# WOUND ASSESSMENT AND PATIENTS' KNOWLEDGE OF WOUND CARE AT A RURAL COMMUNITY HEALTH CENTRE IN THE BOJANALA DISTRICT, RUSTENBURG.

BY

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in partial fulfilment of the requirements for the degree of

Master of Science in Nursing

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## CANDIDATE'S DECLARATION

I, Millicent Johannah Thandi Mokgethi, declare that this course work is my own unaided work. It is being submitted for the Degree of Master of Science in Nursing at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other university.

Millicent Johannah Thandi Mokgethi

30th day of October 2019

Protocol number M170806

## DEDICATION

To the almighty God, who carried me through and gave me strength, wisdom, courage and support to complete this research project.

and

IN MEMORY OF MY LATE MOTHER

EILEEN MOTLAGAE MAKATU

1941–1969

## ACKNOWLEDGEMENTS

**Your word is a lamp to my feet and a light to my path**. ~Psalm 119:105

I would like to express my deep gratitude to Dr A.M.Tshabalala, my research supervisor, for her patient guidance, encouragement and useful critiques of this research work.

I am indebted to my study site and all participants in the Bojanala District of North West for their support, willingness to assist and cooperation during my research.

To my family. Dr.Kebalepile Mokgethi, for the support and encouragement that helped brighten my career and professional life, you influenced me to become the very best version of myself. My sons, Tumelo Mokgethi and Kebaabetswe Mokgethi, for their understanding and unfathomable support throughout my study, I will forever be grateful.

## ABSTRACT

Purpose of the study: The study sought to establish, describe the types and status of managed wounds, as well as the patient knowledge regarding factors that had an impact on wound healing in a rural community healthcare centre in Bojanala District, Rustenburg.

**Methods:** A cross sectional descriptive and correlational design was applied. The anticipated sample was 105 (n=105), however the Bates-Jensen Wounds Assessment Tool (BWAT) was used for data collection on a conveniently realised sample of 93 (n=93) participants. Descriptive data analysis of the participants' demographic data, types and status of wounds was conducted. In addition, multi linear regression analysis was used to determine the correlation between age, lifestyle habits and the presence of chronic disease with wound healing. Furthermore, quantitative data analysis was used to analyse participants' knowledge on wound care and healing.

**Results:** The response rate was 88.6% (n=93). A total of 122 wounds were assessed, of which 78.5% presented with only one wound. The findings revealed eight different wound types, with acute wounds being the most prevalent (79.6%). Of the wounds assessed, 31.2% were trauma wound types affecting predominantly 55.2% males and 44.8% females; the majority of wounds were small, not more than 4sq cm. The prevalence of pressure ulcers was only 4.30% with the sacrum being the common area mostly affected; a bloody type of exudate was noted in 40.9% of the participants. The majority of participants in the current study reported good lifestyle habits, as manifested by 70% and 75.3% respectively, not indulgent in alcohol or smoking habits. The results showed that hypertension, followed by HIV were the common chronic diseases affecting participants (34.4% and 18.7% respectively), with very few (37.6%) taking prescribed medications. Multi linear regression established a statistical significance in the scores of age ($p>0.025$), type of wound ($p>0.002$) and duration of wounds ($p>0.001$), predicting wound healing.

Regarding knowledge of wound care, 70% of the participants responded correctly to wound healing questions, despite their poor level of education. The common wound care practice of cleaning wounds was salted water, used by the majority (57.1%) of participants. Unsatisfactory and not evidence-based practices were noted in very few (10.2 %) participants.

**Recommendations**: Some of the recommendations from this study were firstly to develop a research-based pre-test and post-test training programme on nurses' knowledge of wound assessment criteria and process; secondly, development of a research-based pilot project of wound intervention strategy for patients with chronic wounds; thirdly, to develop guidelines for strengthening of infection control policies as the researcher has observed the nonexistence of policy guidelines on wound management in the district where the study was conducted.

**Conclusion:** The participants were predominantly males. The majority of participants reported a good lifestyle neither smoking nor using alcohol, whilst a minority of slightly more than 30% reported having chronic diseases. The most common reported chronic disease in this study was hypertension. Most of the participants presented with one wound and the lower leg category seemed to be the most common area afflicted. The findings furthermore showed a statistical significance in the scores of age ($p>0.025$), type of wound ($p>0.002$) and duration of wounds ($p>0.001$), predicting wound healing. In addition, the results showed that almost 50% of the participants indicated they were never given information on how to care for their wounds.

**Key words:** Wound assessment; patients' knowledge of wound care; community health centre.

## TABLE OF CONTENTS PAGE


DECLARATION ii

DEDICATION iii

ACKNOWLEDGEMENTS iv

ABSTRACT v

TABLE OF CONTENTS vii

LIST OF FIGURES xii

LIST OF TABLES xii

NOMENCLATURE xi

**CHAPTER 1 OVERVIEW OF THE STUDY**

1.1 INTRODUCTION TO THE STUDY 1

1.2 BACKGROUND OF THE STUDY 1

1.3 PROBLEM STATEMENT 3

1.4 RESEARCH QUESTION 3

1.5 PURPOSE OF RESEARCH 4

1.6 RESEARCH OBJECTIVES 4

1.7 SIGNIFICANCE OF THE STUDY 4

1.8 RESEARCH ASSUMPTIONS 4

1.8.1 Meta-theoretical assumptions 5

1.8.2 Theoretical assumptions 6

1.8.3 Methodological assumptions 8

1.9 ETHICAL CONSIDERATIONS 10

1.10 ORGANISATION OF THE CHAPTERS 10

1.11 CONCLUSION 11

**CHAPTER 2 LITERATURE REVIEW**


2.1 INTRODUCTION 12

2.2 SYNOPSIS OF WOUNDS 12

2.2.1 Categories of wounds 12

2.2.1.1 Acute wounds 12

2.2.1.2 Chronic wounds 13

2.2.2 Causes of acute and chronic wounds 15

2.2.3 Prevalence and Incidence of wounds 15

2.2.3.1 Demography 16

2.2.3.2 Community setting 19

2.2.4 Wound healing 20

2.2.5 Barriers to wound healing 22

2.2.5.1 Clinical barriers 23

2.2.5.2 Psychosocial barriers 29

2.2.5.3 Educational barriers 32

2.2.5.4 Professional/organisational barriers 34

2.3 WOUND ASSESSMENT 36

2.3.1 Benefits of wound assessment 37

2.3.2 Criteria of Wound Assessment Tool (WAT) 37

2.3.3 Procedure for selection of Wound Assessment Tool (WAT) 39

2.3.4 Tools used 40

2.4 PATIENT KNOWLEDGE OF WOUND CARE 41

2.5 SUMMARY 41

## CHAPTER 3 RESEARCH DESIGN AND METHODS


3.1 INTRODUCTION 43

3.2 RESEARCH PURPOSE AND OBJECTIVES 43

3.3 RESEARCH SETTING 43

3.4 RESEARCH DESIGN 44

3.4.1 Cross Sectional Design 44

3.4.2 Descriptive and Correlation Research 45

3.5 RESEARCH METHODS 46

3.5.1 Population, Sample size and Sampling 47

3.5.2 Data Collection 47

3.5.2.1 Data Collection Instrument 47

3.5.2.2 Validity and reliability of the instrument 49

3.5.3 Data Collection Process 50

3.5.4 Data analysis 51

3.6 ETHICAL CONSIDERATIONS 51

3.6.1 Institutional Approval 52

3.6.2 Participants 52

3.7 SUMMARY 52


## CHAPTER 4 RESULTS AND DISCUSSION


4.1 INTRODUCTION 53

4.2 DATA ANALYSIS PROCESS 53

4.3 PRESENTATION OF THE FINDINGS 53

4.3.1 Section A: Demographic results 55

4.3.1.1 Age 55

4.3.1.2 Gender 56

4.3.1.3 Education level 56

4.3.1.4 Occupation 56

4.3.1.5 Smoking and alcohol habits 57
4.3.1.6 Comorbidities 58
4.3.1.7 Anthropometric measures and nutritional status 59
4.3.2 Wound Assessment Results 60
4.3.2.1 Wound data 61
4.3.2.2 Wound characteristics 63
4.3.3 Patient knowledge 69
4.3.3.1 Knowledge regarding wound care 69
4.3.3.2 Knowledge regarding wound healing 71
4.4 DISCUSSION OF RESULTS 73
4.4.1 Demographic data 73
4.4.1.1 Age and gender 73
4.4.1.2 Education and employment 74
4.4.1.3 Smoking and alcohol habits 74
4.4.1.4 Comorbidities 75
4.4.1.5 Anthropometric measures and nutritional status 76
4.4.2 Wound assessment 77
4.4.3 Correlation 81
4.4.4 Participants' knowledge regarding wound care 83
4.5 CONCLUSION 85

**CHAPTER 5 SUMMARY, MAIN FINDINGS, RECOMMENDATIONS, LIMITATIONS AND CONCLUSION**

5.1 INTRODUCTION 86
5.2 SUMMARY OF THE STUDY 86
5.3 SUMMARY OF THE FINDINGS 87
5.3.1 Demographic, lifestyle and comorbidities 87
5.3.2 Types and Status of Wounds 88
5.3.3 Correlation between Age, Lifestyle Factors and Comorbidities to Wound Healing 89
5.3.4 Patient knowledge of wound care 89
5.4 LIMITATIONS OF THE STUDY 89
5.5 RECOMMENDATIONS 90
5.5.1 Recommendation for nursing education 90
5.5.2 Recommendation for research 90
5.5.3 Recommendation for nursing practice 90
5.6 CONCLUSION 91

REFERENCES 92

APPENDIX A Ethical Clearance Certificate. Human Research Ethics Committee (HREC) 102
APPENDIX B Approval of title 103
APPENDIX C Institutional approval 104
APPENDIX D Approval for instrument use 105
APPENDIX E Data collection instrument 106
APPENDIX F Participant information letter 113
APPENDIX F1 Consent form for participants 115
APPENDIX G Participant information letter for children 116
APPENDIX G1 Assent for minor 118
APPENDIX G2 Informed consent form for parents to allow the child to take part in the research study 119
APPENDIX H Editing certificate 120

## NOMENCLATURE

| | |
|---|---|
| **AWM** | Applied Wound Management |
| **BMI** | Body Mass Index |
| **BWAT** | Bates-Jensen Wound Assessment Tool |
| **DFU** | Diabetic Foot Ulcer |
| **HIV** | Human Immunodeficiency Virus |
| **IQR:** | Interquartile Range |
| **NWAF** | National Wound Assessment Form |
| **LU** | Leg Ulcer |
| **PU** | Pressure Ulcer |
| **VLU** | Venous Leg Ulcer |
| **WHO** | World Health Organization |

## LIST OF FIGURES


| | | PAGE |
|---|---|---|
| 4.1 | Age distribution of participants | 54 |
| 4.2 | Smoking habits of participants | 56 |
| 4.3 | Alcohol consumption of participants | 56 |
| 4.4 | Total number of wounds | 61 |
| 4.5 | Frequency of types of wounds | 61 |
| 4.6 | Comorbidities for participants with leg ulcers | 82 |
| 4.7 | Comorbidities for participants with pressure ulcers | 83 |


## LIST OF TABLES

**TABLE**


| | | PAGE |
|---|---|---|
| 1.1 | Summary of data analysis | 10 |
| 4.1 | Gender | 55 |
| 4.2 | Education level of participants | 55 |
| 4.3 | Occupational level of participants | 55 |
| 4.4 | Comorbidities of participants | 57 |
| 4.5 | Anthropometric measures and nutritional status | 59 |
| 4.6 | Location of wounds | 60 |
| 4.7 | Duration of wounds | 62 |
| 4.8 | Wound size | 62 |
| 4.9 | Wound depth and edges | 63 |
| 4.10 | Undermining | 64 |
| 4.11 | Necrotic tissue type and necrotic tissue amount | 64 |
| 4.12 | Exudate type | 65 |
| 4.13 | Skin colour surrounding the wound | 66 |
| 4.14 | Peripheral tissue oedema and peripheral tissue induration | 66 |
| 4.15 | Granulation and epithelialisation | 67 |
| 4.16 | Frequency of dressings | 68 |
| 4.17 | Knowledge of care | 69 |
| 4.18 | Information regarding wound care | 69 |
| 4.19 | Information about where participants obtained advise about wound care | 70 |
| 4.20 | Knowledge of wound healing | 71 |
| 4.21 | Knowledge of what promotes wound healing | 71 |
| 4.22 | Knowledge of what can lead to poor wound healing | 71 |
| 4.23 | Knowledge on what can cause poor wound healing | 72 |
| 4.24 | Multi linear regression to determine factors associated with the scoring of the wound | 81 |

# CHAPTER ONE

## OVERVIEW OF THE STUDY

### 1.1 INTRODUCTION TO THE STUDY

The focus in this chapter is presentation of the introduction and background to the study. A summary of the research methodology as well as the definitions and ethical considerations are also presented.

Information on the extent of wound healthcare needs is important for policy making to develop a standard of care that result in timeous wound healing, thus decreasing the burden of chronic wounds. Internationally, it is estimated that 3.7 in every 1000 people are affected by a wound (Posnett et al, 2009). The cost of wound care is therefore described as a significant cost, in terms of direct healthcare service costs and staffing resources, as well as costs to the patients (Vowden and Vowden, 2009; Greatrex-White and Moxey, 2015). Graves and Zheng (2014) further stated that wound infections result in extensive operational damage as well as a decrease in value of life.

### 1.2 BACKGROUND OF THE STUDY

Wound care constitutes an important part of routine care given by health professionals. The responsibility of wound care continues to be a vital domain in nurse's clinical practice (Gillespie et al., 2014). Furthermore, best wound care practice is clinically significant in lowering the risk of bacterial infection, which delays the healing process and prevents wound closure (Posnett et al., 2009).

Results from a study conducted by Moore and Cowman (2005) showed that 68% of community nurses' time is spent on wound care. Positive wound care outcomes require total assessment of patients not just the wound, therefore wounds that are not appropriately managed result in poor wound healing and consequently in more nursing time and additional resources (Greatrex-White and Moxey, 2013). This is the case in Bojanala healthcare setting, as the researcher noted poor wound care practices.

A similar opinion associated with poor wound management and delayed wound healing was indicated by Vowden and Vowden et al. (2009) and Jarbrink et al. (2016), who stated that the disjointed nature of the available data on wound occurrence often

restricted to categories of specific wound types within single care settings, prohibited assessment of the disease burden.

Walker et al. (2014) stated that quantifying the prevalence of wound infections within the healthcare system was a challenging and complicated responsibility, which impacted on the distribution of healthcare resources towards strategies aimed at prevention and management of wounds. Similarly, the hypothesis of Posnett et al. (2009) is that to some extent, there is minimal awareness of the significance of wound care as a result of the increased focus of the literature on the epidemiology, as well as treatment costs of certain wound types, instead of focusing on the resource impact of wounds in healthcare facilities rendering wound care. Clearly, the famine of comprehensive baseline data on different wound types and status contributes to poor healthcare resource distribution. The current study's findings will therefore create a baseline data that will ensure adequate resource distribution, especially to affected rural areas.

Poor or delayed wound healing is associated with lack of clear guidelines on wound care (Greatrex-White and Moxey, 2013). Findings from a survey conducted in Finland, on the occurrence of chronic wounds, confirmed the need for standardised practice and focus on wound management as the results indicated inadequate guidance and disintegrated treatment of chronic wounds (Måkelå et al., 2010).

Another factor associated with poor wound management is lack of appropriate training and support (Coetzee et al., 2010). Findings from Coetzee et al. (2010), in a study conducted in South Africa, revealed the need for improved education on wound care, as most of the time clinicians are unsure about treatment resulting in poor wound healing outcomes. This poor understanding of best wound care management by healthcare providers deters local attempts to improve the quality of wound care management (Posnett et al., 2009).

The last aspect associated with poor or delayed wound healing is patient knowledge of wound care. Pieper et al. (2007), in a study conducted on discharge knowledge and concerns of patients going home with a wound, found that 67.1% of patients stated no one had taught them about wound care. Guo and DiPietro (2010) affirm the importance of patients' information as there are numerous factors that can interfere with the normal biological process of wound healing. The factors highlighted in Guo and DiPietro's (2010) article are poor wound oxygenation, infection, diabetes, medications, alcoholism, smoking and poor nutrition. This is crucial information that should be

included in the patient wound information. In general, poor wound care practices remain a global concern, especially in the rural community health settings as the researcher noted in the Bojanala community primary healthcare facilities. Anecdotal evidence indicates that junior nurses are given the responsibility of performing wound care practices unsupervised. Despite this, the significance of best wound care strategies remains poorly understood. Lack of skill, inadequate and inappropriate resources deters wound healing and worsens chronicity of diseases resulting in increased mortality. Successful treatment of hard to heal wounds requires a complete assessment of the patient and not only of the wound.

## 1.3 PROBLEM STATEMENT

According to Vowden and Vowden (2009), wound care rarely receives appropriate management priority, which eventually results in infections leading to significant healthcare costs and extensive functional damage manifested by poor quality of life. Greatrex-White and Moxey (2015) state that the nature of wound healing indicates the need for a wound care service that will include initial and ongoing wound assessment, as well as compiling data that will provide baseline for efficient and effective provision of the service. McDermott-Scales et al. (2009) advocate for the strengthening of community wound management services, as the worldwide increase in Type 2 diabetes and therefore the occurrence of diabetic foot ulcers result in the significant risk of mortality and morbidity.

Currently, there is no holistic or systematic approach to wound care in the Bojanala District that could provide estimates of the burden of all types and characteristics of wounds across out-patient populations at the rural clinics. Therefore, the first step would be identifying types and status of wounds, factors affecting wound healing, as well as patient knowledge on wound care and healing.

## 1.4 RESEARCH QUESTION

What is the status of types of wounds managed, factors affecting wound healing, as well as patient knowledge regarding wound care and wound healing, at the rural community health centre in Bojanala District?

## 1.5 PURPOSE OF THE STUDY

The purpose of the study was to describe the types and status of wounds managed, factors affecting wound healing, as well as patient knowledge regarding wound care and wound healing, at the rural community health centre in Bojanala District.

## 1.6 RESEARCH OBJECTIVES

The objectives of the study were to:

- Determine demographic, lifestyle-related factors and comorbidities that may affect wound healing of patients at a rural community health centre in Bojanala District, in Rustenburg.
- Describe the types and status of wounds managed at a rural community health centre in Bojanala District, Rustenburg.
- Determine patients' knowledge regarding wound care and wound healing.

## 1.7 SIGNIFICANCE OF THE STUDY

The researcher strongly believes that the results of the current study of the characteristics, nature of wounds managed, comorbidities and the knowledge of patients with a wound will, in the long run, benefit the services.

Firstly, the results could be used to motivate for a standardised wound assessment process and for a pilot project of wound intervention strategy. Secondly, the results could be used to develop guidelines for the strengthening of policies on infection control as well as developing best practice in wound care, as the researcher has observed poor wound management techniques that result in delayed wound healing in the clinical area.

## 1.8 RESEARCHER'S ASSUMPTIONS

Polit and Beck (2008) consider assumptions as statements or basic principles taken for granted and accepted on faith that they are true without them being tested or verified. Assumptions can therefore be recognised as non-evidenced ideas. Meta-theoretical, theoretical, as well as methodological statements are presented to reflect the researcher's paradigmatic perspective influencing the study.

### 1.8.1 Meta-theoretical assumptions

Meta-theoretical assumptions are defined by Grove, Burns and Grey (2013) as formal systems used to give a description of the structure of other systems. There are four main concepts in the discipline of nursing which are defined as follows:

- **Human being**

A unique individual in unity and integrity, feeling, believing, thinking and whole system. In this study 'human being' refers to all participants enrolled in the study, presenting with a wound at the rural clinic in Bojanala district, healthcare providers, as well as the participants' significant others.

- **Environment**

Environment refers to where the person is constantly and actively involved. The concept can be internal as well as external. The external environment has three aspects, namely preconceptual, operational and conceptual qualities of the human being (Levine, 1991). The internal environment has three aspects, namely the physiologic, mental and spiritual qualities of the human being.

The first aspect of the external environment, being the preconceptual environment, refers to the human being responding to stimuli using senses. In this study, sight, smell, touch and hearing will be significant for assessments of wounds. Sight for inspection of the wound and general appearance of the participant, smell of the bad odour from the wound exudate, touch to reassure the patient, as well as determining pitting oedema, and hearing involves listening and responding to the feedback throughout the data collection process. The second aspect, being operational environment, involves invincible areas such as bacteria, which in this study will be the wound area. It also refers to the therapeutic environment created in the wound care area. The last aspect of the external environment, which is the conceptual environment, involves interaction by communication, which in the study may be through wound assessment, obtaining medical history, providing health education and medical prescription. The health status of all human beings is influenced by both the external and internal environmental aspects.

- **Health**

The World Health Organization (WHO, 1948) defined health as a complete physical, mental and social well-being, and not merely the absence of disease or infirmity. For the purpose of this study, 'health' refers to all participants presenting with a wound at the clinic whose body, mind and soul are in good health and not the absence of a wound. Therefore, a holistic approach as well as best wound care practice are recommended for such patients to create a complete balance of all health aspects.

- **Nursing**

Virginia Henderson described nursing as 'helping the people (sick or well) in the performance of activities contributing to health or its recovery, that they would perform unaided if they had the necessary strength, will and knowledge;' being compassionate, helping real living people heal and providing comfort (Watson, 2010). For the purpose of this research 'nursing' refers to the wound care assessment and support rendered to all participants presenting with a wound at a rural clinic in Bojanala district. Ultimately, the aim is to promote healing of wounds. Patient's knowledge of wound care is crucial to ensure a comprehensive support.

### 1.8.2 Theoretical assumptions

Theoretical assumptions are considered theoretical variables used by the researcher in the study. The following are definitions of terms commonly used in the current study:

- Chronic wounds: Welsh (2018) refers to chronic wounds as wounds that fail to go through the normal healing phases and in which healing is therefore delayed.
- Acute wounds: have been defined as wounds where normal progression and evidence of healing can be noted within four weeks (Swezy, 2015).
- Pressure ulcers: damage affecting the skin as well as underlying tissue as a result of friction, relentless pressure, and/or shear forces (Postnett et al., 2008).
- Peri-wound area: is an area of the skin extending to 4cm beyond the wound edge (Dowsett and Allen, 2013).
- Venous leg ulcer: ulceration of the skin caused by incompetent valves in the superficial or deep perforated veins resulting in venous hypertension (Postnett et al., 2008).

- Wound healing: Jaffe and Wu (2017) described wound healing as an anabolic event requiring intake of macronutrients with carbohydrates, protein, fats, as well as water.
- Wound assessment: a procedure used to collect baseline data that determines the progress or delay in wound healing, as well as pointing out the achievements and failures of wound management decisions (Scott-Thomas et al., 2017).
- Comorbidities: Vowden and Vowden (2016) described comorbidities as more than one condition occurring with the primary disease.

The researcher supports Levine's conservation model, which is based on the idea that nursing interventions should be aimed at conserving function. The model has been linked to the current study as the conserving function can be achieved through a holistic and systematic approach to wound care and wound healing. Accurate identification and description of wound types, statuses and participant's profiles will realise the conserving function, which will result in best wound care practices and healing outcomes. The model is comprised of four major principles, namely conservation of energy, conservation of structural and personal integrity, and conservation of social integrity.

Levine's four conservation principles are defined as follows:

- Conservation of energy- preserving and balancing energy used and restored to prevent life threatening fatigue.
- Conservation of structural integrity- restoration and maintenance of the physical structure by preventing physical breakdown as well as promoting healing.
- Conservation of personal integrity- restoration and maintenance of the patient's self-worth, self-identity and recognising individuality.
- Conservation of social integrity- raising understanding of the patient's social interaction with others in the societal environment.

The recovering of the physical, mental and social well-being of human beings and all the four principles are in harmony with wound management. Conservation can be associated with homeostasis as it aims at maintaining stability of the organism through interacting and sustaining balance to health to maintain the individual wholeness. All human beings strive for conservation. The researcher becomes the conservator when the human being cannot adapt to adverse stimuli. An individual with inadequate venous tone and function is at risk of developing venous leg ulcers. The researcher as a

conservator can assist in correcting the imbalance through accurate wound assessment to improve venous function and skin integrity.

**Conservation of energy**. Proper wound care assessment would reduce clinic visits, the duration of the wound, assist in restoration of skin integrity, minimise use of energy, reduce wound care costs and be less traumatic to participants. The conservation principle can be associated with the current study as the findings will guide and direct on the relevant patient teachings aimed at best wound care practice, thus conserving energy and focusing on wound healing.

**Conservation of structural integrity.** Wound healing re-established continuity through cell growth. Accurate data collection by the researcher, through wound assessment would ameliorate wound care and accelerate wound healing, thereby preventing severe tissue damage and conserving structural integrity.

**Conservation of personal integrity.** Depression, helplessness, isolation and negative self-image are experienced mostly by patients with poor healing chronic and septic wounds. In the current study, the researcher will attempt to restore the participants' self-worth by getting it right the first time through precise and timeous wound assessment, lifestyle habits, comorbidities and patients knowledge on wound care and wound healing.

**Conservation of social integrity**. The researcher will maintain consistent and determined professional relations throughout the interaction with the participants in order to conserve social integrity. Participants adapt and preserve their energy and integrity in harmony with the external environment with which they interact. However, a human being's health will be negatively affected if unable to sustain the energy and integrity.

### 1.8.3 Methodological assumptions

Botes (1995) recognised that improved nursing practice is derived from theories formulated through research. The methodological assumptions applicable to this study are therefore based on Botes' (1995) research model. The three interrelated nursing level activities are also described in the model.

The first level refers to the environment where nursing care aims to promote, maintain and restore health, while at the same time seeking wholeness. In this study, the environment will be the research setting where the study will be conducted.

The second level is about research and theory development resulting from decisions taken by the researcher during the decision-making process. For the purpose of this research, wound assessment and data collection from all enrolled participants presenting with a wound at a rural clinic in Bojanala district, will be conducted by the researcher herself. An effective systematic approach with formulated guidelines emanating from the findings of the study, will be created to develop best wound care practices.

The third level indicates the paradigmatic perspective of the researcher. In this study, statements in meta-theoretical and theoretical assumptions are kept within the framework for wound assessment and data collection, not forgetting the conserving function as per Levine's principles. Therefore, findings of the study will give a clear perspective of quantifiable characteristics of the participants.

- **Data Analysis**

The computer statistical software package STATA version 13.1 was used for descriptive data analysis of the demographic data of the patients, type and status of wounds. Accordingly, the results have been presented as mean and standard deviation in tables.

Linear regression approach was used to determine whether smoking, poor nutrition, presence of a chronic disease had an association with poor wound healing. Multiple linear regression was also used to determine factors associated with the scoring of wounds.

Quantitative content analysis was used to quantify as well as code and categorise responses regarding patients' knowledge of wound care (Rossouw, 2005; Coe and Scacco, 2017)

**Table 1.1 A summary of the data analysis process.**

| Objective | Variable | Types of variables | Statistical test |
|---|---|---|---|
| 1. To describe the age and lifestyle-related factors and comorbidities that may have an effect on wound healing of patients at a rural community health centre in Bojanala District, in Rustenburg. | -Demographic (Age, gender, education level, occupation, chronic diseases, height and weight, BMI, Nutritional status, Medications).<br>-Habits (Smoking, alcohol) | Continuous.<br><br>Categorical. | Means and standard deviation.<br><br>Frequencies and percentages. |
| 2. To describe the types and status of wounds managed at a rural community health centre in Bojanala District, Rustenburg. | Types of wounds, status of wounds. | Categorical. | Frequencies and percentages. |
| 3. To determine patients' knowledge regarding wound care. | Patient knowledge. | Categorical. | Percentages. |

## 1.9 Ethical consideration

The purpose of research ethics is to ensure that appropriate measures are implemented to ensure the research process is not compromised, secondly to ensure institutional permission is obtained and granted and lastly, to ensure protection of the participants (Brink, van der Walt and van Rensburg, 2016).

Permission to conduct the study was obtained from the University of the Witwatersrand Post-Graduate and Human Research Ethics Committee (Appendix A and B), and the Royal Bafokeng Administration and the Research Department, for the study to be conducted in Bojanala District, Rustenburg (Appendix C). Permission was also sought and granted to use the Bates-Jensen Wound Assessment Tool (BWAT), which originated from the Pressure Sores Status Tool (PSST) (Appendix E).

All standard ethical processes aimed at respect for persons; beneficence and justice were put in place and adhered to (Brink, van der Walt and van Rensburg, 2016).

## 1.10 ORGANISATION OF THE CHAPTERS

The research report will consist of the following:

Chapter One provides an overview with the background and justification for conducting the study.

Chapter Two focuses on the literature review on wound management.

Chapter Three presents the description of the research methodology and the proposed data analysis process.

Chapter Four presents a summary of the data analysis process as well as the detailed findings of the study and the discussion.

Chapter Five provides a summary of the study, the main findings and the recommendations, limitations and the conclusion.

## 1.11 CONCLUSION

This chapter focused on the overview and background of the study, as well as the problem statement. The purpose, objectives and significance of the study were outlined.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 INTRODUCTION

This chapter provides an overview of literature on different types of wounds, the importance of wound management, wound assessment, barriers to wound healing as well as patient's knowledge to wound care. The chapter also presents the related literature and studies on the incidence and prevalence of wounds. No attempt is made to describe transmission of infection or dressing materials, as this literature can be found elsewhere, however the causes and types of wounds are briefly highlighted.

## 2.2. SYNOPSIS OF WOUNDS

Various ways of describing a wound have been established. McDermott-Scales, Cowman and Gethin (2009) defined wounds as tissue damage, which may or may not result in loss of intact skin caused by an injury. Similarly, Brown (2018) described a wound as rupture of the wholeness of the skin with development of micro-organisms.

### 2.2.1 Categories of wounds

There are two categories of wounds, namely acute and chronic wound.

#### 2.2.1.1 Acute wounds

Acute wounds have been defined as wounds where normal progression and evidence of healing can be noted within four weeks (Swezy, 2015). McDermott-Scales, Cowman, and Gethin (2009) considered acute wounds as tissue damage developing from an injury, which ultimately may or may not result in loss of intact skin. Halim, Khoo and Mat Saad (2012) recognised another spectrum that is rarely addressed is being described by subacute wounds. These authors further explained that a period between 72 hours and three months post injury should be considered a subacute period.

Halim, Khoo and Mat Saad (2012) recognised a variety of patterns of acute wounds ranging from post-traumatic abrasions, lacerations and burns to high energy explosive wounds. Nicks et al. (2010) also noted that trauma, such as burns, abrasions and lacerations give rise to acute wounds.

The Centres for Disease Control and Prevention (CDC), have defined three classifications of Surgical Site Infections (SSI), namely superficial incisional SSI with infection affecting the skin and subcutaneous layer, deep incisional SSI with tissues and muscle layer affected by infection including the superficial and the organ space, and the organ space SSI, which involves infections of all anatomical organs and spaces regardless on the type of incision.

#### 2.2.1.2 Chronic wounds

Järbrink et al. (2017) defined a chronic wound as one that has failed to heal in an orderly set of stages and timely restorative process to produce the structure and functional integrity within three months period. Situm et al's. (2014) definition is similar to that of Jarbrink et al. (2017), however Situm et al (2014) added a component of etiology and localisation; Welsh's (2018) definition is not different from the stated. In conclusion, Halim, Khoo and Mat Saad (2012) were also of the opinion that chronic wounds fail to heal in a timely manner during certain stages of wound healing, irrespective of the standard wound care, and therefore considered chronic having failed to heal within three months.

Chronic wounds represent an increased burden, not only to patients but healthcare professionals and the entire health care system (Casey, 2018). Gould et al. (2015) recognised chronic wounds as having an impact on the quality of life of the aged population in particular. Welsh (2018) associated this increasing impact with the changing demographics, older people with chronic conditions, as well as multiple comorbidities.

Situm et al. (2014) described two classes of chronic wounds, the first class being the typical class. The author explains that 95% of wounds are the typical ones, which include ischaemic, neurotrophic and hypostatic ulcers, as well as diabetic foot and decubitus ulcers. Casey (2018), Demidova-Rice, Hamblin and Herman (2018) also reported pressure ulcers, venous and arterial leg ulcers as forming part of the majority of atypical chronic wounds.

Nunan, Harding and Martin (2014), in a study on clinical challenges of chronic wounds, have highlighted the three major clinical categories of chronic wounds. These are leg ulcers which resulted from arterial or venous deficiencies (VLU or ALU), diabetic foot ulcers (DFU's) and pressure ulcers (PU's). Conversely, Jarbrink et al. (2016)

mentioned four categories, based on the Wound Healing Society on causative factors, which are, PU's, DFU's, venous ulcers and arterial ulcers. Similarly, these categories have been of interest to the researcher in determining the different types of wound at the rural community health centre in Bojanala.

- **Chronic wounds-lower extremities**

Nunan, Harding and Martin (2014), in a study on clinical challenges of chronic wounds, highlighted an incidence of 0.3%-8.3% of leg ulcers among males over the age of 85. Nunan further reported that 15% of diabetics will be affected by a foot ulcer at a later stage of life. With regards to pressure ulcers, Nunan Harding and Martin (2014) stated that these were primarily located on the sacrum and heels of 18.1% of patients with grade 1-4 PUs.

In contrast, Srinivasaiah et al. (2007) recognised 41.9% of lower leg wounds, leg and foot ulcers (n=629, 37.3%) and pressure ulcers (n=294, 17.4%). It must be noted that 15.1% of the wounds were related to diabetes and 9.7% to cancer (Srinivasaiah et al., 2007).

Sen et al. (2009) reported that 67% of patients of whom lower extremities have been amputated, had diabetes; they also noted 66% of diabetic foot ulcer recurrence rate with a 12% amputation rate rise, including subsequent ulcerations. Diseases such as diabetes and obesity are deemed 'highly branded' by Sen et al. (2009) and therefore associated with patients with chronic wounds.

Graves and Zheng (2014) conducted a systemic review on the incidence of pressure ulcers. Results from the 26 articles reviewed showed that the time period ranged from 0% (four months period) to 29% (six weeks period ) in the hospital setting, 6.3%(52 day period) to 20%(six weeks period) in the community setting, and 11.6% to 11.7% over 41 - 42 days period in the nursing home setting. The outcome of Graves's findings concluded a higher estimate on the prevalence compared to the incidence of pressure ulcers, which signifies an urgent need for appropriate and effective wound care management.

Måkelå et al. (2010), in a cross-sectional survey of the occurrence of chronic wounds within the capital region in Finland, highlighted the reported prevalence of chronic lower extremity wounds ranging between 0.04 - 1.1% in Western Europe and 0.09 - 0.8% in Finland.

### 2.2.2 Causes of acute and chronic wounds

- **Causes of acute wounds**

There are several causes of acute wounds. In the event of an infection, Brown (2018) stated that in most cases it is usually a single organism responsible for acute wound infections as opposed to several micro-organisms causing chronic wounds. Sen et al. (2009) explained that an acute wound is created every time an incision is made.

- **Causes of chronic wounds**

Poor nutrition, increased toxicity at the wound site with minimal blood flow to the wounded area resulting in inadequate oxygenation causes chronicity of wounds, especially the typical chronic wounds (Casey, 2018). Måkelå et al. (2010) is also of the opinion that the causative factor of ulceration is vascular disease, with venous insufficiency in 37-76% of cases as well as peripheral arterial occlusive disease in 9-22% of cases.

Nunan, Harding and Martin (2014) highlighted the association of >70% of leg ulcers with venous disease, which signified destruction to both the superficial and the deep venous systems of the leg resulting in venous hypertension and reduced blood flow.

Other underlying causes of leg ulcers from Nunan, Harding and Martin's (2014) review included an association between squamous cell carcinomas and chronic skin wounds, arterial disease, vasculitis and skin malignancies. Furthermore, the author found that tissues and organs affected by neuropathy and arterial damage resulted from diabetes.

Nunan, Harding and Martin (2014) also recognised that PUs were caused by a combination of direct pressure that had existed for a longer than usual time, acting in parallel to the body's surface as well as damaged skin integrity.

### 2.2.3 Prevalence and Incidence of wounds

Acute and chronic wounds affect millions of people globally. Vowden and Vowden (2009) indicated a famine in information on the prevalence and incidence of wounds. The recent systematic review on the prevalence and incidence of chronic wounds and related complications by Järbrink et al. (2016) suggested there were no dependable estimates for different care settings or categories of chronic wounds. This lack of comprehensive data on the prevalence of especially chronic wounds has been attributed by the author to undesirable assessments of the disease burden. Clearly, unavailability of data supports the need for research on different wound types.

- **Chronic wounds**

Gould et al. (2015) reported an unclear prevalence and incidence of chronic wounds, which resulted from underreporting and inaccurate diagnostic coding for wound care. The aforementioned finding seemingly indicates poor wound assessment, which supports the researcher in the study to motivate for a standardised wound process as well as a baseline data base towards developing best practice in wound care for the rural community in Bojanala district.

In an attempt to analyse the recent and previous research findings, it has been noted that most researchers have highlighted the global dearth of epidemiological data on wound care, which still remains a problematic task to date (Vowden and Vowden, 2009). Clearly, the global absence of epidemiological data has indicated a need for aggressive research that will yield better outcomes for wounded patients.

- **Acute wounds**

On highlighting the prevalence of acute wounds within the Bradford population, Vowden and Vowden (2009) in their survey reported 303 traumatic wounds of which 57.4% of women were affected. These authors echoed that hand and finger trauma affected most men of working age and under 45 years of age, whereas women were affected by lower limb traumatic wounds, with the majority of patients aged 65+. Vowden and Vowden (2009) concluded that all wounds were under a week old and not more than 5cm in surface area.

McDermott-Scales, Cowman and Gethin (2009) reported 1.7% crude point prevalence of surgical wounds, which is 32/1,854 of the total census.

#### 2.2.3.1 Demography

Upon an audit of wounds in the North-East of England, Srinivasaiah et al. (2009) reported surgical wounds (n=699, 41.5%) as the largest proportion of wounds, with 52.7% of patients treated at home.

The literature review on human skin wounds in Sen et al. (2009) revealed that the rates of surgical site infections (SSI) affect 3 - 4% of patients undergoing surgery in European hospitals, resulting in an SSI incidence ranging between <1% - ≥10% .

In the United States, hospital-acquired pressure ulcers affect 9% of hospitalised patients during the first two weeks of admission, and therefore annual treatment of 2.5 million pressure ulcers in acute care facilities have been reported by Sen et al. (2009).

With the ageing population, the authors also predict a sharp rise in the incidence of SSI in patients older than 64 years, as it is correlated to age.

According to Grave and Zheng (2014), prevalence refers to the total number of people with a chronic wound at a point in time in a specified population, with the former regarded as point prevalence and the current known as period prevalence. Grave highlighted that prevalence signified the burden of chronic wounds in a specified population.

Järbrink et al. (2016) indicated that epidemiological data on the incidence and prevalence of chronic wounds is significant for healthcare planning and resource allocation.

The incidence of chronic wounds, which is also referred to as cumulative incidence as explained by Grave and Zheng (2014), refers to a total number of people with newly developed chronic wounds over a specified period. Graves recognised that the rate of development of chronic wounds in a specified population was clearly indicated by the incidence.

Vowden and Vowden (2016) highlighted that the rise in comorbidities of the ageing population resulted in increased prevalence and incidence of wound infections, and therefore minimising wound burden through appropriate wound management techniques that promoted healing was crucial in lowering wound care costs. This is supported by Welsh (2018), who attributed this partly to the changing demographics as well as prolonged comorbidities and chronic conditions in populations resulting in a negative impact on the psychosocial health and well-being.

The literature review of Graves and Zheng (2014), on the prevalence and incidence of chronic wounds, published a vast difference on estimated findings by recent epidemiological studies. The study focused on pressure ulcers, diabetic ulcers, venous ulcers and artery insufficiency ulcers.

In attempting to analyse, Graves and Zheng (2014) highlighted the varied estimated prevalence of pressure ulcers on 38 studies researched in 11 countries from 1.1%-26.7% in hospital settings, 6%-29% in community settings, 7.6%-53.2% in nursing home settings and 13.1%-28.7% in Intensive Care Units. In terms of study density distribution to prevalence, 1.1%-9.5% prevalence was reported from 35 studies,

11.1%-18.1% from 46% of studies, and 22%-28.7% from 26% of studies in the hospital setting.

Nonetheless, Graves' findings signified the increased prevalence of chronic wounds in nursing homes settings as opposed to healthcare facilities. This finding clearly indicated and supported the need to research patient's knowledge on wound care of which the results will be used to determine effective health education programmes for wounded patients, and the appropriate distribution of resources to rural healthcare facilities.

Again, Graves' study indicated different estimated prevalence of different stages of pressure ulcer from one study to the other. A prevalence of 62% for stage I, 29% for stage II and 4% for stages III and IV was reported in a Canadian study conducted in ICU, whereas a lower prevalence of 10.5% for stage I, 11.8% for stage II, 5.2% for stage III and 1.3% for stage IV were reported in a Dutch study conducted in an ICU.

The discussed publications of Graves on PUs, conducted amongst Canadian and Dutch populations, concluded a high prevalence rate of PUs in nursing home facilities as well as stage 1 and 2 PUs in a Canadian ICU. Unquestionably, the high prevalence of chronic wounds could have been associated with the ageing population in Canada, as the researcher has reported high numbers in nursing home facilities, compared to the Dutch population where a low prevalence of 4.2% has been reported.

Graves also noted that in the United Kingdom an annual period prevalence amongst the elderly patient population in the general medical practice was between 0.31%-0.70%, and was reported as the lowest prevalence, whilst 53.3% was reported as the highest prevalence among residents in a long term care facility in Canada.

Sen et al. (2009) found that eight million Americans were affected by a circulatory disease known as peripheral artery disease, which is commonly associated with poor wound healing, and 12-20% of this population were aged 65 and older.

Research findings of Rondas et al. (2013) also highlighted a 4.2% prevalence of chronic wounds in a Dutch nursing home population. Jeya, Vaithiyanathan and Vijayaragavan (2017) reported a prevalence of 35 million diabetics in India, with 25% at risk of developing DFU.

Increased incidence of chronic wounds was markedly high in elderly people with cardiovascular diseases, as well as diabetes (Järbrink et al., 2017). Gould et al. (2015)

is also of the opinion that the aged are mostly affected by the high incidence of chronic wounds, which impact on their quality of life.

However, literature reveals a gap in understanding the correlation between age associated changes on wound healing, as well as several research questions still to be answered (Järbrink et al., 2017; Gould et al., 2015). Gould further highlighted that the basic biology concerning chronic wounds and the correlation between age-related changes on healing wounds are poorly understood.

#### 2.2.3.2 Community setting

The findings of Hopkins and Worboys (2015), in the study on establishing community wound prevalence, indicated a high 44% (*n*=119) prevalence on acute and traumatic wounds and 2.6% as other wound types. Hopkins found that 325 wounds were identified on 272 patients.

McDermott-Scales, Cowman, and Gethin (2009) found 2% crude point prevalence of self-inflicted superficial abrasions and 1.7% of surgical wounds as the most frequent wounds reported, with the duration of less than four weeks and the majority of patients being women.

Hopkins and Worboys (2015) highlighted that academic literature has revealed an absence of evidence on the wound prevalence within community settings. These authors further reported 41% on LUs, 13% on PUs, and the lowest prevalence being other wound types at 2.6% (McDermott-Scales, Cowman and Gethin, 2009).

On highlighting types of wounds, McDermott-Scales, Cowman, and Gethin (2009) in their research on prevalence of wounds in a community care setting in Ireland, found a total of 557 wounds on 290 patients; 141 wounded patients from outpatient services and 149 from inpatients units of which 76 patients had 103 pressure ulcers, which is a 4% crude point prevalence of pressure ulcers recognised. Of the 76 patients with pressure ulcers, 60 were inpatients, which is 5.9% crude prevalence, the remaining 16 were outpatients, which is a crude prevalence of 1.9%; 75% of these patients were over the age of 60.

One hundred leg ulcers were reported on 55 patients, which is 2.96% crude point prevalence of leg ulcers, with ages ranging from 24-93 years and the majority affected were women.

McDermott-Scales findings highlighted data missing for eight patients, and indicated poor epidemiological data on the prevalence of different wound types in community nursing settings. The findings of O'Brien et al. (2016), in their study exploring the prevalence and management of wounds in an urban area in Ireland, indicated 445 patients with a wound, which was a 3.7% point prevalence of wounds; the authors recognised the majority of (43%; *n*=189) patients with surgical wounds. Other wound types (12%; n=52) included pre-tibial lacerations/tears and pilonidal sinus. O'Brian cited numerous wounds (11%; n=50) that were not categorised

However, Gottrup et als'. (2013) findings on the point prevalence of acute wounds in Denmark indicated 33% (n=830) of inpatients with a wound of which 25% (n=207/830) were surgical /trauma wounds.

The wound types included in O'Brien et als. (2016) study were LUs with a prevalence of 19%, PUs with a prevalence of 10%, and DFUs with a prevalence of 5%.

Sen et al. (2009) estimated that 1-2% of the population in developed countries would be affected by a chronic wound during their lifetime. Sen further reported that 6.5 million patients in the USA have already been affected by a chronic wound.

Results of Måkelå' et als. (2010) study revealed a prevalence of 0.10% of chronic wounds in the Capital region; PUs 23%, venous ulcers 13%, diabetic 11% and unhealed operative 11%.

### 2.2.4 Wound Healing

- **Definition and Phases**

Jaffe and Wu (2017) described wound healing as an anabolic event requiring enough intake of macronutrients with carbohydrates, protein, fats, as well as water. Simon and Meyers (2018) defined wound healing as a natural curative reaction to tissue injury, whilst Chester et al. (2016) defined re-epithelialisation as ≥95% wound healing without further wound dressings required.

Guo and DiPietro (2010) and Quain and Khardori (2015) described four interrelated phases of wound healing, namely haemostasis, inflammation, proliferation and tissue remodelling. Quain and Khardori (2015) described the sequence of normal wound healing phases that differed in length with nutritional elements having a crucial role throughout the healing process. Their description of the inflammatory phase also included the haemostasis phase.

The first phase, being the *haemostasis phase* following an injury and lasting up to six days, is where a fibrin clot is created by the coagulation factors and platelets on the injured site to act as a protective barrier so as to achieve haemostasis.

Advancement to the *inflammatory phase,* according to Guo and DiPietro (2010), results from inflammatory cells migrating into the wound once bleeding is controlled. Flanagan (1996) also reported erythema, heat, oedema, functional disturbance and discomfort as clinical signs and symptoms that can be noted during the inflammatory phase.

Han and Ceilley (2017) explained the aim of the inflammatory phase being microbial destruction, as well as removal of foreign material invading the wound and also to prevent further damage.

Guo and DiPietro (2010) further explained the significance of the uninterrupted spread of neutrophils, macrophages and lymphocytes which also feature in the inflammatory phase. The authors acknowledged the cellular debris as well as microorganisms entering or infecting the wound area being destroyed by the neutrophils and the release of cytokines by macrophages triggering the inflammatory response through recruitment and activation of additional lymphocytes. The authors also explained that destruction of apoptotic cells by macrophages ultimately contributes to tissue regeneration thereby promoting transformation from the inflammatory to the proliferative phase of wound healing.

According to Quain and Khardori (2015), the *proliferative phase* follows three to five days post injury and can remain up to three weeks. This was supported by Han and Ceilley (2017) who found that the focus area of the proliferative phase is on production of collagen and ground substance forming the basis for tissue scaffold of the previously wounded area as well as fibroblasts. However, this is in contrast to Casey (2018) who reported the duration of the proliferative phase as lasting from the second through to the tenth day post injury where there is development of new tissue in the wounded area.

Literature indicates that it is during the proliferative phase, where proliferation of fibroblasts, epithelialisation, angiogenesis and formation of granulation tissue takes place resulting in migration of cells at the wound edges (Quain and Khardori, 2015; Simon and Meyers, 2018; Guo and DiPietro, 2010; Flanagan, 1996).

Granulation has been defined by Flanagan (1996) as new capillary growth formation in the wound bed supporting the development of new connective tissue. Casey (2018) also reported growth of nerve endings into the wound and poor regulation of nerve growth result in neuropathic pain post healing. Flanagan (1996) further described angiogenesis as the new development of blood vessels stimulated by hypoxic tissue caused by disturbed blood flow during the injury. Endothelial cells, as well as fibroblasts, play a significant role in supporting capillary growth, collagen and granulation tissue formation (Guo and DiPietro, 2010).

Wound healing begins by contraction of the wound, with structural changes of epidermal cells at the wound edges (Simon and Meyers, 2018; Casey, 2018). Casey further reported growth of blood vessels leading to formation of a new skin depending on the wound environment, more especially the nutrients and oxygenation from these blood vessels.

Wound healing enters the last phase, being the *remodelling phase,* two weeks post injury and may last up to two years (Quain and Khardori, 2015). Quain further highlighted that during this phase, maturation and stabilisation of collagen takes place resulting in increased tensile strength and formation of a scar. Casey (2018) highlighted retraction of blood vessels, as most of the cells have been removed from the wound.

Han and Ceilley (2017) also recognised collagen type 1 being restored in the new wound and maturation of the wound tissue resulting in restoration to the normal structure. Guo and DiPeitro (2010) concluded that most of the newly formed capillaries return to an earlier stage of life to permit vascular maturation of the wound to return to the normal state, as well as physical contraction of the wound throughout the complete healing process.

### 2.2.5 Barriers to wound healing

Historically, the concept that the wound healing process can be accelerated originated in the early 20th century (Calabrese, 2012). Notwithstanding the extent of the progress that has been recently achieved over the years, wound healing remains a challenge to healthcare professionals irrespective of knowledge level or experience (Flanagan, 2005).

Vowden and Vowden (2009), in an article on a survey of wound care provision within one English healthcare district, found that wound healing has been disregarded regardless of the increased number of people with a wound and the cost implications thereof. These authors explained that poor visibility for wounds as well as wound healing may partly emanate from minimal data on specific wound types in single care settings. Successful wound healing occurs in different phases within an acceptable time frame (Guo and DiPietro, 2010). Guo also explained that delayed wound healing results from interference of the phases with the healing process.

The undesirable effects of chronic diseases, lifestyle factors and other comorbidities as a barrier to wound healing should be considered. For the purpose of this study, four areas will be discussed, namely clinical, psychosocial, educational and professional/organisational barriers.

#### 2.2.5.1 Clinical barriers

According to Flanagan (2005), there are eight factors considered to be clinical barriers to wound healing, namely poor tissue perfusion/hypoxia, necrotic tissue, high bacterial load/infection, oedema, copious exudate/maceration, malnutrition/dehydration, and systemic conditions.

- Poor tissue perfusion

Han and Ceilley (2017) recognised the significance of both oxygen supply and oxygen tension in the wound bed. Espensen and Ahmed (2015) found that peripheral arterial diseases not only delayed wound healing but also manifested with various symptoms that remain undetected for lengthy periods in patients failing to present with advanced symptoms, more especially the ageing population. Espensen and Ahmed (2015) further acknowledged that assessment of tissue perfusion is clinically significant to successful wound healing.

Han and Ceilley (2017) found that successful wound healing requires interaction of oxygen with numerous cytokines, adequate supply to proliferating cells, as well as provision of an effector for the neutrophil respiratory burst. Notably, oxygen is essential for cell metabolism, therefore impaired healing results in wounds where oxygenation is poorly restored (Guo and Dipietro, 2010).These authors are of the opinion that long term hypoxia delays wound healing, as opposed to short term hypoxia after injury that triggers wound healing. Guo and Dipietro (2010) further indicated that impaired

vascular flow can result from various systemic conditions, such as diabetes as well as the ageing population.

Ladizinsky and Roe (2010) are of the opinion that wound healing involves sequential events that occur as a result of damaged tissue. The authors recognised that significant wound healing processes are mostly dependent on oxygen and therefore a balance of supply and demand, determined oxygen levels in wounded tissue. Notably, low oxygen supply resulted from radiation, vascular disease, or swelling, whereas increased demand of oxygen resulted from specific cells with metabolic needs at different areas within physiologic phases of wound healing (Ladizinsky and Roe, 2010). The author explained that the clinical significance of fibroblasts to have adequate oxygen levels for collagen and other extra cellular matrix molecules to be secreted, whilst angiogenesis and granulation tissue formation will be permitted to fill the wound as opposed to poor collagen deposits in hypoxic wounds, which becomes easily infected.

Han and Ceilley (2017) further estimated that a tissue oxygen tension of 20mmHg was required by a wound to heal, and therefore oxygen tensions of 5mmHg and below have been attributed to non-healing wounds.

The author's findings are however in contrast to Espensen and Ahmed (2015), as Espensen reported the full healing potential of wounds when transcutaneous oxygen pressure is between 30-40 mmHg and any $O_2$ pressure below 20mmHg resulting in poor prognosis for successful wound healing. However Ladizinsky and Roe (2010) indicated a successful below knee amputation healing rate of 11% in patients with an $O_2$ partial pressure of $< 20$mmHg at the amputation site, 46% healing at 20-30mmHg and 97% at ≥30mmHg. Ladizinsky concluded that the amount of oxygen levels in tissues determined the clinical outcome, and therefore removal of bacterial infection is facilitated by adequate oxygen supply. However, Ellis (2018) recognised that smoking throughout the healing process of a wound, delays recovery at the same time reducing the quality of healing.

- Necrotic tissue

Percival and Suleman (2015) consider necrotic tissue as a black/dark brown, hard, dry tissue that acts as a barrier to wound healing, which is no longer viable to wounds and becomes firmly attached to the wound bed. Percival further described necrotic tissue as a fibrous mass of extracellular matrix components that includes collagen, fibrinogen, elastin, fibronectin as well as chondroitin sulphate. Han and Ceilley (2017) attested

that bacterial growth will be stimulated by necrotic debris and the immune system in fighting the infection will also be compromised as a result of low oxygen tension. Literature review on slough and biofilm, in Percival and Suleman (2015), revealed development of biofilms in viable tissue with limited evidence backing up the progression of biofilms in necrotic tissue. Necrotic tissue becomes hard and dry as it dries out. Percival and Suleman (2015) attested that the necrotic tissue delays wound healing, but also noted that the true size and stage of the wound can be concealed by its presence.

- High bacterial load/infection

Dowsett and von Hallern (2017) described wound infection as invasion of the wound by proliferating bacteria inciting systemic or local response in the host. The author explained that local tissue damage as well as delayed wound healing are caused by the presence of bacteria within the wound.

Han and Ceilley (2017) also considered possible infection as the most common preventable challenge to healing of wounds. Mittal and Kumar (2014) indicated that the exposed surface for development of bacteria as well as microbial colonisation post injury, creates a warm, moist and nutritious environment which ultimately predisposes the wounded tissues to the incidence of infection. This is supported by Halim, Khoo and Mat Saad (2012), who highlighted the risk of chronic wounds being colonised as a result of prolonged opening of the wound as well as poor circulation and underlying disease processes. Critical colonisation, as explained by Halim, Khoo and Mat Saad (2012), means bacterial replication causing local tissue damage. Clearly, early identification of critical colonisation is significant as it is at this level when wound healing delay can be noted.

Coopoosamy and Naidoo (2013) recognised that fungal and bacterial organisms invading the damaged area during injury may cause increased infection levels, and those colonisation can result in delayed wound healing. Halim, Khoo and Mat Saad (2012) echoed that it becomes difficult for the host defence to control microbes at colonisation and this becomes clinically manifested by signs such as a change in the colour of the wound bed, fragile and unhealthy granulation tissue, offensive odour, high amounts of serous exudate and pain at the wound site. These authors also noted a gram of tissue with bacterial levels of $10^6$ or more as infection that impedes wound healing and that higher infection rates in wounds reconstructed during the subacute

period. Greatrex-White and Moxey (2015) associated a gram of tissue with bacterial levels of $10^6$ to any infection which might yield serious consequences for the patient if not recognised early and appropriately treated - morbidity, prolonged hospitalisation and increased costs.

Miyazaki et al. (2012) reported that Methicillin-resistant *Staphylococcus aureus* and *Pseudomonas aeruginosa* were the common bacterial infections found in burn wounds. These authors reported on the common bacterial infection, which came as an interesting fact for the researcher to correlate such bacteria with specific types of wounds. This may mark the confidence of the researcher in establishing effective and best wound care practices for the rural community of the Bojanala region through wound assessment.

Guo and Dipietro (2010) attributed poor healing of chronic ulcers to the presence of biofilms containing *P.aeruginosa,* which ultimately inactivates the effects of antibiotics in treating chronic wounds.

Postnett et al. (2009) found that best wound care practice has always been a necessity and also a management priority, since there has been a probability of bacterial infection to all wound types which prolonged the duration and deterred the process of healing, as well as wound closure.

- Oedema

Young, Hampton and Tadej (2011) recognised that patients with venous leg ulcers experience tissue oxygenation and peripheral circulation problems resulting from oedema as well as maceration of peri-wound tissue causing a considerable increase of the wound size which ultimately delays wound healing.

Romanelli, Vowden and Weir (2010) explained that any predisposing factor to causation of tissue oedema or increased capillary leakage may stimulate heavy exudate production resulting in impaired healing.

- Copious exudate

Menon (2012) described exudate as ‘wound fluid’ or ‘wound drainage.’ The author further highlighted the beneficial effects on healing that includes provision of the correct environment by the exudate to promote autolysis, cell proliferation, transportation of tissue repairing cells as well as nutrients through its fluidity. In contrast, Romanelli, Vowden and Weir (2010) defined exudate as fluid leaking from a wound, however

significant in wound healing. Exudate is also described as water that contains nutrients, proteins, electrolytes, waste products and a variety of other cells (Romanelli, Vowden and Weir, 2010; Probst ,2015).

The literature review of Romanelli, Vowden and Weir (2010) revealed that prolonged delayed healing, damaged wound bed and periwound skin problems also result from increased proteolytic activity of chronic wound exudate. The authors concluded that changes in the type of exudate clearly indicate change in status of the wound and requires re-assessment. Nonetheless, these authors noted that insufficient, overproduction of exudate as well as harmful exudate might incur problems and ultimately delay wound healing. This is supported by Probst (2015), who is also of the opinion that excessive exudate results in ongoing inflammation and delayed wound healing due to high levels of inflammatory mediators and activated matrix metalloproteinases.

Identification of comorbidities and causes of heavy exudate is significant in effective wound care management planning and therefore characteristics of wound exudate should be accurately assessed to determine the wound status, level of bacteria and the wound healing phase (Tickle, 2015). Davies, Harish and Price (2015) found that the risk of maceration which may ultimately cause the breaking down of the periwound area, thereby delaying wound healing, resulted from increased volumes of exudate.

People living with a wound may develop psychological consequences such as low self-esteem, stress, inadequate sleep and social isolation worsened by poorly managed exudate and delayed healing (Tickle, 2015). Dowsett and von Hallern (2017) recognised the heavy volumes of exudate produced by chronic wounds causing maceration of the periwound skin and the wound edge, resulting in delayed stages of healing.

- Malnutrition/dehydration

Jaffe and Wu (2017) defined malnutrition as inadequate nutritional intake resulting in impaired body tissue and weakened body functions. Saghaleini et al. (2018) found that the crucial risk factors of impaired wound healing as well as development of pressure ulcers were inadequate dietary intake as well as nutritional starvation. The inability of the body to fight against infection is worsened by malnutrition, which may therefore be

correlated with poor healing outcomes resulting in higher morbidity and mortality (Saghaleini et al., 2018).

According to Quain and Khardori (2015), the concept malnutrition includes insufficient intake, overeating, as well as deficits of specific nutrients. The authors indicated that during the proliferative healing phase, impaired fibroblasts as well as collagen synthesis result from deficiency of protein, which plays a significant role in all wound healing stages.

This is supported by Demling (2009), who also recognised that protein deficiency impedes healing of both acute and chronic wounds. Demling (2009) further explains that two components are involved in the renewal of the skin, namely cell proliferation, mostly protein synthesis and fibroblasts, and collagen from the fibroblasts. Metabolic processes in the presence of a hypermetabolic catabolic state, are fast-tracked to repair the wound after injury and therefore inadequate intake of protein post injury may result in rapid protein malnutrition.

Han and Ceilley (2017) concluded that a fine balance of numerous nutrients is significant in achieving proper wound healing. Notably, poor nutrition can adversely affect the immune system, collagen synthesis as well as the wound tensile strength, all of which play a significant role in the wound healing phases (Quain and Khardori, 2015). The authors emphasised that regardless of the different wound types and their characteristics, nutrition remains a common denominator for all the patients with a wound, as all the nutritional components play various roles in the wound healing process.

Apart from calories, Quain and Khardori (2015) highlighted another considerable factor of malnutrition that delays wound healing - inadequate fluid intake, which is significant for maintaining skin turgor, promotion of tissue perfusion, controlling glucose levels, assisting in waste removal as well as oxygenation.

Nonetheless, the literature review revealed a scarcity of information on researching the effect of nutrition on wound healing (Parker et al., 2015).

- Systemic conditions

Augustin et al. (2012) found there were a number of factors that negatively impacted on both the well-being and the psychological health of patients living with a wound. Various systemic factors, including age, diabetes, medications, obesity, alcohol

consumption and smoking, influenced wound healing (Guo and Dipietro, 2010). Welsh (2018) stated that the increasing impact has been noted in populations living longer with comorbidities and chronic conditions as well as changing demographics.

The age-related changes and the effects associated with an altered inflammatory response are considered major risk factors for delayed wound healing (Guo and Dipietro, 2010). This includes delayed infiltration of T-cells into the wound area with modified production of chemokine, as well as decreased macrophage phagocytic capacity (Guo and Dipietro,2010).

Järbrink et al. (2017) highlighted the highest risk group for chronic wounds being the elderly, in whom delayed wound repair has been noted as the body ages. Davies, Harish and Price (2015) associated multiple comorbidities affecting normal independent functionality with people having chronic wounds.

Jeya Mary, Vaithiyanathan and Vijayaragavan (2017) recognised DFU being caused by neuropathy, ischemia and infection, whilst wound healing is delayed by age, nutrition, smoking, diabetes, anaemia, obesity, cancer uraemia as well as denervation. Parker et al. (2015) also recognised the dysfunction of the musculoskeletal calf pump caused by obesity on venous ulcer patients. Literature review on risk factors for delayed healing in venous leg ulcers also indicated the relation of venous ulcers located on the ankle or posterior leg to delayed healing (Parker et al., 2015).

#### 2.2.5.2 Psychosocial barriers

The six psychosocial factors that delay wound healing include effects of pain, effects of odour, altered mood, reduced motivation with treatment, lack of education and support, as well as inability to self-care (Flanagan, 2005).

- Effects of pain

According to Upton and Solowiej (2010), pain has been described by the International Association for the Study of Pain as the association between the actual or potential tissue damage and an emotional and sensory experience. Upton and Solowiej (2010) acknowledged that any pain that is associated with a wound, can have a negative impact on wound healing and adversely affect patient quality of life. It has been noted that the psychological, cognitive, emotional, social and acquired behaviours that can influence the patient's awareness of pain, which may include patients' past experience of a similar pain, used strategies used to cope with pain, comparisons with other

patients at different recovery levels, as well as poor ambulatory levels (Upton and Solowiej,2010).

Davies, Harish and Price (2015) also acknowledged pain as one of the components of physical wellbeing that lowers the quality of life and found distressing by patients.

Chester et al. (2016) highlighted on the severe pain and anxiety provoked by burn wounds and the associated wound care procedure, more especially to children, which at times remains unbearable and also undertreated regardless of ongoing progression in wound care.

This is supported by Upton and Solowiej (2010), who recognised the importance of assessment and management of wound pain aiming at gaining trust from patients as pain can elevate stress levels which have shown to have an influence to delayed wound healing.

Chester et al. (2016) undertook a prospective observational study at a burn centre with 130 burn children, of which 35% were diagnosed with one psychological disorder with a high comorbidity rate of post-traumatic stress disorder (PTSD). The findings' prior research indicated a clinically significant association between symptoms of psychological distress and burn pains, each exacerbated by the other and therefore resulting in untreated fears and anxiety leading to poor compliance, complicated pain management and wound healing.

Soon and Acton (2006) in their study on pain induced stress, a barrier to wound healing, reported that suppression of the immune system, which plays a key role in preventing infection, can also result from chronic stress and the disruption would have an adverse effect on tissue repair processes and wound healing.

- Effects of odour

Probst (2015) reported in his findings that wound odour has been closely associated with high levels of exudate and remained a distressful experience, which affected the social and physical wellbeing of patients and families. Probst also suggested that comprehensive assessment is significant prior to management of wound odour.

Menon (2012) reported findings on ulcer specific questions that addressed odour and the exudate level, which indicated 27% depressed patients and 26% anxious patients in whom exudate and odour were closely associated with increased hospital anxiety and depression symptoms.

- Altered mood

Upton, Hender and Solowiej (2012) described mood disorders as ongoing feelings of extreme sadness, despair and helplessness, which have a negative impact on a person's behaviour, resulting in irritability and altered appetite.

Upton, Hender and Solowiej (2012) identified chronic pain and discomfort from the wound as contributory factors to the patient's mood disorders.

A significant impact on the patient's quality of life has been associated with leg ulcers. Kouris et al. (2015) noted a major impact of chronic ulcers on the patient's psychological, socioeconomic as well as physical status. The author also recognised that their ability to work is limited by their condition, which excludes them from their social activities and causing psychological problems such as depression, anxiety and low self-esteem.

This was supported by Guo and Dipietro (2010), who found that anxiety and depression resulting from stressors could contribute to changes in behavioural patterns as well as physiologic processes influencing health outcomes. Guo further emphasised that stressed individuals were prone to poor sleeping habits, inadequate nutrition as well as alcohol and smoking habits, which ultimately modify the healing process.

Parker et al. (2015) recognised that increased geriatric symptoms of depression, anxiety, social isolation and economic status contributed to delay in wound healing.

- Reduced motivation with treatment

Stanton et al. (2016) cited some of the reasons for reluctance of patients to comply with prescribed therapy, including poor understanding of the significance of the therapy, as well as inadequate skill and experience of healthcare personnel resulting in poor patient education. Stanton further recognised that inaccessible healthcare facilities, prolonged waiting times, and poor understanding of the implications of the patient's own health decisions reduced compliance to treatment.

- Lack of education and support

Parker et al. (2015) found that patients who lived alone without family support, were at risk of developing leg ulceration.

Stanton et al. (2016) highlighted the significance of a therapeutic relationship between the nurse and the patient, a holistic assessment, and patient education as crucial facts to improving wound healing.

Nwabudike and Maruhashi (2017) indicated a low level of patients' understanding of their conditions and significance of treatment contributing to poor wound healing. These authors were also of the opinion that successful compliance could be achieved if education and confidence was instilled in population areas that require ongoing support.

- Inability to self-care

Upton, Hender and Solowiej (2012) identified chronic pain and discomfort from the wound as contributory factors to the patient's inability to perform tasks on daily basis.

Tickle (2015) found that patient's inability to carry out daily physical activities result from chronic, heavily exuding wounds. This is acknowledged by Parker et al. (2015), who cited decreased mobility and daily living activities as significant risk factors for delayed healing in venous leg ulcers.

#### 2.2.5.3 Educational barriers

Four factors that impede healing in the educational barriers include traditional knowledge/ritualistic practice, inappropriate training and support, lack of understanding of research process and negative attitudes to evidence-based practice (Flanagan, 2005).

- Traditional knowledge/ritualistic practice

Flanagan (2005) reported that historically, the practical aspect in nursing was traditionally considered more significant than the theoretical aspect, which resulted in a highly developed, practical skilled labour force that could not correlate theory and practice.

Welsh (2018) noted the concept of 'experiential knowledge,' being an important factor in both nursing practice and wound care, was found to be ritualistic in lieu of underpinned evidence.

- Inappropriate training and support

Literature review on knowledge and practice of nurses on the care of wounds, in de Faria et al. (2016), revealed the nursing training process is negatively affected by a gap between theory and practice at the undergraduate level, with respondents confirming inadequate wound care training, as well as knowledge deficit on wound management. de Faria et al. (2016) also validated the feeling of insecurity from nurses, with the inability to make recommendations about wound care, to knowledge deficit of the subject.

Sen et al. (2009) attested that very little education on the science of wound care during medical studies is provided to American medical students. The shortfall in structured tissue viability education has been recognised by Welsh (2017), who linked the deficit to poor prioritisation of wound care as well as failure to organise and deliver adequate education programmes.

Flanagan (2005) acknowledged that in order for the needs of different clinicians at different levels of expertise to be met, the need for educational strategies should be specifically targeted to heighten efficiency. The author cited appropriate guidance and competency with positive attitudes of specialist nurses would effortlessly ensure dissemination and implementation of evidence-based wound care.

- Lack of understanding of research process

Vowden and Vowden (2009) reported an increased progression and enlightenment on the knowledge of the biology of wound healing since early 1990, however this innovation has had minimal influence on clinical service delivery for communities where wounds are a problem.

Flanagan (2005) considers improving the clarification of evidence as a significant method of implementing the best practice.The author also believes that understanding the research design is crucial and should precede analysis of findings as well as practical use from day to day .Further research recommended for all studies has been acknowledged by Flanagan (2005), regardless of clinician's difficulty in interpreting and applying findings to practice.

- Poor quality research

Wound care literature has uncovered that the clinical decision making is adversely affected by a confusing collection of evidence-based guidelines, tools and protocols with the majority not practical nor justified (Flanagan,2005).Notwithstanding the

volumes of published literature on wound management, Welsh (2018) noted an absence of qualitative studies investigating either nurses or patient's knowledge and experiences on wound care. This was supported by McCluskey and McCarthy (2012), who also found insufficient findings on the survey of nurses' knowledge on wound assessment which strengthens the healing process.

- Lack of critical appraisal skills

Flanagan (2005) attested that the evidence-based approach in healthcare was developed through the Critical Appraisal Skills Programme (CASP) in collaboration with local, national and international groups, which aimed at developing significant appraisal skills as well as providing learning resources in finding, appraising and acting on evidence. More publications worth reading, as well as being evidenced-based, were revealed by critical appraisal tools and frameworks. Flanagan (2005) recognised that overloading healthcare personnel with too much information lead to disinterest and reduced confidence, with poor critique of good or bad quality research evidence.

- Negative attitudes to evidence-based practice

Flanagan (2005) recognised that improved practice does not necessarily result from wound care education, especially where the negative attitude towards practical service delivery, such as pressure part care, has been noted. The author stated that the quality of wound care evidence that is so harshly criticised, aims to increase negativity and lack of enthusiasm resulting in low improvement of the situation.

Waters (2018) acknowledged that despite EBP's contribution to improvements in healthcare, as well as obligations of clinicians in abiding to rules and regulations governing implementation of EBP, concerns were raised regarding unforeseen negative consequences. The author also noted the divisions on discussions about EBP's relevance to work resulting in disagreements on what comprises evidence.

Gillespie et al. (2014) concluded in their article on wound care practice, taken from a survey on acute nurses, that regardless of the in-depth knowledge the acute care nurses have on wound care practise, the recommended clinical guidelines to wound care are not optimally used.

#### 2.2.5.4 Professional/organisational barriers

Professional/organisational factors that delayed wound healing included lack of consensus: expert opinion, inconsistent research findings, no standardisation of accepted practice, lack of effective clinical role models, as well as lack of resources.

- Lack of consensus: expert opinion

Flanagan (2005) noted the situation had been worsened by disagreements in literature, manifested by use of unclear definitions in wound healing, wound infection and pressure ulcers, as well as new terminology used in wound care. The author recognised that wound care specialisation differed according to the demographic area and the population, which therefore resulted in incompatible advice and guidelines.

Nwabudike and Maruhashi (2017) noted communication breakdown as well as gaps in the healthcare system, which caused frustration among healthcare personnel.

- Inconsistent research findings

Different sources with inconsistent research findings created difficulty for wound care professionals in need of simple solutions to practical wound care management (Flanagan, 2005).

Greatrex-White and Moxey (2013) emphasised the significance of nursing practice to be informed by up-to-date research as required by evidenced-based practice, however wound care practices learned ‘on the job’ will only influence practice based on beliefs and personal preferences.Conflicts emanating from opposing ideologies, as well as questioned territorial claims, lead to unending wound related developments (Waters, 2017).

- No standardisation of accepted practice

Greatrex-White and Moxey (2013) found that healthcare providers fail to provide nurses with clear care guidelines and protocols as a reference, resulting in poor wound care.

De Farai et al. (2017) recognised that basic concepts on the study of wounds are not emphasised in the guidelines and curriculum of nursing courses as a foundation for nursing care.

Coleman et al. (2017) concluded that different wound assessment criterion used, as well as lack of standardisation, resulted from unavailable national minimum data set

(MDS) for generic wound assessment, which deters the monitoring and quality of the progression of wound healing.

- Lack of effective clinical role models

Wound care specialists should be adequately and appropriately prepared to ensure they are skilled and knowledgeable, with positive attitudes, to implement the best evidence-based wound care (Flanagan, 2005). This was supported by Lucker and Kenrick (1995), in Flanagan (2005), who found that it helped in developing clinical role models who practically demonstrated good practice to their colleagues.

Greatrex-White and Moxey (2013) noted that poorly trained newly qualified nurses with minimal knowledge of wound care felt unprepared to carry out effective wound care practices.

- Lack of resources

McDermott-Scales, Cowman, and Gethin (2009) were of the view that verification of the need to increase wound care resources managed by nurses, has been a problematic task, which resulted from the absence of evidence on the prevalence and wound types.

However, Adejumo and Ilesanmi (2016) found that experienced wound care nurses reported inadequate wound care supplies at their hospitals as a barrier.

Nwabudike and Maruhashi (2017) attributed poor healing of diabetic foot ulcers to inadequate healthcare management of both the ulcers and accompanying comorbidities, especially at resource constrained facilities.

### 2.3 Wound assessment

Different wound descriptions have been significant in wound assessment and effective management, as well as throughout the healing process. Waters (2017) noted that despite calls for a person to be assessed and treated as a whole and not the hole in the person, the ongoing approach of treating symptoms instead of their cause indicate that the best wound care practice remains focused on local wound care.

Dowsett, Gronemann and Harding (2015), in a study on taking wound assessment beyond the edge, described wound assessment as a complex process that required an assortment of clinical skill and knowledge.

Vowden and Vowden (2009) emphasised that poor recognition and disregard of wound healing resulted from unsuccessful collection of relevant epidemiological data of all wound aetiologies.

### 2.3.1 Benefits of wound assessment

It is deemed significant to document assessment findings, which would be used as baseline data that would determine the progress or delay in wound healing as well as pointing out the achievements and failures of wound management decisions (Scott-Thomas et al., 2017). This is supported by Greatrex-White and Moxey (2013), who recognised that progress can be closely monitored as well as successful goal setting through wound assessments, using baseline data as reference.

Dowsett, Gronemann and Harding (2015) were also of the opinion that extensive, methodical and evidence-based assessment of wounds should have offered baseline data that would have assisted clinicians in establishing the current status of wounds, setting accurate goals and closely observing the progress over time using suitable interventions.

Järvinen (2015) recognised that complications and recurrence could have been prevented by a holistic approach and proper wound care strategies. The author also noted that being familiar with wound assessment and the difficulties of clinical management has been considered crucial in ensuring that cost effective and evidence-based intervention strategies were used optimally.

Another important factor considered, was that the correct diagnosis and a developed care plan that focused on patients afflicted by wounds and skin infections with a bearing on healing was dependent on accurate and timely wound assessment (Dowsett and Hallern,2017).

### 2.3.2 Criteria of Wound Assessment Tool (WAT)

Evaluation of WAT followed criteria developed from the international literature on wound assessment (Greatrex-White and Moxey, 2013). Greatrex-White and Mosey (2013) explained the following criteria for inclusion in the optimal WAT:

- **Details and characteristics of the wound** - Holistic wound care by nurses, can only be achieved by obtaining basic background information on wound care and that includes location, duration and causes if known. This will assist in

determining the type of wound and the type of suitable care plan for the wound. This initial wound assessment will serve as reference for follow up care.

- **Patient details** - This is significant to ensure that follow up care plans correspond with the correct patient and the previous assessment as well. The patients' medical history and comorbidities that might deter wound healing should be considered when planning care.
- **Wound measurement -** Greatrex-White and Moxey (2013) consider wound measurement as a useful aspect of a WAT, which assists and guides nurses in determining the progress of wound healing. A 40% reduction in wound size within the first three weeks indicates progress in wound healing. The authors highlighted that ongoing wound measurement without a baseline measurement as a reference is pointless as the trend of healing or delayed healing will not be verified. In conclusion on wound measurement, Greatrex-White and Moxey (2013) recommended further investigations to be done should the wound size fail to reduce.
- **Tissue type –** This is considered as the guide for wound healing phases. The benefit is that, it assists nurses in identifying the wound healing stage so as to make the necessary intervention plans. Necrotic, sloughy, granulating and epithelising are used to describe the tissue types.
- **Exudate -** This is considered significant in maintaining a moist wound environment and normal for wound healing. The delay and healing of the wound can be determined by the thickness and the volume of exudate, whereas at times it might indicate infection or forthcoming dehiscence.
- **Surrounding skin -** Skin assessment around the wound is a useful component of WAT, whereby the initial indication of further tissue damage can be noted on the surrounding tissue.
- **Pain -** Pain assessment is significant and may indicate infection and delay healing, therefore should be immediately addressed to promote comfort.
- **Signs of infection -** Assessment of signs of infection is significant for all types of WAT for early recognition and prompt treatment to prevent further complications, as well as delays in wound healing.
- **Documentation -** Justification of actions, wound progress as well as communication between healthcare providers can be achieved through clear and accurate recording of findings, which should entail detail findings of regular

assessments done and follow up visits for effective communication with health team members. They are also legal records and considered the first source of evidence investigated should a complaint be lodged.

- **Communication and continuity of care -** A WAT should indicate progression of the wound from the previous visit to determine any hindrance as well as communicate clear data so as to facilitate continuity of care to first contacts with the wound.
- **Ease of use -** A well-designed, easy to use WAT that will attract and encourage nurses to use, is recommended.
- **Setting of goals for healing and planning care -** Wound assessment is the first step before the wound care treatment plan, of which the findings will be required for the appropriate treatment plan.
- **Monitoring of the healing process -** Delayed healing processes can be closely monitored through identification of possible barriers to healing and measures to ameliorate the problem.
- **Guiding practice -** WAT provides guidance to assessment, diagnosis, as well as nursing care plans and treatment, based on assessment findings.
- In conclusion, on the criteria selection for the optimal WAT, Greatrex-White and Moxey (2013) suggested that a WAT has good potential, especially for nurses with minimal support and guidance in wound care provision.

### 2.3.3 Procedure for selection of WAT

Greatrex-White and Moxey (2013) explains that the selection of WATs for evaluation was done on tools used by nurses in their work areas. These authors also indicate that additional searches for both published and unpublished WATs were done on MEDLINE (1996-to date) and EMBASE (1980- to date) electronic data bases, using the following search strategy and search terms:

1. Wound assessment tool.mp.
2. Wound assessment chart.mp.
3. Wound assessment form.mp.
4. Wound assessment scale.mp.
5. Wound scoring.mp.
6. Wound assessment.mp.
7. 1 or 2 or 3 or 4 or 5 or 6

Greatrex-White and Moxey (2013) found that 640 references from EMBRACE and 241 from MEDLINE were evaluated. Titles were scanned for relevance and abstracts with

relevant titles were read in addition to articles that seemed relevant. It should be noted there were minimal titles, which therefore restricted the included tools. All WATs were primarily included but some ended up being excluded as a result of specialised wound types that did not meet the inclusion criteria.

WATs used by UK NHS Trusts, which were not restricted for use and available on the internet, were searched on www.google.co.uk. Additional WATs were obtained from the reference lists from the literature and a total of 14 WATs were evaluated (Greatrex-White and Moxey, 2013).

### 2.3.4 Tools used

Greatrex-White and Moxey (2013) highlighted the absence of research aimed at evaluating the WAT (wound assessment tool) that met nurse's needs. Poor knowledge of wound assessment and management by nurses has also been reported by Greatrex-White and Moxey (2013), who were of the view that a WAT could oversee nurses in these areas.

The authors found that of the 14 WATS evaluated, only two tools met the nurses needs in accomplishing wound assessment, namely the AWM (Applied wound management) and the NWAF (National wound assessment form). Greatrex-White and Moxey's (2013) study also revealed the need for research in establishing the nurse's views and the current wound care practice. In conclusion, Greatrex-White and Moxey (2013) were of the opinion that nurses could be guided towards the best practice in wound care through use of a good WAT, which cannot however be considered as an alternative for clinical expertise but to provide a framework to create a model that will assist in provision of successful wound care practice.

Dowsett Gronemann and Harding (2015) also cited that regardless of availability of WAT to support practitioners, there have been no agreements on the choice of suitable tools that could yield a consistent approach to wound management.

Furthermore, the authors described the WAT that is designed to evaluate specific wound type: the Pressure Ulcer Scale for Healing (PUSH), which considers the surface area, exudate and tissue type in the wound bed, when categorising ulcers as well as the leg ulcer measurement tool, which assesses the status of the wound over time to determine the effectiveness of the management strategies used. The description of the

tool supports the researcher in attempting to determine the different wound types and wound status at a rural community health centre.

Again, the authors also recognised that 14 WATs were evaluated and the findings indicated that regardless of the tools providing room for documentation on certain findings of the wound status, none met the set criteria for a satisfactory WAT (e.g. user friendly, improved continuity of care allowed documentation) and many did not provide guidance for subsequent interventions, permitted a way forward, or settings aimed at wound healing.

## 2.4 Patient knowledge of wound care

Literature review on diabetic foot care, self-reported knowledge and practice among patients attending three tertiary hospitals in Nigeria, in Desalu et al. (2011), revealed a high rate of diabetic patients with poor knowledge of foot care. Desalu et al. (2011) found that of the 352 diabetic patients, good knowledge was acquired by 30.1% ,10.2% had good practice of diabetes foot care and the majority of patients (78.4%) had poor practice and knowledge. Desalu et al. (2011) further associated illiteracy and low socioeconomic status with poor practice and knowledge of foot care.

The findings of Khamseh, Vatankhah and Baradaran (2007), in a cross-sectional study of knowledge and practice of foot care in Iranian people with type 2 diabetes, also highlighted (*P=0.008*) illiterate patients who were the least knowledgeable about foot care.

Kaur et al. (1998) recognised foot care done through regular washing by 63.3% of diabetic patients in a cross-sectional survey conducted in a resettlement colony of Chandigarh.

Mavhu et al. (2018), in exploring adolescent wound care knowledge and practices, were of the view that adolescents disregard providers instructions, however younger adolescents depended on parental intervention to prevent hindrances to wound care. Mavhu et al. (2018) also noted lack of significant wound care information from parents and guardians resulting from poor attendance of counselling sessions.

## 2.5 SUMMARY

This chapter gave insight and meaning to the following concepts: wound, wound healing, incidence, prevalence, acute and chronic wound. The literature reviewed and examined, identified the need to research nurse’s knowledge about wound

assessment and care, as well as patient knowledge on wound care. The literature reviewed further highlighted the significance of using efficient WATs that would encourage nurses to conduct wound assessments, as well as provide effective guidelines in wound care practice.

# CHAPTER THREE

## RESEARCH DESIGN AND METHODS

### 3.1 INTRODUCTION

This chapter provides an overview of the study design, methods used to achieve the purpose and objectives of the study, as well as the description of the research setting where the study was conducted. Following this, detailed facts on sample criteria, sampling process, data collection instrument, the data collection process and analysis, reliability and validity are also presented in the chapter. Lastly, the measures aimed at ensuring that this study adhered to the acceptable and appropriate ethical principles, are included.

### 3.2 RESEARCH PURPOSE AND OBJECTIVES

The purpose of the study was to describe the types and status of wounds managed in addition to the factors that have an impact on wound healing as well as patient knowledge regarding wound care and wound healing, at a rural community healthcare centre in Bojanala District, Rustenburg.

The objectives of the study were to:

- Determine demographic, lifestyle related factors and comorbidities that may have an effect on wound healing of patients at a rural community health centre in Bojanala District, in Rustenburg.
- Describe the types and status of wounds managed at a rural community health centre in Bojanala District, Rustenburg.
- Determine patients' knowledge regarding wound care and wound healing.

### 3.3 RESEARCH SETTING

A research setting signifies the specific location where the research data is gathered (Brink, van der Walt and van Rensburg, 2016). The study was conducted at a rural community health centre in Rustenburg. The area endures a "quadruple burden of disease" - HIV /Aids, underdevelopment, chronic diseases resulting from unhealthy lifestyles, in addition to it being situated in a mining area with a high prevalence of work injuries, and chronic wounds related to HIV Aids and TB infections.

The area has many back dwellings rented mostly by foreign mine employees. Patients with different wound types are seen at the clinic, however no studies have been conducted to develop the database that will serve the purpose of advising on required resources.

The clinic is the busiest within the area and preferred by the community members. The facility caters for the health needs of the community within the Bafokeng nation, of which the majority of patients are black Africans. Ordinarily, services such as maternal and child Health, HIV and TB treatment, mental health, chronic diseases (diabetes/hypertension/asthma), MMC (Medical Male Circumcision), emergency trauma and injuries services are offered at the facility. In addition, free circumcision services are rendered to males of all age groups and higher numbers of circumcision wounds are seen during school holidays, especially in winter months.

## 3.4 RESEARCH DESIGN

Grove, Burns and Grey (2013) described a research design as “a blueprint for conducting a study that maximises control over factors that could interfere with the validity of the findings.’ The effective plan and implementation of the research study can only yield intended results through research design (Grove, Burns and Grey, 2013).

To achieve the research objectives and to address the research problem, a cross sectional, descriptive and correlation research design was used for this study, where wounds of the participants were assessed as well as the patient’s knowledge levels in relation to wound care and healing. Consequently, through the design, two or more variables were noted by the researcher at the point in time and was therefore beneficial for communicating how these variables related to one another (Brink, van der Walt and van Rensburg, 2016). Research data was gathered from all patients presenting with a wound at the healthcare centre.

### 3.4.1 Cross-Sectional Design

The cross-sectional design refers to data collected at a specific point in time, which focuses on the here and now only (Brink, van der Walt and van Rensburg, 2016). In contrast to a longitudinal study design, data is collected at different times (LoBiondo-Wood and Harber, 2006); in the event of wound management, it would be when a patient returned for wound assessment and dressings. In the current study, the

researcher administered questionnaire was used only once to collect demographic data as well as for wound observation on all the participants that met the criteria for inclusion in the study.

### 3.4.2 Descriptive and Correlation Research

Brink, van der Walt and van Rensburg (2016) described the descriptive designs as being effective in research that requires detailed data on a specific area through provision of a detailed account of the characteristics as it naturally occurs. Brink, van der Walt and van Rensburg (2016) further highlighted that descriptive designs can be effectively used to indicate problems with the current practice. Nonetheless, the aim of the descriptive designs is to yield an exact impression of the characteristics of the situation observed or studied using statistics to describe or summarise data (Polit and Hungler, 2013).

Conversely, a correlation design is described as an “after the fact’ design and its purpose is to describe the correspondence between two variables (Brink, van der Walt and van Rensburg, 2016). Correlation designs also aim to look into the relationships between variables without any active intervention from the researcher (Brink, van der Walt and van Rensburg, 2016; Polit and Hungler, 2013). Also, in correlation studies, the independent variable cannot be manipulated because the event of interest has already taken place and this therefore clarifies that correlation does not signify causation (Brink, van der Walt and van Rensburg, 2016).

Lastly, a correlation design may confirm the presence of an association, however, may be inadequate to indicate existence of a causal relationship (Brink, van der Walt and van Rensburg, 2016).

In conclusion, descriptive statistics were used to demonstrate the demographic features of the participants as well as the wound related aspects. In contrast, correlation statistical analysis was conducted to establish the relationship between age, lifestyle related factors and comorbidities to wound healing.

## 3.5 RESEARCH METHODS

### 3.5.1 Population, Sample Size and Sampling

Various authors have defined a population as a well-defined group of individuals having similar characteristics that meet the criteria that the researcher is interested in studying (Brink, van der Walt and van Rensburg, 2016; Polit and Beck, 2004). In contrast, a sample is defined as a subset of a population selected by the researcher to be included in the research study (Brink, van der Walt and van Rensburg (2016).

The sample size is determined based on the following factors, the type of questions asked, the degree of relevance and correctness as well as the type and quality of data sought. For the purpose of this study, a preliminary audit undertaken from the clinic indicated that an estimated average of 144 (N=144) patients presented at the healthcare centre for wound treatment over a period of six months (March – August 2016). From the total estimated population, the researcher had to select a number of patients to portray the total population, so that the results from the sample represented the entire group population (LoBiondo-Wood and Haber, 2006). This process is called sampling. A representative sample of (n=105) participants was calculated using the Raosoft method (2004), based on a confidence level of 95%, allowing for a marginal error of 5%. Consequently, all participants who met the inclusion criteria to take part in the research study were considered for the sampling process.

A non-probability convenience sampling method was used to select (n=105) participants who met the inclusion criteria to take part in the research study. However, data was collected from 93 (n=93) participants since there were no new patients presenting with a wound during data collection period, as the rest of the patients who were there for repeat dressings, identified with stickers used on the day, were at the clinic and included in the study. Secondly, data was only collected during the day since most of the wounds presenting in the evening were likely to be emergency in nature and probably referred to hospital, and some of the patients with wounds were unaccompanied minors who did not qualify to be included in the study

**Eligibility criteria**

Polit and Beck (2004) defined eligibility criteria as a principle used to describe the characteristics that people within the population must possess, so as to be included in

the research study. In this study, all minors with wounds accompanied by parents as well as all the patients who presented at the community health centre for wound care were considered as eligible and therefore, included in the study. Parents/guardians views were considered for the data required to meet objective three, for minors presenting with a wound, as children cannot make decisions regarding wound management.

- **Exclusion Criteria**

Unaccompanied minors, and patients needing urgent wound care and referral to hospital were excluded from the study.

### 3.5.2 Data Collection

#### 3.5.2.1 Data collection instrument (Appendix E)

Permission was sought and granted to use the Bates-Jensen Wound Assessment Tool (BWAT), which originated from the Pressure Sores Status Tool (PSST).

The 13 items on BWAT appear with descriptors and are assessed on a score of 0-5. Zero indicates that the aspect that is being assessed has healed or resolved, 1 being the healthiest attribute of the characteristic and 5 being the worst attribute of the characteristics (Bates – Jensen, 1992). The results from the 13 items are added and the wound status is classified on a continuum of 1-65 to assess wound health or degeneration. For the purpose of this study, the wound was only assessed once. The once off scoring determined the current condition of different wound types during the assessment.The severity of wounds were assessed on four different levels, namely 13-20 minimal severity, 21-30 mild severity, 31-40 moderate severity and 41-65 extreme severity level (Garten, 2017).

The data collection instrument (Appendix E) consisted of three sections. Data collected determined the quantifiable characteristics of the sample.

Section A comprised of demographic related information, lifestyle related aspects, as well as existence of chronic diseases as these aspects may have an impact on the wound healing process.

Section B constituted wound related information. The wound assessment section yielded information on the number of wounds, type/s and status of the wound/s with regards to the healing process. Lastly, Section C consisted of eight questions which were a combination of both open- and closed-ended questions designed to determine patient knowledge on wound care. Instructions were added to the questionnaire to avoid uncertainties that would lead to errors.

- **The Bates-Jensen Wound Assessment Tool**

The Bates-Jensen Wound Assessment Tool consists of aspects that describe the characteristics of the wound in relation to the size, depth and edges. This is followed, by assessment of undermining, presence of necrotic tissue and the type as well as the necrotic tissue amount, exudate type and the exudate amount. Lastly, the skin colour surrounding the wound, peripheral tissue oedema, peripheral tissue induration, granulation tissue and lastly epithelialisation is observed. The BWAT aspect was used as part of Section B of the data collection instrument (Appendix E) used for the purpose of the study.

- **Wound data**

Another aspect included in Section B was wound related data; this aspect of the tool was developed by the researcher. The purpose was to acquire information on the participants' wounds regarding their area of location, total number of wounds, types of wounds, frequency of dressings in addition to the duration of the wound.

The first part Section A of the data collection instrument (Appendix E) was designed by the researcher to obtain participants' demographic information. Thirteen questions were used to describe the participants' age, gender, education level, occupation, habits, chronic diseases, medication, weight, height, BMI and nutritional status. The findings were significant in determining the quantifiable characteristics of the participants in relation to the set objectives.

- **Participants' knowledge regarding wound care**

The third part of the wound assessment tool, Section C, consisted of eight questions designed to assess participant knowledge regarding wound care. The questions were centred firstly around home dressings, secondly wound care information, and the third and the last aspect is related to participants' awareness and knowledge on aspects that promote wound healing, and factors that contribute to poor wound healing.

The findings of this section give an indication of the required patient teaching that will ameliorate wound care and promote better wound healing outcomes. In conclusion the complete instrument used for this study had three sections. Section A was demographic data, Section B wound related information and Section C participants' knowledge regarding wound care.

#### 3.5.2.2 Validity and reliability of the instrument

According to Brink, van der Walt and van Rensburg (2016), reliability and validity are closely related concepts. Reliability is considered to be part of validity to an extent that an instrument cannot be considered valid if it does not yield reliable results.

Reliability refers to the level to which the instrument can be trusted to bring regular results if repeatedly used over time on the same person (Brink, van der Walt and van Rensburg, 2016). Conversely, instrument validity ascertains whether the tool or instrument accurately measures what it is supposed to measure (Brink, van der Walt and van Rensburg, 2016).

A correlation measure that varies between 0 and 1 indicates the reliability of an instrument (Brink, van der Walt and van Rensburg, 2016). Ordinarily, the higher the correlation, the measure is closest to 1. Consideration of both qualities is therefore significant when selecting a research instrument.

The original PSST was validated in studies conducted in the 1980's and 90's using experts in the field. However, the content validity index was reported to be .91 and the interrater reliability was r=.91 for first observation and r=92 for the second observation (p=.001). After the development of the BWAT, it was further validated in a research project conducted in Canada on wound photographs depicting each characteristic of the instrument (Harris et al., 2010). A three-phase pictorial guide validation project was implemented for the purpose of authenticating the newly developed BWAT, as described in Harris et al., (2010).

In phase 1, digitalised BWAT wound photographs of high resolution and good quality for publication, were selected from researchers during the initial phase of the validation project. The photographs represented intended characteristics and were validated by the original BWAT authors.

In phase 2, the validation exercise was done face-to-face to include validated photographs, edit and make corrections, obtaining additional photographs to exclude and replace those not validated.

Phase 3 involved online validation that was achieved through an electronic survey.

In 2001, the PSST was revised and renamed the Bates-Jensen Wound Assessment Tool (BWAT) to reflect the global use of the tool with wound types beyond pressure ulcers.

In the current study, strategies of validity and reliability aimed at achieving good quality and reliable research data, as well as validating the tool for the South African context, were implemented.

The researcher engaged an academic from a university and a wound expert from one of the local companies in South Africa that manufacture and supply wound dressings, who specialised in the treatment of all types of wounds, both chronic and acute. There were no changes implemented on the main BWAT as per the author's instruction. However, minor changes were implemented on the researcher-designed aspect of the questionnaire.

Furthermore, an instrument pre-test study was conducted on five participants who were not part of the main study. The purpose of the pre-test study was to have an idea of how the whole process would take place in terms of time and also the participant's ability to understand the questions and responses thereof. However, during the pre-test study, the researcher engaged a wound expert for interrater reliability rating.

### 3.5.3 Data Collection Process

Data collection for both the pre-test study and the main study commenced after permission was unconditionally granted by University of the Witwatersrand Post-Graduate and Human Research Ethics Committee, as well as Royal Bafokeng Administration and the Research Department. The participants were accessible and available in the wound care treatment queue. Data collection lasted for a period of six months.

The researcher approached all the patients presenting at the community health centre for wound care every morning during weekdays, for data collection.

Verbal explanation about the study was presented and the participant information letter (Appendix F) was given to the patients in the wound treatment queue to read; participants were given time to read the information letter. On agreeing to participate, the prospective participant was invited into the office designated for data collection to sign the consent form (Appendix G1). In the case where the patient with a wound was an accompanied minor, then Appendices G, G1 and G2 were used.

Section A and C of the data collection instrument (Appendix E) was administered by the researcher and thereafter, the individual patient with a wound was taken to the wound dressing area for a once off wound assessment. In the wound dressing area,

soiled bandages were removed by the nurse. The researcher took the necessary wound measurements, assessed the wound and completed Section B and the BWAT section (Appendix E). At the end of the wound assessment and data collection, the respective patient was thanked for his/her time and the file was marked with a red coloured label to ensure the same patient was not repeated in the study.

All measures of confidentiality and privacy were maintained throughout the study. No patients were coerced to take part in the study and the participants were advised they could withdraw at any time.

### 3.5.4 Data Analysis

During the data analysis phase, the researcher chose methods of organising raw data gathered during the data collection phase in a methodical, consistent order so that she could easily recognise patterns and relationships (Brink, van der Walt and van Rensburg, 2016).

Data was coded on all completed questionnaires and entered on a Microsoft Excel spreadsheet. Immediately after data coding and capture, the data was imported into STATA version 14 for analysis. Descriptive data analysis was conducted for section A aspects to describe the demographic data of the patients, lifestyle related aspects, presence of chronic diseases and nutritional status. In section B, descriptive data analysis was used to describe the number of wounds, type and wound status. Descriptive statistics inform us what the data set looks like by condensing it and converting it into visual representations, in order to give meaning to the data (Brink, van der Walt and van Rensburg, 2016). The results are presented as mean and standard deviation in tables. Linear regression approach was used to determine whether smoking, poor nutrition, or the presence of a chronic disease have any association with poor wound healing. Multiple linear regression was also used to determine factors associated with the scoring of the wounds.
Quantitative content analysis was used to quantify as well as systematically code and categorise responses regarding patients' knowledge of wound care (Rossouw, 2005; Coe and Scacco, 2017).

## 3.6 ETHICAL CONSIDERATIONS

The purpose of research ethics is to guarantee that appropriate measures are implemented to ensure that the research process is not compromised (Brink, van der Walt and van Rensburg, 2016), institutional permission is obtained and granted and lastly, to safeguard protection of the participants (Brink, van der Walt and van Rensburg, 2016). The following steps were implemented to ensure this study adhered to the acceptable and appropriate ethical principles.

### 3.6.1 Institutional Approval

A clearance certificate (M170806) was granted by the University of the Witwatersrand's Human Research Ethics Committee (Appendix A). Permission to conduct the study was granted by the Research and Post-Graduate Committee of the Health Sciences Faculty of the Witwatersrand (Appendix B). Permission was also sought and granted by Royal Bafokeng Administration and Research Department (Appendix C). Authorisation to use the BWAT was granted by the author.

### 3.6.2 Participants

A participant information letter was given to the participants to read and understand the nature of the study. Participation in the study was voluntary and no-one was coerced to take part in the study. The participants were allowed to freely withdraw from the study at any time without reason, without effecting their care at the clinic. Names were not used, instead code numbers were utilised to identify participants and to ensure confidentiality. Eventually the participant, having agreed to take part in the study, signed the consent form (Appendix F1).

## 3.7 SUMMARY

In this chapter, the research methodology and the ethical considerations have been described. The validity and reliability of the data collection instrument was also discussed. The next chapter will discuss data analysis and the results of the study.

# CHAPTER FOUR

## RESULTS AND DISCUSSION

### 4.1 INTRODUCTION

The previous chapter presented the research methodology used in the study. This chapter describes the method that was used for data analysis and interpretation of the results. Data was collected from a conveniently selected sample of (n=93) patients presenting at a rural community healthcare centre in Bojanala District, Rustenburg for wound care.

### 4.2 DATA ANALYSIS PROCESS

The data analysis process commenced immediately after the six months period of data collection. The completed questionnaires were checked for correctness, coded and entered into a Microsoft Excel spreadsheet. Data was then taken into STATA version 14 for data analysis.

Descriptive statistics were used describe the demographic data of the patients, types and status of wounds. The research results were presented as mean and standard deviation in tables; frequency counts and percentages were computed to obtain the proportions of each of the demographic categories. This was followed by linear regression approach to determine whether demographic data, habits, and lifestyle diseases have an association with poor wound healing. Lastly, quantitative content analysis was used to quantify, code and categorise responses regarding patients' knowledge of wound care (Rossouw, 2005).

### 4.3 PRESENTATION OF THE FINDINGS

The results section is presented in three sections, namely demographic aspect, wound data and patient knowledge of wound care (Appendix E).

Section A comprised demographic related information, such as lifestyle related aspects and existence of chronic diseases, as these aspects may have an impact on the wound healing process.

Section B constituted wound related information. The wound assessment section yielded information on the number of wounds, type/s and status of the wound/s with regard to the healing process. The researcher administered 13 items of the Bates-Jensen wound assessment tool (BWAT) (Appendix E).

The 13 items appear with descriptors and are assessed on a score of 0 to 5. Zero indicates the aspect being assessed has healed or resolved, 1 being the healthiest attribute of the characteristic and 5 being the worst attribute of the characteristics (Bates-Jensen, 1992). The results from the 13 items are added and the wound status classified on a continuum of 1-65 to assess wound health or degeneration. For the purpose of this study the wound was assessed once only. The once off scoring determined the current condition of different wound types during the assessment.

Lastly, Section C consisted of eight questions, which were a combination of both open- and closed-ended questions, designed to determine patient knowledge on wound care.

The response rate obtained from participants was 88.7% (n=93) from a sample of (n=105) patients.

Objective 1

Different wound types were identified from each participant by the researcher during data collection. In categorising the types and status of wounds, the frequency and percentage statistical test method revealed similar wound types grouped under one category. Eight categories of wound types were developed in frequencies, and percentages and characteristics of wounds were also categorised according to the information on the data collection tool and developed into frequencies and percentages.

Objective 2

Two statistical tests were used for objective 2, namely the frequency and percentage statistical test and the mean and standard deviation test method. The frequency and percentage statistical test categorised the desired variables, which were the lifestyle related factors and comorbidities that may have an effect on wound healing of participants. However, mean and standard deviation were used to describe the age variable.

Objective 3

The percentage statistical test was used to categorise the patient responses on knowledge regarding wound care and wound healing. Parents' views were considered for data required to meet objective 3 for minors presenting with a wound as children could not make decisions regarding wound management.

### 4.3.1 Section A: Demographic results

The first demographical aspect entails variables of the sample. Participants were asked about their age, gender, education level, occupation, smoking and alcohol habits, chronic diseases, medications, anthropometric measures and nutritional status.

#### 4.3.1.1 Age

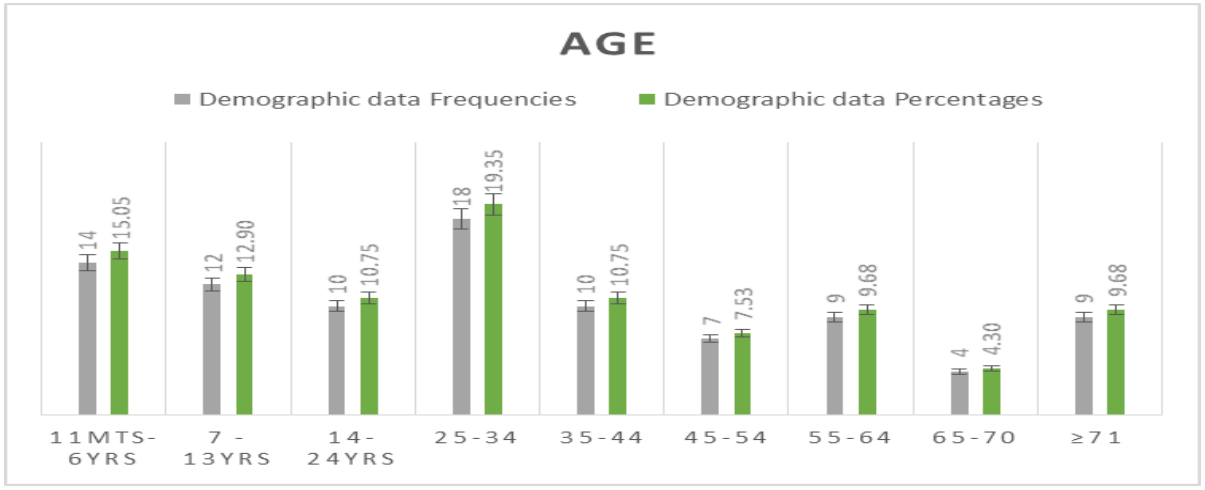


**Figure 4.1 Age distribution of participants**

Figure 4.1 depicts the participants' ages ranged from 11 months to 94 years of age, with a mean age of 35.15 and standard deviation of 25.7; median age was 30 with an IQR of 13 – 55. The categories included pre-scholars (11 months-6years), scholars (7-13 years), youth (14-24years), adults (25-64 years) and seniors (65 and above). The results further showed that the majority of participants were in the age group 25–34 years of age. The findings indicated a sample that comprised of a younger generation, as only 25.8% (n=24) were nearing the retirement age; participants nearing retirement age were categorised as seniors. Clearly, work related injuries would not be anticipated from the seniors' category if unemployed or already retired.

#### 4.3.1.2 Gender

**Table 4.1 Gender**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| Female | 38 | 40.9 |
| Male | 55 | 59.1 |

The results in Table 4.1 showed the sample was predominantly males (59.1%: n=55) and 40.9% (n=38) were females.

#### 4.3.1.3 Education level:

The findings in Table 4.2 indicate the majority (32.3%; n=30), followed by 30.1% (n=28) achieved grade 9-12 and grade 5-8 respectively. The results further showed 8.6% (n=8) participants reached tertiary education: FET certificate, National diploma and Degree.

**Table 4.2 Education level of participants**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| None | 15 | 16.1 |
| 1-4 | 12 | 12.9 |
| 5-8 | 28 | 30.1 |
| 9-12 | 30 | 32.3 |
| FET certificate | 2 | 2.15 |
| National diploma | 4 | 4.3 |
| Degree | 2 | 2.15 |

#### 4.3.1.4 Occupation:

**Table 4.3 Occupation level of participants**

| | | |
|---|---|---|
| Employed | 17 | 18.3 |
| Unemployed | 27 | 29 |
| Self employed | 5 | 5.4 |
| Scholar | 18 | 19.4 |
| Pensioner | 14 | 15 |
| Minor | 12 | 12.9 |

Table 4.3 highlighted that the majority (29%: n=27) of participants were unemployed, 18.3% (n=17) were employed and 5.4% (n=5) participants were self-employed. An additional category of 12.9% (n=12) were minors between the age group 11 months-5years who had not yet started school and therefore not matured to be classified under unemployed category.

#### 4.3.1.5 SMOKING AND ALCOHOL HABITS

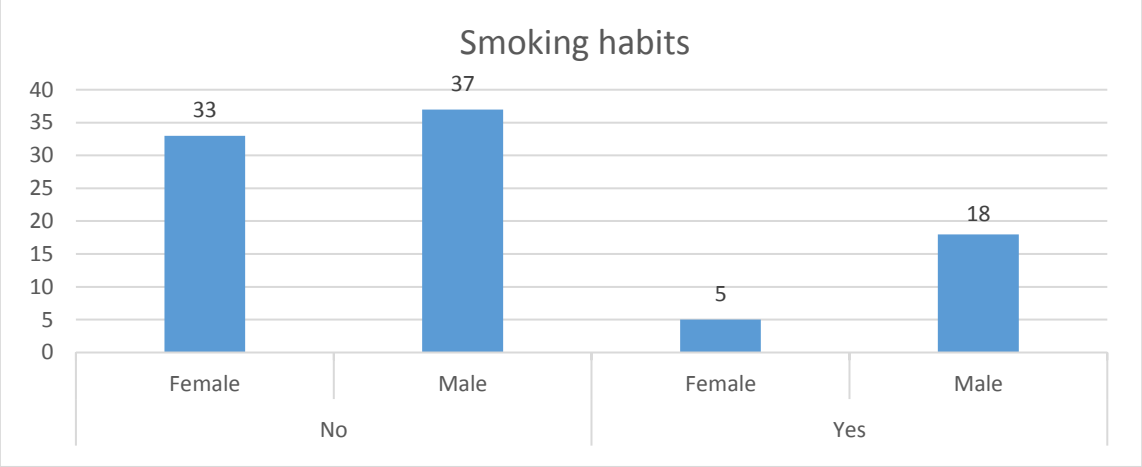


**Figure 4.2: Smoking habits of participants**

In terms of lifestyle, Figure 4.2 illustrated a good health indication due to the fact the majority (75.3%: n=70) of participants were non-smokers and only 24.7% (n=23) smoked. The majority of the smokers were males (78.3%: n=18) and 21.7% (n=5) females. Participants were further required to indicate the number of cigarettes smoked daily. The results showed that 95.7% (n=22) smoked <10 cigarettes daily and only 4.35% (n=1) reported to be smoking 11-20 cigarettes daily. Information regarding participants' habits could not be verified. The researcher relied on participants responses.

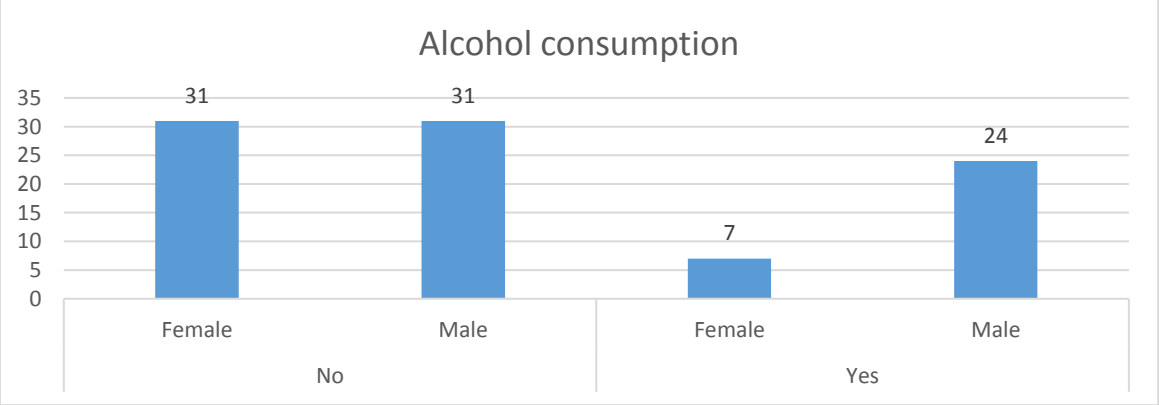


**Figure: 4.3 Alcohol consumption of participants**

Participants were further asked to respond to a question related to alcohol intake. An equal proportion of both male and female participants (66.7%: n=62) reported not to drink alcohol. Thirty-one (33.3%) participants admitted they did drink alcohol.

#### 4.3.1.6 Comorbidities

Participants were asked to indicate if they had an existing chronic disease. This question was followed by a request to indicate the type of chronic disease/s, and to state the current medications used. The results are presented in Table 4.4 below.

**Table 4.4: Comorbidities of participants**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| **Do you have chronic diseases?** | | |
| Yes | 32 | 34.4 |
| No | 61 | 65.6 |
| **Indicate the chronic disease/s:** | | |
| Diabetes Mellitus | 1 | 3.11 |
| Hypertension | 11 | 34.4 |
| Asthma | 1 | 3.11 |
| HIV | 6 | 18.7 |
| Cancer | 1 | 3.11 |
| Other | 5 | 15.6 |
| Diabetes Mellitus & Hypertension | 2 | 6.32 |
| Hypertension & HIV | 2 | 6.32 |
| Asthma & HIV | 1 | 3.11 |
| Hypertension & Other | 1 | 3.11 |
| Diabetes, Hypertension & HIV | 1 | 3.11 |
| **Medication:** | | |
| Prescribed medication | 31 | 33.3 |
| Over the counter medication | 1 | 1.1 |
| Herbal medication | 2 | 2.1 |
| None | 58 | 62.4 |
| Prescribed and herbal medications | 1 | 1.1 |

The findings in Table 4.4 showed that the majority of participants (65.6%: n=61) were not affected by chronic diseases and 34.4% (n=32) reported having a chronic disease.

The common leading chronic disease in the majority of participants was hypertension, with 34.4% (n=11), followed by HIV with 18.7% (n=6). It must be noted that 22% (n=7) of participants were affected by more than one chronic disease.

Findings in a follow up question to establish the current use of medications revealed that the majority of participants (62.4%: n=58) reported they did not use medication whereas a total of 37.6 % (n=35) participants reported use of medications. The results also revealed that prescribed medications were used by 33.3% (n=31), 2.1% (n=2) indicated the use of herbal medications, 1.1% (n=1) used a combination of herbal and prescribed medications and only 1.1% (n=1) reported use of over-the-counter drugs.

#### 4.3.1.7 Anthropometric measures and nutritional status

In this section, the height and weight measurements of participants were assessed, and the findings used to determine the BMI of each category. However, the BMI of nine participants under the age of five was not calculated as the tool used did not accommodate under-fives. The BMI result provided guidance as to whether an individual had a normal healthy weight, was underweight, overweight, obese or extremely obese. The nutritional status was determined through clinical observation.
The mean weight was 51.5 and the standard deviation was 25.6, whereas 55.4 was the median weight with interquartile range IQR of 30-65.

On checking the height, the results showed a mean height of 148.3 with a standard deviation of 28.2; the median height was 160 with interquartile range IQR of 138-165.
Based on the BMI classification, 50% (n=32) of adult participants between the ages 18-94 years had a normal BMI with an acceptable nutritional status, 13 (20.3%) were found to be overweight, 15.6% (n=10) were underweight, 9.4 % (n=6) were obese and 4.7% (n=3) participants were extremely obese.

**Table 4.5: Anthropometric measures and nutritional status of participants**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| **BMI Adults:** | | |
| 12-18=Underweight | 10 | 15.6 |
| 18-24=Healthy | 32 | 50 |
| 25-29=Overweight | 13 | 20.3 |
| 30-39=Obese | 6 | 9.4 |

| | | |
|---|---|---|
| 40-42=Extremely obese | 3 | 4.7 |
| **BMI Girls:** | | |
| 11.8-12.6 =Moderately underweight | 1 | 20 |
| 12.7-17.2 =Normal | 4 | 80 |
| **BMI Boys:** | | |
| 13.1-16.9=Normal | 15 | 100 |
| **Nutritional status:** | | |
| Very poor | 9 | 9.7 |
| Probably adequate | 1 | 1.1 |
| Adequate | 22 | 23.6 |
| Excellent | 61 | 65.6 |

Table 4.5 further depicts five (n=5) female participants between the ages 5-13 years of age of whom 80% (n=4) participants had a normal BMI rate ranging from 12.7 - 17.2 and only 20% (n=1) were moderately underweight, as evidenced by a BMI ranging from 11.8 - 12.6.

All the male participants (100%: n=15) between the ages 5-17 years had a normal BMI rate. A normal BMI rate for such an age group ranges from 13.1 -16.9. The rest of the participants (65.6%; n=61) were found to have an excellent nutritional status, 23.6% (n=22) were reported to have an adequate nutritional status, 1.1% (n=1) had probably inadequate nutritional status and 9.7% (n=9) befit the very poor nutritional status, which can be considered an indication for potential problems.

### 4.3.2 Wound Assessment Results

This section is comprised of two parts. The first aspect enquired about wound data, which provided details of the area, total number of wounds, types of wounds, duration of wounds, as well as frequency of dressings, while the second aspect of wound characteristics described the size, depth, edges, undermining, necrotic tissue type, necrotic tissue amount, exudate type, skin colour surrounding wound, peripheral tissue oedema, peripheral tissue induration, granulation and epithelialisation.

#### 4.3.2.1 Wound data

**Table 4.6: Location of wounds**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| **Area:** | | |
| Head | 10 | 10.8 |
| Chest | 1 | 1.1 |
| Abdomen | 2 | 2.1 |
| Sacrum | 1 | 1.1 |
| Arms | 16 | 17.2 |
| Buttock | 1 | 1.1 |
| Upper leg | 4 | 4.3 |
| Lower leg | 35 | 37.6 |
| Other | 2 | 2.1 |
| Arms & upper leg | 1 | 1.1 |
| Sacrum & hip | 1 | 1.1 |
| Chest & arms | 2 | 2.1 |
| Chest & lower leg | 1 | 1.1 |
| Arms & lower leg | 2 | 2.1 |
| Sacrum, hip & buttock | 1 | 1.1 |
| Head & arms | 1 | 1.1 |
| Penis | 12 | 12.9 |

The results in Table 4.6 show that the lower leg category seems to be the most affected area, accounting for 37.6% (n=35), arms 17.2 % (n=16), penis 12.9% (n=12), head 10.8% (n=10), and upper leg 4.3% (n=4). The least affected areas were the chest, abdomen, buttocks and other areas not specified with a range of 1.1% (n=1) to 2.1% (n=2) of participants affected.

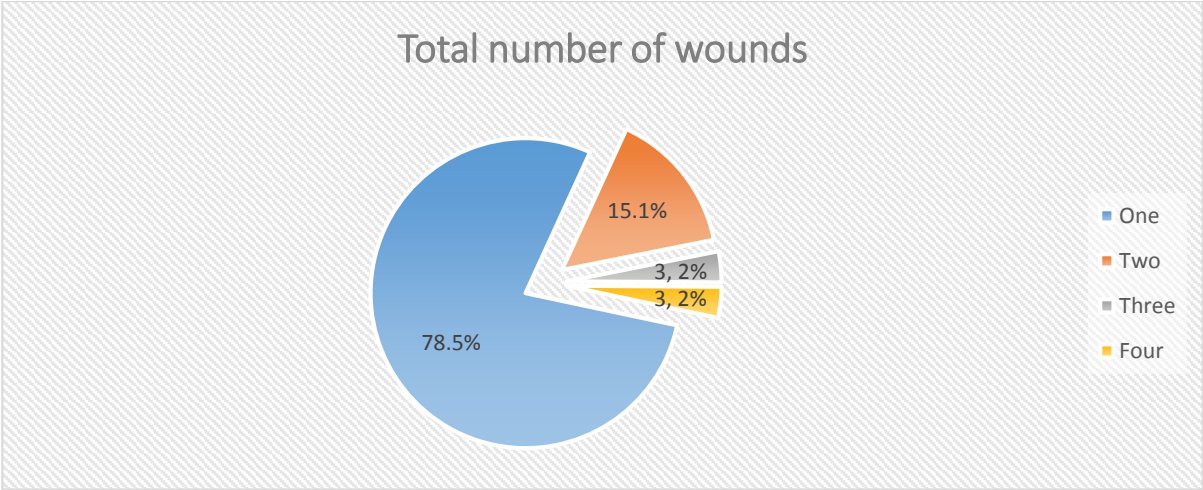


**Figure 4.4 Total number of wounds**

The results in Figure 4.4 depict that 78.5% (n=73) of the participants presented with one wound, 15.1% (n=14) presented with two wounds, whilst the remaining two categories which were three and four wounds, accounted for 3.2% in each category. The findings therefore illustrate 122 wounds from the total sample of n=93 participants.

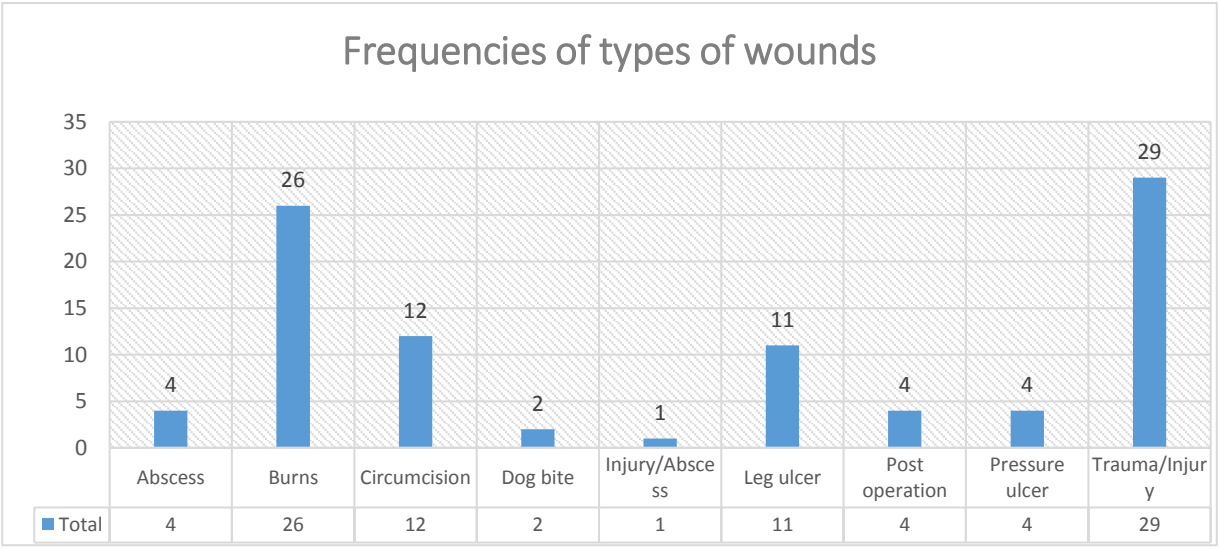


**Figure 4.5 Frequency of types of wounds**

Based on the results in Figure 4.5, acute wounds were the most prevalent with 31.2% (n=29) trauma/injury wound types, followed by burns with 28% (n=26). The most severe wounds were LU (leg ulcers) 11.8% (n=11) and PU (pressure ulcers) 4.3% (n=4). Abscess and post-operative wound types equally accounted for 4.3% (n=4). The least was 1.1% (n=1) participant who had both an abscess and an injury type of wound.

An additional category for circumcision wound type was added as it had a majority of 12.9% (n=12) of participants.

**Table 4.7: Duration of wound**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| **Duration of wound** | | |
| 1 week | 48 | 51.6 |
| 1-2 weeks | 10 | 10.7 |
| 2-4 weeks | 19 | 20.4 |
| 4-6 weeks | 4 | 4.3 |
| 6 weeks- < 3 months | 2 | 2.2 |
| 3 months – 6 months | 5 | 5.4 |
| 6 months -1 year | 1 | 1.1 |
| 1 year - < 5 years | 1 | 1.1 |
| >5 years | 3 | 3.2 |

The duration of the wound varied from one week to beyond five years. The majority of the participants (51.6%: n=48) had wounds with a duration of 1 week, slightly more than 3% of participants' wounds had a duration beyond >5years (3.2%; n=3), whilst the least 1year -5 years duration was only 1.1% (n=1). Details of findings are illustrated in Table 4.7.

#### 4.3.2.2 Wound characteristics

This section enquired about the possible signs of infection with reference to the healing process.

**Table 4.8: Wound size**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| Size | | |
| Length x width <4sq cm | 32 | 34.4 |
| Length x width 4--≤16sq cm | 26 | 28 |
| Length x width 16.1--≤36sq cm | 23 | 24.7 |
| Length x width 36.1--≤80sq cm | 9 | 9.7 |
| Length x width >80sq cm | 3 | 3.2 |

Data analysis from Table 4.8 showed that 34.4% (n=32) of wound sizes was less than 5cm. Slightly more than 3% of participants had wounds that had grown beyond 80sq cm (3.2%: n=3).

**Table 4.9: Wound depth and edges**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| **Depth** | | |
| Non-blanchable erythema on intact skin | 8 | 8.60 |
| Partial thickness skin loss involving epidermis and/or skin | 58 | 62.3 |
| Full thickness skin loss involving damage or necrosis of subcutaneous tissue; may extend down to but not through underlying fascia; and/or mixed partial and full thickness, and/or mixed partial and full thickness and/or tissue layers obscured by granulation tissue | 16 | 17.2 |
| Obscured by necrosis | 10 | 10.8 |
| Full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone or supporting structures. | 1 | 1.1 |
| **Edges** | | |
| Healed, resolved wound | 1 | 1.1 |
| Indistinct, diffuse, none clearly visible | 18 | 19.3 |
| Distinct, outline clearly visible, attached even with wound base | 38 | 40.9 |
| Well-defined, not attached to wound base | 22 | 23.7 |
| Well-defined, not attached to base, rolled under, thickened | 11 | 11.8 |
| Well-defined, fibrotic, scarred or hyperkeratotic | 3 | 3.2 |

The results in Table 4.9 highlighted that 62.3% (n=58) of the wounds observed had partial thickness skin loss involving epidermis and/or skin, and only 1.1 % (n=1) had full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone or supporting structures.

Regarding wound edges, the results indicated 40.9% (n=38) of the wounds had distinct wound edges, with a clearly visible outline attached even with wound base. Twenty-two (23.7%) of the wounds were well-defined, not attached to wound base, whereas 19.3% (n=18) were indistinct, diffuse, none clearly visible, and only 1.1% (n=1) had a completely healed and resolved wound edge.

**Table 4.10: Undermining**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| **Undermining** | | |
| None present | 63 | 67.7 |
| Undermining<2cm in any area | 17 | 18.3 |
| Undermining 2-4cm involving <50% wound margins | 11 | 11.8 |
| Undermining 2-4cm involving >50% wound margins | 1 | 1.1 |
| Undermining >4cm or Tunnelling in any area | 1 | 1.1 |

Table 4.10 above is the result of the undermining process. Undermining was assessed by inserting gauze padded forceps under the edge of the wound, moving it as far as it would go using forceless manoeuvre. A pen was used to mark the raised tip of the forceps that could be felt or seen on the surface of the skin. The distance between the marked area and the wound edge was measured. The undermining process was done around the wound.

Data analysis in Table 4.10 indicated an absence of undermining in 67.7% (n=63).

The findings in Table 4.11 illustrated 62.4% (n=58) of the wounds had no visible necrotic tissue and 7.55% (n=7) had necrotic tissue strongly attached to the base of the wound, of which only 4.3% (n=4) had 75%-100% necrotic tissue amount covering the wound. In conclusion, the results indicated there were few wounds that presented with dead tissue causing delay in wound healing.

**Table 4.11: Necrotic tissue type and necrotic tissue amount**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| **Necrotic tissue type** | | |
| None-visible | 58 | 62.4 |
| White/grey non-viable tissue and/or non-adherent yellow slough | 3 | 3.2 |
| Loosely adherent yellow slough | 17 | 18.3 |
| Adherent, soft, black eschar | 8 | 8.6 |
| Firmly adherent, hard, black eschar | 7 | 7.5 |
| **Necrotic tissue amount** | | |

| | | |
|---|---|---|
| None-visible | 57 | 61.3 |
| <25% of wound bed covered | 11 | 11.8 |
| 25% to 50% of wound covered | 12 | 12.9 |
| >50% and <75% of wound covered | 9 | 9.7 |
| 75% to 100% of wound covered | 4 | 4.3 |

**Table 4.12: Exudate type**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| **Exudate type** | | |
| None | 12 | 12.9 |
| Bloody | 38 | 40.9 |
| Serosanguinous: thin, watery, pale red/pink | 6 | 6.4 |
| Serous: thin, watery, clear | 12 | 12.9 |
| Purulent: thin or thick, opaque, tan/yellow, with or without odour | 25 | 26.9 |
| **Exudate amount** | | |
| None, dry wound | 14 | 15 |
| Scant, wound moist but no observable exudate | 12 | 12.9 |
| Small | 36 | 38.7 |
| Moderate | 25 | 26.9 |
| Large | 6 | 6.5 |

Results in Table 4.12 indicate that 40.9% (n=38) of wounds had a bloody type of exudate, with just 6.4% (n=6) fewer wounds presenting with serosanguinous type of exudate. The results further indicate that 38.7% (n=36) of wounds were considered to have below average exudate amount, with only 6.5% (n=6) classified as largely exuding. The increased haemorrhagic exudate findings concluded and verified the trauma type of injuries presenting with damaged capillaries with minimal signs of infection.

**Table 4.13: Skin colour surrounding the wound**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| **Skin colour surrounding wound:** | | |
| Pink or normal for ethnic group | 63 | 67.7 |

| | | |
|---|---|---|
| Bright red, and/or blanches to touch | 6 | 6.5 |
| White or grey pallor or hypo pigmented | 10 | 10.8 |
| Dark red or purple, and/or non-blanchable | 7 | 7.5 |
| Black or hyper pigmented | 7 | 7.5 |

With regard to the skin colour of the wound, a normal pink skin colour surrounding the wound was observed in 67.7% (n=63) of participants. This is an indicator of normal healing process.

**Table 4.14: Peripheral tissue oedema and peripheral tissue induration**

| **Variable/Categories** | **Frequency** | **Percentage** |
|---|---|---|
| **Peripheral tissue edema:** | | |
| No swelling or oedema | 50 | 53.8 |
| Non-pitting oedema extends <4cm around wound | 20 | 21.5 |
| Non-pitting oedema extends >4cm around wound | 8 | 8.6 |
| Pitting oedema extends <4cm around wound | 14 | 15 |
| Crepitus and/or pitting oedema extends>4cm around wound | 1 | 1.1 |
| **Peripheral tissue induration:** | | |
| None present | 71 | 76.3 |
| Induration<2cm around wound | 12 | 12.9 |
| Induration 2-4cm extending <50% around wound | 4 | 4.3 |
| Induration 2-4cm extending >50% around wound | 4 | 4.3 |
| Induration >4cm in any area around wound | 2 | 2.2 |

Table 4.14 shows that 53.8% (n=50) of the wounds showed no signs of swelling nor oedema, with 15% (n=14) presenting with pitting oedema less of than 4cm around the wound and just 1.1% (n=1) presenting with pitting oedema extending beyond 4cm around the wound. The findings are presented in Table 4.14.

**Table 4.15: Granulation and epithelialisation**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| **Granulation:** | | |
| Skin intact or partial thickness wound | 3 | 3.2 |
| Bright, beefy red; 75% to 100% of wound filled and/or tissue overgrowth | 52 | 55.9 |
| Bright, beefy red; <75% and >25% of wound filled | 12 | 12.9 |
| Pink, and/or dull, dusky red and/or fills ≤25% of wound | 17 | 18.3 |
| No granulation tissue present | 9 | 9.7 |
| **Epithelialisation:** | | |
| 100% wound covered, surface intact | 6 | 6.4 |
| 75% to 100% wound covered and/or epithelial tissue | 52 | 55.9 |
| 50% to 75% wound covered and/or epithelial tissue | 14 | 15.1 |
| 25% to <50% wound covered | 13 | 14 |
| <25%wound covered | 8 | 8.6 |

The growth of new blood capillaries and small blood vessels on the raw surface area of the wound is referred to as granulation tissue. Epithelialisation refers to the process whereby the epidermis rises as pink or red skin throughout the wound. The results show that epithelialisation and granulation were the most common tissue type equally observed, as indicated by 55.9% (n=52). Most wounds presented with a bright beefy red tissue growth, as well as 75%-100% of the wound covered with epithelial tissue indicating healthy tissues.

**Table 4.16 Frequency of dressings**

| Variable/Categories | Frequency | Percentage |
|---|---|---|
| **Frequency of dressings** | | |
| Daily | 24 | 25.8 |
| Alternate days | 62 | 66.7 |
| 2-3 times daily | 5 | 5.4 |
| Once a week | 2 | 2.1 |

The findings in Table 4.16 highlighted 66.7% (n=62) of the wounds were dressed on alternate days, daily dressings for 25.8% (n=24), 2 to 3 times a week 5.4% (n=5), and 2.1% (n=2) were dressed weekly.

### 4.3.3 Patients knowledge

This section comprised eight questions, of which four were closed-ended questions and the other four open-ended respectively. The closed-ended questions required a simple 'yes' or 'no' response, whereas the open-ended questions were concerned with narration. Participants responded voluntarily to all questions. The questions are further divided into categories. The first aspect was concerned with knowledge of wound care, whereas the second aspect was based on wound healing. Parent's views were considered as children could not make decisions.

#### 4.3.3.1 Knowledge regarding wound care

Four questions were asked to describe participant's knowledge of wound care. The first two questions described information related to whether the participants did their own wound dressings at home; a follow up question was asked to determine whether the participants were given information on how to take care of their wounds.

The results in Table 4.17 showed that slightly more than 40% of the participants stated they do their dressings at home, whilst the majority (56.9%: n=53) reported they did not. The results indicated that 51.6% (n=49) of participants reported being given information on how to take care of their wounds, with 48.4% (n=44) participants indicating never having been give information on how to take care of their wounds.

**Table 4.17: Knowledge of wound care**

| Variable | N=93<br>N (%) |
|---|---|
| **Q.1 Do you do your own dressing at home?** | |
| Yes | 40(43.1) |
| No | 53(56.9) |
| **Q.2 Were you ever given information on how to take care of your wound at home?** | |
| Yes | 49(51.6) |
| No | 44(48.4) |

The third question was directed at participants who responded they were given information on wound dressing. Table 4.18 is an indication of the type of information that participants received on wound care.

**Table 4.18: Information regarding wound care**

| **Participants responses to Q.3** | **N=93<br>N (%)** |
|---|---|
| Clean wound with warm water and coarse salt | 28 (57.1) |
| Clean wound with antiseptic (Dettol or Savlon) | 9 (18.4) |
| Clean with iodine solution, apply jelonet. | 1(2.04) |
| Apply aloe gel to wound | 1(2.04) |
| Apply Mokhura leaves to the wound and cover with crepe bandage. | 2 (4.1) |
| Wash wound, apply burn gel and bandage | 1(2.04) |
| Wash wound, apply warm cabbage leaf | 1(2.04) |
| Dress wound with betadine | 1(2.04) |
| Wash with salted water and vinegar | 1(2.04) |
| Apply zambuk | 1(2.04) |
| Apply gentian violet | 1(2.04) |
| Apply sulphur | 1(2.04) |
| Use prescribed ointment | 1(2.04) |

Data analysis revealed that 57.1% (n=28), which is almost a third of the total participants, reported cleaning the wound with warm water and coarse salt, with just 12.3% (n=6) reporting the use of home remedies for wound care. The findings are displayed in Table 4.18.

The fourth question enquired about where participants obtained information about taking care of their wounds.

**Table 4.19: Information regarding where participants obtained advice about wound care**

| | N=93<br>N (%) |
|---|---|
| Nurse at the clinic | 27(55.1) |
| Family | 8(16.3) |
| Self | 6(12.2) |
| Traditional healer | 2(4.1) |
| First aid training | 2(4.1) |
| Neighbour | 1(2.05) |
| Teacher | 1(2.05) |
| Magazines | 1(2.05) |
| General practitioner | 1(2.05) |

The results in Table 4.19 show that the source of information for most participants (55.1%: n=27) regarding taking care of their wounds was the nurse at the clinic, whilst a few 8.2% (n=4) participants indicated having obtained information from neighbours, teachers, magazines and general practitioners; conversely, 4.1% (n=2) reported to have been informed by the traditional healer.

### 4.3.3.2 Knowledge regarding wound healing

Four questions were asked to describe participant's knowledge of wound healing. The first question enquired whether the participants knew what promotes wound healing.

**Table 4.20: Knowledge of wound healing**

| Participants' responses | N=93<br>N (%) |
|---|---|
| **Q.5 Do you know what promotes wound healing?** | |
| Yes | 65(69.9) |
| No | 28(30.1) |

A greater percentage (70%) of participants indicated being knowledgeable about what promotes wound healing with just 30.1% (n=28) who reported no knowledge regarding what promotes wound healing. These findings were illustrated in Table 4.20.
Participants who indicated they had some knowledge on wound healing were asked to respond to a follow up question that explored their knowledge on factors that promote wound healing. The results in Table 4.21 below show that 60% (n=39) considered compliance to treatment and follow up care as significant for promoting wound healing, with 3.1% (n=2) of participants believing home remedies promoted wound healing.

**Table 4.21 Knowledge on what promotes wound healing.**

| | N=93<br>N (%) |
|---|---|
| Compliance to treatment and follow up care at the clinic | 39(60) |
| Good nutrition and a healthy meal | 24(36.9) |
| Home remedies | 2(3.1) |

A follow up question was asked to determine participants' knowledge regarding what could lead to poor wound healing; the findings were presented in Table 4.22.

**Table 4.22 Knowledge on what could lead to poor wound healing.**

| | N=93<br>N (%) |
|---|---|
| **Q.7 Do you know what can lead to poor wound healing?** | |
| Yes | 68(73.1) |
| No | 25(26.9) |

The results showed that 73.1% (n=68) of participants indicated being knowledgeable about what could lead to poor wound healing, whilst 26.9% (n=25) stated not being knowledgeable.

The last question related to participants who answered 'yes' in a question that enquired about participants' knowledge regarding causes of poor wound healing. Table 4.23 shows responses from participants regarding their thoughts on what could cause poor wound healing.

**Table 4.23: Knowledge on what can cause poor wound healing**

| | **N=93 N (%)** |
|---|---|
| Poor compliance to treatment | 28(41.2) |
| Infection | 18(26.5) |
| Poor nutrition | 15(22) |
| Poor lifestyle habits, smoking, alcohol, obesity and chronic diseases | 4(5.9) |
| Home remedies, herbal medications | 3(4.4) |

The results in Table 4.23 indicated that the majority of participants 41.2 % (n=28) cited poor compliance to treatment as a causative factor to poor wound healing, 26.5% (n=18) reported infections as a cause and 22% (n=15) reported poor nutrition. Four (5.9%) participants associated poor lifestyle habits, smoking, alcohol, obesity and chronic diseases with poor wound healing. The last category of participants (4.4%: n=3) cited home remedies and herbal medications as causes of poor wound healing.

## 4.4 DISCUSSION OF RESULTS

### 4.4.1 Demographic Data

#### 4.4.1.1 Age and gender

Data analysis identified that the participants' ages ranged from 11 months - 94 years of age with a mean age of 35.15 and standard deviation of 25.7; the median age was 30, with the interquartile range of 13 – 55. The majority of participants were in the age group between 25 and 34 years of age. Demographic data has been described to determine quantifiable characteristics of participants presenting with a wound.

Similar results were reported in three studies. In the first study conducted by Priyadarshani and Samarawickrama (2017), in Sri Lanka, findings indicated an age

range of 15 - 95 years with a mean range of 55 - 64. In the second study, in Hopkins and Worboys (2015) in London with regard to the age range, the study sample had a 51% majority of males and an age range of 9 - 96 years. In the third study, McDermott-Scales (2009), in Ireland, pointed out an age range of 6 weeks – 101 years with a mean patient age of 64.4 years and SD of 22.7. For the context of this study, the age range was important since Guo and DiPietro (2010) considered increasing age as a major risk factor for impaired wound healing. Parker et al. (2015) cited inconclusive results in considering age being a risk factor for delayed healing in VLU (venous leg ulcer). The findings of the current study are consistent with similar studies conducted globally, irrespective of the developmental state of the countries. Regardless of the similarities of age ranges, the current study shows the younger generation, 25 - 34 years of age, being mostly affected.

The findings of a survey of wound care provision done in an English healthcare district by Vowden and Vowden (2009) showed that of the 1735 with wounds, 56.5% affected mostly women. McDermott-Scale (2009) identified a majority (56.2%: 163/290) of women having wounds as opposed to men (43.8%: 127/290). Findings from the current study showed a dissimilarity between Vowden and Vowden and McDermott-Scale's findings, as 59.1% was predominantly male participants and 40.9% were females. Parker et al. (2015) reported no significant relations between gender and delayed wound healing.

#### 4.4.1.2 Education and employment

In the current study, few participants (8.60%) had attained a tertiary education qualification, whereas 32.3% of participants had reached grade 9-12. A total of 16.1% of participants had never attended school, of which 12.9% were not ready for school as they were minors with an age range between 11 months and 5years and 3.2 % were elderly participants who had never attended school. Therefore, one can conclude that 43% participants had education up to grade eight and below.

Consequently, this poor level of education in the majority of participants could indicate inability to read and write with a possibility of poor understanding of the significance of compliance to treatment as well as wound care instructions.

The results further showed a negative reflection on the economic status of the participants. Only 18.3% of the sample had a stable monthly income in the form of a salary.

The results depicted an increase in the numbers of dependents for financial support, and included the minors, scholars and pensioners. Financial status could have an impact on wound care, compliance and lost for follow up, probably affecting the healing process, as the researcher highlighted that the majority of participants were unemployed, as well as increased numbers of dependents. However, in a study conducted by Parker et al. (2015) there was no significant association between employment status and delayed wound healing. Parker et al's. (2015) findings are based on studies conducted in developed European countries as opposed to the current study conducted in a rural community where the effects of unemployment status result in adverse outcomes in physical health, especially where one struggles to find a job.

#### 4.4.1.3 Smoking and alcohol habits

It was noteworthy to recognise that the majority of participants in the current study reported good lifestyle habits, as manifested by the majority being non-smokers and non-alcohol users, 67.7% and 75.3% respectively. Noted is the fact that only 4.35% of those who smoked were heavy smokers. Information regarding participants' habits could not be verified.The researcher relied on participants' responses.

#### 4.4.1.4 Comorbidities

Chronicity of diseases is globally documented as a risk factor affecting the quality of life and mostly affecting the elderly, predisposing them to poor wound healing. The results in most of the studies reviewed have revealed a lower prevalence of chronic diseases, as evidenced by the population dominated by a younger generation as opposed to the aged population as well as an insignificant $p>0.640$ score to wound healing.

Sen et al. (2009) reported that patients with chronic wounds were commonly affected by "highly branded" diseases such as diabetes and obesity. Menon (2012) attributed high exudate levels, oedema and cause of VLUs to chronic venous hypertension and also recognised the significance of including comorbidities in assessment of patients.

Despite the current study being dominated by a younger generation with a lower prevalence of chronic diseases, Menon's (2012) findings are echoed as the majority (11.8%) of participants with leg ulcers are affected by hypertension, which can be considered as an indicator for delayed healing.

Guo and DiPietro (2010), in a study on factors affecting wound healing, also recognised ulcers as the majority of chronic wounds correlated with diabetes mellitus, ischemia, venous stasis disease, or pressure.

Måkelå (2010) acknowledged vascular diseases as the underlying cause of ulceration. The current study revealed that hypertension and HIV were the common leading chronic diseases affecting the majority of participants, 34.4% and 18.7% respectively. It must be noted that some participants were affected by more than one chronic disease. Guo and DiPietro (2010) recognised the commonly used medications, such as systemic corticosteroids, which may significantly affect the inflammatory responses and negatively affect the healing process. Regardless of the low prevalence of chronic diseases in the current study, the researcher acknowledged and considered Guo and DiPietro's (2010) finding as a precautionary measure and therefore recommends close monitoring of all participants affected by asthma and rheumatoid arthritis.

#### 4.4.1.5 Anthropometric measures and nutritional status

The mean weight was 51.5 with a standard deviation of 25.6; 55.4 was the median weight with IQR of 30-65. The mean height was 148.3 with a standard deviation of 28.2; the median height was 160 with interquartile range IQR of 138-165. Data analysis indicated an overall majority with normal BMI for all categories, namely 50% adults, 80% girls and 100% boys, which supports an excellent nutritional status finding for the majority (65.6%) of participants.

Demling (2009) recognised the significance of optimum nutrition in preserving all phases of wound healing, as satisfactory nutrient flow determines the healing process; 1.1% probably had inadequate nutritional status and 9.7% befit the very poor nutritional status.

Quain and Khardori (2015), in a study conducted to investigate the importance of "Nutrition in wound care management," considered malnutrition as a persistent fundamental factor in wound chronicity and therefore supports assessment of patients' nutritional status in ensuring effective wound care management.

This was supported by Demling (2009), who emphasised the significance of baseline data on measuring the body's composition and also highlighted retardation of healing resulting from protein deficiency in both chronic and acute wounds. Saghaleini et al. (2018), on PU and nutrition, consider inadequate dietary intake and nutritional deprivation as significant risk factors for PU development and delayed healing of wounds. Accordingly, Neloska et al. (2016) found a statistically significant difference of nutritional status between patients with and without PU ($p<0.0001$) and thus concluded a positive correlation of malnutrition with PU prevalence.

Saghaleini et al. (2018) further reported that height, weight, BMI and other laboratory findings may be suitable to establish the overall prognosis of wound healing but may not represent the nutritional status. Jaffe (2017) associated low body weight and reduced BMI with an increased risk of developing ulcers. Parker et al. (2015) recognised obesity as a contributory factor to venous ulceration resulting in dysfunctional musculoskeletal calf pump.

Guo and Dipietro (2010) acknowledged obesity as a risk factor for contracting chronic diseases and further reported wound complications associated with this category. Anthropometric measurements, such as weight, height, BMI, and nutritional status were significant for the current study to enable some comparative analysis based on the BMI classification and to determine predisposing factors to wound healing complications.

It can thus be concluded in the current study that the likelihood of wound healing to be compromised by poor nutritional status on the majority of patients was low, given the fact that 65.6% of participants were in a satisfactory nutritional state. Therefore, the focus in determining the correlation will be shifted to other variables.

### 4.4.2 Wound assessment

The second aspect of results revealed the information on wound data, wound characteristics and the frequency of wound dressings.

Wound characteristics enquired about the possible signs of infection with reference to the healing process. Thirteen items on the characteristics of wounds had to be answered with scores that ranged from 0-5; zero score was if the wound had healed or resolved. The frequency of dressings was assessed to determine compliance and the healing progress.

The results in the current study showed that 37.6% of participants had lower leg ulcers, whilst the arms and the head affected 17.2% and 10.8% respectively. An additional category observed was penile area wounds, affecting 12.9% of circumcised participants. The least affected areas were chest and abdomen with frequencies of 1-2 participants.

Vowden and Vowden's (2009) results, in a survey of wound care provision within one English healthcare district, compared well with the findings in this study. Lower leg wounds were described as the second most prevalent wound type; the same finding was repeated by Priyadarshani and Samarawickrama (2017). The common location of the wound was the foot accounting for 68.6% of the sample.

Parker et al. (2015) considered location as significant in predicting healing outcomes. Swezy (2012) is of the opinion that wounded areas with decreased vascularity, bony landmarks as well as thickest skin areas, noted in obese patients, take time to heal. Conversely, Grey, Enoch and Harding (2006) considered the area to be significant in provision of diagnosis.

The researcher noted a slight similarity in the current study to that of Priyadarshani and Samarawickrama (2017), with common areas of the leg and buttock affected.

The clinical significance of determining the location of the wound in wound assessment may be used as guidance for clinicians in selecting appropriate and most effective intervention strategies. This finding resonates with Grey, Enoch and Harding (2006), who also considered areas to be significant in provision of diagnosis. The researcher also recognised the area as a determining factor of the urgency for intervention, e.g. head injuries, stabbed chest.

In total, 122 wounds were observed during the research process. The majority of participants (78.5%) had one wound, followed by 15.1% with two wounds and 6.4%, the minority, had three to four wounds. The results in this study compared well with O'Brien (2016), wherein more than 60% had only one wound and slightly more than 15% had two wounds, and an almost similar percentage (7%) had three wounds. Comparable results were reported again in McDermott-Scales (2009), where almost 60% had only one wound.

Compared to European studies, a significant difference was noted regarding the total number of wounds. In the current study, the highest recorded number of wounds observed on individual participants was three to four; in O'Brien's (2016) study, one

patient was reported to have 11 (n=11) wounds. However, findings from the current study are similar to patients presenting with three different wound types reported in McDermott-Scales (2009) study.

The findings of the current study revealed that a total of 79.6% participants had acute wound types and 20.4% presented with chronic wound types. The acute wound types were in the majority, with an increased incidence of 31.2% trauma affecting predominantly 55.2% of males and 44.8% of females, 28% burns, 12.9% circumcisions, 4.3% abscess, 4.3% Other (Post surgery), 2.1% dog bite and the least was 1.1% participant with both an abscess and an injury wound type. Chronic wounds were 11.8% LU, 4.3% PU. It must be noted that data collection was done throughout the winter season, hence there was a higher incidence rate of burn wound types.

O'Brien (2016) reported the following types, LU (Leg ulcer, 19%: n=84); PU (Pressure ulcer, 10%: n=46), DFU (diabetic foot ulcer, 5%: n=23), a majority of (43%: n=189) acute/surgical wounds, other wound types were (12%: n=52) pre-tibial lacerations/tears and pilonidal sinus, and 11% (n=50) were uncategorised.

Vowden and Vowden (2009) reported 826 acute wounds, of which 303 were traumatic wounds with burns included, primary closures, open surgical wounds, post-surgical breakdowns, and dehisced wounds, plus other forms of acute wounds including abscesses, skin grafts and skin tears. McDermott-Scales (2009) recognised 26.2% (76/290) with 103 pressure ulcers, Gottrup et al. (2013) reported 25% (207/830) with trauma/surgical wounds. Kröger and Jöster (2018) reported acute wounds in Germany, to be predominant in hospitalised patients, with 50.6%-62% presenting with surgical/traumatic wound types.

Out of 207 patients, Priyadarshani and Samarawickrama (2017) reported diabetic wounds in 38.2% (79), bed sores in 11.1% (23), surgical site wound 10.6 % (22), burn 9.2% (19), venous ulcers 2.4% (5) and other wound types were 20.8% (43).

There are similarities between the findings of the current study and previous studies whereby predominant wounds are acute wound types have been noted, however it is in contrast with Priyadarshani and Samarawickrama (2017) who highlighted a 38.2% majority of diabetic chronic wound types.

Several wound care studies have been conducted in different settings and results show the same wound types affecting different cultures worldwide. The prevalence varies however because of economic factors, large differences in sample sizes and different measurements used.

With regard to wounds, those observed had a duration that varied from 1 week to >5years, with the majority (51.6%) being a week old, 20.4% were 2 - 4 weeks old and only 1.1% for both categories of 6months - 1year and 1year - <5years. O'Brien (2016) reported 4 - 6 weeks mean duration with a difference from 1 week – 5 years. McDermott-Scales (2009) reported <4weeks duration for the majority of wounds (38.2%: 111/290), 24.5% (71/290) reported to have been in existence for >6months and 15.9% (46/290) beyond a year, 1 – 30 years for LU duration, >1 week to 4 years for PU duration.

Data analysis revealed that most wounds (66.7%) were dressed on alternate days, 25.8% were dressed daily, whilst only 2.1% were dressed once a week. The findings resonate with Menon (2012), who acknowledged reductions in wound moisture resulting from increased frequency of dressings.

In the current study, the majority (34.4%) of the wounds observed were smaller in size, with a length and width of <4sq cm. Wounds with a length and width larger than >80sq cm were noted on only 3.2% of participants.

Most wounds (62.4%) had partial epidermal loss with only 1.1% of participants having extensive full thickness skin loss and tissue necrosis. Distinct and clear visibility of most wound edges was identified in 40.9%; only 1.1% of participants showed healed edges. Undermining was less of a problem for 67.7% of the wounds as only 1.08% of participants were identified in each category of undermining 2-4cm and >4cm. The majority (61.3%) of wounds had no visible necrotic tissue as predominant wounds were of the acute type, 12.9% had 25-50% of the wound covered by necrotic tissue and 4.30% had 75-100% coverage.

A bloody type of exudate was identified on 40.9% of wounds and the least amount, 6.4%, presented with serosanguinous type of exudate. An average of 38.7% of wounds, which is slightly less than 40%, presented with low levels of exudate and only 6.4% participants had large amounts of exudate. The findings of a low levelled bloody type of exudate in the majority of wounds can be significantly associated with minimal underlying infection and acute inflammatory stage of healing, as earlier indicated that the majority of wounds were acute wound types.

Dowsett (2017) found that peri-wound skin and maceration of the wound edge resulted from increased amounts of exudate. In the current study, 40.7% of the wound edges were distinct and evenly attached to the wound base with non-presence of undermining to 67.7% and only 1.1% had minimal undermining >4cm, which is considered a good predictor of healing wounds. The current study's findings are significant in view of the fact that Romanelli, Vowden and Weier (2010) described insufficient and excessive exudate harmful to the wound. Romanelli further reported that large sized wounds, such as VLU, and burns produce increased volumes of exudate. Probst (2015) considers a moist wound environment fundamental for healing but reported large amounts were detrimental to the wound healing process. Probst further acknowledged that too much exudate prolongs inflammation and slows the healing process.

In the current study, the general skin condition was assessed for signs of inflammation. Most participants (67.7%) had a normal skin colour surrounding the wound, with only a few (7.5%) presenting with hyperpigmentation and dark red skin colour. Only 1.1% of participants presented with crepitus and/or pitting oedema extending >4cm around the wound.

The findings from this study are significant as Parker et al. (2015) reported that oedematous legs are significantly associated with delayed healing (p=0.001). The non-visibility of peripheral tissue induration in 76.3% of the participants undeniably indicated minimal underlying infection of wounds. However, only 2.2% participants presented with tissue induration >4cm around the wound.

Satisfactory granulation was noted in 55.9% of wounds, with only 9.68% showing no signs of granulation. A high incidence of 55.9% of wounds was observed to be epithelialising, 6.4% were covered with an intact surface and 8.6% were <25% covered with epithelial cells.

### 4.4.3 Correlation

Data comparison was conducted to determine the correlation between age, lifestyle related factors and the presence of a chronic disease with poor wound healing (Brink, van der Walt and van Rensburg (2016).

The correlation between variables to wound healing was determined using the multi-linear regression model, in which wound healing was independent of other variables. The aim of using this statistical technique was to model the relationship between age,

lifestyle-related factors and comorbidities that may have an effect on wound healing of patients at a rural community health centre in Bojanala District, in Rustenburg.
The findings established a statistical significance in the scores of age ($p>0.025$), type of wound ($p>0.002$), and duration of wounds ($p>0.001$), predicting wound healing. These predictors had a meaningful effect on the current study because of the relationship between changes in their predictor value and to poor wound healing.
Despite inconclusive results from Parker et al. (2015) in reflecting age as a risk factor for delayed healing, the considerations of Guo and DiPietro (2010), regarding increasing age as a major risk factor for impaired wound healing, substantiate the statistical significant finding of age ($p>0.025$) in the current study. Multi-linear regression also found negative values, which means the independent variable oppose wound healing.

Conversely, predictors with high ($p>0.05$) scores imply dissociation with the response, which is poor wound healing and therefore non-significant. For the current study, gender had a P value of 0.693, 0.188 was the P value for do you smoke, weight had a P value of 0.753, height had a P value of 0.458, area where the wound was located had a P value of 0.287, chronic diseases had a P value greater than 0.640.

Statistically, the current study indicated the majority (75.3%) of participants were not indulgent in alcohol and smoking habits. Therefore, for the purpose of this study, the interpretation of this finding limits the possibility for the researcher to conclude a possible correlation to delayed wound healing, as the study only allowed a once off session with participants. The finding in the current study may undoubtedly conclude no relation of these systemic factors to wound healing, as the predictor for smoking yielded a statistical insignificant $p>0.188$ score. Regardless, the finding does not rule out the possibility of delayed healing resulting from both habits.
Guo and Dipietro (2010) recognised exposure to alcohol and smoking habits as potential factors to delayed wound healing and increased incidence of wound infections. This is echoed by McDaniel and Browning (2014), who reported dehiscence, prolonged wound healing times and tissue flap necrosis as wound complications associated with cigarette smoking. Guo and DiPietro (2010) further attributed hypoxia to the wounded area with the nicotinic effect that causes vasoconstriction, resulting in delayed wound healing.

Table 4.24: Multi-linear regression to determine factors associated with the scoring of wound.

| Variable | Observational | Mean | Standard. Deviation. | Min | Max |
|---|---|---|---|---|---|
| wound scoring | 93 | 28.63441 | 11.01756 | 13 | 56 |

Table 4.24 indicated that the total mean for (n=93) wounds was 28.63441, with the standard deviation of 11.01756; the minimum score was 13 and the maximum score was 56. Details are in Table 4.24.

The results from the 13 items assessed were calculated and the wound status was classified on a continuum of 1 to 65 to assess wound health or degeneration. For the purpose of this study the wound was only assessed once. The once off scoring results determined the current condition of different wound types during the assessment. The severity of wounds was assessed on four different levels, namely 13-20 minimal severity, 21-30 mild severity, 31-40 moderate severity and 41-65 extreme severity level (Garten, 2017). A mean of 28.63441 implied that the overall wound scoring for 93 (n=93) participants was between 21 and 30, which is mild severity.

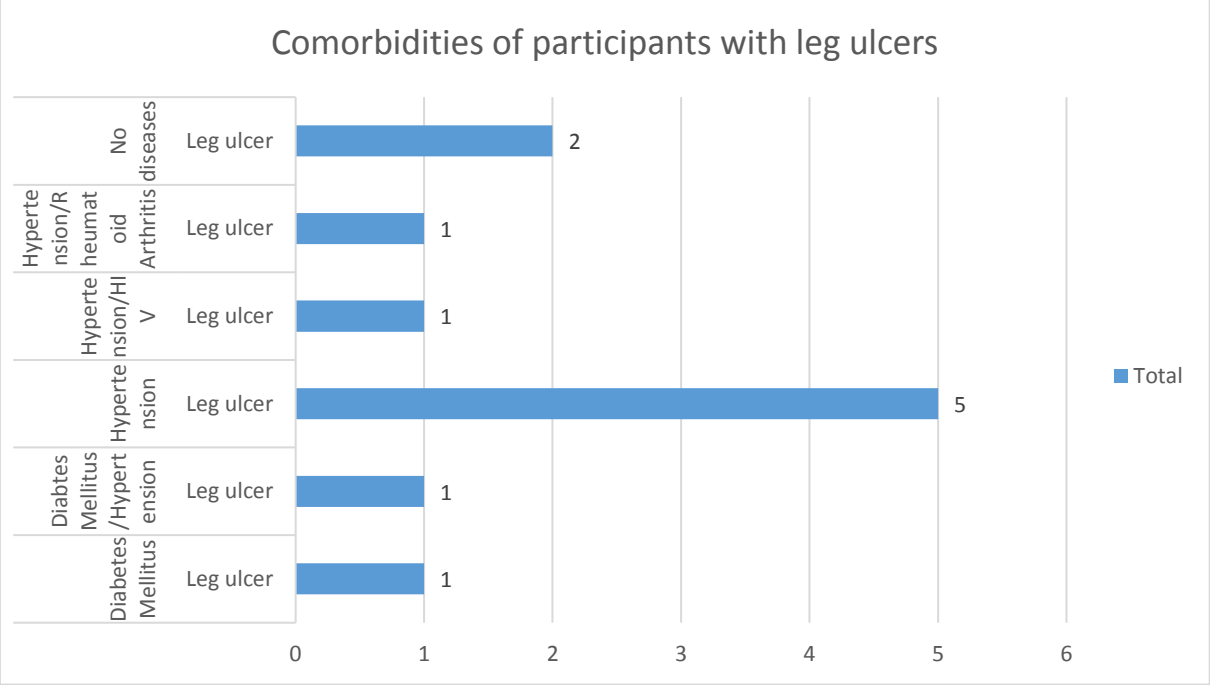


**Figure 4.6: Comorbidities for participants with leg ulcers**

Participants with leg ulcers had different comorbidities, with hypertension being the common disease affecting the majority. Detailed findings are illustrated in Figure 4.6.

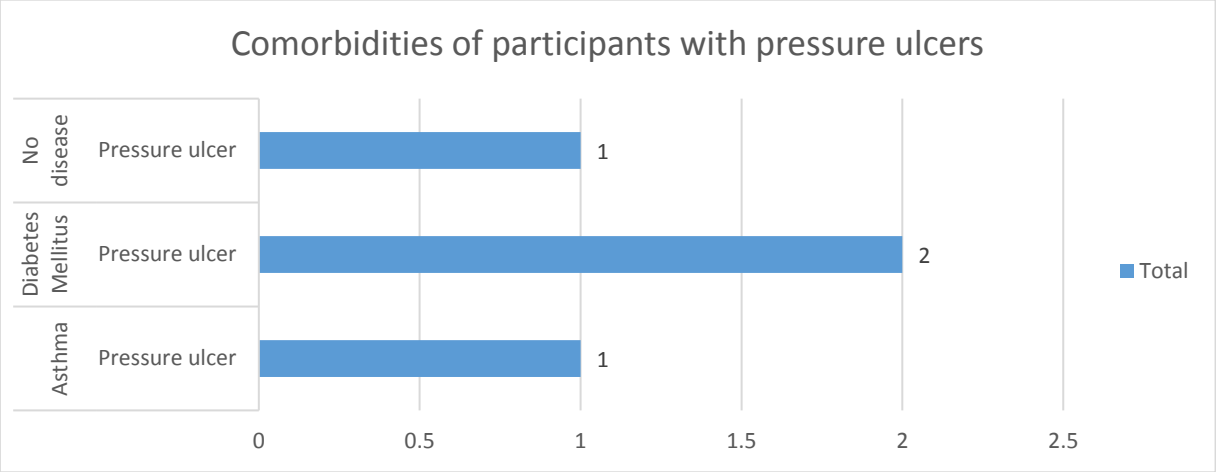


**Figure 4.7: Comorbidities for participants with pressure ulcers**

### 4.4.4 Participants' knowledge regarding wound care

In this section, closed- and open-ended types of questions were used to describe participants' knowledge regarding wound care.

The responses of participants for closed-ended questions indicated that the majority were dependent on the healthcare facility for wound care services, as evidenced by 56.9% of the participants receiving such care at the clinic and 43.1% dressing their wounds at home. Slightly more than 50%, reported having acquired information on how to take care of their wounds, whereas 48.4% reported inadequate knowledge on personal wound care.

In response to the wound care question, the majority of participants reported home remedies and unscientific methods for wound care, which was befitting to their low level of education. Cleaning wounds with coarse salt added to boiled water was the preferred method for the majority (57.1%) of participants. It was interesting to note satisfactory healing outcomes, especially on circumcision wounds where the majority used coarse salt. The safety, progress and the outcome on use of other remedies, could not be determined as the study permitted a once off session per participant.

It was interesting a high response rate (69.9%) of participants indicated being knowledgeable on what promoted wound healing and 73.1% stated to be knowledgeable on what could lead to poor healing, with only 26.9% having no knowledge.

The majority, almost 70% to slightly beyond 70%, of participants gave correct answers in response to both questions regarding wound healing, despite the poor level of education.

The findings indicated that 32.3% of participants reaching grade 9 - 12, with only 8.33% completing tertiary education. The possibility of considering the level of education of participants as a contributory factor to the low level of knowledge regarding wound care cannot be ruled out. In addition, the age factor should also be considered as 23.6% of participants were in the age group 55 - >71 years old.

Priyadarshani and Samarawickrama (2017) associated patient's low level of knowledge regarding chronic wound care with lower level of education, and further reported a significant association with age and education levels. The researcher's findings revealed 56% (116) of participants used unsafe methods, whilst 44% (91) used safe methods.

## 4.5 CONCLUSION

This chapter reflects the overall findings from participants during the data collection period in Rustenburg, at the rural community health centre in the Bojanala district of North West Province. The narration of results was presented in the form of tables, graphs as well as clarity from the suitable literature.

# CHAPTER FIVE

## SUMMARY MAIN FINDINGS, RECOMMENDATIONS, LIMITATIONS AND CONCLUSION

### 5.1 INTRODUCTION

The final chapter of the research report presents a summary presentation of the study and the significant findings. The limitations of the research and recommendations for nursing education, clinical research and nursing practice in order to develop the best wound care practice standards are also included in this chapter.

### 5.2 SUMMARY OF THE STUDY

- **Purpose of the study**

The purpose of the study was to describe the types and status of wounds managed as well as the patients' knowledge regarding factors that had an impact on wound healing in a rural community healthcare centre in Bojanala District, Rustenburg. The following objectives were developed in order to achieve the purpose of the study:

- To determine the demographic, lifestyle related factors and comorbidities that may have an effect on wound healing of patients at a rural community health centre in Bojanala District, Rustenburg.
- To describe the types and status of wounds managed at a rural community health centre in Bojanala District, Rustenburg.
- To determine patients' knowledge regarding wound care and wound healing.

- **Research design**

A cross sectional descriptive correlation research design was used to collect data on a conveniently selected sample of (n=105) participants who presented with a wound at the community clinic, in Bojanala district in Rustenburg, and who met the inclusion criteria.

- **Data collection**

A data collection tool (Appendix E) that consisted of three sections was used. Section A comprised of the demographic data, section B wound related information assessed through a Bates-Jensen Wound Assessment Tool (BWAT) and a wound data aspect designed by the researcher, and the last section described the participants' knowledge regarding wound care.

- **Data analysis**

Collected data was coded on all completed questionnaires and entered on Microsoft Excel spreadsheet for analysis. The computer statistical software package STATA version 14 was used for descriptive data analysis of the demographic data of the patients, type and status of wounds, the correlation between age, lifestyle related factors, comorbidities and lastly patient knowledge regarding wound care. Data was described and summarised using a descriptive approach. Percentages, means, standard deviation and frequency tables were computed to show the proportions of each category.

## 5.3 SUMMARY OF THE FINDINGS

### 5.3.1 Demographics, Lifestyle and Comorbidities

The demographics, lifestyle and comorbidities data indicated that participants were predominantly males of the younger generation, affected by increased rate of unemployment and aged between 25 - 34 years, with only 8.6% attaining tertiary education. Twenty eight participants were under the age of 13, therefore parents views were considered for this category.

It was noteworthy to recognise that the majority of participants in the current study reported good lifestyle habits, as manifested by the majority not indulging in alcohol or smoking habits, 67.7% and 75.3% respectively.

The results showed that hypertension, followed by HIV were the common chronic diseases affecting participants by 34.4% and 18.7% respectively, with very few (37.6%) taking prescribed medications.

The majority of participants presented with a normal BMI with satisfactory nutritional status, which gave a good indication to preserve all phases of wound healing, as satisfactory nutrient flow determined the healing process. The population mostly affected were predominantly a younger generation dominated by males.

### 5.3.2 Types and Status of Wounds

The findings revealed eight different wound types, of which six were acute and two were chronic wound types. Trauma/injury was identified as the most prevalent wound type, followed by burns, and thus gave rise to acute wounds treated at the clinic. An additional category for circumcision had to be added as 12.9% of participants with circumcision wounds was noted. Few participants presented with both pressure ulcer and leg ulcer. The majority of the wounds were small in size, not more than 4sq cm.
It has been remarkable to see that most of the wound dressings at the clinic were changed on alternate days.

A once off assessment for possible signs of infection, with reference to the healing process. was performed for all participants. Acute wound types were the most prevalent affecting lower limbs, followed by a higher incidence of burn wound types.

A total of 122 wounds were assessed on all participants, of which 78.5%, the majority, presented with only one wound. The majority of participants were enrolled during the winter months, hence 28% (n=26) presented with burns and 12.9% (n=12) with circumcision wounds.
It must be emphasised that the majority of wounds were a week old and participants used a common treatment plan of cleaning wounds with salted water, which promoted wound healing.
Statistically, the prevalence of pressure ulcers was only 4.30% (n=4), with the sacrum being the common area mostly affected, accounting for 75% (n=3) of all participants affected by pressure ulcer wounds.

A bloody type of exudate was noted in 40.9% of wounds, also in smaller quantities, as earlier mentioned that acute wounds were the most common wound types. However, suspicious signs of infection were noted in ulcer and abscess wound types, as indicated by moderate to large purulent exudate with thickened rolled under edges. The amount of exudate assists in determining the frequency on change of wound dressing. Therefore, daily wound care dressings are strongly recommended for seriously exuding wounds as opposed to wounds with minimal exudate levels that may be dressed bi-weekly.

### 5.3.3 Correlation Between Age, Lifestyle Factors and Comorbidities to Wound Healing

Parents/guardians' views were considered for this section on behalf of all minors.

The correlation between variables to wound healing was determined using the multi-linear regression model, in which wound healing was independent of other variables. The aim of using this statistical technique was to model the relationship between age, lifestyle related factors as well as comorbidities that may have an effect on wound healing of participants. These findings established a statistical significance in the scores of ages ($p>0.025$), type of wound ($p>0.002$) and duration of wounds ($p>0.001$), predicting wound healing. These predictors had a meaningful effect to the current study because of the relationship between changes in their predictor value and to poor wound healing. Multi-linear regression also found negative values, which means the independent variable opposed wound healing.

### 5.3.4 Patient knowledge of wound care

Parents/guardians views were considered for all children who took part in the study.

When considering the results, the common wound care practice of cleaning wounds with salted water, used by 57.1% of participants, was noteworthy. Unsatisfactory and non-evidence-based practices were noted in 10.2% of participants who had their own beliefs and remedies for wounds, e.g. use of mokhura and cabbage leaves, zambuk. Priyadarshani and Samarawickrama (2017) attributed poor education level of respondents to limited knowledge regarding wound care.

## 5.4 LIMITATIONS OF THE STUDY

The study only allowed a once off session with participants and therefore it was difficult to determine the delay and progression of healing from one phase to another. Secondly, follow up visits would have made a firm decision on the wound outcome however they could not be done as part of the study. The researcher relied on participants' responses even though data could not be verified. Translation from English to Setswana was done by the researcher to participants who did not understand English.

## 5.5 RECOMMENDATIONS

### 5.5.1 Recommendation for nursing education

- Develop a research-based pre-test and post-test training programme on nurses' knowledge of wound assessment criteria and process.
- Based on the evidence emanating from the current study with regard to the types of wounds managed at the rural community health centre as well as participants knowledge of wound care:

  - develop a training development to equip healthcare providers with a standardised wound assessment technique as there is currently no available programme.

  - develop a patient wound care information leaflet.

### 5.5.2 Recommendations for research

The research report was limited to the description of the wounds, and based on participants' knowledge the following recommendations were suggested towards developing best wound care practice:

- Research on nurses' knowledge of wound assessment criteria and process.
- Development of a research-based pilot project of wound intervention strategy for patients with chronic wounds.
- Conduct research to explore the most suitable wound assessment tool for the rural clinics in the Bojanala district.

### 5.5.3 Recommendation for nursing practice

- To develop guidelines for the strengthening of infection control policies, as the researcher has observed the non-existence of policy guidelines on wound management in the district where the study was conducted.
- Results of the study to be possibly used to motivate and plan for resources needed.

## 5.6 Conclusion

This has been the first research study to ascertain dependable data on demographic, different wound types as well as the correlation between variables deterring the wound healing processes, at a rural community health centre in Bojanala District, Rustenburg. The study not only recognised the wound characteristics in relation to wound assessment, but also patient knowledge to wound care.

The overall outcome of the research indicated that the majority of the participants reported a good lifestyle of neither smoking nor using alcohol. A minority of slightly more than 30% reported to have a chronic disease, the most common in this study being hypertension.

Most of the participants presented with one wound and the lower leg category seemed to be the most common area. The findings furthermore showed a statistical significance in the scores of ages, types of wound and duration of wounds predicting wound healing. In addition, the results showed that almost 50% of the participants indicated they were never given information on how to take care of their wounds.

The researcher concludes that it is essential to create baseline information on wound care, as this type of information could be used to provide guidance with regard to future planning as well as policy making, to ensure an effective and efficient wound care service. Therefore, urgent further research is needed in exploring nurses' knowledge in wound care to determine the resource, skill and competency available at rural community healthcare centres.

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# APPENDIX A: ETHICAL CLEARANCE CERTIFICATE.

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R14/49 Ms MJT Mokgethi

## HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
## CLEARANCE CERTIFICATE NO. M170806

| | |
|---|---|
| **NAME: (Principal Investigator)** | Ms MJT Mokgethi |
| **DEPARTMENT:** | School of Therapeutic Sciences<br>Department of Nursing Education<br>Medical School<br>University |
| **PROJECT TITLE:** | Wound assessment and patients' knowledge of wound care at a rural community health centre in the Bojanala district, Rustenburg |
| **DATE CONSIDERED:** | 25/08/2017 |
| **DECISION:** | Approved unconditionally |
| **CONDITIONS:** | |
| **SUPERVISOR:** | Dr AM Tshabalala |
| **APPROVED BY:** | Professor CB Penny, Chairperson, HREC (Medical) |
| **DATE OF APPROVAL:** | 23/02/2018 |

**This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.**

**DECLARATION OF INVESTIGATORS**

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on 3rd floor, Phillip V Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/We fully understand the conditions under which I am/we are authorised 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 resubmit to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. in this case, the study was initially reviewed in **August** and will therefore be due in the month of **August** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature — Date: 05/03/2018

**PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES**

# APPENDIX B: APPROVAL OF TITLE

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

10 January 2018
Person No: 688427
PAG

Mrs MJT Mokgethi
P.o.box 1788
Phokeng
0335
South Africa

Dear Mrs Mokgethi

**Master of Science in Nursing: Approval of Title**

We have pleasure in advising that your proposal entitled *Wound assessment and patients' knowledge of wound care at a rural community health centre in the Bojanala District, Rustenburg* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

# APPENDIX C: INSTITUTION APPROVAL


ROYAL BAFOKENG NATION

**ROYAL BAFOKENG ADMINISTRATION**

P.O Box 1, Phokeng, 0335, Republic of South Africa
1 Direpotsane Street, Phokeng, 0335
**Telephone:** +27 (14) 566 1200
**Email:** info@bafokeng.com
**Website:** www.bafokeng.com

To: Whom it may concern Date: 28 February 2017

From: Lebogang Kgongwana

Research department

Subject: Confirmation that Millicent Mokgethi has permission to conduct research

Dear Sir or Madam,

This letter serves to confirm that Millicent Mokgethi approached the RBA Gcoo and the Research department with a proposal to conduct research : **WOUND ASSESSMENT AND PATIENTS' KNOWLEDGE OF WOUND CARE AT A RURAL COMMUNITY HEALTH CENTRE IN THE BOJANALA DISTRICT RUSTENBURG**

Please note that the proposal has been approved. We look forward to assisting her.
If you have any questions or concerns regarding his research and you would like to address them with the Research Department, please contact Lebogang Kgongwana on 014 566 1355 or lebogang.kgongwana@bafokeng.com

**Kind regard**

Lebogang Kgongwana

# APPENDIX D: APPROVAL FOR INSTRUMENT USE

Dear Professor Bates-Jensen

**Re: BWAT permission**

Thank you so much for permission to use the tool and the latest version of the tool. I really appreciate your positive response to our request. As per your advice, we will have a separate demographic information sheet that will also include additional information that we deem necessary for our primary healthcare service-based research setting.

Once more your assistance is highly appreciated.
Sincerely


---

**From:** Bates-Jensen, Barbara [mailto:batesjen@sonnet.ucla.edu]
**Sent:** 20 June 2017 06:10 PM
**To:** Amme Tshabalala
**Subject:** BWAT permission

Hi Amme,
So sorry but I never received your student's emails. I am happy to give you permission to use the Bates-Jensen Wound Assessment Tool (BWAT) in your research. There can be no changes in the tool, but you could create a demographic data collection form to gather the other information needed for the study. I am attaching the most recent version of the tool here for your use. Thanks very much for your consideration and patience in reaching me!

Sincerely,
Barbara Bates-Jensen
Barbara M. Bates-Jensen PhD, RN, FAAN
Professor of Nursing and Medicine
School of Nursing and David Geffen School of Medicine
University of California, Los Angeles
Los Angeles, CA 90095-6919
Cell: 626-437-8543 (preferred)
Email: bbatesjensen@sonnet.ucla.edu

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**From:** Connie Harris [mailto:connieharris@rogers.com]
**Sent:** 20 June 2017 01:56 AM
**To:** Amme Tshabalala; Bbatesjensen@sonnet.ucla.edu; Connie Harris
**Subject:** Re: Re: Bates-Jensen Wound Assessment Tool

Dear Amme, I just happened to see your email here, and am copying BBJ at the address that I have for her. Any permission to revise the original BWAT must come from Barbara. Best wishes to your students in their project. Connie

Connie L. Harris, RN, ET, IIWCC, MSc Wound Healing and Tissue Repair
Clinical, Education and Research Consultant
connielynneharris@gmail.com

---

On Tuesday, June 13, 2017 5:35 AM, Amme Tshabalala <Amme.Tshabalala@wits.ac.za> wrote:
Dear Ms Harris
**Re: Bates-Jensen Wound Assessment Tool**
I am a lecturer at the University of the Witwatersrand in South Africa. I am supervising a Masters in Nursing student interested in conducting a **survey of type of wounds managed at her rural community health care centre.**
We would like to request permission to use the **Bates-Jensen Wound Assessment Tool** (not the pictorial) with slight modification to include the demographic as well as the socio-economic status of the community.
Your assistance with regards to the procedure for obtaining permission for use of the instrument will be highly appreciated as my students' previous attempts to communicate directly with Prof Bates-Jensen have been unsuccessful.
Warm regards

# APPENDIX E: DATA COLLECTION INSTRUMENT

**SECTION A: DEMOGRAPHIC DATA** **CODE:** ----------

==========

1. **Age** ----------

**2. Gender**

| | |
|---|---|
| Female | 1 |
| Male | 2 |

**3. Education Level**

| | |
|---|---|
| None | 1 |
| 1-4 | 2 |
| 5-8 | 3 |
| 9-12 | 4 |
| FET Certificate | 5 |
| National Diploma | 6 |
| Degree | 7 |
| Other | 8 |

**4. Occupation**

| | |
|---|---|
| Employed | 1 |
| Unemployed | 2 |
| Self employed | 3 |
| Scholar | 3 |
| Pensioner | 4 |

**5. Do you smoke? (Yes/No)**

| | |
|---|---|
| Yes | 1 |
| No | 2 |
| | |

*If No, skip item 6 and proceed to item 7.*

**6 Indicate number of cigarettes**

| | |
|---|---|
| < 10 cigarettes daily | 1 |
| 11-20 cigarettes daily | 2 |
| 20-30 cigarettes daily | 3 |
| 2 packets cigarettes daily | 4 |

**7 Do you drink alcohol?**

| | |
|---|---|
| Yes | 1 |
| No | 2 |

**8. Do you have a chronic disease?**

| | |
|---|---|
| Yes | 1 |
| No | 2 |

*If No, skip item 10 and proceed to item 11*

**9. Tick the chronic diseases mentioned**

| | |
|---|---|
| Diabetes Mellitus | 1 |
| Hypertension | 2 |
| Asthma | 3 |
| HIV | 4 |
| Cancer | 5 |
| Other (Specify) | 6 |

**10. Medication** ***(****Please indicate medications taken if any)***

| | |
|---|---|
| Prescribed medications | 1 |
| Over-the-counter medications | 2 |
| Herbal medications | 3 |
| None | 4 |

**11. Weight and Height**

| | |
|---|---|
| Weight | |
| Height | |

**12. BMI**

| **ADULTS** | | **GIRLS** | | **BOYS** | |
|---|---|---|---|---|---|
| 12-18=Underweight | 1 | <11.8 =Severely underweight | 1 | <12.3 = Severely underweight | 1 |
| 18-24=Healthy | 2 | 11.8-12.6 =Moderately underweight | 2 | 12.3-13.3 = Moderately underweight | 2 |
| 25-29=Overweight | 3 | 12.7-17.2 =Normal | 3 | 13.1-16.9 =Normal | 3 |
| 30-39=Obese | 4 | 17.3-19.7 =Overweight | 4 | 17.0-18.9 =Overweight | 4 |
| 40-42=Extremely obese | 5 | ≥19.8 =Obese | 5 | ≥19.0 =Obese | 5 |
| | | | | | |

**13. Nutritional Status**

| | |
|---|---|
| Very poor | 1 |
| Probably inadequate | 2 |
| Adequate | 3 |
| Excellent | 4 |

## SECTION B: WOUND CODE ----------

**15. Area**

| | |
|---|---|
| Head | 1 |
| Neck | 2 |
| Chest | 3 |
| Abdomen | 4 |
| Sacrum | 5 |
| Arms | 6 |
| Hip | 7 |
| Buttock | 8 |
| Upper leg | 9 |
| Lower leg | 10 |
| Other | 11 |

**16. Total Number of wounds**

| | |
|---|---|
| One | 1 |
| Two | 2 |
| Three | 3 |
| Four | 4 |
| Five | 5 |
| > 5 (*indicate how many*) | 6 |

**17. Type of Wounds**

| | |
|---|---|
| Pressure ulcer | 1 |
| Leg ulcer | 2 |
| Burns | 3 |
| Dog bite | 4 |
| Trauma/Injury | 5 |
| Abscess | 6 |
| Other *(State type)* | 7 |

**18. Frequency of dressings**

| | |
|---|---|
| Daily | 1 |
| Alternate days | 2 |
| 2-3 times a week | 3 |
| Once a week | 4 |
| Other (*State frequency)* | 5 |

19. Duration

| | |
|---|---|
| 1 week | 1 |
| 1-2 weeks | 2 |
| 2-4 weeks | 3 |
| 4-6 weeks | 4 |
| 6 weeks-< 3 months | 5 |
| 3 months-6 months | 6 |
| 6 months – 1 year | 7 |
| 1 year-< 5 years | 8 |
| >5 years | 9 |
| Uncategorised | 10 |

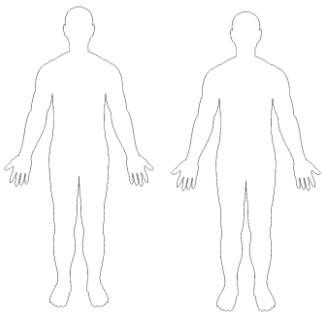
**CODE: ----------**

**BATES-JENSEN WOUND ASSESSMENT TOOL**

Complete the rating sheet to assess wound status. Evaluate each item by picking the response that best describes the wound and entering the score in the item score column for the appropriate date. If the wound has healed/resolved, score items 1,2,3, & 4 as =0.

**Location**: Anatomic site. Circle, identify right **(R)** or left **(L)** and use **"X"** to mark site on body diagrams:

____ Sacrum & coccyx
____ Trochanter
____ Ischial tuberosity
____ Buttock
____ Lateral ankle
____ Medial ankle
____ Heel
____ Other site:



**Shape:** Overall wound pattern; assess by observing perimeter and depth.

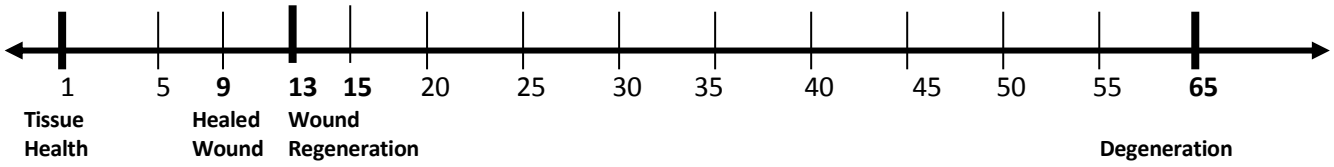
Circle and date appropriate description:

____ Irregular ____ Linear or elongated
____ Round/oval ____ Bowl/boat
____ Square/rectangle ____ Butterfly Other Shape

| Item | Assessment | Date Score | Date Score | Date Score |
|---|---|---|---|---|
| **1. Size*** | *0 = Healed, resolved wound<br>1 = Length x width <4 sq cm<br>2 = Length x width 4--≤16 sq cm<br>3 = Length x width 16.1--≤36 sq cm<br>4 = Length x width 36.1--≤80 sq cm<br>5 = Length x width >80 sq cm | | | |
| **2. Depth*** | *0 = Healed, resolved wound<br>1 = Non-blanchable erythema on intact skin<br>2 = Partial thickness skin loss involving epidermis and/or dermis<br>3 = Full thickness skin loss involving damage or necrosis of subcutaneous tissue, may extend down to but not through underlying fascia, and/or mixed partial and full thickness, and/or tissue layers obscured by granulation tissue<br>4 = Obscured by necrosis<br>5 = Full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone or supporting structures | | | |
| **3. Edges*** | *0 = Healed, resolved wound<br>1 = Indistinct, diffuse, none clearly visible<br>2 = Distinct, outline clearly visible, attached, even with wound base<br>3 = Well-defined, not attached to wound base<br>4 = Well-defined, not attached to base, rolled under, thickened<br>5 = Well-defined, fibrotic, scarred or hyperkeratotic | | | |
| **4. Under-mining*** | *0 = Healed, resolved wound<br>1 = None present<br>2 =Undermining < 2 cm in any area<br>3 = Undermining 2-4 cm involving < 50% wound margins<br>4 = Undermining 2-4 cm involving > 50% wound margins<br>5 = Undermining > 4 cm or Tunneling in any area | | | |
| **5. Necrotic Tissue Type** | 1 = None visible<br>2 = White/grey non-viable tissue and/or non-adherent yellow slough<br>3 = Loosely adherent yellow slough<br>4 = Adherent, soft, black eschar<br>5 = Firmly adherent, hard, black eschar | | | |
| **6. Necrotic Tissue Amount** | 1 = None visible<br>2 = < 25% of wound bed covered<br>3 = 25% to 50% of wound covered<br>4 = > 50% and < 75% of wound covered | | | |

| Item | Assessment | Date Score | Date Score | Date Score |
|---|---|---|---|---|
| | 5 = 75% to 100% of wound covered | | | |
| **7. Exudate Type** | 1 = None<br>2 = Bloody<br>3 = Serosanguineous: thin, watery, pale red/pink<br>4 = Serous: thin, watery, clear<br>5 = Purulent: thin or thick, opaque, tan/yellow, with or without odor | | | |
| **8. Exudate Amount** | 1 = None, dry wound<br>2 = Scant, wound moist but no observable exudate<br>3 = Small<br>4 = Moderate<br>5 = Large | | | |
| **9. Skin Color Sur-rounding Wound** | 1 = Pink or normal for ethnic group<br>2 = Bright red and/or blanches to touch<br>3 = White or grey pallor or hypopigmented<br>4 = Dark red or purple and/or non-blanchable<br>5 = Black or hyperpigmented | | | |
| **10. Peripheral Tissue Edema** | 1 = No swelling or edema<br>2 = Non-pitting edema extends <4 cm around wound<br>3 = Non-pitting edema extends >4 cm around wound<br>4 = Pitting edema extends < 4 cm around wound<br>5 = Crepitus and/or pitting edema extends >4 cm around wound | | | |
| **11. Peripheral Tissue Induration** | 1 = None present<br>2 = Induration, < 2 cm around wound<br>3 = Induration 2-4 cm extending < 50% around wound<br>4 = Induration 2-4 cm extending > 50% around wound<br>5 = Induration > 4 cm in any area around wound | | | |
| **12. Granulation Tissue** | 1 = Skin intact or partial thickness wound<br>2 = Bright, beefy red; 75% to 100% of wound filled &/or tissue overgrowth<br>3 = Bright, beefy red; < 75% & > 25% of wound filled<br>4 = Pink, and/or dull, dusky red and/or fills ≤ 25% of wound<br>5 = No granulation tissue present | | | |
| **13. Epithe-lializa-tion** | 1 = 100% wound covered, surface intact<br>2 = 75% to <100% wound covered and/or epithelial tissue extends >0.5cm into wound bed<br>3 = 50% to <75% wound covered and/or epithelial tissue extends to <0.5cm into wound bed<br>4 = 25% to < 50% wound covered<br>5 = < 25% wound covered | | | |
| | **TOTAL SCORE** | | | |
| | **SIGNATURE** | | | |

**WOUND STATUS CONTINUUM**




Plot the total score on the Wound Status Continuum by putting an **"X"** on the line and the date beneath the line. Plot multiple scores with their dates to see-at-a-glance regeneration or degeneration of the wound.

**CODE: ---------**

## SECTION C:

## PARTICIPANTS' KNOWLEDGE REGARDING WOUND CARE

1. Do you do your own dressings at home?

| | |
|---|---|
| Yes | 1 |
| No | 2 |

All participants should answer question 2

2. Were you ever given information on how to take care of your wound at home?

| | |
|---|---|
| Yes | 1 |
| No | 2 |

**If answered No, move to question 5**

3. Please tell me what you were told about taking care of your wound.

4. Who informed you about taking care of your wound?

5 Do you perhaps know what promotes wound healing?

| | |
|---|---|
| Yes | 1 |
| No | 2 |

**If answered No, move to question 7**

6. Please tell me about what you think promotes wound healing

7. Do you know what can lead to poor wound healing?

| | |
|---|---|
| Yes | 1 |
| No | 2 |

**If answered Yes, move to question 6**

8 Please tell me about what you think can cause poor wound healing?

# APPENDIX F PARTICIPANT INFORMATION LETTER

**INFORMATION SHEET**

Title of Study: **A SURVEY OF TYPE OF WOUNDS MANAGED AT A RURAL COMMUNITY HEALTH CENTRE IN PHOKENG, RUSTENBURG.**

**Introduction**
Good day, my name is Sr. Millicent Mokgethi. I would like to invite you to take part in this study. I am required to conduct research as part of my studies in Masters of Science in Nursing (Infection Control) at the University of the Witwatersrand, Faculty of Health Sciences, and Department of Nursing Education - Division Nursing.

**What is the purpose of this Research Study and why have I been chosen?**
The aim of the study is to describe the characteristics and type of wounds managed at Phokeng Health Centre.
In this research study, I would like to collect information about you by using the wound assessment tool.

**What will happen to me if I take part in this study and what do I have to do?**
On agreeing to participate, permission will be sought from patients in the wound treatment queue. Informed consent will be signed by the participant. Data will be collected from consenting patients in the wound treatment area by the researcher, using the Bates-Jensen wound assessment tool. All measures of confidentiality and privacy will be maintained throughout the study. A 15 minutes session will be adequate for this study, therefore no need for follow up visits.

**What information will be collected and how?**
Demographic data, wound data and participant knowledge on wound care data, will be collected and documented in the data collection instrument. Upon signing the informed consent form, the researcher will check the height, weight and BMI of the participant and document the findings on the data collection instrument. The researcher will then ask the participant all the listed questions in section A, B, and C that requires his/her verbal response. The participant will then be requested to move to the dressing room. In the dressing room, the researcher will do the necessary wound measurements as per the Bates-Jensen wound assessment tool and through observation, complete the remaining questions with observational findings.

**What are the side effects or risks of taking part?**
There are no side effects nor risks anticipated when taking part in the study.

**What are the Benefits for participating in the study?**
There are no direct benefits for participants to take part in the study. The shared information will be of great value in assisting me to complete this research project, the results of which could significantly improve service delivery and wound care management.

**Is there reimbursement for study participation?**
You will not be paid to participate in this study and there will be no costs to you for any of the procedures or tests in participating in the study.

**Do I have to take part?**
Your participation in this study is entirely voluntary, it is up to you to decide whether or not to take part. If you do decide to take part, you will be given this Information Sheet to keep and will be asked to sign an informed consent form. Should you wish to discontinue participation, you may do so freely at any time and without giving a reason. If you choose not to participate or to withdraw from the study it will not affect the care and treatment that you receive from the clinic/doctor in any way.

**Will my taking part in this study be kept confidential?**
All information obtained during this study will be kept confidential. Data may be reported in scientific journals and will not include any information that identifies you as a participant in this study. Data will be kept for two years if published or six years if not published, after this period it will be destroyed. In the event of data sharing with other researchers for academic purposes written permission will be sought from HREC (Medical).

**Who is organizing and funding the research?**
I have organised the study, as stated above, for degree purposes. This study is not funded, nor will it be used for commercial gain.

**Whom do I call if I have questions or problems?**
If you would like more information, have any problems, concerns or questions about the study or experience research related injuries, please contact Sr.Mokgethi on 014 5734307 or the 24 hours Emergency number cell: 0761127551, alternatively my Supervisor, Dr.Tshabalala on Tel: 011 4884269 or email millicent.mokgethi@bafokeng.com
Psychological distress: Counselling – Bafokeng Health Centre, 014 5664720

Or

Human Research Ethics Committee (Medical), University of the Witwatersrand
HREC (Medical) contact details: Prof. P Cleaton Jones, Tel 011 717 2301, email peter.cleaton-jones1@wits.ac.za
Ms Z Ndlovu/Mr Rhulani Mkansi/Mr Lebo Moeng Administrative Officers 011 717 2700/2656/1234/1252 zanele.ndlovu@wits.ac.za; Rhulani.mkansi@wits.ac.za; and Lebo.moeng@wits.ac.za

# APPENDIX F1: CONSENT FORM FOR PARTICIPANTS

**INFORMED CONSENT FORM:**

Title of Study: **A SURVEY OF TYPE OF WOUNDS MANAGED AT A RURAL COMMUNITY HEALTH CENTRE IN PHOKENG, RUSTENBURG.**

I confirm that I have been informed by Sr. Mokgethi about the nature of the study. I have also read/it was read to me and I understood the information sheet and have had the opportunity to ask questions.

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

I am aware that questions will be asked and my wound will be assessed using the Barbara-Bates wound assessment tool. The findings will be anonymously processed into a computerised system. Data will be kept for two years if published or six years if not published, after this period the data will be destroyed.

Should you wish to contact us at any stage regarding consent, contact Sr. Mokgethi at (014573 4307) or Dr.Tshabalala at (011 4884269).

I agree to take part in the above-mentioned study. I hereby give consent for my records to be used as per the above-mentioned conditions and for the purposes of research and also to provide information required to complete the wound assessment tool.

| Name and Surname of Patient/Participant | Signature/Mark or Thumbprint | Date: |
|---|---|---|

Translator/Other Person Explaining Informed Consent (Designation)……:

| Printed name | Signature | Date: |
|---|---|---|

Witness (If applicable):

| Printed name | Signature | Date: |
|---|---|---|

# APPENDIX G: PARTICIPANT INFORMATION LETTER FOR CHILDREN

**INFORMATION SHEET**

Title of Study: **WOUND ASSESSMENT AND PATIENTS' KNOWLEDGE OF WOUND CARE AT A RURAL COMMUNITY HEALTH CENTRE IN THE BOJANALA DISTRICT, RUSTENBURG.**

**Introduction**
Good day, my name is Sr. Millicent Mokgethi. I would like to invite you to take part in this study. I am required to conduct research as part of my studies in Masters of Science in Nursing (Infection Control) at the University of the Witwatersrand, Faculty of Health Sciences, and Department of Nursing Education - Division Nursing.

**What is the purpose of this Research Study and why have I been chosen?**
The aim of the study is to get new ideas and learn new things about the type of wounds managed at Phokeng Health Centre in order to motivate for resources aimed at improving the current wound management practice.
In this research study, I would like to collect information about you by using the wound assessment tool.

**What will happen to me if I take part in this study and what do I have to do?**
On agreeing to participate, permission will be sought from patients in the wound treatment queue. Informed consent will be signed by the participant. Data will be collected from consenting patients in the wound treatment area by the researcher, using the Bates-Jensen wound assessment tool. All measures of confidentiality and privacy will be maintained throughout the study. A 10 minute session will be done once only for this study, and therefore no need for follow up visits.

**What information will be collected and how?**
Demographic data, wound data and participant knowledge on wound care will be collected. Upon signing the informed consent and assent form, the researcher will check the height, weight and BMI of the participant and document the findings on the data collection instrument. The researcher will then ask the participant all the listed questions in section A, B, and C that requires his/her verbal response. The participant will then be requested to move to the dressing room. In the dressing room, the researcher will do the necessary wound measurements as per the Bates-Jensen wound assessment tool and through observation, complete the remaining questions with observational findings.

**What are the side effects or risks of taking part?**
There are no side effects nor did risks anticipate when taking part in the study.

**What are the benefits for participating in the study?**
There are no direct benefits for participants to take part in the study. The shared information will be of great value in assisting to complete this research project, the results of which could significantly improve service delivery and wound care management.

**Is there reimbursement for study participation?**
You will not be paid to participate in this study. There will be no costs to you for any of the procedures or tests in participating in the study.

**Do I have to take part?**
No, you do not have to be in the study. Even if you say yes now, you can change your mind later; it is up to you. No one will be angry with you if you don't want to do this.
You have a choice of taking part or not taking part in the research. You can say Yes or No. Whatever you decide is OK. Refusing to take part in the research will not affect the care and treatment that you receive from the clinic in any way.

**Will my taking part in this study be kept confidential?**
Nobody will be told about the information obtained during the study. Data may be reported in scientific journals and will not include any information that identifies you as a participant in this study. Data will be kept for two years if published or six years if not published, after this period it will be destroyed. In the event of data sharing with other researchers for academic purposes, written permission will be sought from HREC (Medical).

**Who is organising and funding the research?**
I have organised the study and as stated above, this study is for degree purposes. This study is not funded, nor will it be used for commercial gain.

**Whom do I call if I have questions or problems?**
If you would like more information, have any problems, concerns or questions about the study or experience research related injuries, please contact Sr. Mokgethi on 014 5734307 or the 24 hours Emergency number cell: 0761127551, alternatively my supervisor Dr.Tshabalala on Tel: 011 4884269 or email millicent.mokgethi@bafokeng.com
Psychological distress: Counselling – Bafokeng Health Centre, 014 5664720
Or
Human Research Ethics Committee (Medical), University of the Witwatersrand
HREC (Medical) contact details: Prof. P Cleaton Jones, Tel 011 717 2301, email peter.cleaton-jones1@wits.ac.za
Ms Z Ndlovu/Mr Rhulani Mkansi/Mr Lebo Moeng Administrative Officers: 011 717 2700/2656/1234/1252: zanele.ndlovu@wits.ac.za; Rhulani.mkansi@wits.ac.za; and Lebo.moeng@wits.ac.za

# APPENDIX G1: ASSENT OF THE MINOR

Title of Study: **WOUND ASSESSMENT AND PATIENTS' KNOWLEDGE OF WOUND CARE AT A RURAL COMMUNITY HEALTH CENTRE IN THE BOJANALA DISTRICT, RUSTENBURG.**

I confirm that I have been informed by Sr. Mokgethi about the nature of the study. I understood the information sheet and have had the opportunity to ask questions.

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason and without my medical care or legal rights being affected. The findings will be anonymously processed into a computerised system.

I agree to take part in the above-mentioned study and will provide the required data.

| _____ | _____ | _____ |
|---|---|---|
| Name of participant | Signature of participant | Date |
| _____ | _____ | _____ |
| Name of parent/guardian | Signature of parent/guardian | Date |
| _____ | _____ | _____ |
| Person obtaining consent | Signature of person obtaining consent | Date |
| _____ | _____ | _____ |
| Witness | Signature of witness | Date |

# APPENDIX G2 - INFORMED CONSENT FORM FOR PARENTS TO ALLOW THE CHILD TO TAKE PART IN THE RESEARCH STUDY

Title of Study: **WOUND ASSESSMENT AND PATIENTS' KNOWLEDGE OF WOUND CARE AT A RURAL COMMUNITY HEALTH CENTRE IN THE BOJANALA DISTRICT, RUSTENBURG.**

The research study and consent form have been explained to you by:

| | |
|---|---|
| Person Obtaining Consent | Signature of Person Obtaining Consent |
| | Date |

Signing the form indicates that my questions have been answered and I agree to permit my child to take part in the research study. I am legally allowed to consent to the child's participation in this research study and therefore agree to authorise the researcher to use and share the data that will be collected for this study, as explained. If I do not agree to the collection, use and sharing of the research data, my child cannot participate in this study.

Name of Child (Participant)

**PARENTS MUST SIGN THIS CONSENT FORM**

| | |
|---|---|
| Name of parent /guardian | Relationship to participant |
| Signature of parent /guardian | Date |

Name of witness

| | |
|---|---|
| Signature of witness | Date |

# APPENDIX H: EDITING CERTIFICATE


Gill Smithies

Proofreading & Language Editing Services

59, Lewis Drive, Amanzimtoti, 4126, Kwazulu Natal

Cell: 071 352 5410 E-mail: moramist@vodamail.co.za


## Work Certificate

| | |
|---|---|
| To | Dr. A. M. Tshabalala |
| Address | Dept. of Nursing Education, University of Witwatersrand, Johannesburg |
| Date | 15/10/2019 |
| Subject | Research Report: WOUND ASSESSMENT AND PATIENTS' KNOWLEDGE OF WOUND CARE AT A RURAL COMMUNITY HEALTH CENTRE IN THE BOJANALA DISTRICT, RUSTENBURG, by MT Mokgethi |
| Ref | AMT/GS/01 |

I, Gill Smithies, certify that I have proofed the following for grammar, language and style,

Research Report: Wound assessment and patients' knowledge of wound care at a rural community health centre in the Bojanala District, Rustenburg, by Millicent T. Mokgethi,

to the standard as required by the University of Witwatersrand.

Gill Smithies