>
7	Strategies to produce and store PPE	<i>Demonstrate methods to procure and store PPE (D10)</i>
8	Manage PPE in low-resource settings	<i>Manage PPE in low and middle-resource settings (D10)</i>
9	Perform purposeful monotonous tasks during PPE management	<i>Perform burdensome tasks during PPE management e.g. steps in donning and doffing (D10)</i>
10	Plan strategies to facilitate learning opportunities for healthcare workers on PPE management and precautionary measures	<i>Plan strategies to facilitate reflection and learning opportunities for healthcare workers on PPE management and precautionary measures (D10)</i>
11	Develop skills to address non-compliance to precautionary PPE measures	<i>Develop skills to address non-adherence to precautionary PPE measures (D10)</i>
12	Develop strategies to support and enhance the physical health of healthcare providers	<i>Develop measures to enhance and support the physical health of healthcare providers (D10)</i>

6.5 DEVELOPMENT OF DELPHI-SURVEY ROUND TWO

Round 2 of this Delphi-study were conducted with a revised document based on the results of round 1. A comparison between the tools are presented in Table 6.5. The second round was presented as a Likert-scale and included 63 statements which was presented as 10 Domains. See Appendix P. The Domains as well as an explanation thereof is included below:

- Domain 1: Preparation for and Mode of Delivery of the Programme: This domain focuses on structuring the programme delivery and readiness aspects before a disease outbreak, including debriefing sessions, programme format, and competency assessment methods.
- Domain 2: Human Resources: This domain addresses staffing, training, financial consideration, role clarification of community members including nurse protection strategies during both outbreak and non-outbreak periods.
- Domain 3: Community Profiling and Resource Identification: This domain involves the assessment of a community, identifying of resources, supporting of vulnerable groups, recruiting of volunteers during outbreaks, and gaining of trust of the community.
- Domain 4: Preparation of the Infrastructure: This domain focusses on optimizing existing infrastructure, establishing movement pathways, and forming resource management committees during disease outbreaks.
- Domain 5: Financial Management: This domain concentrates on identifying the financial implications of a disease outbreak, preventing of resource wastage, and optimize resource allocation during disease outbreaks.
- Domain 6: Physical Demands during a Disease Outbreak: This domain addresses strategies for maintaining physical health, managing patient care demands, and recognizing ergonomic challenges during disease outbreaks.
- Domain 7: Precautionary Measures and Clinical Practice during non-disease and Disease Outbreak periods: This domain concentrates on enhancing clinical skills, multidisciplinary team compliance, revising of infection prevention and control and precautionary principle as required, reinforcement of standard precautions, managing critical care equipment, appropriation of PPE, managing changes, revision of protocols, contingency of non-outbreak related care, problem solving skills, ethical challenges, as well as acknowledging learning opportunities during disease outbreak scenario's.
- Domain 8: PPE Management : This domain revolves around understanding different PPE items, securing PPE integrity, acknowledging PPE indications and limitations,

improvising measures to secure PPE, application of PPE in different settings, and identification of PPE training opportunities during outbreak and non-disease outbreak.

- Domain 9: Interpersonal Skills During Disease Outbreaks: This domain focuses on understanding human behavior during a disease outbreak, trust behavior, the value of debriefing, providing support in stressful situations, engagement with communication initiatives and challenges, enhancement of compliance and addressing non-compliant behavior, clarify roles during multidisciplinary ethical decision making as well as navigation of technology for the purpose of effective communication, as well as plans to reintegrate into society after a disease outbreak period.
- Domain 10: Intrapersonal Skills during Disease Outbreak: This domain is emphasizing coping strategies, self-care, and decision making.

Table 6.5: Comparison of statements and design of Delphi survey 1 and Delphi survey 2

Round 1		Round 2		
A total of 82 statements are included Presented as a Redcap survey Rating options: • Connote not relevant • Unable to assess connote relevance without connote revision or connote needs such revision that it would no longer be relevant • Connote is relevant but need minor alteration • Connote is very relevant and succinct		A total of 63 statements are included Presented as a Likert scale survey Rating scale: 1 = Not relevant and should be deleted 2 = Item needs major revision 3 = Relevant but need minor revision 4 = Very relevant		
No. Round 1		Rating Round 1		No. Round 2
	Section 2: Preparation for and Mode of Delivery of the Programme		Domain 1: Preparation for and Mode of Delivery of the Programme: This domain focuses on structuring the programme delivery and readiness aspects before a disease outbreak, including debriefing sessions , programme format , and competency assessment methods .	

1	Attend compulsory debriefing sessions prior to commencement of the programme to allow for reflection of outbreak experience	96%	Domain 1: Preparation for and Mode of Delivery of the Programme: Attend mandatory debriefing sessions before initiating the programme to reflect on past outbreak experiences	1
2	Present the programme as contact sessions	68%	Statement 2, 3 and 4 are combined into one statement: Domain 1: Preparation for and Mode of Delivery of the Programme: Deliver the programme in hybrid format, combining different methods of presentation	2
3	Present the programme as on-line sessions	82%		
4	Present the programme as a combination of contact and on-line sessions	93%		
5	Assess competence via a portfolio of evidence	82%	Domain 1: Preparation for and Mode of Delivery of the Programme: Evaluate competence through a semi-structured portfolio of evidence	3
	Section 3: Human Resources During a Disease Outbreak		Domain 2: Human Resources: This domain addresses staffing, training, financial consideration, role clarification of community members including nurse protection strategies during both outbreak and non-outbreak periods.	
1	Assess nursing resources during non-disease outbreak periods	86%	Domain 2: Human Resources: Evaluate nursing resources during non-disease and disease outbreak periods	4
2	Design strategies to develop a disease outbreak specialist nurse	79%	Domain 2: Human Resources: Justify the necessity for developing specialist nurses for disease outbreaks	5

3	Design strategies to develop a disaster management workforce	96%	Domain 2: Human Resources: Create strategies for building a future outbreak management workforce	6
4	Discuss the financial implications of disease outbreak strategies	96%	Domain 5: Financial Management: Assess the cost implications of a disease outbreaks	19
5	Discuss strategies to protect nurses as workforce (physically)	93%	Domain 2: Human Resources: Discuss protective measures for nurses' physical and psychological well-being	7
6	Design strategies to develop all categories of nurses in basic life supporting procedures	93%	Domain 2: Human Resources: Develop strategies to train all nurse categories in basic life support procedures	8
7	Clarify the role of the nursing educator during a disease outbreak	75%	Domain 2: Human Resources: Explain the roles of healthcare providers and community members during disease outbreaks	9
	Section 4: Clinical Practice During Disease Outbreaks		Domain 7: Precautionary Measures and Clinical Practice during non-disease and Disease Outbreak periods: This domain concentrates on enhancing clinical skills , multi-disciplinary team compliance, revising of infection prevention and control and precautionary principle as required, reinforcement of standard precautions , managing critical care equipment , appropriation of PPE , managing changes , revision of protocols, contingency of	

			non-outbreak related care, problem solving skills, ethical challenges , as well as acknowledging learning opportunities during disease outbreak scenario's	
1	Develop strategies to build clinical confidence of all nursing categories	93%	Domain 7: Precautionary Measures and Clinical Practice during non-Disease and Disease Outbreak Periods: Establish plans to empower and enhance the clinical confidence of multi-disciplinary teams	24
2	Develop basic skills in caring for the critically ill of all categories of nurses	93%	Domain 7: Precautionary Measures and Clinical Practice during non-Disease and Disease Outbreak Periods: Equip all nursing categories with essential skills for caring for critical ill patients within their scope of practice	28
3	Management of equipment in the critical care environment	93%	Domain 7: Precautionary Measures and Clinical Practice during non-Disease and Disease Outbreak Periods: Manage critical care equipment including storage, cleaning, disinfections and operation	29
4	Identify appropriate Personal Protective Equipment (PPE) for a disease outbreak	93%	Domain 7: Precautionary Measures and Clinical Practice during non-Disease and Disease Outbreak Periods: Manage appropriate disease related PPE	30
5	Training in maximum PPE level management including donning, doffing, and disposal thereof for all categories staff and volunteers	93%	Domain 7: Precautionary Measures and Clinical Practice during non-Disease and Disease Outbreak Periods: Manage appropriate disease related PPE.	30

			Statement 4 and 5 were described as one statement	
6	Develop change management strategies	86%	Domain 7: Precautionary Measures and Clinical Practice during non-Disease and Disease Outbreak Periods: Develop a plan to support staff in adapting to changes in clinical routines	31
7	Strategies to enhance compliance to clinical routine and monotonous tasks over a long period of time	93%	Domain 7: Precautionary Measures and Clinical Practice during non-Disease and Disease Outbreak Periods: Create measures to ensure sustained compliance with routine and demanding tasks over prolonged periods	32
8	Manage death and dying	96%	Domain 7: Precautionary Measures and Clinical Practice during non-Disease and Disease Outbreak Periods: Develop skills to managing death and dying situations	33
9	Communicate clinical information with available resources	96%	Domain 9: Interpersonal Skills During Disease Outbreaks: Access communication mediums with available resources	53
10	Communicate sensitive information	96%	Domain 9: Interpersonal Skills During Disease Outbreaks: Develop skills to convey sensitive information to family members and staff e.g. the death of a colleague	57
11	Demonstrate Skill to navigate technology	93%	Domain 9: Interpersonal Skills During Disease Outbreaks: Navigate various technologies e.g. electronic data capturing programmes	59

12	Address healthcare worker non-conformity to policies and procedures	100%	Domain 9: Interpersonal Skills During Disease Outbreaks: Develop skills to address non-compliance among healthcare providers and patients during disease outbreaks	49
13	Profile communities according to culture, religion, resources, and skills	82%	Domain 3: Community Profiling and Resource Identification: Conduct and compile a comprehensive community profile	10
14	Develop ethical decision making skills	93%	Domain 7: Precautionary Measures and Clinical Practice during non-Disease and Disease Outbreak periods: Enhance problem solving and ethical decision making abilities	34
15	Clarify the healthcare student's role and support during a disease outbreak	93%	Domain 2: Human Resources: Explain the roles of healthcare providers and community members during disease outbreaks	9
16	Develop and revise existing protocols and guidelines	93%	Domain 7: Precautionary Measures and Clinical Practice during non-Disease and Disease Outbreak periods: Develop and revise existing protocols and guidelines	35
	Section 5: Interpersonal Skills During Disease Outbreaks		Domain 9: Interpersonal Skills During Disease Outbreaks: This domain focuses on understanding human behavior during a disease outbreak, trust behavior, the value of de-briefing , proving support in stressful situations, engagement with communication initiatives and	

			challenges, enhancement of compliance and addressing non-complaint behavior, clarify roles during multi-disciplinary ethical decision making as well as navigation of technology for the purpose of effective communication, as well as plans to re-integrate into society after a disease outbreak	
1	Clarify human behavior and self-preservation during and outbreak (intimidation, bullying, miss-trust, and fear)	96%	Domain 9: Interpersonal Skills During Disease Outbreaks: Explain human (staff and public) behavior and reactions during disease outbreaks (intimidation, bullying, mistrust, fear)	44
2	Develop strategies to build inter collegial trust	100%	Domain 9: Interpersonal Skills During Disease Outbreaks: Develop stratifies to foster trust amongst colleagues and the public	45
3	Facilitate debriefing sessions	89%	Domain 9: Interpersonal Skills During Disease Outbreaks: Facilitate frequent de-briefing sessions for healthcare workers, patients and families	46
4	Explain the role and responsibility of healthcare providers and members of the community during disease outbreaks	100%	Domain 2: Human Resources: Explain the roles of healthcare providers and community members during disease outbreaks	9

5	Develop strategies to build community trust and involvement in care during a non-disease outbreak period	93%	Domain 3: Community Profiling and Resource Identification: Create plans to increase community trust and involvement in care during non-disease outbreak periods	14
6	Care for the terminally ill	89%	Domain 9: Interpersonal Skills During Disease Outbreaks: Provide care for terminally ill individuals in diverse circumstances	47
7	Develop skills on how to cope with grief and loss	96%	Domain 10: Intrapersonal Skills during Disease Outbreak: Cultivate effective intrapersonal intelligence skills (personal assessments of thoughts, emotions, strengths, weaknesses, and building mental models for life decisions)	62
8	Utilize communication strategies during disease outbreaks	93%	Domain 9: Interpersonal Skills During Disease Outbreaks: Utilize various communication techniques before, during and after disease outbreaks	48
9	Develop skills to address non-compliance of healthcare providers during disease outbreaks	96%	Differentiation were made between non-compliance and compliant strategies in 2 separate statements: Domain 9: Interpersonal Skills During Disease Outbreaks: Develop skills to address non-compliance among healthcare providers and patients during disease outbreaks	49

			Domain 9: Interpersonal Skills During Disease Outbreaks: Foster skills to support compliance among healthcare providers and patients during disease outbreaks	50
10	Develop ethical reasoning skills	93%	Domain 9: Interpersonal Skills During Disease Outbreaks: Develop ethical reasoning skills for multi-disciplinary decision-making	51
11	Maintain level of care of patients during a crises	86%	Domain 7: Precautionary Measures and Clinical Practice during non-disease and Disease Outbreak periods: Maintain a consistent and acceptable level of care for both infected and non-infected patients during a crises	36
12	Socialization in communities after an outbreak	89%	Domain 9: Interpersonal Skills during Disease Outbreak: Develop plans to re-integrate into society after a disease outbreaks	60
	Section 6: Intrapersonal Skills During Disease Outbreaks		Domain 10: Intrapersonal Skills during Disease Outbreak: This domain is emphasizing on coping strategies, self-care, and decision making	
1	Develop skills to handle disappointments, intimidation, feeling of defeat, fear, loss feelings of being sacrificed, loss of trust, and guilt	96%	Domain 10: Intrapersonal Skills during Disease Outbreak: Cultivate effective intrapersonal intelligence skills (personal assessments of thoughts, emotions, strengths, weaknesses, and building mental models for life decisions)	62

2	Develop strategies to re-integrate into society after a disaster	89%	Domain 9: Interpersonal Skills During Disease Outbreaks: Develop plans to re-integrate into society after a disease outbreaks	60
3	Attending of debriefing sessions during disasters	93%	Domain 10: Intrapersonal Skills during Disease Outbreak: Engage in frequent individual debriefing sessions during disease outbreaks	61
4	Maintain self-care and self-compassion during disasters	96%	Domain 10: Intrapersonal Skills during Disease Outbreak: Cultivate effective intrapersonal intelligence skills (personal assessments of thoughts, emotions, strengths, weaknesses, and building mental models for life decisions)	62
5	Develop effective decision making skills through intrapersonal intelligence strategies (personal judgements about own thoughts, emotions, strengths and weaknesses, building mental models for making decisions of your own life)	100%	Domain 10: Intrapersonal Skills during Disease Outbreak: Cultivate effective intrapersonal intelligence skills (personal assessments of thoughts, emotions, strengths, weaknesses, and building mental models for life decisions)	62
6	Demonstrate effective change management skills	89%	Domain 10: Intrapersonal Skills during Disease Outbreak: Demonstrate proficiency in delivering effective change management skills	63

7	Identify learning opportunities during an outbreak	93%	Domain 7: Precautionary Measures and Clinical Practice during non-disease and Disease Outbreak periods: Reflect on learning opportunities during disease outbreaks	37
	Section 7: Physical Demands During a Disease Outbreak		Domain 6: Physical Demands during a Disease Outbreak: This domain addresses strategies for maintaining physical health, managing patient care demands, and recognizing ergonomic challenges during disease outbreaks	
1	Develop strategies of the healthcare worker to maintain and enhance physical health during an outbreak	96%	Domain 6: Physical Demands during a Disease Outbreak: Create strategies to promote self-care mindfulness amidst a disease outbreak	22
2	Identify the physical demands of patient care during a disease outbreak	96%	Domain 6: Physical Demands during a Disease Outbreak: Develop measures to minimize the intense physical impact on nursing staff during disease outbreaks	23
3	Demonstrate competence in PPE management (donning, doffing and disposal)	100%	Domain 7: Precautionary Measures and Clinical Practice during non-disease and Disease Outbreak periods: Manage appropriate disease related PPE	30
4	Identify ergonomic challenges in the healthcare environment	92%	Domain 6: Physical Demands during a Disease Outbreak: Develop measures to minimize the intense physical impact on nursing staff during disease outbreaks	23

	Section 8: Communication and Information Management During a Disease Outbreak		Included in Domain 9: Interpersonal Skills During Disease Outbreaks	
1	Communicate inclusively during a disease outbreak	93%	Domain 9: Interpersonal Skills During Disease Outbreaks: Communicate inclusively using various mediums during a disease outbreak	52
2	Assess communication strategies with available resources	89%	Domain 9: Interpersonal Skills During Disease Outbreaks: Access communication mediums with available resources	53
3	Develop strategies for communicating high volumes of information	89%	Domain 9: Interpersonal Skills During Disease Outbreaks: Handle large volumes of changing information	56
4	Communicate to numerous people during a disease outbreak	96%	Domain 9: Interpersonal Skills During Disease Outbreaks: Communicate effectively with diverse groups during a disease outbreak	55
5	Communicate vast changing information	86%	Domain 9: Interpersonal Skills During Disease Outbreaks: Handle large volumes of changing information	56
6	Communicate sensitive information	96%	Domain 9: Interpersonal Skills During Disease Outbreaks: Develop skills to convey sensitive information to family members and staff e.g. the death of a colleague	57
7	Care through communication	93%	Domain 9: Interpersonal Skills During Disease Outbreaks: Demonstrate care through diverse communication methods e.g. a personal introduction note on your hazmat suit	58

8	Facilitate debriefing opportunities	93%	Domain 9: Interpersonal Skills During Disease Outbreaks: Facilitate ample and regular debriefing opportunities for healthcare workers after events	46
	Section 9: Community Profiling and Resource Identification		Domain 3: Community Profiling and Resource Identification: This domain involves the assessment of a community , identifying of resources , supporting of vulnerable groups , recruiting of volunteers during outbreaks, and gaining of trust of the community	
1	Conduct a community profile	100%	Domain 3: Community Profiling and Resource Identification: Conduct and compile a comprehensive community profile	10
2	Identify community resources	96%	Domain 3: Community Profiling and Resource Identification: Identify physical, material resources, strengths and limitations within the community	11
3	Develop strategies to support the vulnerable during a disease outbreak	100%	Domain 3: Community Profiling and Resource Identification: Develop measures to manage and support vulnerable persons during disease outbreaks such as the elderly	12
4	Train volunteers during a disease outbreak	89%	Domain 3: Community Profiling and Resource Identification: Recruit volunteers from the community to perform non-medical tasks during disease outbreaks	13

	Section 10: Financial Management		Domain 5: Financial Management: This domain concentrates on identifying the financial implications of a disease outbreak, preventing of resource wastage , and optimize resource allocation during disease outbreaks	
1	Identify the financial implications if a disease outbreak	96%	Domain 5: Financial Management: Assess the cost implications of a disease outbreaks	19
2	Identify strategies to prevent wastage of resources	100%	Domain 5: Financial Management: Formulate plans to prevent unnecessary expenditure of financial resources	20
3	Identify strategies to allocate resources	100%	Domain 5: Financial Management: Devise strategies for the allocation of financial resources	21
	Section 11: Preparation of the Infrastructure		Domain 4: Preparation of the Infrastructure: This domain focusses on optimizing existing infrastructure, establishing movement pathways , and forming resource management committees during disease outbreaks	
1	Develop strategies to best utilize the existing infrastructure during a disease outbreak	100%	Domain 4: Preparation of the Infrastructure: Develop strategies to optimize existing infrastructure during disease outbreaks and Domain 4: Preparation of the Infrastructure: Recognize ergonomic challenges within the healthcare environment	15 16

			e.g. ward lay-out, isolation rooms, and air conditioning systems	
2	Identify people movement pathways	96%	Domain 4: Preparation of the Infrastructure: Identify safe pathways for movement, considering the living, dying and deceased	17
3	Establish and Infrastructure and Resource Committee with representatives of nursing management, nursing, technical services, infrastructure and buildings, area community services, and community leaders	100%	Domain 4: Preparation of the Infrastructure: Establish an Infrastructure and Resource Committee comprising of representatives from various sectors to coordinate and plan infrastructure-related requirements	18
	Section 12: PPE Management of Precautionary Measures		Domain 8: PPE Management : This domain resolves around understanding different PPE items , securing PPE integrity , acknowledging PPE indications and limitations , improvising measures to secure PPE, application of PPE in different settings , and identification of PPE training opportunities during outbreak and non-disease outbreak periods	
1	Revise infection prevention and control principles	82%	Domain 7: Precautionary Measures and Clinical Practice during non-disease and Disease Outbreak periods: Review and update infection prevention and control principles as required	25

2	Revise the concept precautionary measure	71%	Domain 7: Precautionary Measures and Clinical Practice during non-disease and Disease Outbreak periods: Revise the principle of precaution as required	26
3	Apply standard precaution	86%	Domain 7: Precautionary Measures and Clinical Practice during non-disease and Disease Outbreak periods: Update standard precautions accordingly	27
4	Identify the indications and limitation of each PPE item	93%	Domain 8: PPE Management: Understand the indications and limitations of each PPE item e.g. re-use of face masks	38
5	Demonstrate competence in PPE management	93%	Domain 8: PPE Management: Demonstrate competence in managing PPE as appropriate	39
6	Protect the integrity of your PPE	93%	Domain 8: PPE Management: Safeguard the integrity of in-use PPE	40
7	Strategies to procure and store PPE	96%	Domain 8: PPE Management: Demonstrate methods of procuring and storing of PPE	41
8	Manage PPE in low-resource settings	100%	Domain 8: PPE Management: Manage PPE in low and middle-resource settings	42
9	Perform purposeful monotonous tasks during PPE management	78%	Domain 7: Precautionary Measures and Clinical Practice during non-disease and Disease Outbreak periods: Create measures to ensure sustained compliance with routine and demanding tasks over prolonged periods	32

10	Plan strategies to facilitate learning opportunities for healthcare workers on PPE management and precautionary measures	100%	Domain 8: PPE Management: Plan strategies to facilitate learning opportunities for healthcare workers on PPE management and precautionary measures	43
11	Develop skills to address non-compliance to precautionary PPE measures	96%	Domain 9: Interpersonal Skills During Disease Outbreaks: Develop skills to address non-compliance among healthcare providers and patients during disease outbreaks	49
12	Develop strategies to support and enhance the physical health of healthcare providers	93%	Domain 2: Human Resources: Discuss protective measures for nurses' physical and psychological well-being	7

6.5.1 Participants in Delphi-survey Round Two

Invitations to participate in Round Two as well as information and results from round 1 was presented to the participants. A total of 5 of the 7 participants included in Round One completed the Round Two Likert scale tool.

6.5.2. Results of Round Two

The results of Round 2 is presented in Table 6.7. All the statements were acceptable to the participants.

The statement in domain 1, number 3: Evaluate competence through a semi structured portfolio of evidence scored the lowest at 80%.

A table indicating the domain scores are presented below. See Table 6.6.

Table 6.6: Score results of the domains in Delphi-survey Round Two

Domain	Agreement Rate
Domain 1: Preparation for and Mode of Delivery of the Programme	97%
Domain 2: Human resources	99%
Domain 3: Community Profiling and Resource Identification	98%
Domain 4: Preparation of the Infrastructure	100%
Domain 5: Financial Management	98%
Domain 6: Physical Demands during a Disease Outbreak	100%
Domain 7: Precautionary Measures and Clinical Practice during Non-disease and Disease Outbreak Periods	96%
Domain 8: PPE Management	97%
Domain 9: Interpersonal Skills During Disease Outbreaks	97%
Domain 10: Intrapersonal Skills during Disease Outbreaks	100%

Table 6.7: Results of Delphi- Round 2

	Domain 1: Preparation for and Mode of Delivery of the Programme	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
1	Attend mandatory debriefing sessions before initiating the programme to reflect on past outbreak responses	4		4	4		4	4	20	100%
2	Deliver the programme in hybrid format, combining different methods of presentation	4		4	4		4	4	20	100%
3	Evaluate competence through a semi-structured portfolio of evidence	3		4	4		3	4	18	80%
	Domain Totals	11		12	12		11	12	58	97%

	Domain 2: Human resources	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
4	Evaluate nursing resources during non-disease and disease outbreak periods	4		4	4		4	4	20	100%
5	Justify the necessity for developing specialist nurses for disease outbreaks	4		4	4		4	4	20	100%
6	Create strategies for building a future outbreak management workforce	4		4	4		4	4	20	100%
7	Discuss protective measures for nurses' physical and psychological well-being	4		4	4		4	4	20	100%
8	Develop strategies to train all nurse categories in basic life support procedures	4		4	4		4	4	20	100%
9	Explain the roles of healthcare providers and community members during disease outbreaks	4		4	3		4	4	19	95%
	Domain Totals	24		24	23		24	24	119	99%

	Domain 3: Community Profiling and Resource Identification	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
10	Conduct and compile a comprehensive community profile	4		3	4		4	4	19	95%
11	Identify physical, material resources, strengths and limitations within the community	4		4	4		4	4	20	100%
12	Develop measures to manage and support vulnerable persons during disease outbreaks such as the elderly	4		4	4		4	4	20	100%

13	Recruit volunteers from the community to perform non-medical tasks during disease outbreaks	4		4	4		4	4	20	100%
14	Create plans to increase community trust and involvement in care during non-disease outbreak periods	3		4	4		4	4	19	95%
	Domain Totals	19		19	20		20	20	98	98%

	Domain 4: Preparation of the Infrastructure	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
15	Develop strategies to optimize existing infrastructure during disease outbreaks	4		4	4		4	4	20	100%
16	Recognize ergonomic challenges within the healthcare environment e.g. ward lay-out, isolation rooms, and air conditioning systems	4		4	4		4	4	20	100%
17	Identify safe pathways for movement, considering the living, dying and deceased	4		4	4		4	4	20	100%
18	Establish an Infrastructure and Resource Committee comprising of representatives from various sectors to coordinate and plan infrastructure-related requirements	4		4	4		4	4	20	100%
	Domain Totals	16		16	16		16	16	80	100%

	Domain 5: Financial Management	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
19	Assess the cost implications of disease outbreaks	3		4	4		4	4	19	95%
20	Formulate plans to prevent unnecessary expenditure of financial resources	4		4	4		4	4	20	100%
21	Devise strategies for the allocation of financial resources	4		4	4		4	4	20	100%
	Domain Totals	11		12	12		12	12	59	98%

	Domain 6: Physical Demands during a Disease Outbreak	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
22	Create strategies to promote self-care mindfulness amidst a disease outbreak	4		4	4		4	4	20	100%
23	Develop measures to minimize the intense physical impact on nursing staff during disease outbreaks	4		4	4		4	4	20	100%
	Domain Totals	8		8	8		8	8	40	100%

	Domain 7: Precautionary Measures and Clinical Practice during Non-disease and Disease Outbreak Periods	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
24	Establish plans to empower and enhance the clinical confidence of multi-disciplinary teams	3		4	4		4	4	19	95%
25	Review and update infection prevention and control principles as required	4		4	3		4	4	19	95%
26	Revise the principle of precaution as required	3		4	3		4	4	18	90%
27	Update standard precautions accordingly	4		4	4		4	4	20	100%
28	Equip all nursing categories with essential skills for caring for critical ill patients within their scope of practice	4		4	1		4	4	17	85%
29	Manage critical care equipment including storage, cleaning, disinfection and operation	4		4	4		4	4	20	100%
30	Manage appropriate disease related PPE	4		4	3		4	4	19	95%
31	Develop a plan to support staff in adapting to changes in clinical routines	4		4	4		4	4	20	100%
32	Create measures to ensure sustained compliance with routine and demanding tasks over prolonged periods	4		4	4		4	4	20	100%
33	Develop skills to manage death and dying situations	4		4	3		4	4	19	95%
34	Enhance problem solving and ethical decision making abilities	4		4	4		4	4	20	100%
35	Develop and revise existing protocols and guidelines	4		4	2		4	4	18	90%
36	Maintain a consistent and acceptable level of care for both infected and non-infected patients during a crises	4		4	4		4	4	20	100%
37	Reflect on learning opportunities during disease outbreaks	4		4	3		4	4	19	95%
	Domain Totals	54		56	46		56	56	268	96%

	Domain 8: PPE Management	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
38	Understand the indications and limitations of each PPE item e.g. re-use of face masks	4		4	4		4	4	20	100%
39	Demonstrate competence in managing PPE as appropriate	4		4	4		4	4	20	100%
40	Safeguard the integrity of in-use PPE	3		4	4		4	4	19	95%

41	Demonstrate methods of procuring and storing of PPE	4		4	4		4	4	20	100%
42	Manage PPE in low and middle-resource settings	4		4	4		4	4	20	100%
43	Plan strategies to facilitate learning opportunities for healthcare workers on PPE management and precautionary measures	4		4	4		4	4	20	100%
	Domain Totals	23		24	24		24	24	119	99%

	Domain 9: Interpersonal Skills During Disease Outbreaks	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
44	Explain human(staff and public) behavior and reactions during disease outbreaks (intimidation, bullying, mistrust, fear)	3		4	3		4	4	18	90%
45	Develop strategies to foster trust amongst colleagues and the public	4		4	3		4	4	19	95%
46	Facilitate frequent de-briefing sessions for healthcare workers, patients and families	4		4	3		4	4	19	95%
47	Provide care for terminally ill individuals in diverse circumstances	4		4	4		4	4	20	100%
48	Utilize various communication techniques before, during and after disease outbreaks	4		4	4		4	4	20	100%
49	Develop skills to address non-compliance among healthcare providers and patients during disease outbreaks	4		4	3		4	4	19	95%
50	Foster skills to support compliance among healthcare providers and patients during disease outbreaks	4		4	1		4	4	17	85%
51	Develop ethical reasoning skills for multi-disciplinary decision-making	4		4	4		4	4	20	100%
52	Communicate inclusively using various mediums during a disease outbreak	4		4	4		4	4	20	100%
53	Access communication mediums with available resources	4		4	3		4	4	19	95%
54	Develop plans for managing high volumes of information	4		4	4		4	4	20	100%
55	Communicate effectively with diverse groups during disease outbreaks	4		4	4		4	4	20	100
56	Handle large volumes of changing information	3		4	4		4	4	19	95%
57	Develop skills to convey sensitive information to family members and staff e.g. the death of a colleague	4		4	4		4	4	20	100%

58	Demonstrate are through diverse communication methods e.g. a personal introduction note on your hazmat suit	4		4	4		4	4	20	100%
59	Navigate various technologies e.g. electronic data capturing programmes	4		4	4		4	4	20	100%
60	Develop plans to re-integrate into society after a disease outbreak	4		4	3		4	4	19	95%
	Domain Totals	66		68	59		68	68	329	97%

	Domain 10: Intrapersonal Skills during Disease Outbreaks	P1	D1	D2	D4	D6	D9	D10	Total	Percentage
61	Engage in frequent individual debriefing sessions during disease outbreaks	4		4	4		4	4	20	100%
62	Cultivate effective intrapersonal intelligence skills (personal assessments of thoughts, emotions, strengths, weaknesses, and building mental models for life decisions)	4		4	4		4	4	20	100%
63	Demonstrate proficiency in delivering effective change management skills	4		4	4		4	4	20	100%
	Domain Totals	12		12	12		12	12	60	100%

6.6 SUMMARY

This chapter described the triangulation of the data from the scoping review and in-depth interviews. The findings of the Delphi Round One and Round Two statements were presented. The Ten domains and sub-themes were used to develop the curriculum matrix for the competency-based programme in the next chapter.

CHAPTER SEVEN

DEVELOPMENT AND VALIDATION OF THE COMPETENCY-BASED CURRICULUM

7.1 INTRODUCTION

In this chapter the last step of phase two of this study, the development of the competency-based programme for disease outbreaks is presented. The motivation for designing a competency-based curriculum (CBC), curriculum matrix, as well as validation of the curriculum by subject experts are included in this chapter.

7.2 DEVELOPMENT OF THE CURRICULUM

Based on data from the Delphi-survey presented in Chapter 6 the competency-based curriculum was developed.

7.2.1 Identification of Modules

The results of the Delphi-survey aligned with the proposed modules were presented to the study supervisors. A total of ten modules were developed after a collaborative decision making session. Figure 7.1. The alignment of the results of the Delphi survey with the curriculum statements is presented in Table 7.1. All the domains in the Delphi-survey were included in the curriculum matrix.

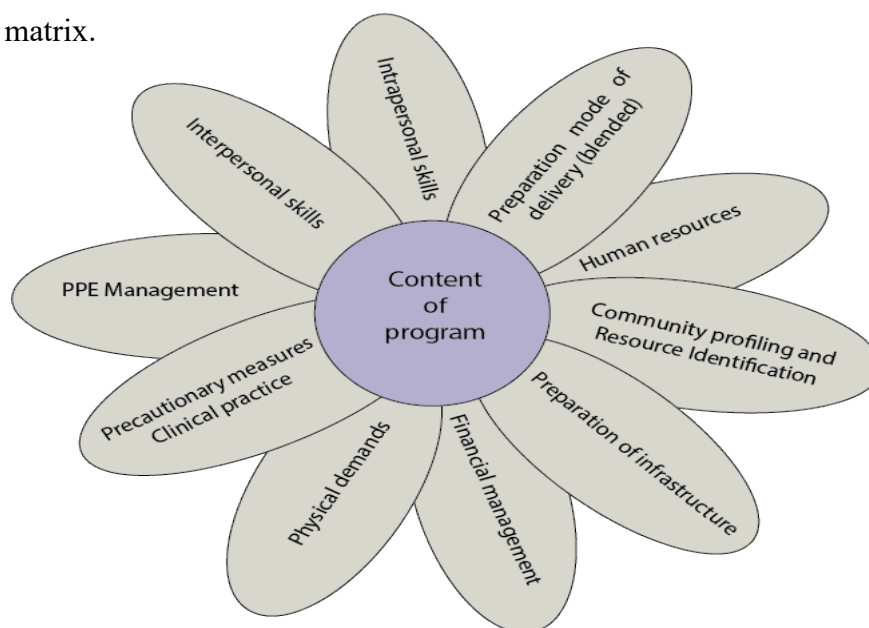


Figure 7.1: The content of the programme after triangulation of data.

Table 7.1 Alignment of the results of the Delphi-survey with the Curriculum Matrix

	Domain 1: Preparation and Mode of Delivery of the Programme	Curriculum Matrix
1.	Attend mandatory debriefing sessions before initiating the programme to reflect on past outbreak experiences	Entry Requirements
2.	Deliver the programme in hybrid format, combining different methods of presentation	Curriculum design
3.	Evaluation through a semi structured portfolio of evidence	Assessment Strategies Module 1-10 in Programme Outline
	Domain 2: Human Resources	Curriculum Matrix
4.	Evaluate nursing resources during non-disease and disease outbreak periods	Topic 4.1
5.	Justify the necessity for developing specialist nurses for disease outbreaks	Module 10
6.	Create strategies for building a future outbreak management workforce	Module 1-10
7.	Discuss protective measures for nurses' physical and psychological well-being	Topic 4.2 and 4.3
8.	Develop strategies to train all nurse categories in basic life support procedures	Topic 8.1
9.	Explain the roles of healthcare providers and community members during disease outbreaks	Topic 4.1 and 4.4
	Domain 3: Community Profiling and Resource Identification:	Curriculum Matrix
10.	Conduct and compile a comprehensive community profile	Topic 5.1
11.	Identify physical, material resources, strengths and limitations within the community	Module 5

12.	Develop measures to manage and support vulnerable persons during disease outbreaks such as the elderly	Topic 5.3
13.	Recruit volunteers from the community to perform non-medical tasks during disease outbreaks	Topic 4.5
14.	Create plans to increase community trust and involvement in care during non-disease outbreak periods	Topic 4.5
	Domain 4: Preparation of the Infrastructure	Curriculum Matrix
15.	Develop strategies to optimize existing infrastructure during disease outbreaks	Topic 6.2
16.	Recognize ergonomic challenges within the healthcare environment e.g. ward lay-out, isolation rooms, and air conditioning systems	Topic 6.3
17.	Identify safe pathways for movement, considering the living, dying and deceased	Topic 6.2
18.	Establish an Infrastructure and Resource Committee comprising of representatives from various sectors to coordinate and plan infrastructure-related requirements	Topic 6.1
	Domain 5: Financial Management	Curriculum Matrix
19	Assess the cost implications of a disease outbreaks	Topic 7.1
20	Formulate plans to prevent unnecessary expenditure of financial resources	Topic 7.2
21	Devise strategies for the allocation of financial resources	Topic 7.2
	Domain 6: Physical Demands during a Disease Outbreak	Curriculum Matrix
22	Create strategies to promote self-care mindfulness amidst a disease outbreak	Topic 4.2
23	Develop measures to minimize the intense physical impact on nursing staff during disease outbreaks	Topic 9.3
	Domain 7: Precautionary Measures and Clinical Practice during non-disease and Disease Outbreak periods	Curriculum Matrix

24	Establish plans to empower and enhance the clinical confidence of multidisciplinary teams	Module 8 Module 10
25	Review and update infection prevention and control principles as required	Module 8
26	Revise the principle of precaution as required	Topic 1.2, 8.4 and, 8.6.
27	Update standard precautions accordingly	Topic 8.1, 8.2, 8.3
28	Equip all nursing categories with essential skills for caring for critical ill patients within their scope of practice	Topic 8.1
29	Manage critical care equipment including storage, cleaning, disinfections and operation	Topic 8.1
30	Manage appropriate disease related PPE	Topic 9.1 and 9.2
31	Develop a plan to support staff in adapting to changes in clinical routines	Topic 8.6
32	Create measures to ensure sustained compliance with routine and demanding tasks over prolonged periods	Topic 9.3 Topic 8.5
33	Develop skills to managing death and dying situations	Topic 8.2
34	Enhance problem solving and ethical decision making abilities	Module 2
35	Develop and revise existing protocols and guidelines	Topic 1.3
36	Maintain a consistent and acceptable level of care for both infected and non-infected patients during a crises	Topic 8.4
37	Reflect on learning opportunities during disease outbreaks	Topic 10.3
	Domain 8: PPE Management	Curriculum Matrix
38	Understand the indications and limitations of each PPE item e.g. re-use of face masks	Topic 9.1
39	Demonstrate confidence in managing PPE as appropriate	Module 9
40	Safeguard the integrity of in-use PPE	Topic 9.3
41	Demonstrate methods of procuring and storing of PPE	Topic 9.4 Topic 7.2
42	Manage PPE in low and middle-resource settings	Topic 9.4

43	Plan strategies to facilitate learning opportunities for healthcare workers on PPE management and precautionary measures	Topic 9.2 Topic 9.3 Topic 10.3
Domain 9: Interpersonal Skills During Disease Outbreaks		Curriculum Matrix
44	Explain human (staff and public) behavior and reactions during disease outbreaks (intimidation, bullying, mistrust, fear)	Topic 3.1
45	Develop strategies to foster trust amongst colleagues and the public	Topic 3.4 Topic 4.5
46	Facilitate frequent de-briefing sessions for healthcare workers, patients and families	Topic 3.3
47	Provide care for terminally ill individuals in diverse circumstances	Topic 8.2 Topic 8.3
48	Utilize various communication techniques before, during and after disease outbreaks	Topic 3.1 Topic 3.5 Topic 3.6 Topic 3.7
49	Develop skills to address non-compliance among healthcare providers and patients during disease outbreaks	Topic 3.2
50	Foster skills to support compliance among healthcare providers and patients during disease outbreaks	Topic 3.2
51	Develop ethical reasoning skills for multi-disciplinary decision-making	Module 2
52	Communicate inclusively using various mediums during a disease outbreak	Topic 3.3 Topic 3.5 Topic 3.6 Topic 3.7
53	Access communication mediums with available resources	Topic 3.5
54	Develop plans for managing high volumes of information	Topic 3.6
55	Communicate effectively with diverse groups during a disease outbreak	Topic 3.6
56	Handle large volumes of changing information	Topic 3.6

		Topic 3.7
57	Develop skills to convey sensitive information to family members and staff e.g. the death of a colleague	Topic 3.6
58	Demonstrate care through diverse communication methods e.g. a personal introduction note on your hazmat suit	Topic 9.3
59	Navigate various technologies e.g. electronic data capturing programmes	Topic 3.5 Topic 3.6 Topic 3.7
60	Develop plans to re-integrate into society after a disease outbreaks	Topic 4.3
	Domain 10: Intrapersonal Skills during Disease Outbreak	Curriculum Matrix
61	Engage in frequent individual debriefing sessions during disease outbreaks	Topic 3.3
62	Cultivate effective intrapersonal intelligence skills (personal assessments of thoughts, emotions, strengths, weaknesses, and building mental models for life decisions)	Topic 4.2
63	Demonstrate proficiency in delivering effective change management skills	Topic 8.6

7.2.2 Designing of the Modules

The backward design was used to design the curriculum. Backward design is defined as teaching students to use the *understanding* of what they learnt in different situations as appose to providing them with information, hoping they will be able to apply the knowledge (Wiggins and McTighe, 2005). The starting point of this design is to present the end results first to the student to enhance their focus and realization of the importance of the activities and foster a life-long learning culture (Daugherty, 2005).

The steps in the design is:

Step 1: Identify the results

Step 2: Determine the evidence

Step 3: Plan the learning experiences and instruction.

7.2.3 The Curriculum Matrix

The curriculum matrix consists of ten modules. Each module include the following: Summary of the module, list of co facilitators, learning outcomes aligned with teaching objectives, module topics, and level of competence per topic, assessment activities and embedded skills required by the student to meet each learning outcome.

The comprehensiveness of the programme necessitates multidisciplinary facilitation of the modules. The list of co facilitators for the programme includes: Nurse Educators, Critical Care Educators, IPC Coordinators, Nursing Managers, ACLS (Advance Cardiovascular Life Support) and BLS (Basic Life Support) Instructure, Clinical Nurse Specialists, Public Health Specialist, Medical Ethics Specialist, Psychologists, Industrial Psychologist, Trauma Councilor, Communications Expert, Technology Expert, Human Resource Manager, Financial Expert, Hospital Managers, Building and Infrastructure Managers, Occupational Health and Safety Manager, Physiotherapists, Medical Equipment Product Specialist, Community Leaders, Religious Leaders, Local Emergency and Risk Departments.

The learner will be challenged with skills to complete the assessment activities and include: Abductive reasoning, Counterfactual Thinking, Analytical Thinking, Forward Thinking, Reflection, Reasoning Skills and, Critical Thinking. The development of guidelines, Audit tools and Presentation skills. Navigation of technology, Media Literacy, Information Literacy and Interpretation of Statistical Data, Aerial Maps and Floorplans.

The competency level requirements of each activity is included in the matrix according to the competency levels of Brenner (1982) previously described in Chapter two.

- **Presentation of work**

Each student is expected to develop their semi-structured e-portfolio of evidence according to the framework provided on the electronic platform.

- **Allocation of credits**

Credits are allocated to each module and presented in detail after each module. A summary of the credits is included below in Table 7.2.

- **Entry requirement**

The student will be expected to attend a debriefing session before starting the programme to have an opportunity to discuss experiences working during the COVID-19 pandemic.

Table 7.2 Credit allocation per module

Module	Total Credit Allocation
Module 1: The Dynamic Landscape of Controlling Disease Outbreaks	5.0
Module 2: Ethical Challenges during Disease Outbreaks	5.0
Module 3: Human Behavior and Communication Strategies	12.0
Module 4: Human Resources	10.0
Module 5: The Community	6.0
Module 6: Infrastructure Management	4.0
Module 7: Financial Management	4.0
Module 8: Clinical Practice and Precautionary Measures	10.0
Module 9: Personal Protective Equipment (PPE) Management	8.0
Module 10: Sustainable Disease Outbreak Education and Training	6.0
Total credits of the programme	72.0

The curriculum matrix is included below (7.3).

7.3 THE CURRICULUM MATRIX

Module 1: The Dynamic Landscape of Controlling Disease Outbreaks

Summary of the module: This introductory module to the programme provides an opportunity for nurses to revise disease outbreak terminology and legislation, the current global national and local infectious disease landscape and disease outbreak related legislation. This module allows the student to contextualize the disease outbreaks within the domain of global health.

Co facilitators: Public Health Specialist, Nurse Educator

Learning Outcomes

- 1.1 Demonstrate current understanding of disease outbreak terminology.
- 1.2 Explain the effects of global newsworthy events to possible disease outbreaks.
- 1.3 Compare the policies and procedures in your hospital with international and local disaster management legislation.

Content Topic	Teaching Objectives	Level of Competence	Assessment Activity	Embedded Skills
1.1 Disease outbreak related terminology	Recall current knowledge and understanding of disease outbreak knowledge (LO1.1)	Proficient	Complete the MCQ (multiple choice questionnaire) activity in the e-portfolio.	Navigation of technology Remembering
1.2 Risk assessment	Interpret global newsworthy events and the impact on disease outbreaks (LO1.2)	Proficient	Create a flowchart identifying the relationship between global newsworthy events and disease outbreaks. See guidelines on the development of a flowchart in your portfolio.	Navigating technology Global Perspective Analytical Thinking Forward Thinking Media Literacy

1.3 Legislation and disease outbreaks	Compare international and local disaster management legislation with hospital legislation (LO1.3)	Competent	Write a report following the templet provided in your portfolio. Compare the policies and procedures in your hospital with international and local disaster management legislation. Refer to the list of resources in the student management platform. Make conclusions. Provide reasons for any disparities and include recommendations	Navigating technology Analytical Thinking Global Perspective Information Literacy Abductive Reasoning Skills

Module 1. The Dynamic Landscape of Controlling Disease Outbreaks	Duration	Credits
1.1 Disease outbreak terminology	10 h	1.0
1.2 Risk assessment	20 h	2.0
1.3 Legislation and disease outbreaks	20 h	2.0
Total	50 h	5.0

Module 2: Ethical Challenges during Disease Outbreaks

Summary of the module: This module allows nurses to revise and expand ethical dilemma decision making strategies during disease outbreaks, including ethical theories and principles and the role players in the ethical decision making processes. The nurse is also expected to reflect on previous experiences that caused moral distress.

Co-facilitators: Nurse Educator, Ethics Specialist, Nursing Managers, members of the Ethics Committee

Learning Outcomes

2.1 Demonstrate current understanding of disease outbreak and ethical terminology.

2.2 Explore the different decision making strategies of Ethical Committees.

2.3 Compare processes related to moral distress.

Content Topic	Teaching Objective	Level of Competence	Assessment Activity	Embedded Skills
2.1 Ethical implications of disease outbreak	Recall current knowledge and understanding of disease outbreak and ethical knowledge (LO2.1)	Proficient	Complete and submit the MCQ activity in your portfolio	Navigating Technology Remembering
2.2 Multidisciplinary Approach to Ethical Challenges	Explore the challenges of Ethical Committees during non-disease and disease, outbreak periods with the student (LO2.2)	Proficient	Compare the decision making process of the Ethical Committee in your hospital during non-disease and disease outbreak periods. Write recommendations on how to support staff at the forefront and present it to the hospital management.	Navigating Technology Presentation Skills Analytical Thinking Conceptual Thinking

2.3 Moral Distress	Compare your experience that caused moral distress with an ideal process of support (LO2.3)	Expert	Present the differences between your experience with moral distress and the ideal process and provide a rationale for the disparities.	Navigating Technology Presentation Skills Abductive Reasoning Skills Analytical Thinking

Module 2. Ethical Challenges during Disease Outbreaks	Duration	Credits
2.1 Ethical implications of disease outbreaks	10 h	1.0
2.2 Multidisciplinary approach to ethical challenges	20 h	2.0
2.3 Moral distress	20 h	2.0
Total	50 h	5.0

Module 3: Human Behavior and Communication Strategies

Summary of the module: This module focuses on understanding human behavior during a disease outbreak, trust behavior, the value of debriefing, providing support in stressful situations, engagement with communication initiatives and challenges, enhancement of compliance and addressing non complaint behavior, clarifying roles during multidisciplinary ethical decision making as well as navigation of technology for the purpose of effective communication.

Co-facilitators: Nurse Educators, Nursing Managers, Psychologists, Communication Experts, Technology Experts, Human Resource Managers

Learning Outcomes

- 3.1 Explore change in behavior of self and other individuals when challenged during a disease outbreak.
- 3.2 Develop a guideline to manage diverse behavior of people in different contexts.
- 3.3 Strategize real time debriefing opportunities.
- 3.4 Foster inter collegial trust during disease outbreaks.
- 3.5 Record inclusive communication strategies and mediums available during disease outbreaks.

3.6 Develop strategies to communicate high volumes and sensitive information in short periods of time during disease outbreaks.

3.7 Develop digital literacy skills to enable the data management processes.

Content Topic	Teaching Objective	Level of Competence	Assessment Activity	Embedded Skills
3.1 Human behavior during disease outbreaks	Foster diversity through awareness of behaviors of self and the multidisciplinary team when challenged with a disease outbreak (LO3.1)	Proficient	Write a short review on human behavior when challenged with an ill -defined complex working environment.	Resource management Writing skills Navigating Technology Self-awareness
3.2 Managing human behavior	Manage diverse behaviors of people in different contexts (LO3.2)	Proficient	Develop a guideline for nurses to manage diverse behaviors. Describe adaptations of difference contexts. Provide justifications for the adaptations provided.	Guideline development Navigating Technology Abductive Reasoning Skills
3.3 Debriefing opportunities	Planning real time debriefing strategies. (LO3.3)	Expert	Develop strategies to facilitate real time debriefing opportunities including human	Writing of a guideline Navigating Technology

			resource allocation and training.	
3.4 Inter collegial trust	Build collaborative relationships of the multidisciplinary team by addressing inter collegial trust (LO3.4)	Proficient	Lead a discussion group on inter collegial trust in the clinical workspace during an outbreak Refer to the contributors of trust and mistrust. Highlight key actions to strengthen inter collegial trust in the clinical space	Facilitation of a Webinar Navigating Technology Abductive Reasoning Skills
3.5 Communication Strategies	Familiarize yourself with available inclusive communication mediums and strategies (LO3.5)	Expert	Conduct an audit on the communication strategies in your institution with recommendations Present your results to hospital management	Audit Tool Development Auditing Navigation of Technology Presentation Skills
3.6 Emergency information management	Foster innovation strategies to communicate high volumes and sensitive information on a regular basis (LO3.6)	Expert	Develop a protocol to communicate high volumes and sensitive information to all stakeholders in the hospital within short notice and	Protocol development Navigating Technology Presentation Skills

			present to hospital management.	
3.7 Digital and information literacy	Navigate digital programmes and data.(LO3.7)	Proficient	Review the provided scenario's and create an appropriate data management tool to represent the information in different formats.	Navigating Technology

Module 3. Human Behaviour and Communication Strategies	Duration	Credits
3.1 Human behaviour during disease outbreaks	10 h	1.0
3.2 Managing human behaviour	20 h	2.0
3.3 Debriefing opportunities	20h	2.0
3.4 Inter-collegial trust	10h	1.0
3.5 Communication strategies	20h	2.0
3.6 Emergency Information Management	20h	2.0
3.7 Digital Information Literacy	20h	2.0
Total	120 h	12.0

Module 4: Human Resources

Summary of the module: This module addresses the multidisciplinary role clarification, empowerment of nurses to take responsibility for their own wellbeing which include intrapersonal skills and emotional resilience. Social reintegration of the self into the same community you serve, including role clarification and recruitment strategies of community members that could contribute to care during a disease outbreak.

Co-facilitators: Human Resource Manager, Industrial Psychologist, Nurse Educator, Finance Manager, Trauma Counsellor

Learning Outcomes

4.1 Conduct a SWOT analysis of the multidisciplinary resources

4.2 Explore staff wellbeing opportunities that aligns with the needs of the staff and the institution.

4.3 Reflect on experiences to facilitate reintegration into the community during and after disease outbreak.

4.4 Map the available community resources to support the needs of the hospital.

4.5 Develop strategies to recruit community members, during non-disease and disease outbreak periods.

Content Topic	Teaching Objective	Level of Competence	Assessment Activity	Embedded Skills
4.1 Resource analysis and profiling	Analysis of the multidisciplinary human resources (LO4.1)	Proficient	Conduct a SWOT analysis with recommendations of the multidisciplinary human resources in your institution and map the specific resources	Navigating Technology
4.2 Self-protection, resilience and well being	Empower others by introducing individual staff wellbeing programmes (LO4.2)	Proficient	Source a programme on individual staff wellbeing and outline a presentation to hospital management for their approval.	Data management Presentation Skills Navigating technology:
4.3 Social re-integration	Empower yourself to reintegrate through reflection into communities during and post	Proficient	Write a reflective piece on your role in the community during a disease outbreak. Prompts to consider	Reflection Navigating Technology Abductive Reasoning Skills

	disease outbreak periods (LO4.3)		-Expectations before, during, and after the outbreak and what caused any changes -How did you approach challenges - What did you find easy and difficult - What did you learn as a result of the experience -What will you do different next time -How will you put into practice what you have learnt	Self-knowledge
4.4 Expanded human resources during disease outbreaks	Align skills of the community members with the needs of the hospital during disease outbreaks (LO 4.4.)	Proficient	Map the expanded human resources available in the community including skills competencies and availability relevant to disease outbreaks	Navigating Technology Analytical Thinking Fostering teamwork
4.5 Recruitment of community members	Demonstrate leadership to gain buy in from the community to support the hospital during non-disease and	Proficient	Develop a strategy to recruit community members to perform nonmedical duties during disease outbreaks motivated by their trust in your	Project Management Presentation Skills Navigating Technology

	disease outbreaks (LO4.5)		service and present to the hospital management. Insert the strategy and presentation in your POE.	

Module 4. Human Resources	Duration	Credits
4.1 Resource analysis and profiling	30 h	3.0
4.2 Self-protection resilience and well-being	20 h	2.0
4.3 Social reintegration	10 h	1.0
4.4 Expanded human resources during disease outbreaks	20h	2.0
4.5 Recruitment of community members	20h	2.0
Total	100h	10.0

Module 5: The Community

Summary of module: This module provides an opportunity for nurses to conduct a SWOT analysis of the community, identification of nonhuman resources and, building support structures for vulnerable groups.

Co-facilitators: Community Leaders, Religious Leaders, Local Government Department Managers, Local Department Disaster and Risk Managers, Fire Department, Business Owners, Nurse Manager, Hospital Manager

Learning Outcomes

- 5.1 Identify physical, material resources, strengths and limitations within the community.
- 5.2 Develop strategies to include community non-human resources in disease outbreak management.
- 5.3 Present strategies to support vulnerable persons during disease outbreaks such as the elderly.

Content Topic	Teaching Objectives	Level of Competence	Assessment Activities	Embedded Skills

5.1 Knowing your community	Apply strategic thinking by conducting a SWOT analysis to profile the community (LO5.1)	Proficient	Provide a community resource grid with recommendations based on the scenario provided.	Navigating technology (Excel document) Interpretation of statistical data Interpretation of natural and man-made resources on an aerial map.
5.2 Non-human resources	Nurse Manager: Integration of community non-human resources (LO5.2)	Proficient	Develop a strategy to facilitate the inclusion of non-human resources in the management of disease outbreaks.	Navigating technology Resource Allocation Critical Thinking
5.3 Vulnerable populations	Nurse Manager Develop strategies to support vulnerable groups in the community during an outbreak (LO5.3)	Proficient	Present strategies to support vulnerable groups in the community during an outbreak to hospital management by referring to the ideal environment and your current environment.	Navigating technology Presentation skills Counterfactual Thinking Skills

Module 5. The Community	Duration	Credits
5.1 Knowing your community	20 h	2.0
5.2 Non-human resources	20 h	2.0

5.3 Vulnerable populations	20h	2.0
Total	60h	6.0

Module 6: Infrastructure Management

Summary of the module: This module allows the student to focus on the collaborative nature of infrastructure management, optimizing existing infrastructure, establishing movement pathways, and addressing ergonomic challenges during non-disease and disease outbreaks periods.

Co-facilitator: Building and infrastructure manager, Financial Manager, Nursing Manager, Risk manager, Occupation Health and Safety Manager

Learning Outcomes

6.1 List the roles and responsibilities of the members of the multidisciplinary Infrastructure Committee.

6.2 Review the existing infrastructure available to manage a disease outbreak.

6.3 Recognize ergonomic challenges within the healthcare environment e.g. ward lay out, isolation rooms, and air conditioning systems.

Content Topic	Teaching Objectives	Level of Competence	Assessment Activity	Embedded Skills
6.1 Collaborative role identification	Realize existing collaborative relationships in the hospital relevant to infrastructure management (LO6.1) :	Proficient	Write a report on the existing organogram and role descriptors of members of the multidisciplinary Infrastructure Committee during a disease outbreak	Report writing skills Navigating Technology
6.2 Optimizing the infrastructure	Identify space allocation and movement pathways on existing	Proficient	Interpret and comment on the hospital floorplan provided in the scenario, and	Interpretation of floorplans. Navigating Technology

	hospital floorplans during non-disease and disease outbreak times (LO6.2)		possible expansion of additional treatment areas when required, by referring to the ideal and actual environment.	Counterfactual Thinking Skills
6.3 Ergonomic re-design during disease outbreaks	Comment on hospital layout, equipment and furniture allocation in the hospital required accommodate the isolation of patients (LO6.3)	Proficient	Annotate the floorplan, photographs and comments according to the scenario provided	Basic calculation of floor space and measuring of distances. Interpretation of floor plans and people movement. Navigating Technology

Module 6 Infrastructure Management	Duration	Credits
6.1 Collaborative role identification	10 h	1.0
6.2 Optimizing Infrastructure	20 h	2.0
6.3 Ergonomic re-design during disease outbreaks	10 h	1.0
Total	40h	4.0

Module 7: Financial Management

Summary of the module: This module guides the nurse to realize the financial implications of disease outbreaks and to engage with responsible financial planning strategies.

Co-facilitators: Financial Manager, Hospital Manager, Nursing Managers, Administrative staff.

Learning Outcomes:

7.1 Assess the cost implications of a disease outbreak.

7.2 Formulate plans to prevent misappropriation of financial resources.

Content Topic	Teaching Objectives	Level of Competence	Assessment Activities	Embedded Skills
7.1 Financial planning	Nurse Manager: Gather financial information on providing disease outbreak services (LO7.1)	Proficient	Compare the expenditure of the hospital during non-disease outbreak times to disease outbreak times by referring to the scenario and comment on the cost of disease outbreaks.	Budgeting skills Navigating Technology (Design of an Excel document)
7.2 Responsible management of financial resources	Nurse Manager: Develop strategies to prevent misappropriation of hospital resources (LO7.2)	Proficient	Design an infographic illustrating how to prevent unnecessary wastage of resources in the hospital. Write an explanation on	Navigating Technology Abductive Reasoning Skills

			what contributes to unnecessary wastage of resources in the hospital.	

Module 7 Financial Management	Duration	Credits
7.1 Financial planning	25 h	2.5
7.2 Responsible management of financial resources	15 h	1.5
Total	40h	4.0

Module 8: Clinical Practice and Precautionary Measures

Summary of the module: This module guides the student to enhance specific clinical and precautionary skills within a multidisciplinary team framework, revision of specific clinical practice standards, care for the diseased in precautionary environments, and the enhancement of clinical resilience on a dynamic unpredictable clinical platform.

Co-facilitators: Nursing Managers, Critical Care Nurse Educators, Infection Prevention and Control Educators, Intensivists, Physiotherapists, BLS and ACLS Instructors, Equipment product specialists

Learning Outcomes

- 8.1 Verify your competence in BLS and ACLS, Infection Prevention and Control precautionary skills, basic critical care skills and management of Critical Care Equipment.
- 8.2 Demonstrate care for the dying and deceased in isolation environments.
- 8.3 Revise clinical practice standards in collaboration with the multidisciplinary team.
- 8.4 Outline strategies to enhance surge capacity of the hospital.
- 8.5 Discuss strategies to support staff to sustain compliance when performing routine and demanding tasks over prolonged periods.
- 8.6 Develop an algorithm to guide staff in adapting to implement changes in clinical regimes.

Content Topic	Teaching Objectives	Level of Competence	Assessment Activities	Embedded Skills
8.1 Clinical outsourced Skills	Competent in performing BLS (Basic Life Support) and ACLS (Advanced Cardiovascular Life Support) skills, IPC – Basic Critical Care skills and Critical Care Equipment management (LO 8.1)	Proficient	Insert valid certification of BLS and ACLS and competence verification of the following: Infection Prevention and Control Precautionary Skills, Basic Critical Care Skills and management of Critical Care Equipment.	Critical Thinking Counterfactual Thinking Problem solving Clinical Skills
8.2 Care for the dying and deceased	Caring for the dying and deceased during a disease outbreak (LO8.2)	Proficient	Compare practices managing the dying and diseased during non-disease and disease outbreak periods under the following conditions 1. Contact Isolation 2. Droplet Isolation 3. Airborne Isolation Consider • Access of family members and religious leaders • Religious and cultural rituals • Care, storage and transportation of	Navigating Technology

			the deceased body • Decontamination of the isolation unit, equipment and documentation. • Personal items of the deceased Request the IPC coordinator of the hospital to assess you and include the documents in the POE	
8.3 Revision of clinical practice standards	Revise clinical practice standards in collaboration with the multidisciplinary team (LO8.3)	Expert	Revise the following clinical practice standards of the hospital. Provide proof of multidisciplinary involvement: • Care of the patient in isolation • Care of the deceased patient in isolation Compare the ideal isolation practice standards with the current practice standards in your hospital and provide explanations of the disparities. Insert in the POE.	Navigating Technology Abductive Reasoning Skills Counterfactual Skills.

8.4 Surge Capacity	Strategies to enhance the surge capacity of the hospital (LO8.4)	Proficient	Outline a hospital policy on how to ensure care for non-disease outbreak patients during a disease outbreak event and insert in your POE.	Navigating Technology
8.5 Enhancing clinical resilience	Persuade staff to comply with routine practices over prolonged periods (LO8.5)	Proficient	Discuss strategies on how to enhance sustained compliance with routine and demanding tasks over prolonged periods and present to the Clinical Department.	Presentation Skills Navigating Technology
8.6 Coping with the unpredictable clinical platform	Develop a decision tree to support staff in adapting to changes in clinical regimes (LO8.6)	Proficient	Develop an algorithm as guide to nurses to implement regular changes to patient treatment regimes. Include role clarification of the multidisciplinary team, and present to hospital management	Presentation Skills Navigating Technology

Module 8: Clinical Practice and Precautionary Measures	Duration	Credits
8.1 Clinical- Outsourced Skills	-	-
8.2 Care for the dying and deceased	30h	3.0
8.3 Revision of clinical practice standards	20h	2.0
8.4 Surge Capacity	20h	2.0

8.5 Enhancing clinical resilience	10h	1.0
8.6 Coping in the unpredictable clinical platform	20h	2.0
Total	100h	10.0

Module 9: Personal Protective Equipment (PPE) Management

Summary of the module: This module allows the nurse to engage with different PPE items, PPE appropriation, improvising measures to secure the integrity of PPE, application of PPE in different settings, and identification of PPE training opportunities. Discussions regarding the physical, often unspoken physical challenges experienced when PPE is donned for long periods of time, as well as initiatives to ensure the availability of PPE throughout disease outbreak periods.

Co- facilitators: Nursing Managers, Nurse Educators, PPE Product Specialists, Financial Manager

Learning Outcomes

9.1 Differentiate between the product specifications, application and disposal of different PPE items.

9.2 Empower others to become confident PPE users.

9.3 Discuss the physical challenges when working in PPE for an extended period of time.

9.4 Develop strategies to ensure availability of PPE at all times.

Content Topic	Teaching Objectives	Level of Competence	Assessment Activities	Embedded Skills
9.1 PPE differentiation	Differentiate between PPE items according to product specification, application and disposal requirements (LO9.1)	Expert	Develop infographics of PPE items by referring to appropriation, product specifications and disposal techniques	Navigate Technology Analytical Thinking

9.2 Building confidence in PPE practice	Empower others to become confident in donning and doffing practices (LO9.2)	Expert	Develop a project to facilitate all staff to attend annual PPE training and present to hospital management.	Navigate Technology Project Management Presentation Skills
9.3 Physical Challenges	Discuss the physical challenges of staff working in PPE for an extended period of time (LO 9.3)	Expert	Facilitate a discussion group on the physical challenges of working in PPE for extended periods of time. Provide explanations for the challenges and possible solutions and present the results to the OH manager.	Group facilitation Presentation skills Navigating Technology Abductive Reasoning Skills
9.4 Availability of PPE	Develop strategies to ensure availability of PPE at all times through a multidisciplinary approach (LO9.4)	Proficient	Facilitate a multidisciplinary discussion on plans to ensure availability of PPE at all times and present the plan to hospital management	Navigate Technology Facilitation of group discussions Presentation Skills

Module 9: Personal Protective Equipment (PPE)	Duration	Credits
9.1 PPE differentiation	20 h	2.0
9.2 Building confidence in PPE practice	20h	2.0
9.3 Physical challenges	20h	2.0

9.4 Availability of PPE	20h	2.0
Total	80h	8.0

Module 10: Sustainable Disease Outbreak Education and Training

Summary of the module: This module allows the student to develop and implement their self-developed disease outbreak programmes, to facilitate real time education and training initiatives on surge capacity and disease outbreaks. The nurse will be challenged to develop sustainable strategies to ensure the distribution of evidence based information on a continuous basis.

Co-facilitators: Nursing Managers, Nurse Educators, Financial Manager, HR Manager, Occupational Health and Safety Coordinator, Risk Manager

Learning Outcomes

10.1 Develop a sustainable disease outbreak training programme.

10.2 Develop strategies to enhance surge capacity awareness.

10.3 Develop plans to utilize learning opportunities during disease outbreaks in real-time teaching and learning.

10.4 Develop strategies to ensure the communication of evidence based information relevant to surge capacity and disease outbreaks.

Concept Topics	Learning Activities References	Level of Competence	Indicators of Progress	Additional Skills Required
10.1 Programme development	Develop a multidisciplinary sustainable disease outbreak training programme. (LO10.1)	Expert	Develop a multidisciplinary sustainable disease outbreak training programme for non-disease and disease outbreak times and present to hospital management.	Programme Development Presentation Skills Navigating technology Strategic Thinking

10.2 Surge capacity awareness	Develop strategies to enhance Surge Capacity awareness in the hospital (LO10.2)	Expert	Initiate a Hospital Surge Capacity information platform to communicate initiatives, and achievements of wards and individuals regarding disease outbreak preparation.	Navigating technology Fostering innovation
10.3 Real time teaching and learning during disease outbreaks	Develop plans to incorporate learning opportunities during disease outbreaks in training programmes by involving the multi-disciplinary team (LO10.3)	Expert	Develop a plan with the multidisciplinary team to incorporate real time disease outbreak teaching and learning during a disease outbreak event. Include the following: 1. Identification of learning opportunities 2. Teaching strategies and mediums 3. Protection of students 4. Legal aspects Present your plan to the training department	Navigating Technology Innovation thinking Fostering teamwork Presentation skills
10.4 Distribution of evidence based information	Nurse Manager Develop strategies to ensure the communication of evidence based	Expert	Develop a project to ensure the availability and communication of academic resources relevant to surge	Project development Navigating Technology Reviewing of Literature

	information relevant to surge capacity and disease outbreaks (LO10.4)		capacity and disease outbreaks to all staff in the hospital	Innovation thinking

Module 10. Sustainable Disease Outbreak Education and Training	Duration	Credits
10.1 Programme development	20 h	2.0
10.2 Surge capacity awareness	10 h	1.0
10.3 Real-time teaching and learning during disease outbreaks	20 h	2.0
10.4 Distribution of evidence-based information	10h	1.0
Total	60h	6.0

7.4 VALIDATION OF THE CURRICULUM

The curriculum was validated according to three principles of design.

Alignment refers to the degree by which the content is aligned with the learning outcomes.

Relevance refers to the degree by which the content is relevant to the title of the module and the programme as a whole.

Feasibility refers to what extend the credit allocation and volume of work is feasible for implementation.

7.4.1 Development of a validation document

A validation document was developed to allow experts to provide their findings and comments. See Appendix Q.

7.4.2 Selection of experts

The curriculum was validated by purposefully selected experts in the field of nursing education and disease outbreak management. Each expert was provided with an information letter and

consent document see Appendix R, as well as a programme outline (Appendix S), curriculum matrix, and validation document once they agreed to participate in the study.

Subject experts were included based on their experience in curriculum development and disease outbreak knowledge. All the experts were actively working during the COVID-19 pandemic.

Motivation for the inclusion of the subject experts:

Expert 1: The participant holds an MSc degree in Occupational Health and Safety. The participant is the Head of the School of a private nursing education institution and has been in nursing education for the past 15 years and is 41 years of age. The participant has steered curriculum development projects on both undergrad and postgraduate levels and coordinated students as well as nursing educators during the COVID-19 pandemic in seventeen private hospitals.

Expert 2: The participant holds an MSc degree in Nursing Education and has experience in outbreak management of Hemorrhagic Viral Fever (Congo fever; Ebola; Lugo and COVID-19). The participant holds a postgraduate diploma in intensive care nursing and a postgraduate certificate in nephrology, as well as nursing education. The participant has 42 years of experience in IPC and is 75 years of age. The participant developed and facilitated COVID-19 related workshops for nurses as well as doctors, physiotherapists and occupational therapy students in both the private and public sectors during the COVID-19 pandemic. The participant is affiliated with the University of The Witwatersrand.

Expert 3: The participant holds an MSc degree in Nursing Education, specializing in Infection Prevention and Control practice. The participant is 51 years of age, has 16 years of experience in the field of infection prevention and control and has developed and facilitated clinical workshops for coordinators in both the public and private sectors. The participant is currently employed as a project coordinator in the Clinical Microbiology and Infectious Diseases Department at the University of the Witwatersrand.

7.4.3 Validation findings

The results of the validation of the modules are presented in Table 7.3.

Table 7.3: Validation results of the curriculum matrix

Module 1: The Dynamic Landscape of Controlling Disease Outbreaks	Alignment	Relevance	Feasibility
Expert 1	33%	67%	67%
Expert 2	100%	100%	100%
Expert 3	100%	100%	100%
Total score	77.7%	89%	89%
Module 2: Ethical Challenges During Disease Outbreaks	Alignment	Relevance	Feasibility
Expert 1	100%	100%	100%
Expert 2	100%	100%	100%
Expert 3	100%	100%	100%
Total score	100%	100%	100%
Module 3: Human Behavior and Communication Strategies	Alignment	Relevance	Feasibility
Expert 1	100% ¹	100%	100% ¹
Expert 2	100%	100%	100%
Expert 3	100%	100%	100%
Total score	100%	100%	100%
Module 4: Human Resources	Alignment	Relevance	Feasibility
Expert 1	100%	100%	100%
Expert 2	100%	100%	100%
Expert 3	100%	100%	100%
Total score	100%	100% ¹	100%
Module 5: The Community	Alignment	Relevance	Feasibility
Expert 1	100%	100%	100%
Expert 2	100%	100%	100%
Expert 3	100%	100%	100%
Total score	100%	100%	100%

Module 6: Infrastructure Management	Alignment	Relevance	Feasibility
Expert 1	100%	100%	100% ¹
Expert 2	100%	100%	100%
Expert 3	100%	100%	100%
Total score	100%	100%	100%
Module 7: Financial Management	Alignment	Relevance	Feasibility
Expert 1	100%	100%	100%
Expert 2	100%	100%	100%
Expert 3	100%	100%	100%
Total score	100%	100%	100%
Module 8: Clinical Practice and Precautionary Measure	Alignment	Relevance	Feasibility
Expert 1	100%	100%	100%
Expert 2	100%	100%	100%
Expert 3	100%	100%	100%
Total score	100%	100%	100%
Module 9: Personal Protective Equipment (PPE)	Alignment	Relevance	Feasibility
Expert 1	100%	100%	100%
Expert 2	100%	100%	100%
Expert 3	100%	100%	100%
Total score	100%	100%	100%
Module 10: Sustainable Disease Outbreak Education and Training	Alignment	Relevance	Feasibility
Expert 1	100%	100%	100%
Expert 2	100%	100%	100%
Expert 3	100%	100%	100%
Total score	100%	100%	100%

Each of the ten modules scored 85% and higher, with modules two to ten scoring 100%. Module 1 scored 85%. The alignment score for Module One scored 77%, relevance scored 89% and, feasibility scored 89%.

Expert 1 recommended that content topic 1.3 is repositioned before 1.2 as it will assist the student to meet the requirements of LO 1.1. The original topics of module one were revised. Expert 1 also commented on the content that will be delivered to the students during risk assessment discussions. The researcher does take note of this comment and it will be addressed during the micro curriculum development phase.

7.4.4 Summary of the results from the curriculum validation phase

The validation of the competency based curriculum represented the last phase of the study. The main findings of this phase include the following:

- A total of three experts took part in the validation of the programme. All three participants have academic and clinical backgrounds in the field of IPC as well as education and training.
- The mean age of the three experts was 56 years. The minimum age was 41 and the maximum age was 75.
- The average number of years they worked in their fields was 60.3 years, with the lowest at 15 years and the highest was 40 years.
- All three of the purposefully chosen experts returned the completed validation documents.
- Modules 2 to 10 scored a 100% for alignment, relevance and feasibility.
- Module 1 scored 85%.
- The curriculum matrix was scored acceptable for alignment, relevance and feasibility.

7.5 SUMMARY

The curriculum matrix for the competency-based programme was developed and validated by experts. The curriculum was rated as acceptable for alignment, relevance and feasibility. Discussion of the study findings, justification, strengths, limitations and conclusions of the study is presented in Chapter Eight.

CHAPTER EIGHT

DISCUSSIONS, JUSTIFICATION, STRENGTHS, LIMITATIONS AND CONCLUSIONS

8.1 INTRODUCTION

In this last chapter, a comprehensive summary of the outcomes of the study according to the objectives is presented. A discussion and interpretation of the findings is also included, as well as strengths, limitations and the conclusion.

The study aimed to develop a competency-based programme tailored for South African nurses to address their challenges in managing disease outbreaks, thereby enhancing their readiness and capacity to respond effectively to such events.

8.2 PHASE ONE OF THE STUDY

The outcome of phase one was to identify the needs of nurses as well as the challenges nurses experienced during disease outbreaks. This was achieved by conducting a scoping review, in-depth interviews with healthcare professionals and in-depth interviews with nurses.

8.2.1 Step One: The Scoping Review - Objective 1

The objective of the scoping review was to identify the educational needs of nurses during outbreaks presented in literature. The results of the scoping review produced three categories with sub-categories that describes the needs of nurses during disease outbreaks. The categories are:

- *Intrapersonal needs* which includes self-safety, decision making and learning skills and, adaptability skills.
- *Interpersonal needs* which includes communication management, people management and, providing psychological support.
- *Disease specific and clinical skills* which includes IPC and clinical skills and, specific disease information. All the categories and sub-categories could be aligned with the ICP Core Competencies in Disaster Nursing Version 2.0 of 2019 in Chapter 4, section 4.7.2.

The results also provided insight into the publishing environment relevant to the challenges of nurses during disease outbreaks.

- No publications relevant to the needs of nurses on disease outbreaks were found between 1981 and 2005. Before 2020, limited studies addressed the needs of nurses during the abovementioned outbreaks, including the Zika outbreak in 2015, and the Ebola outbreak in 2014. Research on the needs of nurses during outbreaks has increased during the outbreak of the COVID-19 pandemic. A possible explanation for this could be the availability of social media which was used by nurses during the COVID-19 pandemic to voice their challenges and shed light on nursing during the disease outbreak event.
- The USA published the most sources (14), followed by China which published a total of 6 sources. A total of 7 sources originated from the African continent. In 2009 Michaud concluded that most of the infectious diseases occur in the sub-Saharan African region, and were confirmed 10 years later by 2019 by Mboussou *et al* in 2019 (Michoud, 2009; Mboussou *et al.*, 2019). It was expected that most of the sources would originate from African researchers residing on the continent.
- A total of 23 publications in this search included nurses whose professional qualifications were not indicated. Healthcare workers participated in 16 studies. ICU- and ED Nurses each participated in seven sources, followed by Nurse Managers in four and OR nurses in three publications. Nurse Educators were included in one publication. One transdisciplinary study was also included. The categories of nurses are different in every country. The term *nurse* can indicate a person with a nursing qualification at professional or non-professional level, with an academic qualification from NQF 6 to 10. This is a challenge when comparison studies are conducted. In this study in South Africa, the researcher included only professional nurses in different specialty areas.
- The methodologies presented in the sources are: 31 quantitative studies; 22 qualitative studies; three mixed methods and, six reports.
- The data collection methods included 25 self-administered questionnaires; seven surveys; ten interviews; three focus groups; two observation studies; twelve literature reviews; three reflective analysis and; two discussions.

8.2.2 Step Two: In-depth interviews with Healthcare Professionals –Objective 2

The objective of step two was to elicit the challenges experienced by nurses during the COVID-19 pandemic through in-depth interviews with a cohort of healthcare professionals. The participants included two physiotherapists, one surgeon, one anesthetists, one paramedic and five doctors. The average years of experience of the participants was 13.9 years. The average age of the participants was: 39.8 years.

The interviews provided insights into the challenges of nurses at coal-face level. A total of eight themes resulted from the thematic analysis. The subthemes relates to the ‘causes’ of the themes. The themes and sub themes (causes) are presented below:

- *Management of PPE* which include miss appropriation of PPE, non-compliance to PPE protocols and, lack of PPE protocols.
- *Clinical Skills* which include lack of resuscitation skills, lack of critical care skills, and lack of experience to care for the intubated and ventilated patient, patient documentation demands and, re allocation of untrained staff.
- *Knowledge of Outbreak Management* which include the unprepared workforce, unprepared hospital system, and in experienced hospital managers.
- *Information Management* which include dissemination of information, lack of protocols, change in protocols.
- *Physical Demands* which include tiredness.
- *Communication strategies* which include ineffective communication skills.
- *Resource allocation* which include lack of resources and,
- *Psychological support* which include lack of psychological support, no debriefing opportunities, psychological burnout and failure to manage fear.

8.2.3 Step Three: In-depth interviews with Nurses - Objective 3

The objective of step three was to elicit the challenges encountered by nurses during the COVID-19 pandemic through in-depth interviews with a group of professional nurses. The results are presented below:

- A total of 25 % of the participants were nursing managers, ICU and perioperative nurse groups each represented 21.43%, nurse educators represented 17.86% and emergency department nurses represented 14.29% as the smallest group. The participant groups

represents the nurse specialties who were responsible for nursing COVID-19 patients during all the stages of the disease.

- The average age of the participants combined is 50.3 years. The average years of experience combined is 24.8 years. The participant group is experienced nurses within their specific fields.
- The data from the in-depth interviews with nurses resulted in the identification of ten themes with sub-themes that were experienced as challenges for nurses during the COVID-19 pandemic. The themes included were: Nursing Resources, Clinical Skills, Interpersonal and Intrapersonal Skills, Physical Challenges, Communication and Information Management, Community Profiling and Resources, Financial Management, Preparation of Infrastructure and PPE management and Precautionary Measures.
- All the themes including the sub themes were justified by literature in Chapter Five, Section 5.3.2.
- All of the 28 nursing participants referred to their lack of experience and training with regard to disease outbreaks and referred back to their basic training at the beginning of their nursing careers. One nurse educator (054) referred to his experiences during community nursing and one nursing manager (036) completed two certificated programme in infection prevention and control.

Although this was a qualitative phase of this study, additional quantitative data became evident during data analysis and should be acknowledged as it provides additional insights into the healthcare environment, perceptions of members of the multidisciplinary team, and could be explored with further research studies.

- The contributions of the different groups of nurses are presented, but not discussed as it is not the objective of this study.

Contributions (challenges) of ICU Nurses

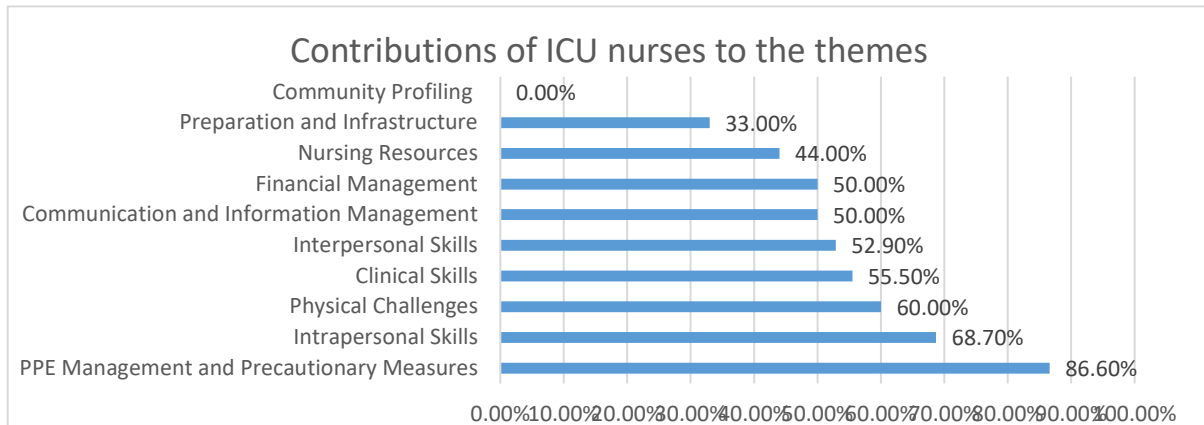


Figure 8.1: Contributions of ICU nurses

The contributions of the ICU nurses to the themes are presented in Figure 8.1. ICU nurses identified PPE Management and Precautionary Measures at 86.60%; Intrapersonal Skills at 68.70%; Physical Challenges at 60%; Clinical Skills at 55.5%; Interpersonal Skills at 52.9%; Communication and Information Management at 50%; Financial Management at 50%; Nursing Resources at 44%; Preparation and Infrastructure at 33% and; Community Profiling at 0%.

Contributions (challenges) of Emergency Department Nurses

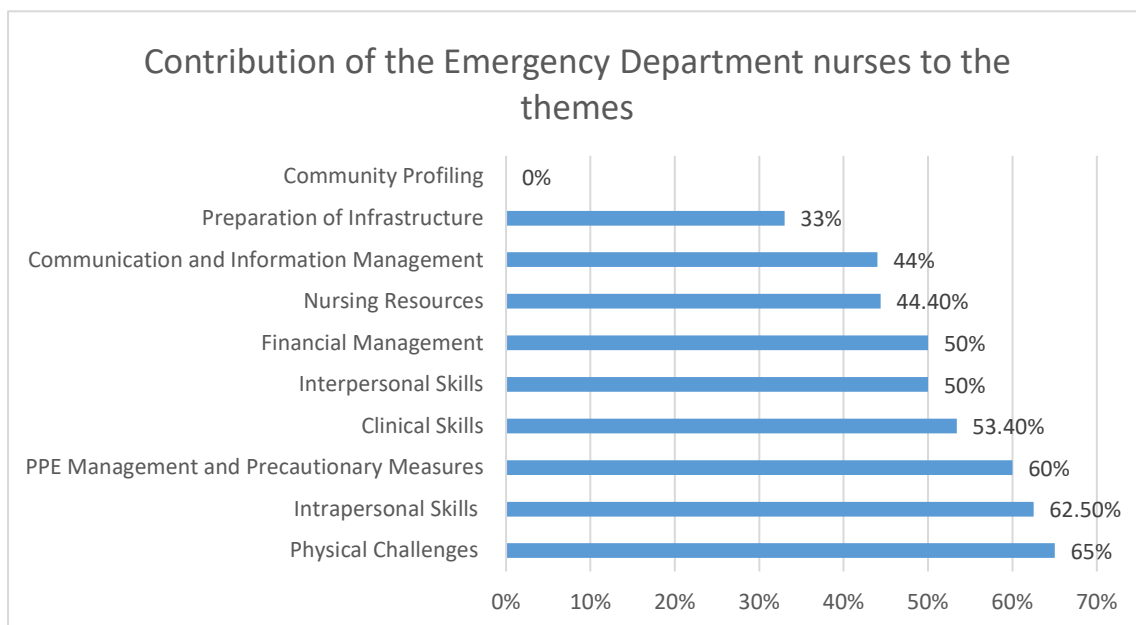


Figure 8.2: Contributions of the Emergency Department Nurses

Emergency Department nurses identified Physical Challenges at 65%; Intrapersonal Skills at 62.5%; PPE Management and Precautionary Measures at 60%; Clinical Skills at 53.40%; Interpersonal Skills at 50%; Financial Management at 50%; Nursing Resources at 44.40%; Communication and Information Management at 44%; Preparation of Infrastructure at 33% and; Community Profiling at 0%.

Contributions (challenges) of Perioperative nurses

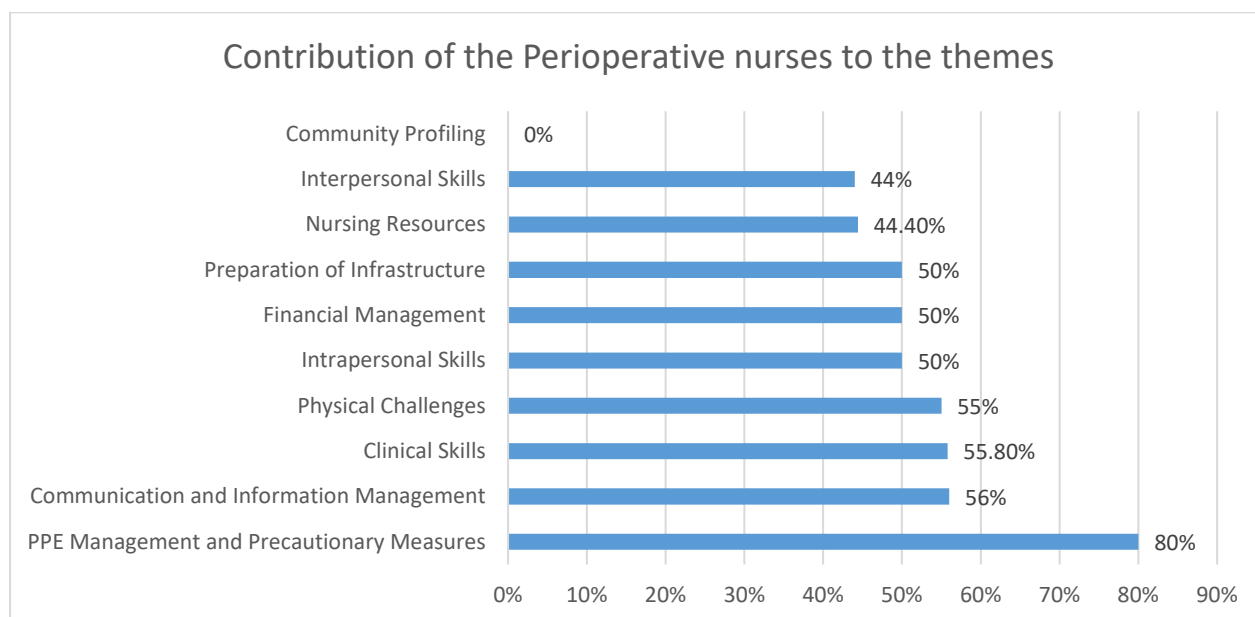


Figure 8.3: Contributions of Perioperative nurses

The contributions of the Perioperative nurses to the themes are presented in Figure 8.3. Perioperative nurses identified PPE Management and Precautionary Measures at 80%; Communication and Information Management at 56%; Clinical Skills at 55.8%; Physical Challenges at 55%; Intrapersonal Skills at 50%; Financial Management at 50%; Preparation of Infrastructure at 50%; Nursing Resources at 44.4%; Interpersonal Skills at 44% and; Community Profiling at 0%.

Contributions (challenges) of Nursing Managers

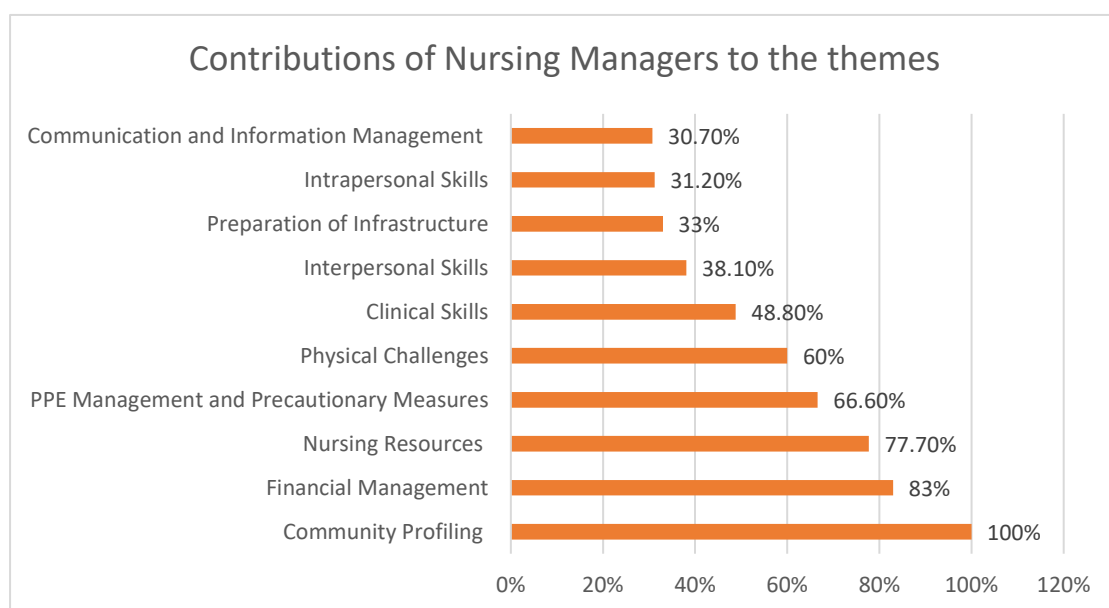


Figure 8.4: Contributions of nursing managers to the themes.

Nursing Managers identified Community Profiling at 100%; Financial Management at 83%; Nursing resources at 77.7%; PPE Management and Precautionary Measures at 66.6%; Physical Challenges at 60%; Clinical Skills at 48.8%; Interpersonal Skills at 38.1%; Preparation of Infrastructure at 33%; Intrapersonal Skills at 31.2% and; Communication and Information Management at 30.7%. See Figure 8.4

Contributions (challenges) of the Nursing Educators

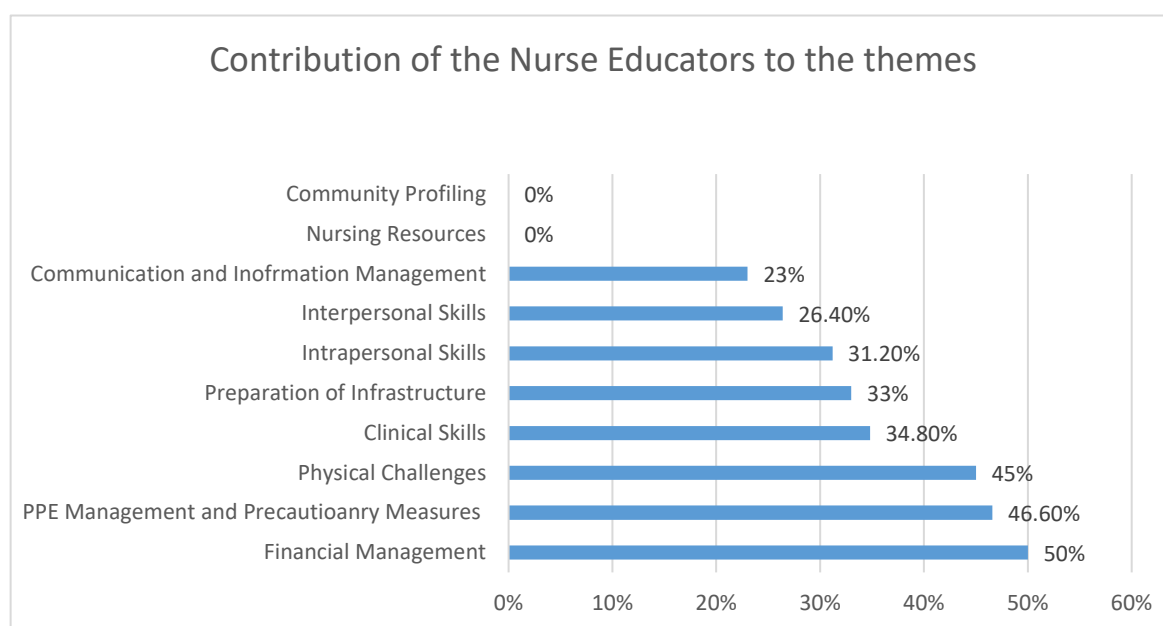


Figure 8.5: Contributions of Nurse Educators.

The Nursing Educators identified Financial Management at 50%; PPE Management and Precautionary Measures at 46.60%; Physical Challenges at 45%; Clinical Skills at 34.8%; Preparation of Infrastructure at 33%; Intrapersonal Skills at 31.20%; Interpersonal Skills at 26.40%; Communication and Information Management at 23%; Nursing Resources at 0%) and, Community Profiling at 0%. See Figure 8.5.

Contributions of Healthcare Professionals

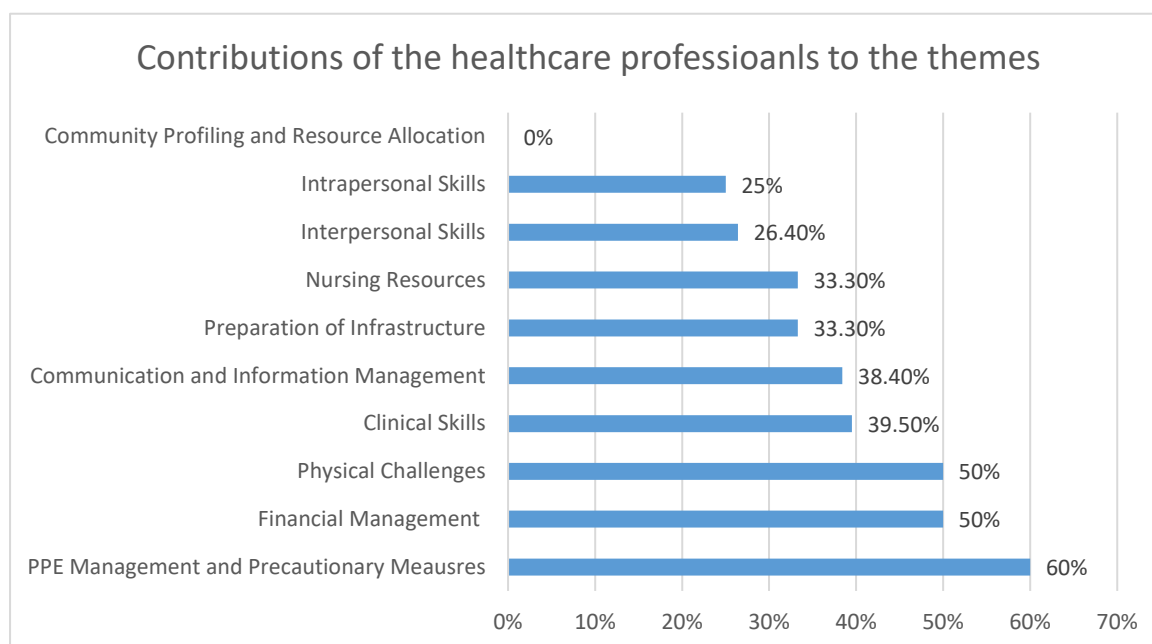


Figure 8.6: Contributions of healthcare professionals

The Healthcare professionals identified PPE Management and Precautionary Measures at 60%; Financial Management at 50%; Physical Challenges at 50%; Financial Management at 50%; Physical Challenges at 50%; Communication and Information Management at 38.4%; Preparation of Infrastructure at 33.3%; Nursing Resources at 33.3%; Interpersonal Skills at 26.4%; Intrapersonal Skills at 25%; Community Profiling and Resources at 0%. See Figure 5.6.

8.3 PHASE TWO OF THE STUDY

The outcome of phase two was to triangulate the data based on the information obtained in the study (a scoping review, and in-depth interviews), and to develop a competency-based programme on the management of disease outbreaks.

8.3.1 Step One: Delphi-survey – Objective 4

The objective of step four was to triangulate the data based on the information obtained in the study (scoping review, and in-depth interviews).

A total of seven participants were purposefully chosen to participate in the Delphi-survey. The average age of the participants were 51 years. The average years of experience were 22 years. The Delphi consisted of two rounds. Only five of the seven participants completed the second round. All the domains scored 80% and more.

Triangulation was achieved through the Delphi-survey, and resulted in the development of 10 Domains which included:

- Preparation for and mode of Delivery of the Programme
- Human Resources; Community Profiling and Resource Identification
- Preparation of Infrastructure
- Financial Management
- Physical Demands during a Disease Outbreak
- Precautionary Measures and Clinical Practice during Non- disease and Disease Outbreak Periods
- PPE Management
- Interpersonal Skills during Disease Outbreaks
- Intrapersonal Skills during Disease Outbreaks

8.3.2 Step Two: Development of a competency-based curriculum - Objective 5

The objective of this phase was to develop a programme based on the insights derived from the preceding steps. The backward design was used to design the curriculum. Backward design is defined as teaching students to use the *understanding* of what they learnt in different situations as appose to providing them with information, hoping they will be able to apply the knowledge (Wiggins and McTighe, 2005).

The curriculum matrix developed based on the results of the Delphi-survey consists of ten modules. Each module include the following: summary of the module, list of co facilitators, learning outcomes aligned with teaching objectives, module topics, and level of competence per topic, assessment activities and embedded skills required by the student to meet each learning outcome.

8.4 PHASE THREE OF THE STUDY

The outcome of phase three was to elicit the degree of validation of the programme from experts.

8.4.1 Step One: Validation phase - Objective 6

The curriculum was validated according to three principles of design which included alignment, relevance and feasibility. A validation document was designed to use during the validation process. Three experts were purposefully chosen to participate in this phase. The average age of the participants was 57 years of age and the average years of experience was 24 years. All the modules scored 85% and higher. The curriculum matrix was scored acceptable for alignment, relevance and feasibility.

A comparison of the curriculum developed in this study with the ICN Core Competencies in Disaster Nursing as well as the Preparedness and Resilience for Emergency Threats (PRET) framework of the World Health Organization (2023) is discussed below.

- The curriculum matrix developed in this study is compared with the ICN Core Competencies in Disaster Nursing Version 2.0 and is presented in Table 8.1.

Table 8.1: Comparison of the Curriculum Matrix with the ICN Core Competencies in Disaster Nursing Version 2.0.

ICN Competencies	Curriculum Matrix
Domain 1: Preparation and Planning	Module 3: Human Behavior and Communication Strategies Module 4: Human Resources Module 5: The Community Module 6: Infrastructure Management Module 7: Financial Management Module 8: Clinical Practice and Precautionary Measures Module 9: PPE Management Module 10: Sustainable Disease Outbreak Education and Training
Domain 2: Communication	Module 3: Human Behavior and Communication Strategies
Domain 3: Incident Management	Module 1: The Dynamic Landscape of Controlling Disease Outbreaks

	Module 10: Sustainable Disease Outbreak Education and Training
Domain 4: Safety and Security	Module 2: Ethical Challenges During Disease Outbreaks Module 3: Human Behavior and Communication Strategies Module 4: Human Resources Module 8: Clinical Practice and Precautionary Measures Module 9: PPE Management
Domain 5: Assessment	Module 3: Human Behavior and Communication Strategies Module 4: Human Resources Module 5: The Community Module 8: Clinical Practice and Precautionary Measures Module 10: Sustainable Disease Outbreak Education and Training.
Domain 6: Intervention	Module 5: The Community Module 6: Infrastructure Management Module 8: Clinical Practice and Precautionary Measures Module 9: PPE Management Module 10: Sustainable Disease Outbreak Education and Training
Domain 7: Recovery	Module 3: Human Behavior and Communication Strategies Module 4: Human Resources Module 10: Sustainable Disease Outbreak Education and Training
Domain 8: Law and Ethics	Module 1: The Dynamic Landscape of Controlling Disease Outbreaks Module 2: Ethical Challenges During Disease Outbreaks Module 10: Sustainable Disease Outbreak Education and Training

There is an alignment between the modules in the curriculum matrix and the set of competencies for disaster nursing developed by the ICN.

- Comparison of the curriculum matrix with the Preparedness and Resilience for Emergency Threats (PRET) framework of the World Health Organization (2023) is discussed below.

Objective 1: Update preparedness plans that affirm priority and accord actions and that have considered learning from past events.

In this study, the modules of the curriculum matrix were developed based on the needs and challenges nurses experienced during the COVID-19 pandemic. A total of 28 nurses were interviewed from different specialties in phase one of this study.

Objective 2: Increase connectivity among stakeholders in pandemic preparedness planning through systematic coordination and cooperation.

The curriculum included collaboration with multi-disciplinary stakeholders in healthcare and included members of the community, religious leaders, financial specialists, technical specialists, human resource specialists, psychologists and counselors, nurse managers, clinical nurse specialists, nurse educators, members from the medical equipment industry as well as medical specialists as co-facilitators of the programme.

Objective 3: Dedicate sustained investments, financing, and monitoring of pandemic preparedness with a particular focus on addressing gaps identified during past pandemics and epidemics.

Module 10 of the curriculum matrix allows the student (nurses) to develop and implement their self-developed sustainable disease outbreak programmes, and to develop strategies to enhance surge awareness as well as training opportunities.

There is an alignment between the modules in the curriculum matrix and the objectives of PRET.

All the objectives of this study was met. A competency based curriculum on disease outbreaks was developed and validated for alignment, relevance and feasibility.

8.5 LIMITATION OF THE STUDY

This study has limitations as all the in-depth interviews with non-nurse professionals and nurses were conducted in Gauteng and is not a representation of all nurses in South Africa. Patients as well as members of the community were not included in this study. The curriculum matrix was validated for alignment, relevance and feasibility only.

8.6 RECOMMENDATIONS

8.6.1 Recommendations for Clinical Practice

From the scoping review and interviews with both the healthcare professionals and nurses it was evident that the nurses faced challenges, influenced by the healthcare system as well as their own professional development. The programme provides the knowledge and guidance for nurses to support patients and colleagues and will enhance basic clinical practice skills and disease outbreak specific skills. This programme holds the potential for nurses to develop disease outbreak competencies that will contribute to the surge capacity of the healthcare provider in the management of the infected and not infected patient care during the disease outbreak period. In South Africa nurses were expected to work outside their scope of practice due to the staff and skill shortage during the COVID-19 pandemic. The outcomes of this study could enhance discussions on the possible job enlargement of certain categories of nurses specific to disease outbreak nursing in collaboration with SANC.

8.6.2 Multidisciplinary education

This programme highlighted the challenges of nurses during disease outbreaks, but also showcases the complexity of the challenges in that a multidisciplinary approach is required to address many of the challenges. The contribution of a disease outbreak competent nurse to the multidisciplinary team decision making processes during all the phases of a disease outbreak event is invaluable.

8.6.3 Recommendations for Nursing Education

Nurses indicated that they did not receive and did not have disease outbreak management skills prior to the outbreak of COVID-19. Therefore it is recommended that this programme is used as a continuous professional development strategy to enhance the disease outbreak training of all nursing students and qualified nurses. The presentation of this programme should be considered to accommodate the work-life demands of qualified nurses. It is also recommended that multidisciplinary team members with nurses, of the same healthcare provider engage with the programme to collaboratively address the demands of enhancing surge capacity and demands to manage an outbreak.

8.6.4 Recommendations for further research

During the post outbreak phase of every disease outbreak is important to assess the performance and challenges of nurses, and research on this topic should therefore be a continuous process. Although this study focused on nurses during disease outbreaks, members of the multidisciplinary team indicated that they also experienced challenges during the COVID-19 outbreak. Research studies to support the rest of the team is recommended. The collaboration with psychologists should be considered to conduct research relevant to strategies to prepare and support the multidisciplinary team for and during disease outbreak events.

The curriculum matrix was validated by experts for alignment, relevance and feasibility but the implementation of the programme should be considered as a research study. A comparative study to determine the difference in challenges of various specialist nurses during the COVID-19 pandemic should be considered as this could results in area specific disease outbreak programmes.

8.7 CONCLUSION

This study developed a competency-based programme on disease outbreaks. A three-phase exploratory sequential mixed method study was used to identify themes to be included in the programme based on the challenges of nurses during the COVID-19 pandemic. The themes were informed by a literature review, healthcare professionals and nurses in specialist areas. The content was triangulated by experts. A ten module programme was developed and validated by nursing experts. This programme will support nurses to develop disease outbreak competencies in order to be better prepared for the next disease outbreak and will enhance patient care and management. Disease outbreak competent nurses will enhance future research in disease outbreak management.

REFERENCES

- Ahangar, A., Mohammed, F., Tehrani-Banihashemi, S.A., Joulani, M., Safarani, S., Nojomi, S. (2023). The Effects of Covid-19 on Financial-Economic and Performance Efficiency of Hospitals. *Medical Journal of The Islamic Republic of Iran*, 37 – 43. <https://doi.org/10.47176/mjiri.37.43>
- Al-Eyd, G., Achike, F., Agarwal, M., Atamna, H., Attapattu, D., Castro, L., Estrada, J., Ettarh, R., Hassan, S., Lakhan, S., Nausheen, F., Seki, T., Stegeman, M., Suskind, R., Velji, A., Yakub, M., Tenore, A. (2018). Curriculum Mapping as a Tool to Facilitate Curriculum Development: a new school of medicine experience. *British Medical Education*, 18(185), 1-14. <https://doi.org/10.1186/s12909-018-1289-9>
- Ali, P., McDonald, T., Clark-Derrington, J. (2023). Digital capability: An essential nursing skill for proficiency in a post-COVID-19 world. *International Nursing Review*, 2023; 1-6. <https://doi.org/10.1111/inr.12839>.
- Alstersley, T., Brooks, A., Human, P., Lawrenson, J., Comititis, G., De Decker, R., Fourie, B., Manglany, R., Pribut, H., Salie, S., Swanson, L., and Zuhlke, L. (2023). The impact of COVID-19 on the South African pediatric cardia service: implications and insights into service capacity. *Frontiers in Public Health*, 11(1177365). Accessed on: 21 February 2024. <http://www.doi.org/10.3389/fpubh.2023.1177365>
- Andersen, B.M., Lindemann, R., Bergh. K., Nesheim, B.I., Syversen, G., Solheim, N., Laugerud, F. (2002). Spread of methicillin-resistant *Staphylococcus aureus* in a neonatal intensive unit associated with understaffing, overcrowding and mixing of patients. *Journal of Hospital Infections*, 50(1): 18-24. <https://doi.org/10.1053/jhin.2001.1128>
- Andrews, A., Powers, J., Cichowicz, J., Coffey, C., Fries, M.L., Yorio, P.L., D'Alessandro, M., Pittsburg, P.A. (2020). National Institute for Occupational Safety and Health. United States Department of Health and Human Services, Centres for Disease Control and Prevention, NPPTL Report Number P2020-0113.
- Annan, A., Yar, D., Owusu, M., Bimey, E., Forson, P., Okyere, P., Gyimah, A., Owuso-Dabo, E. (2017). Health care workers indicate ill preparedness for Ebola Virus Disease

outbreak in Ashanti Region of Ghana. *Bio Medical Central Public Health*, 17(1), 546.
<https://doi.org/10.1186/s12889-017-4474-6>

Archer, M. (1995). *Realist Social Theory: The Morphogenetic Approach*. Cambridge: Cambridge University Press.

Argenti, P. (2020). Communicating through the coronavirus crises. *Harvard Business Review*. March 2020. <https://hbr.org/2020/03/communicating-through-the-coronavirus-crises>.

Arskey, H., and O'Malley, L. (2005). Scoping Studies: Towards a Methodological Framework. *International Journal of Social Research Methodology*, 8(1), 19-32.

Asku, C., Ayar, D., Kuşlu, S. (2023). The Correlation of intrapersonal intelligence levels of nurses with their emotional contagion and caring behaviours. *Applied Nursing Research*. Vol. 73. October 2023, 151733. <https://doi.org/10.1016/j.9pnr.151733>.

Aydin, A., Fidan, H. (2022). The Effect of Nurses' death Anxiety on Life Satisfaction During the Covid-19 Pandemic in Turkey. *Journal of Religion and Health* (2022) 61: 811-826.
<https://doi.org/10.1007/s10943-021-01357-9>

Baack, S., & Alfred, D. (2013). Nurses' Preparedness and Perceived Competence in Managing Disease. *Journal of Nursing Scholarship*, 45(3), 281-287.
<http://www.doi.org/10.1111/jnu.12029>

Bai, X., Gan, X., Yang, R., Zhang, C., Luo, X., Luo, C., Chen, S. (2022). Construction of a Competency Evaluation Index System for Front-Line Nurses during the Outbreak of Major Infectious Diseases: A Delphi-study. *PLOS ONE*, 17(7), 1-4.
<https://doi.org/10.1371/journal.pone.o270902>

Bakker, A.B. and Demerouti, E. (2007), "The Job Demands-Resources model: state of the art", *Journal of Managerial Psychology*, Vol. 22 No. 3, pp. 309-328. <https://doi.org/10.1108/02683940710733115>

Bartsch, S, Gorham, K., Lee, B. (2015). The cost of and Ebola case. *Pathogens and Global Health*, 109(1): 4-9. <https://doi.org/10.1179/2047773214y.0000000169>

Begum, F. (2016). Mapping Disease: John Snow and Cholera. Royal College of Surgeons of England. Accessed on 14 January 2024. Available from <https://www.rcseng.ac.uk/library-and-publications/library/blog/mapping-disease-john-snow-and-cholera/>

Bell, J. and Nuzzo, B. (2021). *Global Health Security Index: Advancing Collective Action and Accountability amid Global Crises*. United States of America: Johns Hopkins Bloomberg School of Public Health.

Benner, P. (1982). From Novice to Expert. *American Journal of Nursing*, 82(3), 402–407. <https://doi.org/10.2307/3462928>

Benner, P. (1984). *From Novice to Expert: Excellence and power in clinical nursing practice*. Menlo Park: Addison-Wesley.

Berchtenbreiter, K., Innes, K., Watterson, J., Nickson, C., Wong, P. (2023). Intensive Care unit nurses' perceptions of debriefing after critical incidents: A qualitative descriptive study. *Australian Critical Care* (In press). Available online 1 August 2023. <https://doi.org/10.1016/j.aucc.2023.06.002>.

Bhaskar, R. (2009). *Scientific Realism and Human Emancipation*. 1st Edition. London: Taylor and Francis.

Bible Gateway. (n.d.). Diseases of the Bible. *Bible Gateway*. Accessed on 14 January 2024. Available from: <https://www.biblegateway.com/resources/encyclopedia-of-the-bible/Diseases-Bible>

Bibliomedpflodge. (2020). SpahnsetztPersonaluntergrenzen in der Pflegeaus.Coronavirus - SpahnsetztPersonaluntergrenzen in der Pflegeaus (bibliomed-pflege.de)

Bloom, D., & Cadarette, D. (2019). Infectious Disease Threats in the Twenty-First Century: Strengthening the Global Response. *Frontiers in Immunology*, 10(549), 1-15. <http://www.doi.org/10.3389/fimmu.2019.00549>

Bonita, R., Beaglehole, R., & Kjellstrom, T. (2019). *Basic Epidemiology*. Geneva: World Health Organization.

Bourgealt, L., Maier, C., Dieleman, M., Ball, J., MacKenzie, A., Nancarrow, S., Nigenda, G., Sidat, M. (2020). The COVID-19 Pandemic Presents an Opportunity to Develop more Sustainable Health Workforce. *Hum Resourc Health*, 18(83), 1-8.

Boyce, M.R., Katz, R. (2019). Community Health Workers and Pandemic Preparedness: Current and Prospective Roles. *Frontiers in Public Health* 2019, 7:62.
<https://doi.org/10.3389/fpubh.2019.00062>

Braun, V., and Clarke, V. (2022). *Thematic Analysis: A Practical Guide*. London: SAGE.

Bridge, K. and Baxter, L (1992). Blended Relationships: Friends at work associates, *Western Journal of Communication*, 56, 200-225.

British Broadcasting Company. (2022). What has Novak Djokovic actually said about vaccines? *British Broadcasting Company*. 6 January 2022. United Kingdom.

Broetje, S., Jenny, G.J., Bauer, G.F.(2020). The key job demands and resources of nursing staff: An integrative review. *Frontiers in Psychology*, 11(84).

Brönnimann, A. (2021). How to Phrase Critical Realist Interview questions in Applied Social Science Research. *Journal of Critical Realism*, 0(0), 1-24.
<http://www.doi.org/10.1080/14767430.2021.1966719>

Brown, G. (2009). The Ontological Turn in Education. *Journal of Critical Realism*, 8(1), 5-34. <https://doi.org/10.1558/jocr.v8.1.5>

Buchan, J., and Catton, H. (2023). *Investing in the Nursing Workforce for health systems Effectiveness*. Geneva: International Council of Nurses.

Buheij, M., and Buhaid, N. (2020). Nursing Human Factor During COVID-19–Pandemic. *International Journal of Nursing Science*, 10(1): 12-24.:
<https://doi.org/10.5923/j.nursing.20201001.02>

Burgess, L., Irvine, F., Wallymahmed, A. (2010). Personality, Stress and Coping in intensive care nurses: a descriptive exploratory study. *Nursing Critical Care* (2010). 15(3):129-40.
<https://doi.org/110.1111/j.1478-5153.2009.00384.x>

Burrows, W and Scarpelli, D. (2024). *Disease*. Accessed on 14 January 2024. Available from: <https://www.britannica.com/science/disease>.

Cannon, H.C., Feinstein, A.H., Friesen, D.P. (2010). Managing Complexity: Applying the Conscious-Competence Model to Experiential Learning. *Developments in Business Simulations and Experiential Learning*, 37, 172-182.

Carayon, A., Woolridge, A., Hose, B., Salwei, M., Benneyan, J. (2018). Challenges and Opportunities for Improving Patient Safety Trough Human Factors and Systems Engineering. *Health Affairs*, 37(11), 1862-1869. <https://doi.org/10.1377/hlthaff.2018.0723>

Castaldo, A., Lusignani, M., Papini, M., Eleuteri, S. (2021). Nurses' experiences of accompanying patients dying during the COVID-19 pandemic: A qualitative descriptive study. *Journal of Advanced Nursing*, 78, 2507-2521. <https://doi.org/10.1111/jan.15195>.

Center for Transportation Research, (n.d.) Chapter 4: Developing a Community Profile. Available from: https://www.cutr.usf.edu/oldpubs/CIA/Chapter_4.pdf. Accessed on 8 December 2023.

Centers for Disease Control and Prevention. (2015a). Epidemiology Glossary. Centers for Disease Control and Prevention. Accessed on: 20 December 2023. Available from: https://www.cdc.gov/reproductivehealth/data_stats/glossary.html#:~:text=opportunity%20for%20exposure.,EPIDEMIC.,a%20particular%20period%20of%20time.

Chacko, B., and Comacho, H. (2016). An Observational Study to Analyze Compliance with Infection Control Practices among ED Nurses During Outbreak of MERS-COV Disease. *Journal of Emergency Medicine, Trauma and Acute Care*, 2(13), 1-16. <https://doi.org/10.5339/jemtac.2016.icepq.13>

Charles, M. (2021). South African health care workers first up to receive country's initial batch of COVID-19 vaccines. Independent Online. 8 January 2021. Available from: <https://www.iol.co.za/capeargus/news/sa-healthcare-workers-first-up-to-receive-countrys-initial-batch-of-covid-19-vaccines-aea5c3c9-18f8-4d0c-bf4a-a338b8ba7d61> Accessed June 17, 2021.

Choi, K., Jeffers, K., and Logsdon, C. (2020). Leading Global Nursing Research: Nursing and the Novel Coronavirus: Risks and Responsibilities in a Global Outbreak. *Journal of Advanced Nursing*, 76(7), 1486-1487. www.https://doi.org/10.1111/jan.14369

Choi, S., Martin, P., Cho, J., Ryou, Y., Heinz, M. (2022). Personality and compliance with COVID-19 protective measures among older Americans: Moderating effects of age, gender, and race/ethnicity. *Personality and Individual Differences*, 189 111499.

Chu, K., Bertels, L., and Goliath, A. (2021). Estimating the surgical backlog from the COVID-19 log down in South Africa: A retrospective analysis of six government hospitals. *South African Medical Journal*, 111(7), 685-688.
<http://www.doi.org/10.7196/SAMJ.2021.v111i7.15686>

Churchill, W. (1948). In *History Repeating*. College of Liberal Arts and Human Sciences. Available from: <https://liberalarts.vt.edu/magazine/2017/history-repeating.html>. Accessed on: 2 February 2023.

Clark, A.M., Lissel, S.L., Davis, C. (2008). Complex critical realism: tenets and application in nursing research. *Advanced Nursing Science*, 31(4), 67-79.
<http://www.doi.org/10.1097/01.ANS.0000341421.34457.2a>.

Comins, L. (2023). The shifting landscape of South Africa's informal settlements. Mail & Guardian. 30 October 2023. Available from: <https://mg.co.za/news/2023-10-30-the-shifting-landscape-of-south-africas-informal-settlements/> Accessed on: 23 February 2024.

Cooper, S., Winton, M., Farrington-Exley, J. (2020). Fifteen-minute consultation: Time-Out as an alternative to toxic debrief. *Archive of Disease in Childhood: Education and Practice*, 105, 270-275. <http://www.doi.org/10.1136/archdischild-1019-317180>

Cowan, K., and Evans. S. (2020). Just 207 critical care beds and 350 ventilators added to public hospitals during lockdown. News24. 7 June 2020. Available from: <https://www.news24.com/news24/southafrica/investigations/exclusive-just-207-critical-care-beds-and-350-ventilators-added-to-public-hospitals-during-lockdown-20200607> Accessed on: 6 February 2024.

Cowling W.R., Smith M.C., & Watson J. (2008). The Power of Wholeness, Consciousness, and Caring: A Dialogue on Nursing Science, Art, and Healing. *ANS Adv Nurs Sci*, 31(1), 41-51. <http://www.doi.org/10.1097/01.ANS.0000311535.11683.d1>. PMID: 20531260.

Creswell, J.W. (2022). *A Concise Introduction to Mixed Methods Research*. 92nd edition. California: SAGE

Daugherty, K. (2006). Backward Course Design: Making the End the beginning. *American Journal of Pharmaceutical Education*, 70(6), 1-5.

Davidson, N. (2014). How much wetland has the world lost? Long-term and recent trends in global wetland area. *Marine and Freshwater Research*, 65(10): 936-941. <https://doi.org/10.1071/MF14173>

De Villiers, K. (2021). Bridging the health inequality gap: an examination of South Africa's social innovation in health landscape. *Infectious Diseases of Poverty*, 10(19), 1-9.

Demerouti, E., Bakker, A. B., Nachreiner, F., Schaufeli, W.B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, 86 (3), 499.

Department of Health. (2020). National Department of Health Strategic Plan 2020/2021-2024-2025. South Africa. ISBN: 978-0-621-48280-5

Department of Health. 2020. National Infection Prevention and Control Strategic Framework. Republic of South Africa: NDP.

Diaz-Agea, J., Orcajada-Munoz, I., Leal-Costa C., Adanez-Martinez, M., DeSouza Oliveira, A., Rojo-Rojo, A. (2022). How did the pandemic affect communication in clinical settings? A qualitative study with critical and emergency care nurses. *Healthcare*, 2022 10.373. <https://doi.org/10.3390/healthcare10020373>

Difabria, A., Saklofske, D. (2018). The contributions of personality and emotional intelligence to resiliency. *Personality and Individual Differences*, 123, 140–144.

Dinic, M., SantricMilcevic, S., Tripcovic, K. (2021). Health workforce management in the context of the COVID-19 pandemic: a survey of physicians in Serbia, *Int.J. Health Plann. Manag*, 36(1), 92-111, <https://doi.org/10.1002/hpm.3141>.

Donaldson, S., and Crowley, D. (1978). The discipline of nursing. *Nursing Outlook*, 26(2), 113-120. PMID: 245616. Available from: <https://pubmed.ncbi.nlm.nih.gov/245616/>
Accessed on: 21 October 2023.

Dukhi, H., Manyapel, T., Mokhele, T., Sifunda, S., Ndlovu, P., Sewpaul, R., Naidoo, I., Jooste, S., Thou, B., Moshabela, M., Maboso, M., Zuma, K., Reddy, P. (2021). Determinants of confidence in overall knowledge about Covid-19 among healthcare workers in South Africa: Results from an online survey. *Frontiers in Public Health*, 9(614858).
<https://doi.org/10.3389/fpubh.2021.614858>

Eastwood, J.G., Jalaludin, B.B., Kemp, L. (2014). Realist explanatory theory building method for social epidemiology: a protocol for a mixed multilevel study of neighborhood context and postnatal depression. *Springer Plus*, 3(12). <https://doi.org/10.1186/2193-10801-3-12>.

Edoka, I., Fraser, H., Jamieson, L., Meyer-Rath, G., Mdewa, W. (2022). Inpatient Care Cost of Covid-19 in South Africa's Public Healthcare System. *International Journal of Health Policy and Management*. 2022, 11(8) 1354 – 1361. <https://doi.org/10.34172/ijhpm.2021.24>.

Ehrlich, R., Katzenellenbogen, J., Joubert, G. (2014). *Epidemiology. A Research Manual for South Africa*. 3rd Edition. South Africa: Oxford University Press.

Fan, J., Jiang, Y., Hu, K., Chen, X., Xu, D., Qi, Y., Yin, Y., Gou, X., Liang, S. (2020). Barriers to using personal protective equipment by healthcare staff during the COVID-19 outbreak in China. *Medicine Baltimore*, November, 25; 99 (48): e23310. PMID: 33235088.

Fawcett, J. (2022). Evolution of One Version of our Disciplinary Metaparadigm. *Nursology.net*. Available from: <https://nursology.net/2023/01/17/evolution-of-one-version-of-our-disciplinary-metaparadigm/> Accessed on: 21 December 2023.

Fawcett, J., Aronowitz, T., AbuFannoun, A., Al Usta, M., Fraley, H. E., Howlett, M. S. L., Mtengozo, J., Muchira, J., Nava, A., Thapa, S., Zhang, Y. (2015). Thoughts about the name of our discipline. *Nursing Science Quarterly*, 28(4), 330-333.
<http://www.doi.org/10.1177/0894318415599224>

Fernandez, R., Lord, H., Halcomb, E., Moxham, L., Middleton, R., Alananxeb, I., Ellwood, L. (2020). Implications for COVID-19: A systematic review of nurses' experiences of

working in acute care hospital settings during a respiratory pandemic. *International Journal of Nursing Studies*, 111, 103637. <https://doi.org/10.1016/j.inurstu.2020.103637>

Fetters, M.D., Curry, L.A., Creswell, J.W. (2013). Achieving Integration in Mixed Methods Design-Principles and Practices. *Health Services Research*, 48 (6Pt2).

Find Easy. (2023). *South Africa Population 2023*. Available from: <https://www.findeasy.in/population-of-south-africa/> Accessed on: 23 February 2024.

Fletcher, D., Sarkar, M. (2016). Mental fortitude training: An evidence-based approach to developing psychological resilience for sustainable success. *Journal of Sport Psychology in Action*. 2016, 7, 135-157.

Forder, A. (2007). A brief history if infection control – past and present. *South African Medical Journal*, 97(11), 1161-1164.

Fortaleza, C., and Fortaleza, C. 2011. Knowledge and Attitudes of Health Care From Intensive Care Units Regarding Nosocomial Transmission of Influenza: A Study on the Immediate Pre-pandemic Period. *The Journal of Venomous Animals and Toxins including Tropical Diseases*, 17(2): 168-175.

Frayar, A. (2023). Former PM Boris Johnson testifies over Britain's botched COVID-19 response. *NPR All Things Considered*. 6 December 2023. United States of America. Available at: <https://www.npr.org/2023/12/06/1217663342/former-pm-boris-johnson-testifies-over-britains-botched-covid-19-response> Accessed on: 2 January 2023.0

Frimpong, S.O., Paintsil, E. (2020). Community Engagement in Ebola outbreaks in sub-Saharan Africa and implication for COVID-19 control: A Scoping Review. *International Journal of Infectious Diseases* 126 (2023), 182 – 192.

Fukada, M. (2018). Nursing Competency. Definitions, Structure and Development. *Yonago Acta Medica*, 61(1), 1-7. <https://doi.org/10.33160/yam.2018.03.001>

Gardner, H. (2011). *Frames of mind: The theory of multiple intelligences*. United Kingdom: Hachette.

Gardner, H. E. (2000). *Intelligence reframed: Multiple intelligences for the 21st century*. United Kingdom: Hachette.

Gilber, H., (2020). Florence Nightingale's Environmental Theory and its influence on contemporary infection control. *Collegian Journal of the Royal College of Nursing Australia*, 27, 26 – 633. <https://doi.org/10.1016/j.colegn.2020.09.006>

Global Fund. (2021). Transforming the Medical PPE Ecosystem, Working Paper, 6 August 2021. <https://reliefweb.int/report/world/transforming-medical-ppe-ecosystem-joint-action-can-protect-healthcare-workers>

Global Health Security Agenda Team. (2024). States Parties Self-Assessment Annual Reporting Tool. Global Health Security Team Agenda. Accessed on 14 January 2024.

Available from:

<https://www.nationalacademies.org/documents/embed/link/LF2255DA3DD1C41C0A42D3BEF0989ACAECCE3053A6A9B/file/D1DEA4D4B4EA4E30CDBE27AC52188158EF242F644E2A?noSaveAs=1>.

Green, J., Thorogood, N. (2014). *Qualitative Methods for Health Research* 3rd Edition. California: SAGE.

Grasselli, G., Pesenti, A., and Cecconi, M. 2020. Critical Care Utilization for the Covid-19 Outbreak in Lombardi: Early Experience and Forecast During an Emergency Response. *American Medical Association*, 323(16), 1545-1546. <https://doi.org/10.1001/jama.2020.4031>

Grisham, T. (2008). The Delphi Technique: A Method for Testing Complex Multifaceted Topics. *IJMPB*, 2(1), 112-130. <https://doi.org/10.1108/17538370910930545>

Guba, E., Lincoln, Y. (1989). *Fourth Generation Evaluation*, California: Sage.

Guerrero, J.G., Banson, A.W., Pingue-Raguini, M., De Sagun, R.S., Cordero, R.P. (2019). Interpersonal and Intrapersonal Intelligence Skills of Nursing Students: It's Relevance in the goal of patient care. *International Journal of Medical Research and Health Sciences*, 2019, 8(4): 30-38.

Hadi-Moghddam, M., Karimollahi, M., Aghamohammadi, M. (2021). Nurses' trust in managers and its relationship with nurses' performance behaviours: A descriptive correlational study. *BMC Nursing* (2021), 20:132. <https://doi.org/10.1186/s12912-021-00653-9>

- Hales, P., White, A., Eden, A., Hurst, R., Moore, S., Riotto, C., Achour, N. (2020). A case study of a collaborative allied health and nursing crises response. *Journal of Interprofessional Care*, 34(5), 614 -621. <https://doi.org/10.1080/13561820.2020.1813093>
- Hamele, M., Neymayer, K., Sweney, J., and Poss, W. (2018). Always Ready, Always Prepared - Preparing for The Next Pandemic. *Journal of Translational Pediatrics*, 7(4), 344-355. <https://doi.org/10.21037/tp.2018.09.06>
- Harbarth, S., Sudre, P., Dharan, S, Cadenas, M, Pittet. (1999). Outbreak of *Enterobacter cloacae* related to understaffing, overcrowding, and poor hygiene practices. *Infection Control Hospital Epidemiology*, 20(9): 598-603. <https://doi.org/10.1086/501677>
- Harrison, P. (2020). Johannesburg and its epidemics: Can we learn from history? *Gauteng City-Region Observatory*, Paper 16. Accessed on: 16 March 2024. Available from: http://www.cdn.gcro.ac.za/media/documents/GCRO_Occasional_Paper-Epidemics.pdf
- Hasson, F., Keeney, S., McKenna, H,. (2000). Research guidelines for the Delphi survey technique, *Journal of Advanced Nursing*, 2000, 32(4), 1008-1015.
- Haupt, B. (2020). The use if crises communication strategies in emergency management *Journal of Home Security Emergency Management*, 18(2), 125-150.
- Health & Care Professions Council. (2021). *Scope of Practice*. Accessed 20 April 2023. Available from: <https://www.hcpc-uk.org/standards/meeting-our-standards/scope-of-practice/>
- Heiden, M., Bernild, C., Kikkenborg Ber, S., Dugyaran, I., Missel, M., Christensen, S., Risom, S., Hojskov, I. (2023). From Expert to novice and back: a qualitative study of interprofessional collaboration and experiences of frontline healthcare professionals during the first wave of COVID-19. *BMC Medical Education*, 23(1), 299 <https://doi.org/10.1186/s12909-023-04262-9>
- Hobby, E.T. (2019). Critical realism in empirical research: employing techniques from grounded theory methodology. *International Journal of Social Research Methodology*. 22(1), 111-124. <https://doi.org/10.1080/13645579.1503400>.
- Hospital Times. (2020). How flexible healthcare infrastructure can be crucial to fighting Covid-19. 15 April 2020. Hospital Times. Available from:

<https://www.hospitaltimes.co.uk/how-flexible-healthcare-infrastructure-can-be-crucial-to-fighting-covid-19/> Accessed on: 4 December 2022.

Houghton, C., Meshell, P., Delaney, H., Smalle, M., Glenton, C., Booth, A., Chan, X.H.S., Devane, D., Biesty, L.M. (2021). Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: a rapid qualitative evidence synthesis. *Cochrane Database of Systematic Reviews*, 4(4).

Hsiao-Yen, M. and An-Tien, H (2017). Friendship at work and error disclosure. *Business Research Quarterly*, (20), 213 -225. <http://dx.doi.org/10.1016/j.brq.2017.07.002>

Hunter, L. (2016). Debriefing and feedback in the current healthcare environment. *Journal of Perinatal Neonatal Nursing*, (2016), 30(3), 174-178.

www.https://doi.org/10.1097/JPN.000000000000173178

Hyllestad, S., Iversen, A., MacDonald, E., Amato, E., Orge, B., Boe, A., Sandvin, A., Brandal, L., Lyngstad, T., Naseer, U., Nygard, K., Veneti, L., Vold, L. (2020). Large waterborne *Campylobacter* outbreak: use of multiple approaches to investigate contamination of the drinking water supply system, Norway, June 2019. *Eurosurveillance*, 25(35), 35-42. www.https://doi.org/10.2807/1560-7917.ES.2020.25.35.2000011

Institute for Health Metrics and Evaluation. (2022). South Africa Population. Institute for Health Metrics and Evaluation. Available from: <https://www.healthdata.org/south-africa> Accessed on: 23 December 2023.

Institute of Environmental Science and Research. (2012). *Guidelines for the Investigation and Control of Disease Outbreaks*. New Zealand: Institute of Environmental Research Limited.

International Council of Nurses. (2019). *Core Competencies in Disaster Nursing Version 2.0*. Geneva: International Council of Nurses. Available from: https://www.icn.ch/sites/default/files/inline-files/ICN_Disaster-Comp-Report_WEB.pdf Accessed on 24 November 2023.

International Council of Nurses. (2019). Job Description Manager, Membership & Governance. Accessed on: 20 February 2024. Available from:

https://www.icn.ch/sites/default/files/inline-files/Manager_Membership_and_Governance_JD.pdf

International Federation of Red Cross and Red Crescent Societies. (2020). *Analysis of Legislation Related to Disaster Risk Reduction in South Africa*. Geneva: International Federation of Red Cross and Red Crescent Societies. Available from: https://disasterlaw.ifrc.org/sites/default/files/media/disaster_law/2020-09/1213900-IDRL_Analysis_South%20Africa-EN-LR.pdf Accessed on: 18 January 2024.

Investec. (2020). Is SA's healthcare system prepared for Covid-19? Investec Focus. 8 June 2020. Available from: https://www.investec.com/en_za/focus/digital-content-team.html Accessed on: 1 February 2024.

Ivankova, N.V., Sticks, S.L. (2007). Students' persistence in a distributed doctoral programme and educational leadership in higher education: A mixed method study. *Research in Higher Education*. 48, 93-135. <http://www.doi.org/10.1007/s1162-006-9025-4>

Johnson, R., Onwuegbuzie, A., and Turner, L. (2007). Towards a Definition of Mixed Methods Research. *Journal of Mixed Methods Research*, 1(112), 112-133.

Jordan, P., Iwu-Jaj, C., Mokoka, E., Kearns, I., Oamen, B., DeLange, S., Schutte, L., Naidoo, V. (2021). Development of a training programme for professional nurses in South Africa- An educational response to the COVID-19 pandemic. *Nursing Open*, 10(1), 377-384. <https://doi.org/10.1002/nop2.1273>

Jossey-Bass, Kuper, A., Lingard, L., Levinson, W. (2008). Critically appraising qualitative research. *British Medical Journal*, (337), 687-689.

Joynt, G., Gopalan, D., Argent, A., Chetty, S., Wise, R., Lai, V., Hodgson, E., Lee, A., Joubert, I., Mokgokong, S., Tshukutsoane, S., Richards, G., Menezes, C., Mathivha, R., Espen, B., Levy, B., Asante, K., and Paruk, F. (2019). The Critical Care Society of Southern Africa Consensus Statement on ICU Triage and Rationing (ConICTri). *S Afr Med J*, 109(8), 613–29. <http://www.doi.org/10.7196/SAMJ.2019.v109i8b.13>

Joynt, G., Gopalan, D., Argent, A., Chetty, S., Wise, R., Lai, V., Hodgson, E., Lee, A., Joubert, I., Mokgokong, S., Tshukutsoane, S., Richards, G., Menezes, C., Mathivha, R., Espen, B., Levy, B., Asante, K., and Paruk, F. (2019). The Critical Care Society of Southern

Africa Consensus Statement on ICU Triage and Rationing (ConICTri). *S Afr Med J*, 109(8b), 630–642. <http://www.doi.org/doi.org/10.7196.SAMJ.2019v109i8b.13947>

Kagasniem, M., Arala, K., Becker, E., Suutarla, A., Haapa, T., Korhonen, A. (2017). The development of ethical guidelines for nurses' collegiality using the Delphi-method. *Nursing Ethics*, 24(5), 538 – 555. www.doi.org/10.1177/0969733015617342

Kandel, N., Chungong, S., Omaar, A., and Xing, J. (2020). Health Security Capacities in the Context of Covid-19 outbreak: An Analysis of International Health Regulations Annual Report Data from 182 Countries. *Lancet*, 395(10229):1047-1053
[https://doi.org/10.1016/S0140-6736\(20\)30553-5](https://doi.org/10.1016/S0140-6736(20)30553-5)

Kang, Y., Shin, K. (2020). Covid-19: Korean nurses' experiences and ongoing tasks for the pandemic's second wave. *International Nursing Review*, 67(4), 445 – 449.
<https://doi.org/10.1111/inr.12644>

Khazem, D. (2018). Critical realist approaches to global learning: A focus on education for sustainability. *International Journal of Development Education and Global Learning*, 10(2), 125-134. <https://doi.org/10.18546/IJDEGL.10.2.02>

Khazem, D. (2018). Critical realist approaches to global learning: A focus on education for sustainability'. *International Journal of Development Education and Global Learning*, 10 (2), 125–134. <https://doi.org/10.18546/IJDEGL.10.2.02>

Kim, H., Hegde, S., LaFiura, C., Raghavan, M., Sun, N., Cheng, S., Rebholz, C.M., Siedelman, S. B. (2021). Access to personal protective equipment in exposed healthcare workers and COVID-19 illness, severity, symptoms and duration, a population-based case-control study in six countries. *British Medical Journal Global Health*, 6(1), e 004611.
<https://doi.org/10.1136/bmjgh-2020-004611>

Kouwenhoven, G.W. (2003). *Designing for competence: towards a competence-based curriculum for the faculty of Education of the Eduardo Mondlane University*: Doctoral dissertation. Enschede: Twente University.

Kuehnert, P., Fawcett, J., DePriest, K., Chinn, P., Cousin, L., Ervin, N., Flanagan, J., Fry-Bowers, E., Killion, C., Maliski, S., Maughan, E. D., Meade, C., Murray, T., Schenk, B., & Waite, R. (2022). Defining the social determinants of health for nursing action to achieve

health equity. A consensus paper from the American Academy of Nursing. *Nursing Outlook*, 70(1), 10-27.

Kulmann, E., Dussault, T., Corella, T. (2021). Global health and health workforce development: what to learn from COVID-19 on health workforce preparedness and resilience. *Int. J. Health Plann. Manag*, pp. 5-8. <https://doi.org/10.1002/hpm.3160>.

Last, J. (2001). *A dictionary of epidemiology*. 4th ed. Oxford: Oxford University Press

Laster, K.B., Sloane, D.M., McHugh, M.D., Cimiotti, J.P., Rimsan, K.A., Martin, B., Alexander, M., Aiken, L.H. (2021). Evaluation of hospital nurse-to-patient staffing ratios and sepsis bundles on patient outcomes. *American Journal of Infection Control*, 49(7), 868-873. <https://doi.org/10.1016/j.ajic.2020.12.002>

Lee,T., Roy,A., Power, P., Sembajwe, G., Dropkin, J.(2022). Ergonomic exposures and control measures associated with mass fatality decedent handling in morgues and body collection points in New York healthcare system during Covid-19: A case series. *International Journal of Industrial Ergonomics* 88(2022) 103260. [www.https://doi.org/10.1016/j.ergon.2022.103260](https://doi.org/10.1016/j.ergon.2022.103260)

Liu, M., Kunaiktikul, W., Senaratana, W., Tonmukayakul, O., Erickson, L. (2007). *International Journal of Nursing Studies*, 44(5), 805-813. <https://doi.org/10.1610/j.ijnurstu.2006.01.010>

Livingston, M., Cummings-Clay, D. (2023). Advancing adult learning using andragogic instructional practices. *International Journal of Multidisciplinary Perspectives in Higher Education*, 8(1): 29-53. <https://doi.org/10.32674/jimphe.v8i1.3680>

MacKenzie, A. (2020). Personal communication based on the point of the relative supply of the two professionals: as detailed in CIHI (2019) Canada's Health Care Providers, 2014 to 2018 – Data Tables. <https://doi.org/10.1001/jama.2020.4978>.

Marston, C., Renedo, A., Miles, S. (2020). Community participation in crucial in a pandemic. *The Lancet*. (395). [https://doi.org/10.1016/S0140-6736\(20\)31054-0](https://doi.org/10.1016/S0140-6736(20)31054-0).

Mayer, J.D., Caruso, D.R., Salovey, P. (2016). The ability model of emotional intelligence: Principles and update. *Emotional Review*, (8), 290 – 300.

Mboussou, F., Ddumbi, P., Ngom, R., Kamassali, O., Van Beek, J., Williams, G., Okot, C., Hamblion, E.L., Impouma, B. (2019). Infectious disease outbreaks in the African region: overview of events reported to the WHO in 2018. *Epidemiology and Infection*, (67).

McCauley, L., Kirwan, M., Matthews. (2021). The factors contributing to missed care and non-compliance in infection prevention and control practices of nurses: A scoping review. *International Journal of Nursing Studies Advances*, (3)100039.

Mehany, M., Ahmed,E., Abdalfatah, A. (2020). Nurses' level of Competence and Reported Practices Among Pediatric and Adult Ventilated Patients with Covid-19. *Assiut Scientific Nursing Journal*. 8(23), 124-133.

Mendelson, M., Booyens, L., Boutall, A., Cairncross, L., Calligaro, G., Dave, J.A., Dlamini, S., Dyer, S., Eick, B., Fieggen, K., Frankfield, P., Hoare, J., Hoffmeyer, R., Joska, J., Joubert, I., Krause, T., Kropman, A., Levin, D., Maughan, D., Meintjies, G., Muller, E., Ntusi, N., Papavarnavas, N., Patel, B., Peter, J., Raubenheimer, P., Said-Hartley, Q., Singh, P., Wasserman, S. (2020). The Mechanics of setting up a Covid-19 response: Experiences of the COVID-19 epidemic from Groote Schuur Hospital, Cape Town. *South Africa. South African Medical Journal*, (110). <http://dx.doi.org/10.7196/samj.2020.v110i10.15215>

Merriam, S. (1998). Qualitative research and case study applications in education, San Francisco. ERIC

Michaud, C.M. (2009). Global Burden of Infectious Diseases. *Encyclopedia of Microbiology*, 444–454. <https://doi.org/10.1016/B978-012373944-5.00185-1>.

Miller, N.P., Milson, P., Johnson, G., Bedford, J., Diallo, A.O., Hassen, K., Rafique, N., Islam, K., Camara, R., Kandeh, J., Wesseh, C.S., Rasanathan, K., Zambruni, J.P., Papowitz, H. (2018). Community health workers during the Ebola outbreak in Guinea, Liberia and Sierra Leone. *Journal of Global Health*, 8(2). <https://doi.org/10.7189/jogh.08020601>

Minichiello, V., Aroni, R., and Hays, T. (2008). *In-Depth Interviewing*. Australia: Pearsons.

Mirza, N.A., Akhtar-Danesh, N., Noesgaard, C., Martin, L., Staples, E. (2014). A concept analysis of abductive reasoning. *Journal of Advanced Nursing*, 70(9), 1980-1994. <https://doi.org/10.1111/jan.12379>.

Mohammadimehr, R. (2021). Dissertation, Crucial, Knowledge and Skills for Caring in a Pandemic Situation: An Interview Study on the Views of Swedish Nurses. Sweden: Linnæus, Sweden.

Munn, Z., Peters, M., Stern, C., Tufanaru, C., McArthur, A., and Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology*, 18(143), 1-7.

National Institute for Communicable Diseases, (2024). *The South African Field Epidemiology Training Programme*. University of Pretoria. Accessed on 14 January 2024. Available from: <https://www.nicd.ac.za/our-services/training-2/the-south-african-field-epidemiology-training-programme/>

Ndayishimiye, C., Sowada, C., Dyjach, P., Stasiak, A., Middleton, J., Lopes, H., Jakobczyk, D. (2022). Associations between the COVID-19 Pandemic and Hospital Infrastructure Adaption and Planning- A Scoping Review. *International Journal of Environmental Research and Public Health*, 19(8195). <https://doi.org/10.3390/ijerph 19138195>

Nelson, K., and Williams, C. (2014). *Infectious Disease Epidemiology Theory and Practice*. 3rd Edition. Burlington: Jones and Bartlett Publications.

Nie, A., Su, X., Dong, M., Guan, W. (2022). Are nurses prepared to respond to next infectious disease outbreaks: A narrative synthesis. *Nursing Open*, 9(908-919/) <https://doi.org/10.1002/nop2.1170>

Nurul, N. (2021). Dehumanization to Medical Staff during Covid-19 Pandemic. *Advances in Social Science, Education and Humanities Research*, (562), 108-112.

O'Brien, K., Levac, D., Colquhoun, H. (2016). Advancing Scoping Study Methodology: A Web-based Survey and Consultation of Perceptions on Terminology, Definition and Methodological Steps. *BMC Health Services Research*, 16(305), 1-12.

Office of Nursing and Midwifery Services Director and Northern Ireland Practice and Education Council for Nursing and Midwifery. (2021). All-Ireland Nursing and Midwifery. Digital Health Capability Framework. *Office of the Nursing and Midwifery Services Director*. <https://healthservice.hse.ie/filelibrary/onmsd/all-ireland-nursing-midwifery-digital-health-capability-framework.pdf>.

Oh, Y., Gastmans, C. (2023). Ethical issues experienced by nurses during COVID-19 pandemic: Systematic Review. *Nursing Ethics*. Vol. 0(0) 1-20. DOI: 10.1177/0969733023/200564

Oppenheim, B. Gallivan, M. Madhav, N. (2019). Assessing global preparedness for the next pandemic: development and application of Epidemic Preparedness Index. *BMJ Glob Health* 29(4), 1-8. <https://doi.org/10.1136/bmjgh-2018-001157>

Oral, S.E., Aydin, A.K., Kirici, D. (2022). Physical problems and fatigue levels of nurses during the Covid-10 pandemic. *Nurses forum*, (57), 399-406.

Oxford Advanced Learner's Dictionary. (2020). 10th Edition. Oxford University Press.

Paprio, Y., Malik, S., Punjani, N., Farooq, S. (2013). Critical Realism: Tenets and Application in Nursing. *International Journal of Innovative Research and Development*, 2 (11), 490-493.

Paterson, J. G., & Zderad, L. T. (1976). *Humanistic nursing*. (Reissued 1988). New York: National League for Nursing.

Patton, M.Q. (2002). *Qualitative Research and evaluation methods*. 3rd Edition. California: SAGE

Peters MDJ, Godfrey C, McInerney P, Munn Z, Tricco AC, Khalil, H. Chapter 11: Scoping Reviews (2020 version). Aromataris E, Munn Z, editors. *JBIM Manual for Evidence Synthesis*. JBI; 2020. <https://doi.org/10.46658/JBIMES-20-12>

Peyrovi, H., Nasrabadi, A., Valiee, S. (2016). Exploration of barriers of reporting nursing errors in intensive care units. A qualitative study. *Journal of Intensive Care Society*, 17(3), 215– 21. <https://doi.org/10.1111/1751143716638370>

Polit, D.F. and Beck, C.T. (2014) *Essentials of Nursing Research*. Lippincott Williams & Wilkins, Philadelphia

Pollock, D., Peters, M.D.J., Khalil, H., McInerney, P., Alexander, L., Tricco, A.C., Evans, C., Brandao de Moraes, E., Godfrey, C.M.C., Pieper, D., Saran, A., Stern, C., Munn, Z. (2023). Recommendations for the extraction, analysis, and presentation of results in scoping reviews. *JBIM Evidence Synthesis*, 21(3), 520 – 532. <https://doi.org/10.1111/24/JBIES-22-00123>

Porpora, D. (2016). The Recent Methods Debate in American Sociology and how Critical Realism Fits into it. *Journal of Critical Realism*, 15(4), 342-351.

<http://www.doi.org/10.1080/14767430.2016.1193674>

Portia, M. (2008). *A dictionary of epidemiology*. 5th ed. New York: Oxford University Press.

Pravi, P., Farhana Fatima, M. (2017). A study on employees monotony and boredom towards job satisfaction of women nurses of hospitals in Tirunelveli City. *Paripex-Indian Journal of Research*, 6, 535-538.

Prevent Epidemics. (n.d.). Epidemics. The Cost of Not Being Prepared. Prevent Epidemics. Available from: <https://wellcome.org/news/cost-of-not-preparing-for-infectious-diseases> Accessed on: 2 December 2021.

Rahmani, F., Hosseinzadeh, M., Gholizadeh, L. (2023). Complicated groef and related factors among nursing staff during the Covid-19 pandemic: a cross-sectional study. *BMS Psychiatry*, 73(23). <https://doi.org/10.1186/s12888-023-04562-w>

Reed, P.G. (2006). Commentary on neomodernism and evidence-based nursing: Implications for the production of nursing knowledge. *Nursing Outlook*. 54(1).

Ritchie, H., Spooner, F., and Roser, M. (2021). Forests and Deforestation. *Our World In Data*. Available from: <https://ourworldindata.org/forests-and-deforestation> Accessed on 30 December 2023.

Roller, M. (2020). The In-Depth Interview Method. *Research Design Review*, 0(12), 1-24.

Roller, M., and Lavrakas, P. (2015). Applied qualitative research design: A total quality framework approach. *The Qualitative Report*. <http://www.doi.org/10.46743/2160-3715/2018.3344>

Roomany, A. R., van Wyk, B., Cois, A., Pillay van Wyk, V. (2023). Multimorbidity patterns in South Africa, A latent class analysis. *Frontiers in Public Health*, 11(10). Accessed on 26 February 2023. <http://www.doi.org/10.3389/fpubh.2022.1082587>

Roper, N., Logan, W., Tierney, A.J. (2000). *The Roper-Logan-Tierney Model of Nursing: Based on activities of living*. United Kingdom: Churchill Livingstone.

Rowe, G., Wright, G. (2011). The Delphi technique: past, present, and future prospects – introduction to the special issue. *Technol Forecast Soc Change*, 78(9), 1478–1490
<http://www.doi.org/10.1016/j.techfore.2011.09.002>

Royal College of Nursing. (2024). Eliza's Lessons: infection control in 1887. Accessed on 14 January 2024. Available from: <https://www.rcn.org.uk/magazines/History/2021/History-of-nursing-infection-control-in-1887>

Saleem, A., Azler, M. (2013). The Next Pandemic-Tuberculosis: The Oldest Disease of Mankind. *British Journal of Medical Practice*, 6(1), 1-8.

Saudi Patient Safety Center. (2019). International Council of Nurses. Nurse Staffing Levels for Patient Safety and Workforce Safety. SPS and ICN White Paper. Riyadh, Saudi Arabia

Saunders, M.N.K., Lewis, P., Thornhill, A., Bristow, A. (2019). *Research Methods for Business Students*: Chapter 4: Understanding research philosophy and approaches to theory development. 8th Edition. California: Pearson.

Sayburn, A. (2014). Who gives go ahead for experimental treatments to be used in Ebola outbreak. *British Medical Journal*, 2014(349), 1. <https://doi.org/10.1136/bmj.g5161>

Shadrak, O. and Paintsil, E. (2023). Community Engagement in Ebola outbreaks in sub-Saharan Africa and implications for COVID-19 control: A Scoping Review. *International Journal of Infectious Diseases*, 126(2023), 182-192.

Shaye, V.E., Reich, J.A., Bosworth, B.P., Stern, D.T., Volpecelli, F., Shapiro, N.M., Hauck, K.D., Fagan, I.M., Villagomez, S.M., Uppal, A., Sauthoff, H., LoCurio, M., Cocks, P.M., Bails, D.B. (2023). Collaborating Across Private, Public, Community, and Federal Hospital Systems: Lessons Learned from the Covid-19 Pandemic Response in NYC. *NEJM Catalyst. Massachusetts Medical Society*, 1(6) <https://doi.org/10.1056/CAT.20.0343>

Silverman, H., Kheirbek, R., Moscou-Jackson, G. (2021). Moral distress in nurses caring for patients with COVID-19. *Nursing Ethics*, 29(4).

Singer, P. (2024). *Deontological Ethics*. Accessed on 14 January 2024. Available from: <https://www.britannica.com/topic/deontological-ethics>

Sisti, L., Buonsenso, D., Moscato, U., Constanzo, G., and Malorni, W. (2023). The Role of Religions in the COVID-19 Pandemic: A Narrative Review. *International Journal of Environmental Research and Public Health*, 20(3), 1691.
<http://www.doi.org/10.3390/ijerph20031691>

Smith, E., Keating, J. (1997). *Making sense of the training reform and competency-based training*. New South Wales: Social Press. (ISBN: 1876033193).

Smith, P., Watkins, K., Hewlet, A. (2012). Infection Control through the ages. *American Journal of Infection Control*, 40(1), 35-42. <https://doi.org.10.1016/j.ajic.2011.02.019>

Sood, G., Perl, T. (2016). Outbreaks in Health Care Settings. *Infectious Disease Clinics of North America*, (30), 661–687 <http://dx.doi.org/10/1016/j.idc.2016.04003>

South Africa (Republic). (1965). Medication Related Substance Act 101 of 1965. Cape Town: Government Printer.

South Africa (Republic). (1995). Regulations for Hazardous Biological Agents, Occupational Health and Safety Act 66 of 1995. Cape Town: Government Printer.

South Africa (Republic). (1996a). Constitutions of the Republic of South Africa. Cape Town: Government Printer.

South Africa (Republic). (2000). National Health Laboratory Service Act 37 of 2000. Cape Town: Government Printer.

South Africa (Republic). (2002). Disaster Management Act 54 of 2002. Cape Town: Government Printer.

South Africa (Republic). (2003a). The National Health Act 61 of 2003. Cape Town: Government Printer.

South Africa (Republic). (2003b). Regulation 178: Regulation Relating to the Registration of Microbiological Laboratories and the Acquisition, Importation, Handling, Maintenance, and Supply of Human Pathogens, National Health Act 61 of 2003. Cape Town: Government Printer.

South Africa (Republic). (2005). Nursing Act, 2005 (Act No. 33 of 2005). Regulations leading to registration as Nurse Specialist or Midwife Specialist. No 635. Accessed on: 24 February 2024. Available from: <https://www.sanc.co.za/wp-content/uploads/2021/11/Regulations-leading-to-registration-as-Nurse-Specialist-OR-Midwife-Specialist-compressed-x2.pdf>

South Africa (Republic). (2005). South African Nursing Act 33 of 2005. Cape Town: Government Printer.

South Africa (Republic). (2015). Disaster Management Amended Act 16 of 2015. Cape Town: Government Printer.

South Africa (Republic). (2020). Regulations Regarding Scope of Practice for Nurses and Midwives, The South African Nursing Act 33 of 2005. Cape Town: Government Printer.

South Africa (Republic). (2020a). Mortality and causes of death in South Africa, 2017: Findings from death notification. Statistical Release PO309.3. Available from: <https://www.statssa.gov.za/publications/P03093/P030932017.pdf> Accessed on 24 January 2024.

South Africa (Republic). (2020c). Nursing Act, 2005 (Act No. 33 of 2005). Regulations leading to registration as Nurse Specialist or Midwife Specialist. No 635. Accessed on: 24 February 2024. Available from: <https://www.sanc.co.za/wp-content/uploads/2021/11/Regulations-leading-to-registration-as-Nurse-Specialist-OR-Midwife-Specialist-compressed-x2.pdf>

South Africa (Republic). (2023). The National Department of Health of South Africa. The Ideal Hospital Realisation and Maintenance Framework Manual (Version 2, August 2023).

South Africa (Republic). (n.d.). South Africa's provinces. South African Government. Official Information and Services. Available at: www.gov.za/about-sa/south-africas-provinces Accessed on: 1 December 2023.

South African Nursing Council. (2014). Competencies-Critical Nurse Specialist (Adult): March 2014. Available from: <https://www.sanc.co.za/wp-content/uploads/2020/06/SANC-Competencies-Critical-Care-Nurse-Specialist-Adult.pdf> Accessed on: 26 February 2024.

South African Nursing Council. (2014). Generic Competency Framework for Advanced Nurse Practitioners. South Africa. <https://www.sanc.co.za/wp-content/uploads/2020/06/SANC-Competencies-Generic-Framework-for-Advanced-Nurse-Practitioners.pdf>. Accessed 6 February 2022.

South African Nursing Council. (2019). Statistics. South Africa: South African Nursing Council. Available from: <https://www.sanc.co.za/wp-content/uploads/2020/09/Stats-2019-2-Registrations-and-Listed-Qualifications.pdf> Accessed on: 2 February 2024.

South African Nursing Council. (2020a). Competencies for a Nurse Educator. Available from: <https://www.sanc.co.za/wp-content/uploads/2020/06/SANC-Competencies-Nurse-Educator.pdf> Accessed on 21 February 2024

South African Nursing Council. (2020b). Competencies for Emergency Nursing. Available from: <https://www.sanc.co.za/wp-content/uploads/2020/06/SANC-Competencies-Emergency-Nurse.pdf> Accessed on: 25 February 2024.

South African Nursing Council. (2022a). Provincial Distribution of Nursing Manpower Versus The Population of The Republic of South Africa as at 31 December 2022. South African Nursing Council. Accessed on 14 January 2024. Available at: SANC Distribution Stats 2022

South African Nursing Council. (2024). Competencies for Emergency Nursing. Accessed on 14 January 2024. Available from: <https://www.sanc.co.za/wp-content/uploads/2020/06/SANC-Competencies-Emergency-Nurse.pdf> Accessed on: 21 December 2023.

Speare, R., Durrheim, D.N., Ogunbanjo, G.A., Edginton, M.E., Harris, B, N. (2003). An effective Training Strategy for Communicable Disease Control Nurses. *Africa Journal of Nursing and Midwifery*, 5(1), 50-55.

Statista. (2022). *Total population of South Africa in 2022, by ethnic groups*. Available from: <https://www.statista.com/statistics/1116076/total-population-of-south-africa-by-population-group/> Accessed on: 24 February 2024.

- Stocking, J., Sandrock, C., Fitall, E., Kendall, K., Gale, B. (2021). AHRQ PSNet Annual Perspective Impact of COVID-19 Pandemic on Patient Safety. *Agency for Healthcare Research and Quality*. March, 2021.
- Su, Z., Zhang, H., McDonnell, D., Ahmad, J., Cheshmehzangi, A., Yuan, C. (2022). Crises communication strategies for health officials. *Frontiers in Public Health* 10:796572. doi:103389/fpubh.2022.796572
- Sumari, M., Duff, E. (2022). Cognitive Behaviour Therapy: A Strategy to Address Pandemic-Induced Anxiety. *Journal for Nurse Practitioners*. 18 (36-39).
- Suri, H. (2020). Ethical considerations of conducting systematic reviews in educational research. Chapter p 41 – 54.
- Sutherland, B., Pecanac, K., LaBorde, T., Bartels, C., Brennan, M. (2022). Good working relationships: how healthcare system proximity influences trust between healthcare workers, *Journal of Interprofessional Care*. DOI: 10.1080/13561820.2021.192089
- Taha, H., Durham, J., Reid, S. (2023). Communicable Disease Prevalence among Refugees and Asylum Seekers: Systematic Review and Meta-Analysis. *Infectious Disease Reports*, 15(2), 188-203. <https://doi.org/10.3390/idr15020020>
- Takase, M., Teraoka, S., Miyakoshi, Y., Kawada, A. (2011). A concept analysis of nursing competence: a review of international literature. *Nihon Kango Kenkyu Gakkai Zasshi*, 34, 103–9. <https://doi.org/10.15065/jjsnr.20110404011>
- Taylor, S.P. (2018). Critical Realism vs Social Constructionism & Social Constructivism: Application to a Social Housing Research Study. *International Journal of Science: Basic and Applied Research*, 27(2), 216 –222.
- Teddlie, C, and Tashakkori, A. 2009. *Foundations of Mixed Methods Research Integrating Quantitative and Qualitative Approaches in the Social and Behavioral Sciences*. California: SAGE.
- The Conversation. (2023). South Africa’s traditional medicines should be used in modern health care. The Conversation. 29 August 2023. Available from:

<https://theconversation.com/south-africas-traditional-medicines-should-be-used-in-modern-health-care-211382> Accessed on: 22 December 2023.

The Independent Panel for Pandemic Preparedness and Response. (2021). Centering communities in pandemic preparedness and response. The Secretariat for the Independent Panel for Pandemic Preparedness and Response. Background paper 10, (2021).

The International Epidemiology Association's Dictionary of Epidemiology, *Dictionary of Epidemiology* (Oxford University Press, USA, 2008). <https://www.oxfordreference.com/view/10.1093/acref/9780195314496.001.0001/acref-9780195314496>

Tloneng, N., Cohen, C., Made, F., Kootbodien, T., Masha, M., Naicker, N., Blumberg, L., Jassat, W. (2022). COVID-19 hospital admissions and mortality among healthcare workers in South Africa 2020–2021. *International Journal of Infectious Diseases Regions* 5, 54–61. <http://www.doi.org/10.1016/j.ijregi.2022.08.014>

Tolson, D., McIntosh, J., Loftus, L., Cormie, O. (2007). Developing a managed clinical network in palliative care: A realistic evolution. *International Journal of Nursing Studies*, 44(2), 183-195. <http://www.doi.org/10.1016/j.ijnstu.2005.11.027> .

Tomlinson, C. (2023). What the new WHO TB numbers mean for South Africa. *Daily Maverick*. 10 November 2023. Available from: <https://dailymaverick.co.za/article/2023-11-10-what-the-new-who-tb-numbers-mean-for-south-africa/> Accessed on: 6 February 2024.

Tripathi, N and Sapra, A. (2023). Gram Straining. National Library of Medicine. Accessed on 14 January 2024. Available from: Gram Staining - StatPearls - NCBI Bookshelf (nih.gov)

Tsay, S., Kao, C., Wang, H., Lin, C. (2020). Nursing's response to COVID-19: Lessons learned from SARS in Taiwan. *International Journal of Nursing Studies*, 108, 103587. <https://doi.org/10.1016/j.inurstu.2020.1-3587>

Ughasoro, M., Esangbedo, D., and Udorah, M. 2019. Health-Care Workers' Perspectives on Preparedness of Health-Care Facilities for Outbreak of Communicable Diseases in Nigeria: A Qualitative Study. *Am. J. Trop. Med. Hyg*, 100(4), 1022-1028.

Ugwu, C.N., Eze, V.H. (2023). Qualitative Research. *International Digital Organization for Scientific Research IDOSR Journal of Computer and Applied Sciences*, 8(1), 20–35. ISSN 2579-0803.

United Kingdom Audit Office (2020). The supply of personal protective equipment during the Covid-19 pandemic. United Kingdom. Available from: <https://www.nao.org.uk/reports/supplying-the-nhs-and-adult-social-care-sector-with-personal-protective-equipment-ppe/> Accessed on: 4 January 2024.

United Nations High Commissioner for Refugees. (n.d.). Available from: <https://www.unhcr.org/> Accessed on 8 January 2024.

United Nations. (2015). Sendai Framework for Disaster Risk Reduction 2015 – 2030. United Nations. Accessed on 14 January 2024. Available from: https://cdn.who.int/media/docs/default-source/health-security-preparedness/drr/sendai-framework-for-disaster-risk-reduction-2015-2030.pdf?sfvrsn=8aa55898_23&download=true

United Nations. (2024). Department of Economic and Social Affairs Sustainable Development. Sustainable Development Goals United Nations. United Nations.

University of Witwatersrand (2024). Clinical Microbiology and Infectious Diseases. Johannesburg: University of Witwatersrand. Accessed on 14 January 2024. Available from: <https://www.wits.ac.za/pathology/divisions/clinical-microbiology--infectious-diseases/>

van Niekerk, D., Coetzee, C., Nemaikonde, L. (2020). Implementing the Sendai Framework in Africa: Progress against the Targets (2015-2018). *Int J Disaster Risk Sci*, 11, 179-189.

Vangie, D. (2022). Perioperative Nurses: Stand up and Take your Bow. *AORN Journal*, 116(5), 395-398. <https://doi.org/10.1002/aorn.13809>

Veenema, T. (2018). *Disaster Nursing and Emergency Preparedness: For Chemical, Biological, and Radiological Terrorism and other Hazards*. 4th Edition. United States of America: Springer Publishing Company.

Vergenes, J., Marchal-Sixou, C., Nabet, C., Maret, D., Hamel, O. (2010). Ethics in Systematic Reviews. *Journal of Medical Ethics*, (36), 771 – 774. <https://doi.org/10.1136/jme.2010.039941>

- Vicca, A.F. (1999). Nursing staff workload as a determinant of methicillin resistant *Staphylococcus aureus* spread in an adult intensive therapy unit. *Journal of Hospital Infection*, 43, 109–113. <https://doi.org/10.1053/jhin.1999.0246>
- Wallace, C., Wladkowski, S., Gibson, A., White, P. (2020). Grief during COVID-19 pandemic considerations for palliative care providers. *J Pain Symptom Manage*, 60(1), e70-6. <https://doi.org/10.1016/j.painsymman.2020.04.012>
- Wang, Huihui; Zeng, Wu; Munge Kabubei, Kenneth; Rasanathan, Jennifer; Kazungu, Jacob; Ginindza, Sandile; Mtshali, Sifiso; Salinas, Luis E.; McClelland, Amanda; Buissonniere, Marine; Lee, Christopher T.; Chuma, Jane; Veillard, Jeremy; Matsebula, Thulani; Chopra, Mickey. (2023). The Economic Burden of SARS-CoV-2 Infection Amongst Health Care Workers in the First Year of the Pandemic in Kenya, Colombia, Eswatini, and South Africa. Washington, DC: World Bank. <http://hdl.handle.net/10986/40070>
- Wiggins, G., McTigle, J. (2005). Understanding by design. Expanded Second edition. Association for Supervision and Curriculum Development. ISBN 1-4166-0035-3.
- Wiggerman, N., Zhou, J., Kumpar, D. (2020). Proning patients with Covid-19: A Review of Equipment and Methods. *Human Factors*, 62(7), 1069-1076. <https://doi.org/10.1177/0018720820950532>
- Wiggerman, N., Zhou, J., Mc Gann, N. (2020). Effect of repositioning AIDS and patient weight on biomechanical stresses when repositioning patients in bed. *Human Factors and Ergonomics Society*, 001872081989585.10.1177/0018720819895850
- Wiggins, G, and McTighe, J. (2005). *Understanding by Design*. 2nd Edition. Virginia: Association for Supervision and Curriculum Development.
- Wilkinson, M., Quraishi, M., Irfan, L., & Schneuwly Purdie, M. (2022). Building on the shoulders of Bhaskar and Matthews: Acritical realist criminology. *Journal of Critical Realism*, 21(2), 123–144.
- Williams, L., Rycroft-Malone, Christopher, R. (2017). Bringing critical realism to nursing practice: Roy Baskar's contribution. *Nursing Philosophy*, (2). <https://doi.org/10.1111/nup.12130>

Wilson, V., Mc Cormack, B. (2006). Critical realism as emancipatory action: the case for realistic evaluation in practice development. *Nursing Philosophy*, 7(1), 45-47.
<https://doi.org/10.1111/j.1466-769X.2006.00248.x>.

World Bank. (2022). *Inequality in Southern Africa: An assessment of the Southern African Customs Union*. World Bank Group. Accessed on 24 February 2024. Available from:
<https://documents1.worldbank.org/curated/en/099125303072236903/pdf/P1649270c02a1f06b0a3ae02e57eadd7a82.pdf>

World Health Organization (2021b). Community-Cantered Approaches to Health Emergencies: Progress and Gaps and Research Priorities. Geneva, Switzerland.

World Health Organization. (2010a). What Is a Pandemic? Available from:
<https://www.who.int/teams/environment-climate-change-and-health/emergencies/disease-outbreaks> Accessed on: 20 November 2023.

World Health Organization. (2011a). WHO Community Case Management during a Influenza Outbreak: Participant's handout. A training package for community health workers. *World Health Organization*. Geneva, Switzerland. Chapter 5 p 41

World Health Organization. (2019a). Health Emergency and Disaster Risk Management Framework. Geneva: World Health Organization. Available from:
<https://iris.who.int/handle/10665/326106> Accessed on: 21 February 2024.

World Health Organization. (2020). Community Engagement (Power Point Presentation) Module B5. Geneva, Switzerland. <https://pdf4pro.com/amp/view/module-b5-world-health-organization-63320e.html>.2020.

World Health Organization. (2020a). *Biodiversity and Infectious Diseases Questions and Answers*. Available from: https://www.who.int/docs/default-source/climate-change/qa-infectiousdiseases-who.pdf?sfvrsn=3a624917_3 Accessed on 14 August 2023.

World Health Organization. (2021b). Global tuberculosis report. Geneva: World Health Organization. Available from: <https://www.who.int/publications/i/item/9789240037021> Accessed on: 21 January 2023.

World Health Organization. (2021c). Global Strategy on digital health (2020 – 2025). World Health Organization. Geneva. 2021. ISBN 978-92-4-002092-4.

World Health Organization. (2023a). WHO Director-General's Opening Remarks at the Media Briefing – 5 May 2023. World Health Organization. Accessed on 21 December 2023. Available from: <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing---5-may-2023>

World Health Organization. (2023b). Antimicrobial Resistance. World Health Organization. Accessed on 14 January 2024. Available from: Antimicrobial resistance (who.int)

World Health Organization. (2024a). ICD-11 2023 Release. *World Health Organization Family of International Classifications Network*. World Health Organization. Accessed on 14 January 2024. Available from: <https://www.whofig.org.za/icd-11-2023-release>

World Health Organization. (2024b). International Health Regulations. Accessed on 14 January 2024. Available from: https://www.who.int/health-topics/international-health-regulations#tab=tab_1

World Health Organization. 2008. *What is human factors and why is it important to patient safety?* Available from:

https://www.int/patientsafety/education/curriculum/who_mc_topic_2.pdf. Accessed on 9 January 2021.

World Health Organization. 2014a. *Hospital Preparedness for Epidemics*. Available from: <https://www.who.int/publications/i/item/hospital-preparedness-for-epidemics> Accessed on 12 January 2024.

World Health Organization. 2020b. *State of the World's Nursing: Investing in Education, Jobs and Leadership*. Available from:

<https://www.who.int/publications/i/item/9789240003279> Accessed on 21 February 2024.

World Health Organization. 2021a. *Global Preparedness Monitoring Board: From Worlds Apart to a World Prepared*. Available from:

https://www.gpmb.org/docs/librariesprovider17/default-document-library/gpmb-annual-report-execsummary-2021.pdf?Status=Master&sfvrsn=b56d4ae2_48 Accessed on 13 August 2022.

World Health Organization. 2021c. *Critical Preparedness, Readiness and Response Actions for Covid-19: Interim Guidance*. Available from:

<https://www.who.int/publications/i/item/critical-preparedness-readiness-and-response-actions-for-covid-19> Accessed on 17 October 2023.

Worldometer. (2023). South Africa Population. Accessed on 20 December 2023 11:09 GMT.

<https://www.worldometers.info/coronavirus/>

Worldometer. (2023a). South Africa Demographics. Accessed on 21 December 2023.

Available from: <https://worldometers.info/demographics/south.africa-demographics/>

Worldometer. (2023b). South Africa Coronavirus Cases. Accessed on: 20 December 2023.

Available from: <https://www.worldometers.info/coronavirus/country/south-africa/>

Worldometer. (2024). Global Population. Accessed on 9 January 2024. Available from:

<https://www.worldometers.info/world-population/>

Wynn, D., and Williams, C. (2012). Principles for Conducting Critical Realist Case Study Research in Information Systems. *MIS Quarterly*, 36(3), 787-810.

<http://www.doi.org/10.2307/41703481>

Yadav, A., Kuman, S., Singh, G., Kansara, N. (2021). Demystifying R naught:

Understanding what does it hide? *Indian Journal of Community Medicine*, 46(1): 7-14.

Zamberg, I., Manzano, S., Posfay-Barbe, K., Windish, O., Agoritsas, T., Schiffer, E. (2020).

A Mobile Health Platform to Disseminate Validated Institutional Measurements During the COVID-10 Outbreak: Utilization-Focused Evaluation Study. *Journal of Medical Internet Research. Public Health Surveill*, 6(2): 18668. <http://www.doi.org/10.2196/18668> Available

at: <http://publichealth.jmir.org/2020/2/e18668/> Accessed on 10 November 2023.

Zeiss Group Global. (n. d.). Zeiss Group Global History. *Zeiss Group Global*. Accessed on

14 January 2023. Available from: <https://www.zeiss.com/corporate/en/about-zeiss/past/history.html>

Zhang, X., Shi, T., Sun, L. (2020). COVID-19: What is next for nursing in public health emergency? *Nurse Education in Practice*, 46, 102821.

<https://doi.org/10.1016/j.nepr.2020.102821>

Classification of Infectious Diseases

Infectious disease according to clinical manifestations

Classification	Infection
Diarrheal diseases	Secretor and invasive
Respiratory diseases	Upper and lower respiratory infection
Central nervous System Infections	Meningitis, Encephalitis, and Abscesses.
Cardio Vascular Infections	Endocarditis, Myocarditis, Vasculitis
Sepsis	Disseminated

(Adapted from Nelson and Williams, 2014)

Infectious disease according to relevant microbiology

Classification	Organism
Bacterial	Gram-negative and Gram-positive
Viral	DNA-virus, RNA-virus, Enveloped and Non-enveloped
Fungal	Disseminated and Localized
Parasitic	Protozoa, Helminth, Trematodes, and Cestodes
Prion	Protein

(Adapted from Nelson and Williams, 2014)

Infectious disease according to means of transmission.

Transmission	Characteristics
Contact	Direct or in-direct
Food-or-water-borne	Indigestion of contaminated food
Airborne	Inhalation of contaminated air
Vector-borne	Depends on the biology of the vector and host.
Perinatal	In-utero contamination or during labor

(Adapted from Nelson and Williams, 2014)

Infectious disease according to reservoir.

Reservoir	Example
Human	HIV, Hepatitis B and C
Animals (Zoonotic)	Rabies, <i>yesinia pestis</i>
Soil	<i>clostridium botulinum</i> and <i>clostridium tatani</i>
Water	<i>legionella</i> and <i>pseudomonas aeruginosa</i>

(Adapted from Nelson and Williams, 2014)

APPENDIX B

Research methods of the study

Research Objective	Research Design	Sample and Population	Data Collection	Data Analysis
Phase 1- Step 1 Objective To investigate the educational needs of nurses during outbreaks through a comprehensive scoping review.	Scoping review according to the JBI guidelines (Peters, et al 2020). Reported according to PRISMA-ScR.	63 Publications from data bases between 1981 and April 2022. All types of literature included.	Literature search from database: PubMed. ProQuest, CINAL via hand searches. Scopus and Medline did not provide any eligible sources to be included in this review.	Braun and Clarke Thematic Analysis Descriptive narrative summary of the results
Phase 1-Step 2 Objective To elicit the challenges nurses experienced during the COVID-19 pandemic, by conducting in-depth interviews with a group of healthcare professionals.	Qualitative exploratory descriptive design	8 Participants (Purposeful sampling)	In-depth interviews (individual)	Reflexive Thematic Analysis Braun and Clark (2022). Mendeley and Otter Ai.
Phase 1-Step 3 Objective To elicit the challenges nurses experienced during the COVID-19 pandemic, by conducting in-depth interviews with a group of professional nurses.	Qualitative exploratory descriptive design	28 Participants (Purposeful sampling) (ICU nurses x 6, Perioperative nurses x 6, Nursing Managers x 7, ED Nurses x 4 Nurse Educators x 5)	In-depth interviews (individual)	Reflexive Thematic Analysis Braun and Clark (2022). Mendeley and Otter Ai.
Phase 1-Step 4 To integrate the data based on the information obtained in the study (a scoping review, and in-depth interviews).	Quantitative design. Expert Analysis (Two Delphi rounds)	7 Participants (Purposeful sampling)	Delphi-technique Round 1: Redcap Round 2: Likert Scale	Consensus based on quantitative data analysis
Phase 2 To develop a programme based on the data obtained in the previous step.	Qualitative development design.	Researcher and study supervisors	Curriculum development (Backward design)	
Phase 3 To validate the programme using a group of national experts.	Quantitative Validation: Alignment, Relevance and Feasibility	A total of 3 experts	Validation document	Quantitative analysis of scores

PARTICIPANT INFORMATION DOCUMENT FOR IN-DEPTH INTERVIEWS



Study title: The development of a Competency-based Programme on the Management of Disease Outbreaks

Good Day,

Introduction:

I am doing research to develop a competency-based programme for specialist nurses based on their educational needs during the current Covid-19 pandemic. This is the first study to focus on communicable disease educational needs of specialist nurses (ICU-and OR Nurses, Midwives, Nursing Educators and Nursing Managers). The results of this research study will give specialist nurses an opportunity to engage with CPD programmes specific to their area of expertise and will contribute to our preparedness to manage future disease outbreaks.

I am inviting you to participate in this mixed method, multiphase research study. Your contribution is regarded as extremely valuable as the preparation of the next generation nurses in the management of communicable disease outbreaks rest on the shoulders of every nurse. You will be expected to be interviewed and answer open-ended questions relating to the challenges nurses encountered during the Covid-19 outbreak. The interview will take approximately 30 minutes.

Your identity may not be shared with any person(s) outside the focus group, unless required by law or the Human Research Ethics Committees of the University of the Witwatersrand to respond to a formal complaint, or for a compliance audit. All data collected in the course of the study will be securely retained for two (2) years, if a scientific publication arises from the study and six (6) years, if there is no publication. Thereafter it will be destroyed accordingly.

You will not directly benefit from partaking in this study, except your valuable contribution to the future of the nursing profession in the preparation of our nurses in their ability to manage communicable disease outbreaks we will encounter in the future.

You will have access to information on the study during this phase of the study and after the results are available.

The refusal to participate before commencement of this phase or during the data collection process will involve no penalty, or loss of benefits to which the participant is otherwise entitled; there is no requirement to provide a reason for withdrawing and any data collected will in default be destroyed, unless the participant specifically consents to its retention.

You may contact the primary investigator and the supervisors of this study to clarify aspects of the study.

Primary Investigator: Linette Engelbrecht

Contact Number: 011 488 4272
E-mail: linette.engelbrecht@wits.ac.za

Supervisor 1: Prof. Shelley Schmollgruber
Contact Number: 011 488 4196
E-mail: shelley.schmollgruber@wits.ac.za

Supervisor 2: Dr. Lizelle Crous
Contact Number: 011 488 4061
E-mail: lizelle.crous@wits.ac.za

This study has been approved by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg ("Committee"). A principal function of this Committee is to safeguard the rights and dignity of all human subjects who agree to participate in a research project and the integrity of the research.

If you have any concern over the way the study is being conducted, please contact the Chairperson of this Committee who is Dr Clement Penny, who may be contacted on telephone number 011 717 2301, or by e-mail on Clement.Penny@wits.ac.za. The telephone numbers for the Committee secretariat are 011 717 2700/1234 and the e-mail addresses are Zanele.Ndlovu@wits.ac.za and Rhulani.Mukansi@wits.ac.za

Thank you for reading this Study Information Sheet.

Date: 01/21



PARTICIPANT CONSENT SHEET

The Development of a competency-based programme on the management of disease outbreaks

1. I have been given a Participant Information Sheet which explains the nature and processes involved in this study, which is attached hereto;
2. I was given time to read it, or had it read to me, in the language I best understand;
3. I was given time to ask any questions I wanted to and found any answers given to me to be reasonable and satisfactory;
4. I believe I fully understand why the study is being conducted and what the intended outcomes will be;
5. I understand that there will be no immediate benefit to me, should I agree to participate, nor will I receive any payment; conversely, participation will not cost me anything but my time;
6. I understand that, even if I initially consent to take part in the study, I may subsequently withdraw at any time and would not be required to give any reasons; if that happened, any data collected about me for the purposes of the study would immediately be destroyed, unless I give consent for it to be retained
7. I have been given a range of contact details, listed below. If I require further information or become concerned about any aspect of this study I am free to speak to any of these contacts.

Primary Investigator: Linette Engelbrecht, Contact Number: 011 488 4061
E-mail: linette.engelbrecht@wits.ac.za

Supervisor 1: Prof. Shelley Schmollgruber, Contact Number: 011 488 4196
E-mail: shelley.schmollgruber@wits.ac.za

Supervisor 2: Dr. Lizelle Crous, Contact Number: 011 488 4061
E-mail: lizelle.crous@wits.ac.za

Professor CB Penny, Chairperson of the Human Research Ethics Committee (Medical) at the University of Witwatersrand, on telephone no. 011 717 2301, or by e-mail at Clement.Penny@wits.ac.za.
Ms. Z Ndlovu or Mr Rhulani Mkansi, Committee Secretariat, telephone nos.: 011 717 2700 or 1234, or by e-mail at: Zanele.Ndlovu@wits.ac.za or Rhulani.Mkansi@wits.ac.za

Name of Participant _____

Signature of Participant _____

Date _____

INFORMED CONSENT FOR AUDIO-RECORDING



The Development of a Competency-Based Programme on the Management of Disease Outbreaks.

I hereby understand that the semi-structured interviews will be audio recorded for data collection and analysis purposes.

I agree to be audio recorded. I understand that my identity will be kept confidential by being assigned a participant code for the duration of the study.

I understand that the audio-recordings and transcriptions will be stored in a secured place for the recommended amount of time.

Name of Participant _____

Signature of Participant _____

Date _____



APPENDIX F

DISTRESS PROTOCOL FOR THE STUDY

THE DEVELOPMENT OF A COMPETENCY-BASED PROGRAMME ON THE MANAGEMENT ON THE MANAGEMENT OF DISEASE OUTBREAKS

STUDENT: LINETTE ENGELBRECHT: 773909

SUPERVISORS: PROF. S. SCHMOLLGRUBER and DR. L. CROUS

**FACULTY OF HEALTH SCIENCES, SCHOOL OF THERAPEUTIC SCIENCES, DEPARTMENT OF NURSING
EDUCATION**

PURPOSE OF THE PROTOCOL

The purpose of this protocol is to have organized plan to assist participants, during the data collection phases of this study, when they display signs of distress. The researcher is of opinion that when requesting study participants to reflect on their performance during the Covid-19 pandemic, it can lead to emotional distress.

This protocol is relevant during the following stages of the study:

Phase One: Step 2: In-depth interviews with non-nursing professionals

Phase One: Step 3: In-depth interviews with nurses

OPERATIONAL DEFINITIONS

Sensitive Topic: A topic and/ or content that challenges individuals on emotional, ethical/moral level (Burke, Martsoff and Poole, 2009).

Distress: Any reaction to an event or incident that leads to unmanageable levels of sadness, pain (emotional and physical), anxiousness and extreme worry (Cambridge Dictionary, 2014).

PREPARATION OF DATA COLLECTION EVENT

The researcher is conducting all the in-depth interviews herself. The counsellor assigned to the study is available, in person, during all data collection events. All participants are informed of the Distress Protocol and assistance at the start of each data collection event. Participants are encouraged to indicate when they experience high levels of distress and discomforts during the data collection process. Participants are assured that they can withdraw their consent to participate in the data collection event at any time.

PROTOCOL

1. The interviewer plans the interview event.
2. The interviewer can stop the interview at any time if the interviewee shows signs of distress.
3. The participant can either stop the specific discussion, call a comfort break or request the counselor for professional support.
4. The interview is only resumed if the interviewee agrees to continue.
5. The interviewee can request to continue with the interview without the recording device.

Protocol developed by: L Engelbrecht



DEMOGRAPHIC DATA SHEET

The participant is requested to complete the following information. Please note that as stipulated in the participant's information letter, the information will remain confidential. The information will be used to assist the researcher only.

Participant Code: _____

Professional qualification	
Years of experience	
Age	
Nationality	
Gender	
Are you employed in the public sector?	
Are you employed in the private sector?	



INTERVIEW GUIDE FOR IN-DEPTH INTERVIEWS – HEALTHCARE PROFESSIONALS

1. Introduction
2. Validation of documentation
3. In your opinion, what did the nurses find challenging whilst performing their professional nursing duties during Covid-19 pandemic?
4. What contributed to the challenges or support they experienced whilst performing duties during the Covid-19 pandemic?
5. As a member of the multi-disciplinary team treating SARS-CoV-19 patients, can you elaborate on your experience working during the Covid-19 pandemic?
6. Summarise and closure

Delphi Round 1: Invitation, Information and Consent

Dear XXXXXX

You are hereby invited to participate in a study of a PhD study titled: The Development of a Competency-Based Programme on the Management of Disease Outbreaks.

Statements collected from a scoping review; as well as in-depth interviews have been used to develop a Delphi-questionnaire. The objective of the Delphi- questionnaire is to confirm and triangulate the data from the previous phases. A competency based programme for specialist nurses will be developed based on the results of the Delphi-questionnaire.

You will be required to complete the Delphi-questionnaire on REDCap. The link will be shared with you once you agree to participate in this pilot study.

The Delphi- questionnaire consist 172 statements presented in 12 sections.

Section	Title
1	Demographic data
2	Preparation for and Mode of Delivery of the Programme
3	Human Resources during a Disease Outbreak
4	Clinical Practice during Disease Outbreak
5	Interpersonal Skills during Disease Outbreaks
6	Intrapersonal Skills during Disease Outbreaks
7	Physical Demands during a Disease Outbreak
8	Communication and Information Management during a Disease Outbreak
9	Community Profiling and Resource Identification
10	Financial Management
11	Preparation of the Infrastructure
12	PPE Management and Precautionary Measures

Upon completion of the Participant Consent Document below, you will be provided with the link to access the questionnaire as well as an additional document whereby you will be required to comment on your experience completing the questionnaire. Your contribution is highly appreciated.

PARTICIPANT CONSENT

Delphi-Questionnaire- Pilot Study

Main Study Title: The Development of a Competency-Based Programme on the Management of Disease Outbreaks: M 210603

Phase Two: Development of a Delphi-questionnaire: A pilot-study

1. I have been given a Participant Information Sheet which explains the nature and processes involved in this study.
2. I was given time to read it, or had it read to me, in the language I best understand.
3. I believe I fully understand why the study is being conducted and what the intended outcomes will be.
4. I understand that there will be no immediate benefit to me, should I agree to participate, nor will I receive any payment; conversely, participation will not cost me anything but my time.
5. I understand that, even if I initially consent to take part in the study, I may subsequently withdraw at any time and would not be required to give any reasons; if that happened, any data collected about me for the purposes of the study would immediately be destroyed, unless I give consent for it to be retained
6. I have been given a range of contact details, listed below. If I require further information or become concerned about any aspect of this study, I am free to speak to any of these contacts.

Contact details:

Linette Engelbrecht, PhD Student

Email Address: linette.engelbrecht@wits.ac.za

Supervisor 1: Prof. Shelley Schmollgruber

Email Address: shelley.schmollgruber@wits.ac.za

This study has been approved by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg ("Committee"). A principal function of

this Committee is to safeguard the rights and dignity of all human subjects who agree to participate in a research project and the integrity of the research.

If you have any concern over the way the study is being conducted, please contact the Chairperson of this Committee who is Professor Paul Ruff, who may be contacted via any one member of the secretariat. The telephone numbers for the Committee secretariat are 011 717 2700/1234/2656/1252 and the e-mail addresses are Zanele.Ndlovu@wits.ac.za, Rhulani.Mukansi@wits.ac.za, Mapula.Ramaila@wits.ac.za and Iain.Burns@wits.ac.za.

Name and Surname:

Signature:

Date:

APPENDIX J

DELPHI ROUND 2 INVITATION AND INFORMATION



Dear XXXXXX

I would like to thank you for your participation in the first round of the Delphi Survey, in my PhD study titled: The Development of a Competency-Based Programme on the Management of Disease Outbreaks. I presented the data of the first round, to the supervisors of this study, in an intense workshop in order to validate the content of the second round survey based on the data you provided.

You are hereby invited to participate in the second round of this Delphi-survey.

The Survey consist of 63 items presented as 10 domains. The table below explains the domains:

Table 1: Domains and Explanations

Domain	Explanation	Number of items
Preparation for and Mode of Delivery of the Programme	This domain focuses on structuring the programme delivery and readiness aspects before a disease outbreak, including debriefing sessions , programme format , and competency assessment methods .	3
Human Resources	This domain addresses staffing, training, financial consideration, role clarification of community members including nurse protection strategies during both outbreak and non-outbreak periods.	6

Community Profiling and Resource Identification	This domain involves the assessment of a community , identifying of resources , supporting of vulnerable groups , recruiting of volunteers during outbreaks, and gaining of trust of the community	5
Preparation of the Infrastructure	This domain focusses on optimizing existing infrastructure, establishing movement pathways , and forming resource management committees during disease outbreaks	4
Financial Management	This domain concentrates on identifying the financial implications of a disease outbreak, preventing of resource wastage , and optimize resource allocation during disease outbreaks	3
Physical Demands during a Disease Outbreak	This domain addresses strategies for maintaining physical health, managing patient care demands, and recognizing ergonomic challenges during disease outbreaks	2
Precautionary Measures and Clinical Practice during non-Disease and Disease Outbreak Periods	This domain concentrates on enhancing clinical skills , multi-disciplinary team compliance, revising of infection prevention and control and precautionary principle as required, reinforcement of standard precautions , managing critical care equipment , appropriation of PPE , managing changes , revision of protocols, contingency of non-outbreak related care, problem solving skills , ethical challenges, as well as acknowledging learning opportunities during disease outbreak scenario's	14
PPE Management	This domain revolves around understanding different PPE items , securing PPE integrity , acknowledging PPE indications and limitations , improvising measures to secure PPE, application of PPE in different settings , and identification of PPE training opportunities during outbreak and non-disease outbreak periods	6
Interpersonal Skills	This domain focuses on understanding human behavior during a disease outbreak, trust behavior, the value of de-briefing , proving support in stressful situations, engagement with communication initiatives and challenges, enhancement of compliance and addressing non-complaint behavior, clarify roles during multi-disciplinary ethical decision making as well as navigation of technology for the purpose of effective communication, as well as plans to re-integrate into society after a disease outbreak	17

Intrapersonal Skills	This domain is emphasizing on coping strategies, self-care, and decision making	3

The Survey is presented in PDF format as a Likert scale with rating options ranging from 1 to 4.

You are not required to provide demographic data in this survey, and your participation code has been added on the survey.

You are required to rate each item on the document and, you have an opportunity to provide comments at the end.

You are kindly requested to e-mail the completed survey back to me to the following e-mail address: linette.engelbrecht@wits.ac.za

Your contribution to this important study is valuable, highly appreciated, and I thank you in advance for your time.

Kind Regards,

Linette Engelbrecht

Contact details:

Linette Engelbrecht, PhD Student

Email Address: linette.engelbrecht@wits.ac.za

Supervisor 1: Prof. Shelley Schmollgruber

Email Address: shelley.schmollgruber@wits.ac.za

This study has been approved by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand, Johannesburg ("Committee").

A principal function of this Committee is to safeguard the rights and dignity of all human subjects who agree to participate in a research project and the integrity of the research.

If you have any concern over the way the study is being conducted, please contact the Chairperson of this Committee who is Professor Paul Ruff, who may be contacted via any one member of the secretariat.

The telephone numbers for the Committee secretariat are 011 717 2700/1234/2656/1252 and the e-mail addresses are Zanele.Ndlovu@wits.ac.za, Rhulani.Mukansi@wits.ac.za, Mapula.Ramaila@wits.ac.za and Iain.Burns@wits.ac.za.

UNIVERSITY OF THE
WITWATERSRAND
JOHANNESBURG



R49 Ms L. Engelbrecht

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M210603

NAME: Ms L. Engelbrecht
(Principal Investigator)

DEPARTMENT: School of Therapeutic Sciences
Department of Nursing Education
Medical School
University

PROJECT TITLE: *The development of a competency-based programme
for management of disease outbreaks*

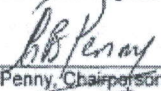
DATE CONSIDERED: 2021/06/25

DECISION: Approved unconditionally

CONDITIONS:

NOTE: If contact information regarding student study participants is required,
please contact the Registrar's office - <Nicoleen.Potgieter@wits.ac.za>

SUPERVISOR: Professor S Schmollgruber and Dr K Crous

APPROVED BY: 
Dr CB Penny, Chairperson, HREC (Medical)

DATE OF APPROVAL: 2021/10/27

This Clearance Certificate is valid for 5 years from the date of approval. An extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and ONE COPY returned to the Research Office secretariat on the 3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to submit details to the Committee. I agree to submit a yearly progress report. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in June and therefore reports and re-certification will be due in the month of June each year. Unreported changes to the study may invalidate the clearance given by the HREC (Medical).

Signature of Principal Investigator

Date

1.	Database	PUBMED: .Accessed via Wits Library Platform
2.	Date of Search	15 November 2021 – 30 December 2021
3.	Search Words	1 st User Input Search Word = KNOWLEDGE; result = found results. Search Word = NURSES; result = found results. Search Words = DISEASE OUTBREAK; result = found results.
4.	Records Identified (1)	13 458
5.	Activation of Medical Subject Headings	1 st User Input [MeSH]
6.	Records Identified (2)	1149
7.	Inclusion Criteria	1 st User Input Drop-down box accessed Language - [English] Country – [ALL] Date: From [1981-01-01] till [Current]
8.	Duplicate Records	0
9.	Ineligible Records	434
10.	Records Screened	715
		1 st User Input [Highlight title] Read abstract [Return to list] or [Download]
11.	Records Excluded	550
12.	Records sought for retrieval	155 Imported into Mendeley
13.	Records Read	155
14.	Records Excluded	124 - Deleted from Mendeley
15.	Records Included	31 Loaded into Excel Extraction Document
8.	Duplicate Records	0
9.	Ineligible Records	434
10.	Records Screened	715
		1 st User Input [Highlight title] Read abstract [Return to list] or [Download]
11.	Records Excluded	550

12.	Records sought for retrieval	155 Imported into Mendeley
13.	Records Read	155
14.	Records Excluded	124 - Deleted from Mendeley
15.	Records Included	31 Loaded into Excel Extraction Document

List of References of sources per category

Article Number in Charting Table	Category 1: Intrapersonal Needs
	Subcategory 1a. Self-safety Number of Articles (23)
1	Alsaahfi, A. J., & Cheng, A. C. (2019). Health care workers' awareness and infection control practices about Ebola virus disease in Hajj 2015. <i>Journal of Infection and Public Health</i> , 12(5), 720–725. https://doi.org/10.1016/j.jiph.2019.03.022
2	Ma, X., He, Z., Wang, Y., Jiang, L., Xu, Y., Qian, C., Sun, R., Chen, E., Hu, Z., Zhou, L., Zhou, F., Qin, T., Cao, X., An, Y., Sun, R., Zhang, X., Lin, J., Ai, Y., Wu, D., & Du, B. (2011). Knowledge and attitudes of healthcare workers in Chinese intensive care units regarding 2009 H1N1 influenza pandemic. <i>BMC Infectious Diseases</i> , 11. https://doi.org/10.1186/1471-2334-11-24
5	Alsubaie, S., Hani Temsah, M., Al-Eyadhy, A. A., Gossady, I., Hasan, G. M., Al-Rabiaah, A., Jamal, A. A., Alhaboob, A. A., Alsohime, F., & Somily, A. M. (2019). Middle East Respiratory Syndrome Coronavirus epidemic impact on healthcare workers' risk perceptions, work and personal lives. <i>Journal of Infection in Developing Countries</i> , 13(10), 920–926. https://doi.org/10.3855/jidc.11753
6	Adongo, P. B., Tabong, P. T. N., Asampong, E., Ansong, J., Robalo, M., & Adanu, R. M. (2017). Health workers perceptions and attitude about Ghana's preparedness towards preventing, containing, and managing Ebola Virus Disease. <i>BMC Health Services Research</i> , 17(1). https://doi.org/10.1186/s12913-017-2225-0
7	Fan, J., Hu, K., Li, X. (2020). A qualitative study on the vocational and psychological perceptions and issues of trans-disciplinary nurses during the Covid-19 outbreak. <i>Aging</i> , 12 (13), 12479 – 12492.
9	Shahid, H., Haider, M. Z., Taqi, M., Gulzar, A., Zamani, Z., Fatima, T., Khalid, Y., Ahmed, Z., Nadeem, H. A., & Anwer, F. (2020). COVID-19 and Its Psychological Impacts on Healthcare Staff – A Multi-Centric Comparative Cross-Sectional Study. <i>Cureus</i> . https://doi.org/10.7759/cureus.11753
15	Al-Ashwal, F.Y., Kubas, M., Zawiah, M., Bitar, A.N., Saheed, R.M., Sulaiman, S.A., Khan, A.H., Ghadzi, S.M. (2020). Healthcare workers' knowledge, preparedness, counselling practices and perceived barriers to confront COVID-19: A cross-sectional study from a war-torn country, Yemen. <i>PLoS ONE</i> 15(12): e0243962. https://doi.org/10.1371/journal.pone.0243962
16	Kassie, B. A., Adane, A., Tilahun, Y. T., Kassahun, E. A., Ayele, A. S., & Belew, A. K. (2020). Knowledge and attitude towards COVID-19 and associated factors among health

	care providers in Northwest Ethiopia. <i>PLoS ONE</i> , 15. https://doi.org/10.1371/journal.pone.0238415
18	Bell, S.A., Munro-Kramer, M.L., Eisenberg, M.C., Williams, G., Amarah, P., Lori, J.R. (2017). Ebola kills generations': Qualitative interviews with Liberian healthcare providers. <i>Midwifery</i> , 2(45), 44-49. https://doi.org/10.1016/j.midw.2016.12.005
19	Liu, Q., Luo, D., Haase, J.E., GUO, Q., Wang, X.Q., Liu, S., Xia, L., Liu, Z., Yang, J., Yang, B.X. (2020). The experiences of health-care providers during the COVID-19 crises in China: a qualitative study. <i>Lancet Global Health</i> , 8(e), 790-798. https://doi.org/10.1016/S2214-109X(20)30204-7
22	Pițigoi, D., Săndulescu, O., Ionescu, T., Nițescu, B., Nițescu, M., Streinu-Cercel, A., & Streinu-Cercel, A. (2018). Assessment of knowledge, attitudes and perceptions regarding Ebola disease in healthcare workers from a tertiary care hospital in Romania. <i>Public Health</i> , 164, 7–15. https://doi.org/10.1016/j.puhe.2018.07.002
28	Peiró, T., Lorente, L., & Vera, M. (2020). The covid-19 crisis: Skills that are paramount to build into nursing programmes for future global health crisis. <i>International Journal of Environmental Research and Public Health</i> , 17(18), 1–14. https://doi.org/10.3390/ijerph17186532
31	Butsashvili, M., Triner, W., Kamkamidze, G., Kajaia, M., & McNutt, L.A. (2007). Knowledge and anticipated behavior of health care workers in response to an outbreak of pandemic influenza in Georgia. <i>J Infect Development Countries</i> , 1(3): 329-332.
32	Lam, S.K.K., Kwang, E. W. Y., Hung, M, S, Y., Pang, S. M. C., Chiang, V. C. L. (2017). Nurses' preparedness for infectious disease outbreaks: A literature review and narrative synthesis of qualitative evidence. <i>Journal of Clinical Nursing</i> , 27e, 1244-1255. https://doi.org/10.1111/jocn.14210
35	Lau, P.Y., Chan, C.W.H. (2005). SARS (Severe Acute Respiratory Syndrome): reflective practice of a nurse manager. <i>Journal of Clinical Nursing</i> , (14), 28-34.
38	Sultan, M.A.S., Khorram-Manesh, A., Carlstrom, E., Sorensen, J.L., Al Sulayyim, H. J., Tauber, F. (2020). Nurses' Readiness for Emergencies and Public Health Challenges- The Case of Saudi Arabia. <i>Sustainability</i> , 12(7874), 1-18. https://doi.org/10.3390/su12197874
40	Chung, J., Davies, N. (2016). A Review of Compassion Fatigue of Nurses During and After the Canterbury Earthquakes. <i>Australasian Journal of Disaster and Trauma Studies</i> , 20 (People in Disasters Special Issue).
44	Joo, J. Y., Lui, M. F. (2021). Nurses' Barriers to caring for patients with Covid-19: A Qualitative Systematic Review. <i>International Nursing Review</i> , 68, 202-213.

48	Amberson, T., Wells, C., & Gossman, S. (2020). Increasing Disaster Preparedness in Emergency Nurses: A Quality Improvement Initiative. <i>Journal of Emergency Nursing</i> , 46(5), 654-665.e21. https://doi.org/10.1016/j.jen.2020.05.001
50	Buheji, M., & Buheid, N. (2020). Nursing Human Factor During COVID-19 Pandemic. <i>International Journal of Nursing Science</i> , 10(1), 12–24. https://doi.org/10.5923/j.nursing.20201001.02
51	Karnjuš, I., Prosen, M., & Ličen, S. (2021). Nurses' core disaster-response competencies for combating COVID-19 - A cross-sectional study. <i>PLoS ONE</i> , 16(6 June). https://doi.org/10.1371/journal.pone.0252934
53	Lira, A. L. B. de C., Adamy, E. K., Teixeira, E., & Silva, F. V. da. (2020). Nursing education: challenges and perspectives in times of the COVID-19 pandemic. <i>Revista Brasileira de Enfermagem</i> , 73, e20200683. https://doi.org/10.1590/0034-7167-2020-0683
57	Fortaleza, C.R., Fortaleza, C.M.C.B. (2011). Knowledge and attitudes of healthcare workers from intensive care units regarding nosocomial transmission of influenza: a study on the immediate pre-pandemic period. <i>The Journal of Venomous Animals and Toxins including Tropical Diseases</i> . 17(2), p. 168 – 175. ISSN1678-9199
Article Number in Charting Table	Subcategory 1b. Decision making and learning skills Number of Articles (24)
32	Lam, S.K.K., Kwang, E. W. Y., Hung, M, S, Y., Pang, S. M. C., Chiang, V. C. L. (2017). Nurses' preparedness for infectious disease outbreaks: A literature review and narrative synthesis of qualitative evidence. <i>Journal of Clinical Nursing</i> , 27e, 1244-1255. doi.10.1111/jocn.14210
56	Philips, N., Hughes, L., Vindrola-Padros, C., Petrella, A., Fern, L. A., Panel-Coates, F., Taylor, R. M., & Taylor, R. (n.d.). <i>The impact of leadership on the nursing workforce during the COVID-19 pandemic Short heading: Nursing leadership during a pandemic</i> . https://doi.org/10.1101/2021.05.18.21256802
61	Hancock, B., Catrambone, C., Mayer, K. M., Hoskins, J. L., Chierici, C., & Start, R. E. (2021). Leveraging Professional Governance During the COVID-19 Pandemic. <i>The Journal of Nursing Administration</i> , 51(3), 117–119. https://doi.org/10.1097/NNA.0000000000000990
19	Liu, Q., Luo, D., Haase, J.E., GUO, Q., Wang, X.Q., Liu, S., Xia, L., Liu, Z., Yang, J., Yang, B.X. (2020). The experiences of health-care providers during the COVID-19 crises in

	China: a qualitative study. <i>Lancet Global Health</i> , 8(e), p. 790-798 https://doi.org/10.1016/S2214-109X(20)30204-7
49	Annan, A. A., Yar, D. D., Owusu, M., Biney, E. A., Forson, P. K., Okyere, P. B., Gyimah, A. A., & Owusu-Dabo, E. (2017). Health care workers indicate ill preparedness for Ebola Virus Disease outbreak in Ashanti Region of Ghana. <i>BMC Public Health</i> , 17(1). https://doi.org/10.1186/s12889-017-4474-6
4	Almutairi, K. M., Alodhayani, A. A., Moussa, M., Aboshaiqah, A. E., Tumala, R. B., & Vinluan, J. M. (2016). Ebola outbreak preparedness and preventive measures among healthcare providers in Saudi Arabia. <i>Journal of Infection in Developing Countries</i> , 10(8), 829–836. https://doi.org/10.3855/jidc.6941
33	Labrague, L.J., Hammand, K., McEnroe-Petitte, D. M., Froda, D.C., Obeidat, A.A., Leocadio, M.C., Cayaban, A.R., Mirafuentes, E.C. (2018). Disaster preparedness among nurses: a systematic review of literature. <i>International Nursing Review</i> , 65, 41-53.
38	Sultan, M.A.S., Khorram-Manesh, A., Carlstrom, E., Sorensen, J.L., Al Sulayyim, H. J., Tauber, F. (2020). Nurses' Readiness for Emergencies and Public Health Challenges - The Case of Saudi Arabia. <i>Sustainability</i> , 12 (7874), 1-18. https://doi.org/10.3390/su12197874
47	Said, N. B., & Chiang, V. C. L. (2020). The knowledge, skill competencies, and psychological preparedness of nurses for disasters: A systematic review. <i>International Emergency Nursing</i> (Vol. 48), . https://doi.org/10.1016/j.ienj.2019.100806
10	Backes, M. T. S., Carvalho, K. M. de, Santos, E. K. A. dos, & Backes, D. S. (2020). New coronavirus: what does nursing have to learn and teach in times of a pandemic? <i>Revista Brasileira de Enfermagem</i> , 73, e20200259. https://doi.org/10.1590/0034-7167-2020-0259
15	Al-Ashwal, F.Y., Kubas, M., Zawiah, M., Bitar, A.N., Saheed, R.M., Sulaiman, S.A., Khan, A.H., Ghadzi, S.M. (2020). Healthcare workers' knowledge, preparedness, counselling practices and perceived barriers to confront COVID-19: A cross-sectional study from a war-torn country, Yemen. <i>PLoS ONE</i> 15(12):e0243962. https://doi.org/10.1371/journal.pone.0243962
20	Gümüş, K., & Başgün, A. (2021). Evaluation of the Knowledge of Operating Room Nurses of Preventive Practices for Protection Against COVID-19. <i>Journal of Perianesthesia Nursing</i> , 36(3), 300–304. https://doi.org/10.1016/j.jopan.2020.10.003
22	Pițigoi, D., Săndulescu, O., Ionescu, T., Nițescu, B., Nițescu, M., Streinu-Cercel, A., & Streinu-Cercel, A. (2018). Assessment of knowledge, attitudes and perceptions regarding Ebola disease in healthcare workers from a tertiary care hospital in Romania. <i>Public Health</i> , 164, 7-15. https://doi.org/10.1016/j.puhe.2018.07.002
43	Langan, J. C., Lavin, R., Wolgast, K. A., & Veenema, T. G. (2017). Education for developing and sustaining a health care workforce for disaster readiness. <i>Nursing Administration Quarterly</i> , 41(2), 118-127. https://doi.org/10.1097/NAQ.0000000000000225

35	Lau, P.Y., Chan, C.W.H. (2005). SARS (Severe Acute Respiratory Syndrome): reflective practice of a nurse manager. <i>Journal of Clinical Nursing</i> , (14), 28-34.
60.	Ion, R., Craswell, A., Hughes, L., Johnston, A., Kilbride, L., Hubbard-Murdoch, N., & Massey, D. (2021). International nurse education leaders' experiences of responding to the COVID-19 pandemic: A qualitative study. <i>Journal of Advanced Nursing</i> , 77(9), 3797–3805. https://doi.org/10.1111/jan.14892
39	Veenema, T.G., Loskiski, S.L., Newton, S.M., Seal, S. (2017). Exploration and development of standardized nursing leadership competencies during disasters. <i>Health Emergency and Disaster Nursing</i> . 4, p. 26-38.
51	Karnjuš, I., Prosen, M., & Ličen, S. (2021). Nurses' core disaster-response competencies for combating COVID-19—A cross-sectional study. <i>PLoS ONE</i> , 16 (6 June). https://doi.org/10.1371/journal.pone.0252934
37	Hou, Y., Zhou, Q., Li, D., Guo, Y., Fan, J., Wang, J., Shanxi, T. (2020). Preparedness of our Emergency Department during the coronavirus disease outbreak from the nurses' perspectives: A qualitative research study. <i>Journal of Emergency Nursing</i> , 46(6), 848-861.
45	Garbut, S.J., Peltier, J.W., Fitzpatrick, J.J. (2008). Evaluation of an instrument to measure nurses' familiarity with emergency preparedness. <i>Military Medicine</i> , 173(11), 1073-1077.
48	Amberson, T., Wells, C., & Gossman, S. (2020). Increasing Disaster Preparedness in Emergency Nurses: A Quality Improvement Initiative. <i>Journal of Emergency Nursing</i> , 46(5), 654-665.e21. https://doi.org/10.1016/j.jen.2020.05.001
50	Buheji, M., & Buhaid, N. (2020). Nursing Human Factor During COVID-19 Pandemic. <i>International Journal of Nursing Science</i> , 10(1), 12–24. https://doi.org/10.5923/j.nursing.20201001.02
53	Lira, A. L. B. de C., Adamy, E. K., Teixeira, E., & Silva, F. V. da. (2020). Nursing education: challenges and perspectives in times of the COVID-19 pandemic. <i>Revista Brasileira de Enfermagem</i> , 73, e20200683. https://doi.org/10.1590/0034-7167-2020-0683
Article Number in Charting Table	Subcategory 1c. Adaptability skills Number of Articles (22)
5	Alsubaie, S., Hani Temsah, M., Al-Eyadhy, A. A., Gossady, I., Hasan, G. M., Al-Rabiaah, A., Jamal, A. A., Alhaboob, A. A., Alsohime, F., & Somily, A. M. (2019). Middle East Respiratory Syndrome Coronavirus epidemic impact on healthcare workers' risk perceptions, work and personal lives. <i>Journal of Infection in Developing Countries</i> , 13(10), 920–926. https://doi.org/10.3855/jidc.11753

37	Hou, Y., Zhou, Q., Li, D., Guo, Y., Fan, J., Wang, J., Shanxi, T. (2020). Preparedness of our Emergency Department during the coronavirus disease outbreak from the nurses' perspectives: A qualitative research study. <i>Journal of Emergency Nursing</i> , 46(6), 848-861.
19	Liu, Q., Luo, D., Haase, J.E., GUO, Q., Wang, X.Q., Liu, S., Xia, L., Liu, Z., Yang, J., Yang, B.X. (2020). The experiences of health-care providers during the COVID-19 crises in China: a qualitative study. <i>Lancet Global Health</i> , 8(e), 790-798. https://doi.org/10.1016/S2214-109X(20)30204-7
48	Amberson, T., Wells, C., & Gossman, S. (2020). Increasing Disaster Preparedness in Emergency Nurses: A Quality Improvement Initiative. <i>Journal of Emergency Nursing</i> , 46(5), 654-665.e21. https://doi.org/10.1016/j.jen.2020.05.001
21	Leigh, L., Taylor, C., Glassman, T., Thompson, A., & Sheu, J. J. (2020). A Cross-Sectional Examination of the Factors Related to Emergency Nurses' Motivation to Protect Themselves Against an Ebola Infection. <i>Journal of Emergency Nursing</i> , 46(6), 814–826. https://doi.org/10.1016/j.jen.2020.05.002
28	Peiró, T., Lorente, L., & Vera, M. (2020). The covid-19 crisis: Skills that are paramount to build into nursing programmes for future global health crisis. <i>International Journal of Environmental Research and Public Health</i> , 17(18), 1–14. https://doi.org/10.3390/ijerph17186532
1	Alsahafi, A. J., & Cheng, A. C. (2019). Health care workers' awareness and infection control practices about Ebola virus disease in Hajj 2015. <i>Journal of Infection and Public Health</i> , 12(5), 720–725. https://doi.org/10.1016/j.jiph.2019.03.022
55	Fereidouni, A., Vizesfar, F., Ghanavati, M., & Tavakol, R. (2021). Knowledge about the effects of electrosurgery smoke among operating room nurses during COVID-19 Pandemic: A Cross-Sectional Study. <i>Perioperative Care and Operating Room Management</i> , 24. https://doi.org/10.1016/j.pcorm.2021.100189
40	Chung, J., Davies, N. (2016). A Review of Compassion Fatigue of Nurses During and After the Canterbury Earthquakes. <i>Australasian Journal of Disaster and Trauma Studies</i> . 20 (People in Disasters Special Issue)
47	Said, N. B., & Chiang, V. C. L. (2020). The knowledge, skill competencies, and psychological preparedness of nurses for disasters: A systematic review. In <i>International Emergency Nursing</i> (Vol. 48). Elsevier Ltd. https://doi.org/10.1016/j.ienj.2019.100806
50	Buheji, M., & Buhaid, N. (2020). Nursing Human Factor During COVID-19 Pandemic. <i>International Journal of Nursing Science</i> , 10(1), 12–24. https://doi.org/10.5923/j.nursing.20201001.02
33	Labrague, L.J., Hammand, K., McEnroe-Petitte, D. M., Froda, D.C., Obeidat, A.A., Leocadio, M.C., Cayaban, A.R., Mirafuentes, E.C. (2018). Disaster preparedness among nurses: a systematic review of literature. <i>International Nursing Review</i> , 65, 41 – 53.

8	Houghton, C., Meskell, P., Delaney, H., Smalle, M., Glenton, C., Booth, A., Chan, X.H.S., Devane, D., Biestly, L.M. (2020). Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: a rapid qualitative synthesis (Review). <i>Cochrane Database of Systematic Reviews</i> . 4(CD013582). doi:1002/14651858CD013582
18	Bell, S.A., Munro-Kramer, M.L., Eisenberg, M.C., Williams, G., Amarah, P., Lori, J.R. (2017). 'Ebola kills generations': Qualitative interviews with Liberian healthcare providers. <i>Midwifery</i> , 2(45), 44-49. doi:10.1016/j.midw.2016.12.005
39	Veenema, T.G., Loskiski, S.L., Newton, S.M., Seal, S. (2017). Exploration and development of standardized nursing leadership competencies during disasters. <i>Health Emergency and Disaster Nursing</i> , 4, 26-38.
51	Karnjuš, I., Prosen, M., & Ličen, S. (2021). Nurses' core disaster-response competencies for combating COVID-19—A cross-sectional study. <i>PLoS ONE</i> , 16 (6 June). https://doi.org/10.1371/journal.pone.0252934
43	Langan, J. C., Lavin, R., Wolgast, K. A., & Veenema, T. G. (2017). Education for developing and sustaining a health care workforce for disaster readiness. <i>Nursing Administration Quarterly</i> , 41(2), 118-127. https://doi.org/10.1097/NAQ.0000000000000225
44	Joo, J. Y., Lui, M. F. (2021). Nurses' Barriers to caring for patients with Covid-19: A Qualitative Systematic Review. <i>International Nursing Review</i> , 68, 202-213
46	Harthi, M.A., Thobiatty, A.A., Ahmari, A.W., Almalki, M. (2020). Challenges for Nurses in Disaster Management: A Scoping Review. <i>Risk Management and Healthcare Policy</i> , 13, 2627-2634
53	Lira, A. L. B. de C., Adamy, E. K., Teixeira, E., & Silva, F. V. da. (2020). Nursing education: challenges and perspectives in times of the COVID-19 pandemic. <i>Revista Brasileira de Enfermagem</i> , 73, e20200683. https://doi.org/10.1590/0034-7167-2020-0683
60	Ion, R., Craswell, A., Hughes, L., Johnston, A., Kilbride, L., Hubbard-Murdoch, N., & Massey, D. (2021). International nurse education leaders' experiences of responding to the COVID-19 pandemic: A qualitative study. <i>Journal of Advanced Nursing</i> , 77(9), 3797–3805. https://doi.org/10.1111/jan.14892
61	Hancock, B., Catrambone, C., Mayer, K. M., Hoskins, J. L., Chierici, C., and Start, R. E. (2021). Leveraging Professional Governance During the COVID-19 Pandemic. <i>The Journal of Nursing Administration</i> , 51(3), 117-119. https://doi.org/10.1097/NNA.0000000000000990

	Category 2: Interpersonal Needs
Article Number in	Subcategory 2a. Communication Management Number of Articles (20)

Charting Table	
13	von Strauss, E., Paillard-Borg, S., Holmgren, J., & Saaristo, P. (2017). Global nursing in an ebola viral haemorrhagic fever outbreak: Before, during and after deployment. <i>Global Health Action</i> , 10(1). https://doi.org/10.1080/16549716.2017.1371427
16	Kassie, B. A., Adane, A., Tilahun, Y. T., Kassahun, E. A., Ayele, A. S., & Belew, A. K. (2020). Knowledge and attitude towards COVID-19 and associated factors among health care providers in Northwest Ethiopia. <i>PLoS ONE</i> , 15. https://doi.org/10.1371/journal.pone.0238415
21	Leigh, L., Taylor, C., Glassman, T., Thompson, A., & Sheu, J. J. (2020). A Cross-Sectional Examination of the Factors Related to Emergency Nurses' Motivation to Protect Themselves Against an Ebola Infection. <i>Journal of Emergency Nursing</i> , 46(6), 814–826. https://doi.org/10.1016/j.jen.2020.05.002
28	Peiró, T., Lorente, L., & Vera, M. (2020). The covid-19 crisis: Skills that are paramount to build into nursing programmes for future global health crisis. <i>International Journal of Environmental Research and Public Health</i> , 17(18), 1–14. https://doi.org/10.3390/ijerph17186532
3	Ruijs, W. L., la Hautvast, J., van Ijzendoorn, G., van Ansem, W. J., Elwyn, G., van der Velden, K., & Hulscher, M. E. (2012). How healthcare professionals respond to parents with religious objections to vaccination: A qualitative study. <i>BMC Health Services Research</i> , 12(1). https://doi.org/10.1186/1472-6963-12-231
4	Almutairi, K. M., Alodhayani, A. A., Moussa, M., Aboshaiqah, A. E., Tumala, R. B., & Vinluan, J. M. (2016). Ebola outbreak preparedness and preventive measures among healthcare providers in Saudi Arabia. <i>Journal of Infection in Developing Countries</i> , 10(8), 829–836. https://doi.org/10.3855/jidc.6941
9	Shahid, H., Haider, M. Z., Taqi, M., Gulzar, A., Zamani, Z., Fatima, T., Khalid, Y., Ahmed, Z., Nadeem, H. A., & Anwer, F. (2020). COVID-19 and Its Psychological Impacts on Healthcare Staff – A Multi-Centric Comparative Cross-Sectional Study. <i>Cureus</i> . https://doi.org/10.7759/cureus.11753
8	Houghton, C., Meskell, P., Delaney, H., Smalle, M., Glenton, C., Booth, A., Chan, X.H.S., Devane, D., Biestly, L.M. (2020). Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: a rapid qualitative synthesis (Review). <i>Cochrane Database of Systematic Reviews</i> . 4(CD013582). doi:1002/14651858CD013582
34	Lan, S.L., Kwang, W.Y.E., Hung, S.Y.M., Pang, S.M.C. (2016). Bridging the gap between guidelines and practice in the management of emergency infectious diseases: a qualitative study of emergency nurses. <i>Journal of Clinical Nursing</i> , 25, 9. 2895 5 2905. doi: 10.1111/jocn.13343
45	Garbut, S.J., Peltier, J.W., Fitzpatrick, J.J. (2008). Evaluation of an instrument to measure nurses' familiarity with emergency preparedness. <i>Military Medicine</i> , 173 (11), p. 1073 – 1077.

48	Amberson, T., Wells, C., & Gossman, S. (2020). Increasing Disaster Preparedness in Emergency Nurses: A Quality Improvement Initiative. <i>Journal of Emergency Nursing</i> , 46(5), 654-665.e21. https://doi.org/10.1016/j.jen.2020.05.001
51	Karnjuš, I., Prosen, M., & Ličen, S. (2021). Nurses' core disaster-response competencies for combating COVID-19—A cross-sectional study. <i>PLoS ONE</i> , 16. https://doi.org/10.1371/journal.pone.0252934
61	Hancock, B., Catrambone, C., Mayer, K. M., Hoskins, J. L., Chierici, C., & Start, R. E. (2021). Leveraging Professional Governance During the COVID-19 Pandemic. <i>The Journal of Nursing Administration</i> , 51(3), 117–119. https://doi.org/10.1097/NNA.0000000000000990
54	Gordon, J. M., Magbee, T., & Yoder, L. H. (2021). The Experiences of critical care nurses caring for patients with COVID-19 during the 2020 pandemic: A qualitative study. <i>Applied Nursing Research</i> , 59. https://doi.org/10.1016/j.apnr.2021.151418
62	Ughasoro, M. D., Esangbedo, D. O., & Udorah, I. M. (2019). Health-care workers' perspectives on preparedness of health-care facilities for outbreak of communicable diseases in Nigeria: A qualitative study. <i>American Journal of Tropical Medicine and Hygiene</i> , 100(4), 1022–1028. https://doi.org/10.4269/ajtmh.18-0404
22	Pițigoi, D., Săndulescu, O., Ionescu, T., Nițescu, B., Nițescu, M., Streinu-Cercel, A., & Streinu-Cercel, A. (2018). Assessment of knowledge, attitudes and perceptions regarding Ebola disease in healthcare workers from a tertiary care hospital in Romania. <i>Public Health</i> , 164, 7–15. https://doi.org/10.1016/j.puhe.2018.07.002
43	Langan, J. C., Lavin, R., Wolgast, K. A., & Veenema, T. G. (2017). Education for developing and sustaining a health care workforce for disaster readiness. <i>Nursing Administration Quarterly</i> , 41(2), 118–127. https://doi.org/10.1097/NAQ.0000000000000225
46	Harthi, M.A., Thobiatty, A.A., Ahmari, A.W., Almalki, M.(2020). Challenges for Nurses in Disaster Management: A Scoping Review. <i>Risk Management and Healthcare Policy</i> , 13, 2627-2634
56	Philips, N., Hughes, L., Vindrola-Padros, C., Petrella, A., Fern, L. A., Panel-Coates, F., Taylor, R. M., & Taylor, R. (n.d.). <i>The impact of leadership on the nursing workforce during the COVID-19 pandemic Short heading: Nursing leadership during a pandemic.</i> https://doi.org/10.1101/2021.05.18.21256802
60	Ion, R., Craswell, A., Hughes, L., Johnston, A., Kilbride, L., Hubbard-Murdoch, N., & Massey, D. (2021). International nurse education leaders' experiences of responding to the COVID-19 pandemic: A qualitative study. <i>Journal of Advanced Nursing</i> , 77(9), 3797–3805. https://doi.org/10.1111/jan.14892
Article Number in Charting Table	Subcategory 2b. People Management Number of Articles (15)

50	Buheji, M., & Buhaid, N. (2020). Nursing Human Factor During COVID-19 Pandemic. <i>International Journal of Nursing Science</i> , 10(1), 12–24. https://doi.org/10.5923/j.nursing.20201001.02
18	Bell, S.A., Munro-Kramer, M.L., Eisenberg, M.C., Williams, G., Amarah, P., Lori, J.R. (2017). 'Ebola kills generations': Qualitative interviews with Liberian healthcare providers. <i>Midwifery</i> .2 (45), 44-49. doi:10.1016/j.midw.2016.12.005
49	Annan, A. A., Yar, D. D., Owusu, M., Biney, E. A., Forson, P. K., Okyere, P. B., Gyimah, A. A., & Owusu-Dabo, E. (2017). Health care workers indicate ill preparedness for Ebola Virus Disease outbreak in Ashanti Region of Ghana. <i>BMC Public Health</i> , 17(546), 1-7. https://doi.org/10.1186/s12889-017-4474-6
33	Labrague, L.J., Hammand, K., McEnroe-Petitte, D. M., Froda, D.C., Obeidat, A.A., Leocadio, M.C., Cayaban, A.R., Mirafuentes, E.C. (2018). Disaster preparedness among nurses: a systematic review of literature. <i>International Nursing Review</i> , 65, 41-53
42	Barfield, W. D., & Krug, S. E. (2017). Disaster preparedness in neonatal intensive care units. <i>Pediatrics</i> , 139(5). https://doi.org/10.1542/peds.2017-0507
47	Said, N. B., & Chiang, V. C. L. (2020). The knowledge, skill competencies, and psychological preparedness of nurses for disasters: A systematic review. In <i>International Emergency Nursing</i> (Vol. 48). Elsevier Ltd. https://doi.org/10.1016/j.ienj.2019.100806
51	Karnjuš, I., Prosen, M., & Ličen, S. (2021). Nurses' core disaster-response competencies for combating COVID-19—A cross-sectional study. <i>PLoS ONE</i> , 16. https://doi.org/10.1371/journal.pone.0252934
62	Ughasoro, M. D., Esangbedo, D. O., & Udorah, I. M. (2019). Health-care workers' perspectives on preparedness of health-care facilities for outbreak of communicable diseases in Nigeria: A qualitative study. <i>American Journal of Tropical Medicine and Hygiene</i> , 100(4), 1022–1028. https://doi.org/10.4269/ajtmh.18-0404
12	Zafar, N., Jamal, Z., Khan, M.M. (2020). Preparedness of the Healthcare Personnel Against the Coronavirus Disease 2019 (COVID-19) Outbreak: An Audit Cycle. <i>Frontiers in Public Health</i> , 8(502). doi: 10.3389/fpubh.2020.00502
13	von Strauss, E., Paillard-Borg, S., Holmgren, J., & Saaristo, P. (2017). Global nursing in an ebola viral haemorrhagic fever outbreak: Before, during and after deployment. <i>Global Health Action</i> , 10(1). https://doi.org/10.1080/16549716.2017.1371427
36	Hewlet, B., Hewlet, B. (2005). Providing Care and Facing Death: Nursing During Ebola Outbreaks in Central Africa. <i>Journal of Transcultural Nursing</i> , 16(4), 289 – 297. doi: 301.1177/104365960527835

37	Hou, Y., Zhou, Q., Li, D., Guo, Y., Fan, J., Wang, J., Shanxi, T. (2020). Preparedness of our Emergency Department during the coronavirus disease outbreak from the nurses' perspectives: A qualitative research study. <i>Journal of Emergency Nursing</i> , 46(6), 848–861.
39	Veenema, T.G., Loskiski, S.L., Newton, S.M., Seal, S. (2017). Exploration and development of standardized nursing leadership competencies during disasters. <i>Health Emergency and Disaster Nursing</i> , 4, 26–38.
48	Amberson, T., Wells, C., & Gossman, S. (2020). Increasing Disaster Preparedness in Emergency Nurses: A Quality Improvement Initiative. <i>Journal of Emergency Nursing</i> , 46(5), 654-665.e21. https://doi.org/10.1016/j.jen.2020.05.001
56	Philips, N., Hughes, L., Vindrola-Padros, C., Petrella, A., Fern, L. A., Panel-Coates, F., Taylor, R. M., & Taylor, R. (n.d.). <i>The impact of leadership on the nursing workforce during the COVID-19 pandemic Short heading: Nursing leadership during a pandemic.</i> https://doi.org/10.1101/2021.05.18.21256802
Article Number in Charting Table	Subcategory 2c. Providing Psychological Support Number of Articles (6)
5	Alsubaie, S., Hani Temsah, M., Al-Eyadhy, A. A., Gossady, I., Hasan, G. M., Al-Rabiaah, A., Jamal, A. A., Alhaboob, A. A., Alsohime, F., & Somily, A. M. (2019). Middle East Respiratory Syndrome Coronavirus epidemic impact on healthcare workers' risk perceptions, work and personal lives. <i>Journal of Infection in Developing Countries</i> , 13(10), 920–926. https://doi.org/10.3855/jidc.11753
13	von Strauss, E., Paillard-Borg, S., Holmgren, J., & Saaristo, P. (2017). Global nursing in an ebola viral haemorrhagic fever outbreak: Before, during and after deployment. <i>Global Health Action</i> , 10(1). https://doi.org/10.1080/16549716.2017.1371427
47	Said, N. B., & Chiang, V. C. L. (2020). The knowledge, skill competencies, and psychological preparedness of nurses for disasters: A systematic review. In <i>International Emergency Nursing</i> (Vol. 48). Elsevier Ltd. https://doi.org/10.1016/j.ienj.2019.100806
48	Amberson, T., Wells, C., & Gossman, S. (2020). Increasing Disaster Preparedness in Emergency Nurses: A Quality Improvement Initiative. <i>Journal of Emergency Nursing</i> , 46(5), 654-665.e21. https://doi.org/10.1016/j.jen.2020.05.001
51	Karnjuš, I., Prosen, M., & Ličen, S. (2021). Nurses' core disaster-response competencies for combating COVID-19—A cross-sectional study. <i>PLoS ONE</i> , 16. https://doi.org/10.1371/journal.pone.0252934
53	Lira, A. L. B. de C., Adamy, E. K., Teixeira, E., & Silva, F. V. da. (2020). Nursing education: challenges and perspectives in times of the COVID-19 pandemic. <i>Revista Brasileira de Enfermagem</i> , 73, e20200683. https://doi.org/10.1590/0034-7167-2020-0683

Article Number in Charting Table	Category 3: Disease Specific and Clinical Subcategory 3a. Infection Prevention and Control Clinical Skills (32)
15	Al-Ashwal, F.Y., Kubas, M., Zawiah, M., Bitar, A.N., Saheed, R.M., Sulaiman, S.A., Khan, A.H., Ghadzi, S.M. (2020). Healthcare workers' knowledge, preparedness, counselling practices and perceived barriers to confront COVID-19: A cross-sectional study from a war-torn country, Yemen. <i>PLoS ONE</i> 15(12):e0243962. https://doi.org/10.1371/journal.pone.0243962
22	Pițigoi, D., Săndulescu, O., Ionescu, T., Nițescu, B., Nițescu, M., Streinu-Cercel, A., & Streinu-Cercel, A. (2018). Assessment of knowledge, attitudes and perceptions regarding Ebola disease in healthcare workers from a tertiary care hospital in Romania. <i>Public Health</i>, 164, 7–15. https://doi.org/10.1016/j.puhe.2018.07.002
24	Olowookere, S. A., Abioye-Kuteyi, E. A., Adepoju, O. K., Esan, O. T., Adeolu, T. M., Adeoye, T. K., Adepoju, A. A., & Aderogba, A. T. (2015). Knowledge, Attitude, and Practice of Health Workers in a Tertiary Hospital in Ile-Ife, Nigeria, towards Ebola Viral Disease. <i>Journal of Tropical Medicine</i>, 2015. https://doi.org/10.1155/2015/431317
21	Leigh, L., Taylor, C., Glassman, T., Thompson, A., & Sheu, J. J. (2020). A Cross-Sectional Examination of the Factors Related to Emergency Nurses' Motivation to Protect Themselves Against an Ebola Infection. <i>Journal of Emergency Nursing</i>, 46(6), 814–826. https://doi.org/10.1016/j.jen.2020.05.002
27	Al- Dossary, R., Alamri, M., Alboqawi, H., Al- Hosis, K., Aljeldah, M., Aljohan, M., Aljohani, K., Almadani, N., Alrasheadi, B., Falatho, R., Almazah, J. (2020). Awareness, Attitudes, Prevention and Preparations of COVID-19 Outbreak among Nurses in Saudi- Arabia. <i>International Journal of Environmental Research and Public Health</i>. 17(21):8269. https://doi.org/10.3390/ijerph17218269
28	Peiró, T., Lorente, L., & Vera, M. (2020). The covid-19 crisis: Skills that are paramount to build into nursing programmes for future global health crisis. <i>International Journal of Environmental Research and Public Health</i>, 17(18), 1–14. https://doi.org/10.3390/ijerph17186532
18	Bell, S.A., Munro-Kramer, M.L., Eisenberg, M.C., Williams, G., Amarah, P., Lori, J.R. (2017). 'Ebola kills generations': Qualitative interviews with Liberian healthcare providers. <i>Midwifery</i>, 2(45), 44-49. doi:10.1016/j.midw.2016.12.005
9	Shahid, H., Haider, M. Z., Taqi, M., Gulzar, A., Zamani, Z., Fatima, T., Khalid, Y., Ahmed, Z., Nadeem, H. A., & Anwer, F. (2020). COVID-19 and Its Psychological Impacts on Healthcare Staff – A Multi-Centric Comparative Cross-Sectional Study. <i>Cureus</i>. https://doi.org/10.7759/cureus.11753
23	Tadesse, D. B., Gebrewahd, G. T., & Demoz, G. T. (2020). Knowledge, attitude, practice and psychological response toward COVID-19 among nurses during the COVID-19 outbreak in northern Ethiopia, 2020. <i>New Microbes and New Infections</i>, 38. https://doi.org/10.1016/j.nmni.2020.100787

25	Neupane, H. C., Shrestha, N., Adhikari, S., Angadi, S., Shrestha, B. K., & Gauli, B. (2020). Knowledge of health care professionals and medical students regarding covid-19 in a tertiary care hospital in nepal. <i>Journal of the Nepal Medical Association</i> , 58(227), 480–486. https://doi.org/10.31729/jnma.4995
26	Khan, S., Khan, M., Maqsood, K., Hussain, T., Noor-ul-Huda, & Zeeshan, M. (2020). Is Pakistan prepared for the COVID-19 epidemic? A questionnaire-based survey. <i>Journal of Medical Virology</i> , 92(7), 824–832. https://doi.org/10.1002/jmv.25814
31	Butsashvili, M., Triner, W., Kamkamidze, G., Kajaia, M., & McNutt, L.-A. (2007). <i>Knowledge and anticipated behavior of health care workers in response to an outbreak of pandemic influenza in Georgia</i> . http://www.pandemicflu.gov/index.html
42	Barfield, W. D., & Krug, S. E. (2017). Disaster preparedness in neonatal intensive care units. <i>Pediatrics</i> , 139(5). https://doi.org/10.1542/peds.2017-0507
49	Annan, A. A., Yar, D. D., Owusu, M., Biney, E. A., Forson, P. K., Okyere, P. B., Gyimah, A. A., & Owusu-Dabo, E. (2017). Health care workers indicate ill preparedness for Ebola Virus Disease outbreak in Ashanti Region of Ghana. <i>BMC Public Health</i> , 17(1). https://doi.org/10.1186/s12889-017-4474-6
50	Buheji, M., & Buhaid, N. (2020). Nursing Human Factor During COVID-19 Pandemic. <i>International Journal of Nursing Science</i> , 10(1), 12–24. https://doi.org/10.5923/j.nursing.20201001.02
39	Veenema, T.G., Loskiski, S.L., Newton, S.M., Seal, S. (2017). Exploration and development of standardized nursing leadership competencies during disasters. <i>Health Emergency and Disaster Nursing</i> , 4, 26 – 38.
47	Said, N. B., & Chiang, V. C. L. (2020). The knowledge, skill competencies, and psychological preparedness of nurses for disasters: A systematic review. In <i>International Emergency Nursing</i> (Vol. 48). Elsevier Ltd. https://doi.org/10.1016/j.ienj.2019.100806
45	Garbut, S.J., Peltier, J.W., Fitzpatrick, J.J. (2008). Evaluation of an instrument to measure nurses' familiarity with emergency preparedness. <i>Military Medicine</i> , 173(11), 1073–1077.
57	Fortaleza, C.R., Fortaleza, C.M.C.B. (2011). Knowledge and attitudes of healthcare workers from intensive care units regarding nosocomial transmission of influenza: a study on the immediate pre-pandemic period. <i>The Journal of Venomous Animals and Toxins including Tropical Diseases</i> , 17(2), 168 – 175. ISSN1678-9199
58	Melander, S. (2021). <i>Intensive care nurses' experiences of working during the COVID-19 pandemic: A Qualitative Metasynthesis</i> . Umeå University: Sweden.
62	Ughasoro, M. D., Esangbedo, D. O., & Udorah, I. M. (2019). Health-care workers' perspectives on preparedness of health-care facilities for outbreak of communicable diseases in Nigeria: A qualitative study. <i>American Journal of Tropical Medicine and Hygiene</i> , 100(4), 1022–1028. https://doi.org/10.4269/ajtmh.18-0404
35	Lau, P.Y., Chan, C.W.H. (2005). SARS (Severe Acute Respiratory Syndrome): reflective practice of a nurse manager. <i>Journal of Clinical Nursing</i> , (14), 28-34

41	Hamele, M., Neumayer, K., Sweney, J., & Bradley Poss, W. (2018). Always ready, always prepared-preparing for the next pandemic. <i>Translational Pediatrics</i> , 7(4), 344–355. https://doi.org/10.21037/tp.2018.09.06
13	von Strauss, E., Paillard-Borg, S., Holmgren, J., & Saaristo, P. (2017). Global nursing in an ebola viral haemorrhagic fever outbreak: Before, during and after deployment. <i>Global Health Action</i> , 10(1). https://doi.org/10.1080/16549716.2017.1371427
48	Amberson, T., Wells, C., & Gossman, S. (2020). Increasing Disaster Preparedness in Emergency Nurses: A Quality Improvement Initiative. <i>Journal of Emergency Nursing</i> , 46(5), 654-665.e21. https://doi.org/10.1016/j.jen.2020.05.001
12	Zafar, N., Jamal, Z., Khan, M.M. (2020). Preparedness of the Healthcare Personnel Against the Coronavirus Disease 2019 (COVID-19) Outbreak: An Audit Cycle. <i>Frontiers in Public Health</i> , 8(502). doi: 10.3389/fpubh.2020.00502
14	Elhadi, M., Msherghi, A., Alkeelani, M., Zorgani, A., Zaid, A., Alsuyihili, A., Buzreg, A., Ahmed, H., Elhadi, A., Khaled, A., Boughididah, T., Khel, S., Abdelkadir, M., Gaffaz, R., Bahroun, S., Alhashimi, A., Biala, M., Abulmida, S., Elharb, A., ... Amshai, A. (2020). Assessment of healthcare workers' levels of preparedness and awareness regarding Covid-19 infection in low-resource settings. <i>American Journal of Tropical Medicine and Hygiene</i> , 103(2), 828–833. https://doi.org/10.4269/ajtmh.20-0330
52	Aktas, F.O., Damar, H.T. (2020). Attitudes and Practices of Operating Room Nurses toward CODID-19 in Turkey. <i>Healthcare Sciences and Services</i> , 13(1), 167–174
11	Vatan, A., Güçlü, E., Öğütlü, A., Kibar, F. A., & Karabay, O. (2021). Knowledge and attitudes towards COVID-19 among emergency medical service workers. <i>Revista Da Associacao Medica Brasileira</i> , 66(11), 1553–1559. https://doi.org/10.1590/1806-9282.66.11.1553
17	Hu, X., Zhang, Z., Li, N., Liu, D., Zhang, L., He, W., Zhang, W., Li, Y., Zhu, C., Zhu, G., Zhang, L., Xu, F., Wang, S., Cao, X., Zhao, H., Li, Q., Zhang, X., Lin, J., Zhao, S., ... Du, B. (2012). Self-Reported Use of Personal Protective Equipment among Chinese Critical Care Clinicians during 2009 H1N1 Influenza Pandemic. <i>PLoS ONE</i> , 7(9). https://doi.org/10.1371/journal.pone.0044723
30	Papagiannis, D., Malli, F., Raptis, D. G., Papathanasiou, I. v., Fradelos, E. C., Daniil, Z., Rachiotis, G., & Gourgoulialis, K. I. (2020). Assessment of knowledge, attitudes, and practices towards new coronavirus (SARS-CoV-2) of health care professionals in greece before the outbreak period. <i>International Journal of Environmental Research and Public Health</i> , 17(14), 1–14. https://doi.org/10.3390/ijerph17144925
55	Fereidouni, A., Vizeshfir, F., Ghanavati, M., Tavako, R. (2021). Knowledge about the effects of electro surgery smoke among operating room nurses during COVID-19 pandemic: A cross sectional study. <i>Perioperative CARE AND Operating Room Management</i> . 24 (2021)100189. https://doi.org/10.1016/j.pcorm.2021.100189
Article Number in Charting Table	Subcategory 3b. Specific Disease Information (28)

1	Alsaahafi, A. J., & Cheng, A. C. (2019). Health care workers' awareness and infection control practices about Ebola virus disease in Hajj 2015. <i>Journal of Infection and Public Health</i> , 12(5), 720–725. https://doi.org/10.1016/j.jiph.2019.03.022
58	Melander, S. (2021). <i>Intensive care nurses' experiences of working during the COVID-19 pandemic: A Qualitative Metasynthesis</i> . Umeå University: Sweden.
15	Al-Ashwal, F.Y., Kubas, M., Zawiah, M., Bitar, A.N., Saheed, R.M., Sulaiman, S.A., Khan, A.H., Ghadzi, S.M. (2020). Healthcare workers' knowledge, preparedness, counselling practices and perceived barriers to confront COVID-19: A cross-sectional study from a war-torn country, Yemen. <i>PLoS ONE</i> 15(12):e0243962. https://doi.org/10.1371/journal.pone.0243962
48	Amberson, T., Wells, C., & Gossman, S. (2020). Increasing Disaster Preparedness in Emergency Nurses: A Quality Improvement Initiative. <i>Journal of Emergency Nursing</i> , 46(5), 654-665.e21. https://doi.org/10.1016/j.jen.2020.05.001
42	Barfield, W. D., & Krug, S. E. (2017). Disaster preparedness in neonatal intensive care units. <i>Pediatrics</i> , 139(5). https://doi.org/10.1542/peds.2017-0507
2	Ma, X., He, Z., Wang, Y., Jiang, L., Xu, Y., Qian, C., Sun, R., Chen, E., Hu, Z., Zhou, L., Zhou, F., Qin, T., Cao, X., An, Y., Sun, R., Zhang, X., Lin, J., Ai, Y., Wu, D., & Du, B. (2011). Knowledge and attitudes of healthcare workers in Chinese intensive care units regarding 2009 H1N1 influenza pandemic. <i>BMC Infectious Diseases</i> , 11. https://doi.org/10.1186/1471-2334-11-24
14	Elhadi, M., Msherghi, A., Alkeelani, M., Zorgani, A., Zaid, A., Alsuyihili, A., Buzreg, A., Ahmed, H., Elhadi, A., Khaled, A., Boughididah, T., Khel, S., Abdelkabar, M., Gaffaz, R., Bahroun, S., Alhashimi, A., Biala, M., Abulmida, S., Elharb, A., Amshai, A. (2020). Assessment of healthcare workers' levels of preparedness and awareness regarding Covid-19 infection in low-resource settings. <i>American Journal of Tropical Medicine and Hygiene</i> , 103(2), 828–833. https://doi.org/10.4269/ajtmh.20-0330
18	Bell, S.A., Munro-Kramer, M.L., Eisenberg, M.C., Williams, G., Amarah, P., Lori, J.R. (2017). 'Ebola kills generations': Qualitative interviews with Liberian healthcare providers. <i>Midwifery</i> , 2(45), 44-49. doi:10.1016/j.midw.2016.12.005
21	Leigh, L., Taylor, C., Glassman, T., Thompson, A., & Sheu, J. J. (2020). A Cross-Sectional Examination of the Factors Related to Emergency Nurses' Motivation to Protect Themselves Against an Ebola Infection. <i>Journal of Emergency Nursing</i> , 46(6), 814–826. https://doi.org/10.1016/j.jen.2020.05.002
24	Olowookere, S. A., Abioye-Kuteyi, E. A., Adepoju, O. K., Esan, O. T., Adeolu, T. M., Adeoye, T. K., Adepoju, A. A., & Aderogba, A. T. (2015). Knowledge, Attitude, and Practice of Health Workers in a Tertiary Hospital in Ile-Ife, Nigeria, towards Ebola Viral Disease. <i>Journal of Tropical Medicine</i> , 2015. https://doi.org/10.1155/2015/431317
29	Malik, U. R., Atif, N., Hashmi, F. K., Saleem, F., Saeed, H., Islam, M., Jiang, M., Zhao, M., Yang, C., & Fang, Y. (2020). Knowledge, attitude, and practices of healthcare professionals on covid-19 and risk assessment to prevent the epidemic spread: A multicenter cross-sectional study from Punjab, Pakistan. <i>International Journal of Environmental Research and Public Health</i> , 17(17), 1–13. https://doi.org/10.3390/ijerph17176395

31	Butsashvili, M., Triner, W., Kamkamidze, G., Kajaia, M., & McNutt, L.-A. (2007). <i>Knowledge and anticipated behavior of health care workers in response to an outbreak of pandemic influenza in Georgia</i> . <i>J Infect Development Countries</i> , 1(3): 329-332.
35	Lau, P.Y., Chan, C.W.H. (2005). SARS (Severe Acute Respiratory Syndrome): reflective practice of a nurse manager. <i>Journal of Clinical Nursing</i> , (14), 28-34.
37	Hou, Y., Zhou, Q., Li, D., Guo, Y., Fan, J., Wang, J., Shanxi, T. (2020). Preparedness of our Emergency Department during the coronavirus disease outbreak from the nurses' perspectives: A qualitative research study. <i>Journal of Emergency Nursing</i> , 46(6), 848–861.
13	von Strauss, E., Paillard-Borg, S., Holmgren, J., & Saaristo, P. (2017). Global nursing in an ebola viral haemorrhagic fever outbreak: Before, during and after deployment. <i>Global Health Action</i> , 10(1). https://doi.org/10.1080/16549716.2017.1371427
6	Adongo, P. B., Tabong, P. T. N., Asampong, E., Ansong, J., Robalo, M., & Adanu, R. M. (2017). Health workers perceptions and attitude about Ghana's preparedness towards preventing, containing, and managing Ebola Virus Disease. <i>BMC Health Services Research</i> , 17(1). https://doi.org/10.1186/s12913-017-2225-0
7	Fan, J., Hu, K., Li, X. (2020). A qualitative study on the vocational and psychological perceptions and issues of trans-disciplinary nurses during the Covid-19 outbreak. <i>Aging</i> , 12(13), 12479–12492.
20	Gümüş, K., & Başgün, A. (2021). Evaluation of the Knowledge of Operating Room Nurses of Preventive Practices for Protection Against COVID-19. <i>Journal of Perianesthesia Nursing</i> , 36(3), 300–304. https://doi.org/10.1016/j.jopan.2020.10.003
22	Pițigoi, D., Săndulescu, O., Ionescu, T., Nițescu, B., Nițescu, M., Streinu-Cercel, A., & Streinu-Cercel, A. (2018). Assessment of knowledge, attitudes and perceptions regarding Ebola disease in healthcare workers from a tertiary care hospital in Romania. <i>Public Health</i> , 164, 7–15. https://doi.org/10.1016/j.puhe.2018.07.002
11	Vatan, A., Güçlü, E., Öğütü, A., Kibar, F. A., & Karabay, O. (2021). Knowledge and attitudes towards COVID-19 among emergency medical service workers. <i>Revista Da Associacao Medica Brasileira</i> , 66(11), 1553–1559. https://doi.org/10.1590/1806-9282.66.11.1553
12	Zafar, N., Jamal, Z., Khan, M.M. (2020). Preparedness of the Healthcare Personnel Against the Coronavirus Disease 2019 (COVID-19) Outbreak: An Audit Cycle. <i>Frontiers in Public Health</i> , 8(502). doi: 10.3389/fpubh.2020.00502
17	Hu, X., Zhang, Z., Li, N., Liu, D., Zhang, L., He, W., Zhang, W., Li, Y., Zhu, C., Zhu, G., Zhang, L., Xu, F., Wang, S., Cao, X., Zhao, H., Li, Q., Zhang, X., Lin, J., Zhao, S., ... Du, B. (2012). Self-Reported Use of Personal Protective Equipment among Chinese Critical Care Clinicians during 2009 H1N1 Influenza Pandemic. <i>PLoS ONE</i> , 7(9). https://doi.org/10.1371/journal.pone.0044723
54	Gordon, J. M., Magbee, T., & Yoder, L. H. (2021). The Experiences of critical care nurses caring for patients with COVID-19 during the 2020 pandemic: A qualitative study. <i>Applied Nursing Research</i> , 59. https://doi.org/10.1016/j.apnr.2021.151418
59	

8	Chacko, B., & Camacho, M. (2016). An observational study to analyze compliance with infection control practices among ED nurses during outbreak of MERS-COV disease. <i>Journal of Emergency Medicine, Trauma and Acute Care</i>, 2016(2). https://doi.org/10.5339/jemtac.2016.icepq.13
47	Houghton, C., Meskell, P., Delaney, H., Smalle, M., Glenton, C., Booth, A., Chan, X.H.S., Devane, D., Biestly, L.M. (2020). Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: a rapid qualitative synthesis (Review). <i>Cochrane Database of Systematic Reviews</i>, 4(CD013582). doi:1002/14651858CD0135
51	Said, N. B., & Chiang, V. C. L. (2020). The knowledge, skill competencies, and psychological preparedness of nurses for disasters: A systematic review. In <i>International Emergency Nursing</i> (Vol. 48). Elsevier Ltd. https://doi.org/10.1016/j.ienj.2019.100806
25	Karnjuš, I., Prosen, M., & Ličen, S. (2021). Nurses' core disaster-response competencies for combating COVID-19—A cross-sectional study. <i>PLoS ONE</i>, 16. https://doi.org/10.1371/journal.pone.0252934 Neupane, H. C., Shrestha, N., Adhikari, S., Angadi, S., Shrestha, B. K., & Gauli, B. (2020). Knowledge of health care professionals and medical students regarding covid-19 in a tertiary care hospital in nepal. <i>Journal of the Nepal Medical Association</i>, 58(227), 480–486. https://doi.org/10.31729/jnma.4995

Voice 015

Fri, May 05, 2023 11:19AM 16:06

SUMMARY KEYWORDS

nurses, patients, staff, medication, icu, situation, problems, physio, sufficient, support, treated, people, doctors, precautions, overworked, oxygen, ventilator, sense, procedures, staff members

00:01
Okay, and the recording has stopped and activated the recording device. Thank you so much for agreeing to participate in the semi structured interview.

00:12
As a member of the multidisciplinary team during the SARS COVID 19. outbreak, can you elaborate on your experience working with specialist nurses during during this event?

00:26
Several things one,

00:30
nobody was really prepared for what we were going to experience.

00:38
From a practical point.

00:42
Nurses no doctors were prepared and had the necessary skills to treat the patients because it was an unknown condition where patients were just treated with supportive treatment in a sense.

00:59
Isolation techniques and situations were not part of our daily life before the COVID situation so

isolation techniques and situations were not part of our daily life before the COVID situation so



01:10

much time was spent trying to get dressed and undressed and not living off the page patients.



01:20

Support from the general public was limited because there was no understanding about the crisis that the situation of the situation



01:35

overworked nurses overworked



01:38

staff because of



01:41

staff members colleagues being sick at home, and very long hours, worked.



01:51

Problems with for example, hand over at ward rounds where the first group has to go and get undressed, and the next group has to get dressed. And then patients were without care for up to an hour while staff is getting dressed and undressed because you know, specific facilities where they could do it.



02:10

Medication



02:12

problem, because firstly, they will no known medications, they had to wait for medication from pharmacy medication couldn't be delivered in the normal way because people were not allowed in the ward. Same goes for feeding of patients and that food be left at the door and then necessarily do the work of unqualified staff to feed patients.



02:34

In the wards itself, nurses had to do much more than before because they were limited staff, drips, patients coughing,



02:46

patients crashing no oxygen.



02:51

So all star basically overworked, overstressed overwhelmed with a situation.



02:59

Management, the same situation because management in the private hospitals didn't have experienced with this kind of condition before.



03:08

And it was the kind of



03:12

work from one crisis to the next on a daily basis to try and keep staff keep patients going provide oxygen provide medication.



03:24

major issues in the IDI departments where ambulances brought people in and they had to be ventilated and treated in ambulances or in chairs, not sufficient oxygen points. And staff just not coping with all that.



03:40

And then



03:42

probably one of them was difficult situations is where patients are dying, suffocating and there is no oxygen, there's no ventilator, with no build an ICU. And the patient then would be in a sense be left to die.



03:58

And that is extremely



04:02

difficult to solve and for associated people to work in that situation because we're trying to save people not to watch people die.



04:12

And



04:16

the last one is that nursing staff medical staff were working in conditions that were horrible.



04:27

And the general public did not realize under what circumstances where people are working and what really is happening in health facilities. And support in that sense was limited at home and limited from the general public. To the nurses



04:49

and in the last thing is that the specialist nurses



04:55

or nobody was trained,



04:58

properly trained



05:00

To handle this kind of pandemic or infectious conditions, because we were not used to it, and we've never had major issues with outbreaks like this. So most people was this physically, emotionally and support staff and structures not up to standards or not up to standards one of

emotionally and support staff and structures, not up to standards or not up to standards, one of the so it was basically working in the dark.



05:26

So if we, if you if you have to comment on, on what you think news is experienced as most challenging, especially, let's take an ICU environment.



05:41

How would you how would you describe that? If we can maybe focus more on clinical clinical skills?



05:50

I think the first thing is that



05:55

clinical skills



05:57

before you can use your clinical students skills, you had to be good, you had to get dressed in a certain way you had to done a certain way you had to dolphin a certain way that it's time consuming. Secondly,



06:10

nurses were shooting have support cleaners,



06:17

people to support us, they had to do all that themselves. In ICU, there was nobody to help. Third thing is that we're



06:30

in a normal ICU, it's one to one or two to one nurse to patient to nurses in the room or in the COVID icu sometimes nurses are three or four or five patients that were ventilated, critically ill and it was totally overwhelming. Meditation

-  06:49
had to be done remotely without the systems working properly because they weren't designed for that medication was delivered
-  06:58
to the door to somebody else. And then the nurses had to sort out the medication from it and
-  07:05
pack it away and dish it up. And and and so
-  07:11
that is the practical problems and nursing problems is is that
-  07:17
masks on gownned double gloving
-  07:23
respiratory
-  07:25
precautions to prevent infections to prevent getting sick way in a normal circumstances. If there's a recess, you go and do a research, the research is not going to be done unless all the normal or the new precautions has been taken. And patients were recessed light because precautions have to be taken before it could be done. normal procedures like Jackie ostomies were done with a team
-  07:51
because of the possibility of infections,
-  07:56
central lines as a problem and all the normal routine procedures were complicated by



08:07

trying to protect staff and yourself against the possibility of getting the disease. And then and the



08:18

major problem was that as qualified staff got overworked



08:24

units had to utilize unqualified or not fully qualified ICU staff to use we work in ICUs. And that led to the problems being worsened because the staff on both staff members we're not used to ICU very dent and treating very sick patients.



08:45

And then



08:49

yeah, I think that most of the problems over Yes. And in communication. It's not that you could go out and go and get the medication from pharmacy, got to phone pharmacy pharmacies got to send somebody up with it.



09:03

It takes time to get medication needed time to get everything sorted out because of the



09:11

isolation procedures that have to be followed.



09:16

So



09:18

in your opinion, what are how can we support nurses



09:27

to



09:29

to make them more disaster or disease outbreak ready?



09:35

disease outbreak ready workforce.



09:39

First thing that has to be done is that the infrastructure that's available physical infrastructure infrastructure, like ICUs, ventilators



09:54

proper medication medication available.



09:58

Lisa first thing and we have



10:00

A significant lack of that, and



10:05

keeping up of the



10:07

current hospitals and ICUs is a problem, especially in the state sector. Secondly, the numbers of nurses. There is a severe lack of sufficient trained people. Firstly, because not sufficient staff are trained various reasons for that. Secondly, because a lot of staff have left for greener pastures overseas.



10:30

And then



10:34

the aren't just not sufficient nurses and health workers because of people not interested in doing that. So I think, firstly, is



10:46

the facilities have to be okay. Secondly, the numbers of nurses that have to be trained should be sufficient and the stage is not. And thirdly, it's just that I think the quality of the nurses that we're getting



11:01

is sometimes not as good as what it was before. And maybe a situation of



11:11

screening people or having



11:17

them to go through a process where they have to fulfill certain criteria, like they do with maybe doctors not at the same level, but that you get stopped on really



11:31

magnetizable capable of doing the job because



11:37

we need intelligent, diligent people to do the job. And at this stage, I think it's my personal opinion that we take what we get, and because there is nothing else.



11:51

So



11:53

thank you.



11:57

Is there anything else you would like to add



12:00

to that specific to any of the questions?



12:06

I think, yes.



12:10

One is, is that



12:15

the waste of handled



12:19

this situation, an unknown situation, very dangerous situation, situation where lots and lots of staff members lost families, colleagues, children, parents.



12:37

Most of the time, when they were asked to come and work, they were available. Very, very few



12:46

did not do that. But most of the staff did do that. And it is absolutely commendable that they were prepared to risk their lives for somebody else.



12:58

12:50
That's number one. Number two, I think the

13:03
communication and the

13:06
working together of doctors and nurses and some of the other physios and dieticians change for the better, because I think after this,

13:18
the people or the people realize that it's a team. That is respect, that one should respect when people sacrifice what they did, to look after other people. And I think that brought the to some extent the

13:39
the calling of being a healthcare worker back.

13:44
And now after

13:48
the major crisis, do you think that

13:53
the multi disciplinary team, is there a difference in how they work together based on the experiences during during COVID?

14:04
Yes, I think especially and it's interesting to me, and I don't know, it's just a personal opinion is that the people that worked in those units, because there was certain staff members that work in those units more than others. And the communication and the respect and how they work with the with the different health specialists or healthcare people has improved because they appreciate it more because they understand the situation more. They understand that the

physio as a place and that the physio has also is risking their lives by treating the patients, the nurses. I think the doctors that work there realize that these people are really sacrificing families time to be available and to do their job or their calling in a sense. Even the dietician said



15:00

To go into those wars. So I think from that point of view, definitely, I think also the



15:11

sometimes dot do bottom approach from doctors, a specialist towards nurses



15:20

has changed in the sense where nurses were seen as a definite part of the team. Definitely placement team are definite opinions that should be taken into consideration. Because they are at the coalface and they are they and you have to depend on them and have to trust him to help you and I think that has made a difference in the trust and how the different professional sees as I think that's, that's maybe the biggest positive



15:54

change I've seen from us.



15:57

Thank you very much for your time. Thank you.

Field Notes of Interviews

Field notes: 013

Date of interview: 20-01-2023

Time: 16H30

Venue: In office of the practice, no distractions experienced. Good light and ventilation.

Participant worked in private ICU's (36 beds) during Covid-19 pandemic. Participant looks very young for her 27 years of age. I was surprised by her insight into how the ICU nurses managed procedures. Participant is very reserved, serious and focused. She is a team player as she is referring to 'we' (ICU nurses and herself). This is the first interview after revision of questionnaire. Although her answers were detailed, I experienced it more structured and not as overwhelming compared to the pilot interviews.

Field notes: 019

Date of interview: 08-02-2023

Time: 16H00

Venue: In office in the OT- area. Private, no disturbances

Participant speaks soft and kind but is very direct. Acknowledges her own shortcomings, is very honest about challenges. Is a team player as the participant refers to 'we'. The participant is open about the lack of sharing of information in the private healthcare environment as well as the resentment towards private ICU practitioners for not accepting assistance from 'outside' colleagues (like herself). The participant experienced feelings of self-blame and guilt if patient complicates, and acknowledged that the team did not de-brief about it. The participant provided valuable information about a usual enclosed environment (OR).

Field notes: 015

Date of interview: 26-01-2023

Time: 12H00

Interviewed in practice office private, no disturbances. Participant has previous experience with Pertussis outbreak, SARS, and now Covid-19. The oldest participant with the most experience so far. Enquired about me and how I am doing post-Covid-19 before recording started. Participant's severe sadness is obvious to me, speaks soft, calm and to the point. Looks tired and 'alone'. Shares the following: 'I cannot do it again- I will close my practice'. Comments on managerial and coordination challenges not only about patient treatment.

Field notes: 023

Date of interview: 19-04-2023

Time: 13H00

Interviewed in office on campus, private, no disturbances. Participant is very serious and direct not emotional. Comments on the systems approach of hospital management. Focused a lot on PPE management.

Field notes: EI221

Date of interview: 21-09-2022

Interviewed in an office on campus, Private no disturbances. Participant talks fast and provide a lot of information. Participant worked in emergency units as well as ICU's with different nursing teams. Participant is eager to share information, and becomes emotional but refuses to stop the recording or activation of the distress protocol. I felt drained after the interview.

Field notes: 016

Date of interview: 27-01-2023

Time: 10H00

Venue: Interviewed in the Nursing Education Department board room. Private, no disturbances. Participant worked in Covid-19 wards in a public hospital. The participant is one of the youngest and less experienced participants in the group. Talks fast and is serious. Commented that she missed the support from the senior nurses compared to pre pandemic times. Focused on monitoring and resuscitation skills of the nursing staff.

Field notes: 021

Date of interview: 02-02-2023

Time: 15H00

Venue: Interviewed in Nursing Education Department boardroom

Participant looks very tired. Very serious, soft spoken and elaborates on statements. Also shares own personal experience and loss during Covid-19. Became emotional but insisted to continue with recording when describing the amount of deceased patients on gurneys she passed on her way to an ICU to see students in a public hospital.

Field notes: EI119

Date of interview: 19-09-2022

Time: 11H00

Venue: Interviewed in an office in the Department of Nursing Education Private no disturbances. Worked in a private hospital emergency department during the Covid-10 pandemic. Participant looks serious, stressed, traumatized but talks with a kind controlled voice. Shared own personal loss during Covid before recording started. Family centered care and communication with and for the dying patient bothered him a lot. I felt extremely sad after the interview.

Interview 037

Field Notes:

1. Interviewed at hospital in her office
2. Private, no disruptions
3. Was transferred to the hospital during Covid-19
4. Met with a high level antagonism towards hospital managers from nursing staff due to the managerial style of the previous manager. CCMA had a permanent representative on site. Nehawu prominent and active.
5. Had to understand to the Hindi-culture of the community and staff quickly
6. Calm, and pragmatic, did get emotional when allocation of resources were discussed. Requested for recording to be stopped. Insisted to continue with the interview. Information presented as non-recorded information.
7. 'This is a GOOD Nurse' my own thoughts....

Interview 025

Field Notes:

1. NSM at a private hospital
2. PhD in nursing education
3. Did shifts as an ICU qualified nurse during Covid in ICU whenever possible
4. Made lots of notes prior to interview
5. Interviewed in hospital boardroom, private, no interruptions
6. A good hands-on nurse....my thoughts

Interview 032

Field Notes:

1. NSM at a major trauma private hospital (600 staff)
2. Energetic
3. Resilient
4. Pragmatic



Delphi- survey: Round 2

Verification of statements to be included in a competency based programme on disease outbreaks

Participant Verification Code:

Rating Scale:

1 = not relevant and should be deleted

2 = item needs major revision

3 = relevant but need minor revision

4 = very relevant

Domain 1: Preparation for and Mode of Delivery of the Programme: This domain focuses on structuring the programme delivery and readiness aspects before a disease outbreak, including debriefing sessions , programme format , and competency assessment methods .					
	Statement	1	2	3	4
1	Attend mandatory debriefing sessions before initiating the programme to reflect on past outbreak experiences				
2	Deliver the programme in hybrid format, combining different methods of presentation				
3	Evaluate competence through a semi structured portfolio of evidence				
Domain 2: Human Resources: This domain addresses staffing, training, financial consideration, role clarification of community members including nurse protection strategies during both outbreak and non-outbreak periods.					
	Statement	1	2	3	4
4	Evaluate nursing resources during non-disease and disease outbreak periods				
5	Justify the necessity for developing specialist nurses for disease outbreaks				

6	Create strategies for building a future outbreak management workforce				
7	Discuss protective measures for nurses' physical and psychological wellbeing				
8	Develop strategies to train all nurse categories in basic life support procedures				
9	Explain the roles of healthcare providers and community members during disease outbreaks				
Domain 3: Community Profiling and Resource Identification: This domain involves the assessment of a community , identifying of resources , supporting of vulnerable groups , recruiting of volunteers during outbreaks, and gaining of trust of the community					
	Statement	1	2	3	4
10	Conduct and compile a comprehensive community profile				
11	Identify physical, material resources, strengths and limitations within the community				
12	Develop measures to manage and support vulnerable persons during disease outbreaks such as the elderly				
13	Recruit volunteers from the community to perform non-medical tasks during disease outbreaks				
14	Create plans to increase community trust and involvement in care during non-disease outbreak periods				
Domain 4: Preparation of the Infrastructure: This domain focusses on optimizing existing infrastructure, establishing movement pathways , and forming resource management committees during disease outbreaks					
	Statement	1	2	3	4
15	Develop strategies to optimize existing infrastructure during disease outbreaks				
16	Recognize ergonomic challenges within the healthcare environment e.g. ward layout, isolation rooms, and air conditioning systems				
17	Identify safe pathways for movement, considering the living, dying and deceased				
18	Establish an Infrastructure and Resource Committee comprising of representatives from various sectors to coordinate and plan infrastructure related requirements				
Domain 5: Financial Management: This domain concentrates on identifying the financial implications of a disease outbreak, preventing of resource wastage , and optimize resource allocation during disease outbreaks					
	Statement	1	2	3	4
19	Assess the cost implications of a disease outbreaks				
20	Formulate plans to prevent unnecessary expenditure of financial resources				

21	Devise strategies for the allocation of financial resources				
Domain 6: Physical Demands during a Disease Outbreak: This domain addresses strategies for maintaining physical health, managing patient care demands, and recognizing ergonomic challenges during disease outbreaks					
	Statement	1	2	3	4
22	Create strategies to promote self-care mindfulness amidst a disease outbreak				
23	Develop measures to minimize the intense physical impact on nursing staff during disease outbreaks				
Domain 7: Precautionary Measures and Clinical Practice during non-disease and Disease Outbreak periods: This domain concentrates on enhancing clinical skills , multi-disciplinary team compliance, revising of infection prevention and control and precautionary principle as required, reinforcement of standard precautions , managing critical care equipment , appropriation of PPE , managing changes , revision of protocols, contingency of non-outbreak related care, problem solving skills , ethical challenges, as well as acknowledging learning opportunities during disease outbreak scenario's					
	Statement	1	2	3	4
24	Establish plans to empower and enhance the clinical confidence of multidisciplinary teams				
25	Review and update infection prevention and control principles as required				
26	Revise the principle of precaution as required				
27	Update standard precautions accordingly				
28	Equip all nursing categories with essential skills for caring for critical ill patients within their scope of practice				
29	Manage critical care equipment including storage, cleaning, disinfections and operation				
30	Manage appropriate disease related PPE				
31	Develop a plan to support staff in adapting to changes in clinical routines				
32	Create measures to ensure sustained compliance with routine and demanding tasks over prolonged periods				
33	Develop skills to managing death and dying situations				
34	Enhance problem solving and ethical decision making abilities				
35	Develop and revise existing protocols and guidelines				
36	Maintain a consistent and acceptable level of care for both infected and non-infected patients during a crises				
37	Reflect on learning opportunities during disease outbreaks				

Domain 8: PPE Management : This domain revolves around understanding different PPE items , securing PPE integrity , acknowledging PPE indications and limitations , improvising measures to secure PPE, application of PPE in different settings , and identification of PPE training opportunities during outbreak and non-disease outbreak periods					
	Statement	1	2	3	4
38	Understand the indications and limitations of each PPE item e.g. reuse of face masks				
39	Demonstrate competence in managing PPE as appropriate				
40	Safeguard the integrity of in use PPE				
41	Demonstrate methods of procuring and storing of PPE				
42	Manage PPE in low and middle-resource settings				
43	Plan strategies to facilitate learning opportunities for healthcare workers on PPE management and precautionary measures				
Domain 9: Interpersonal Skills During Disease Outbreaks: This domain focuses on understanding human behavior during a disease outbreak, trust behavior, the value of debriefing , proving support in stressful situations, engagement with communication initiatives and challenges, enhancement of compliance and addressing noncompliant behavior, clarify roles during multidisciplinary ethical decision making as well as navigation of technology for the purpose of effective communication, as well as plans to re-integrate into society after a disease outbreak					
	Statement	1	2	3	4
44	Explain human (staff and public) behavior and reactions during disease outbreaks (intimidation, bullying, mistrust, fear)				
45	Develop stratifies to foster trust amongst colleagues and the public				
46	Facilitate frequent debriefing sessions for healthcare workers, patients and families				
47	Provide care for terminally ill individuals in diverse circumstances				
48	Utilize various communication techniques before, during and after disease outbreaks				
49	Develop skills to address noncompliance among healthcare providers and patients during disease outbreaks				
50	Foster skills to support compliance among healthcare providers and patients during disease outbreaks				
51	Develop ethical reasoning skills for multidisciplinary decision-making				
52	Communicate inclusively using various mediums during a disease outbreak				
53	Access communication mediums with available resources				

54	Develop plans for managing high volumes of information				
55	Communicate effectively with diverse groups during a disease outbreak				
56	Handle large volumes of changing information				
57	Develop skills to convey sensitive information to family members and staff e.g. the death of a colleague				
58	Demonstrate care through diverse communication methods e.g. a personal introduction note on your hazmat suit				
59	Navigate various technologies e.g. electronic data capturing programmes				
60	Develop plans to reintegrate into society after a disease outbreaks				
Domain 10: Intrapersonal Skills during Disease Outbreak: This domain is emphasizing on coping strategies, self-care, and decision making					
	Statement	1	2	3	4
61	Engage in frequent individual debriefing sessions during disease outbreaks				
62	Cultivate effective intrapersonal intelligence skills (personal assessments of thoughts, emotions, strengths, weaknesses, and building mental models for life decisions)				
63	Demonstrate proficiency in delivering effective change management skills				

Comments	

Thank you.

APPENDIX Q

Validation Tool for the Competency Based Disease Outbreak Management Programme

The modules and content topics are presented in the tables below aligned with the three design principles to be validated.

An explanation of the design principles are presented below:

- **Alignment** refers to the degree by which the content is aligned with the learning outcomes.
- **Relevance** refers to the degree by which the content is relevant to the title of the module and the programme as a whole.
- **Feasibility** refers to what extend the credit allocation and volume of work is feasible for implementation

Module 1. The Dynamic Landscape of Controlling Disease Outbreaks	Alignment		Relevance		Feasibility	
	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not acceptable (0)	Acceptable (1)	Not acceptable (0)
1.1 Disease outbreak terminology						
1.2 Risk assessment						
1.3 Legislation and disease outbreaks						

Comments: (You are requested to justify your scores as it provides guidance for changes to the module)

Module 2. Ethical Challenges during Disease Outbreaks	Alignment		Relevance		Feasibility	
	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)
2.1 Ethical implications of disease outbreaks						
2.2 Multidisciplinary approach to ethical challenges						
2.3 Moral distress						

Comments: (You are requested to justify your scores as it provides guidance for changes to the module)

Module 3. Human Behaviour and Communication Strategies	Alignment		Relevance		Feasibility	
	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)
3.1 Human behaviour during disease outbreaks						
3.2 Managing human behaviour						
3.3 Debriefing opportunities						
3.4 Inter collegial trust						
3.5 Communication strategies						
3.6 Emergency Information Management						
3.7 Digital Information Literacy						

Comments: (You are requested to justify your scores as it provides guidance for changes to the module)

Module 4. Human Resources	Alignment		Relevance		Feasibility	
	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)
4.1 Resource analysis and profiling						
4.2 Self-protection resilience and well-being						
4.3 Social reintegration						
4.4 Expanded human resources during disease outbreaks						
4.5 Recruitment of community members						

Comments: (You are requested to justify your scores as it provides guidance for changes to the module)

Module 5. The Community	Alignment		Relevance		Feasibility	
	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)
5.1 Knowing your community						
5.2 Nonhuman resources						
5.3 Vulnerable populations						

Comments: (You are requested to justify your scores as it provides guidance for changes to the module)

Module 6 Infrastructure Management	Alignment		Relevance		Feasibility	
	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)
6.1 Collaborative role identification						
6.2 Optimizing Infrastructure						
6.3 Ergonomic redesign during disease outbreaks						

Comments: (You are requested to justify your scores as it provides guidance for changes to the module)

Module 7 Financial Management	Alignment		Relevance		Feasibility	
	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)
7.1 Financial planning						
7.2 Responsible management of financial resources						

Comments: (You are requested to justify your scores as it provides guidance for changes to the module)

Module 8: Clinical Practice and Precautionary Measures	Alignment		Relevance		Feasibility	
	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)
8.1 Clinical Outsourced Skills						
8.2 Care for the dying and deceased						
8.3 Revision of clinical practice standards						
8.4 Surge Capacity						
8.5 Enhancing clinical resilience						
8.6 Coping in the unpredictable clinical platform						

Comments: (You are requested to justify your scores as it provides guidance for changes to the module)

Module 9: Personal Protective Equipment (PPE)	Alignment		Relevance		Feasibility	
	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (1)
9.1 PPE differentiation						
9.2 Building confidence in PPE practice						
9.3 Physical challenges						
9.4 Availability of PPE						
Total						

Comments: (You are requested to justify your scores as it provides guidance for changes to the module)

Module 10. Sustainable Disease Outbreak Education and Training	Alignment		Relevance		Feasibility	
	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)	Acceptable (1)	Not Acceptable (0)
10.1 Programme development						
10.2 Surge capacity awareness						
10.3 Real-time teaching and learning during disease outbreaks						
10.4 Distribution of evidence based information						

Comments: (You are requested to justify your scores as it provides guidance for changes to the module)



DEVELOPMENT OF COMPETENCY BASED PROGRAMME ON THE MANAGEMENT OF DISEASE OUTBREAKS

Dear Colleague,

My name is Linette Engelbrecht, I am an infection prevention and control nurse and I am currently registered to read for a PhD at the University of the Witwatersrand. I am hoping to complete a research project for the development of a competency based programme on the management of disease outbreaks.

I hereby invite you as an expert in the field to validate the competency based programme on disease outbreaks. You will be provided with a consent document, demographic document, programme outline, curriculum matrix and a validation tool.

Participation in the validation process is completely voluntary. Due to the need to contact you, I would kindly request that you provide personal details on the check list that will be presented to you. As you are an acknowledged expert in the area under study, you will appreciate that your anonymity will be compromised. However, I undertake to ensure that no identification of your personal information will be given in reporting on your opinions so as to ensure your confidentiality.

If you consent to be part of this study, please complete the attached consent form and return it to me via e-mail. I appreciate that you will derive no direct benefit from participating.

The appropriate people and research committees of the University of the Witwatersrand have approved the study and its procedures.

Thank you for taking the time to read this information letter. Should you require any further information regarding your rights as a study participant you are free to contact me in the Department of Nursing Education, area 261 / 4 or at the telephone number listed below.

Yours sincerely,

Linette Engelbrecht

Cell phone: 072 120 7692

E mail: linette.engelbrecht@wits.ac.za

UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG



CONSENT DOCUMENT FOR EXPERTS TO BE INCLUDED IN THE VALIDATION
GROUP OF THE STUDY: DEVELOPMENT OF A OF COMPETENCY BASED
PROGRAMME ON THE MANAGEMENT OF DISEASE OUTBREAKS

I, (please print name) give permission to be included in the study.

I have read with understanding the content of the information sheet and I have been given
the opportunity to ask questions I might have regarding the procedure and my consent to
my being included in the study.

Date

Signature



Programme Outline for Validation of a Disease Outbreak Management Programme

1.0 INTRODUCTION

The aim of this competency based programme is to develop nurses' competence in disease outbreak management in an attempt to increase the surge capacity on the clinical platform, based on the data from the research study.

2.0 PROGRAMME DESIGN

2.1 Programme Objectives

The objectives of the programme is to support the nurse to:

- Demonstrate competence in disease outbreak nursing through specific precautionary and problem solving clinical, technical, ethical and administrative skill development strategies.
- Demonstrate competence in dealing with people by leading others, enhancing communication and influencing multidisciplinary teamwork during disease outbreaks.
- Demonstrate competence in self-management during a disease outbreak.
- Demonstrate competence in the application of evidence-based judgement and critical thinking in ill-defined and unstructured environments.

2.2 Module Outline

The contents of the programme has been identified through various data collection methods in the study that included:

- A scoping review
- In-depth interviews with the multi-disciplinary team
- In-depth interviews with nurses, and
- A Delphi survey that included specialist in nursology.

Each module including the content topics is presented below:

Module 1: The Dynamic Landscape of Controlling Disease Outbreaks

- Disease outbreak terminology
- Risk assessment
- Legislation and disease outbreaks

Module 2: Ethical Challenges during Disease Outbreaks

- Ethical implications of disease outbreaks
- Multidisciplinary approach to ethical challenges
- Moral distress

Module 3: Human Behaviour and Communication Strategies

- Human behaviour during disease outbreaks
- Managing destructive behaviour
- Debriefing opportunities
- Inter-collegial trust
- Communication strategies
- Emergency information management
- Digital information literacy

Module 4: Human Resources

- Resource analysis and profiling
- Self-protection resilience and well-being
- Social reintegration
- Expanded human resources during disease outbreaks
- Recruitment of community members

Module 5: The Community

- Knowing your community
- Nonhuman resources
- Vulnerable populations

Module 6: Infrastructure Management

- Collaborative role identification
- Optimizing infrastructure
- Ergonomic re-design during disease outbreak

Module 7: Financial Management

- Financial planning
- Responsible management of financial resources

Module 8: Clinical Practice and Precautionary Measures

- Clinical outsourced skills
- Care of the dying and deceased
- Revision of clinical practice standards
- Surge capacity
- Enhancing clinical resilience
- Coping in the unpredictable clinical platform

Module 9: Personal Protective Equipment (PPE)

- PPE differentiation

- Building confidence in PPE practice
- Physical challenges
- Availability of PPE

Module 10: Sustainable Disease Outbreak Education and Training

- Programme development
- Surge capacity awareness
- Real-time teaching and learning during disease outbreaks
- Distribution of evidence-based information

2.3 Credit Allocation

The credit allocation per module is presented below.

Module	Credit Allocation
Module 1. The Dynamic Landscape of Controlling Disease Outbreaks	5.0
Module 2. Ethical Challenges during Disease Outbreaks	5.0
Module 3. Communiatiion Strategies	12.0
Module 4. Human Resource Management	10.0
Module 5. Community Care and Resources	6.0
Module 6. Infrastructure Management	4.0
Module 7. Financial Management	4.0
Module 8. Clinical Practice and Precautionary Measures	10.0
Module 9. Presonal Protective equipment (PPE)	8.0
Module 10. Sustainable Disease Outbreak Education and Training	6.0
Total Credits	70.0

2.4 Level of Competence

The allocation of the level of competence is based on the stages of competence as described by Benner in 1982. A description of each level is included below.

Stage 1: Novice. The person has no knowledge nor experience, displays no clinical confidence, and requires constant coaching to perform the task over an extended period of time.

Stage 2: Advanced Beginner. The person is referred to as 'marginally' acceptable during the performance of the task, with knowledge that is being developed as the task is performed. The person had experience in similar clinical context, is efficient in some aspect of the skill, and requires occasional guidance and performs in or outside an acceptable time frame.

Stage 3: Competent. The person has experience in similar clinical situations, performs with confidence in a coordinated fashion, and demonstrates efficiency. The person understands the challenge (problem) in abstract and analytical terms, and plans deliberately to solve that problem, perform the task. The skill is completed within the acceptable time frame and she needs no support in completing the task.

Stage 4: Proficient. The person contextualize the task within the holistic sphere and understands the value it brings to the whole. She can modify her performance to accommodate the unexpected based on previous experience and can identify critical indicators within the task based on the changing environment, which demands high-level decision-making skills.

Stage 5: The Expert. The person has a comprehensive understanding of the problem, is quick to assess a situation, has fluid and precise performance and can perform within the unknown due to her ability to be highly analytical (Benner, 1984).

2.5 Curriculum Matrix

The curriculum matrix for review is provided as a separate document.

-END OF PROGRAMME OUTLINE-

APPENDIX

UNIVERSITY OF THE
WITWATERSRAND
JOHANNESBURG



Private Bag 3 Wits, 2050
Fax: 027117172119
Tel: 02711 7172076

Reference: Mrs Sandra Benn
E-mail: sandra.benn@wits.ac.za

03 January 2022
Person No: 773909
TAA

Mrs L Engelbrecht
PO Box 1200
Albertonnoord
1449
South Africa

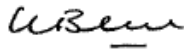
Dear Mrs Linette Engelbrecht

Doctor of Philosophy: Change of title of research

I am pleased to inform you that the following change in the title of your Thesis for the degree of **Doctor of Philosophy** has been approved:

From: **The Development of a Continuous Professional Development Program for Specialist Nurses to Enhance Surge Capacity During Disease Outbreak Events.**
To: **The Development of a Competency-based Program for the Management of Disease Outbreaks.**

Yours sincerely



Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences