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The experience of a nurse who survived a highly pathogenic novel arenavirus

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THE EXPERIENCE OF A NURSE WHO SURVIVED A HIGHLY PATHOGENIC NOVEL ARENAVIRUS

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A dissertation submitted to the
Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in fulfillment of the requirements for the degree
of

Master of Science in Nursing

Johannesburg, 2015

DECLARATION

I, Andrea Rosemary Hayward, hereby declare that this research dissertation is my own work. It is being submitted for the degree of Master of Science in Nursing at the University of the Witwatersrand in Johannesburg. It has not been submitted before for any degree at this or any other University.

Signature _____

Date _____

Protocol number: M130432

DEDICATION

I dedicate this dissertation to the Nurses and Management of Mediclinic Morningside and those colleagues who died in the course of this outbreak. Thank you for being the special people that you are. Your professionalism, dedication and perseverance in the face of extremely difficult circumstances will never be forgotten. It was a privilege to be part of the team and work alongside you. Continue to hold your heads high and be role models for those who follow in your footsteps. This is for you.

ACKNOWLEDGEMENTS

A special thank you goes to my husband, Herbert who spent many hours encouraging me. Your support, never-ending patience and faith in me enabled me to complete this study.

To my daughter, Melanie, son-in law, Ian and grandchildren, Craig and Kim, thank you for your support, understanding and patience during my progress.

To Michelle, thank you from the bottom of my heart. Your generosity in sharing is overwhelming.

My sincere gratitude and thanks also go to the following:

- My research supervisors, Shelley Schmollgruber and Gayle Langley, for their assistance in supporting and guiding my study.
- My lifelong friend, Ann, thank you for always being there for me during the difficult times.
- Special colleagues, Jaco and Jean for your encouragement friendship and assistance.
- My mentors at Mediclinic Ltd, Estelle Jordaan and Avril Stroh, thank you for believing in me.
- My colleagues at Mediclinic Morningside and the Northern Region Learning Centre, I hope I have made you proud.
- My colleagues in the Department of Nursing who were always willing to assist me.
- My friends for their input and, most importantly, for their friendship, inspiration and supporting me all the way. I am grateful to each and every one of you.

ABSTRACT

The purpose of the study was to explore and describe the experience of a nurse in a private sector hospital after contracting a highly pathogenic novel haemorrhagic fever from a patient and to explore the context of the environment in which she was cared for.

Patients with complications from severe acute febrile diseases are admitted to intensive care units. During 2008, two patients with an unidentified disease were airlifted from Zambia and admitted to a private sector hospital in Johannesburg, South Africa. Four of five patients died in the outbreak before a diagnosis of Lujo virus was confirmed. Countries to the North and West of South Africa are known to be endemic areas of Viral Haemorrhagic Fevers (VHF). This puts South Africa at risk for imported VHF and future outbreaks. The sole survivor was able to share useful advice for future implementation from experiences during the period of her illness. Unique challenges of the management and environment of this outbreak may assist in future outbreaks.

A bounded single case study design using mixed multiple qualitative approaches including phenomenology was used to underpin and guide the study of the participant's experience. The participant's reflection was subjected to in-depth analysis using Colaizzi's framework. Triangulation using the reflection of the contents of the "Outbreak diary" – a journal kept by members of the managing team and clinical nursing records was undertaken. Emerging themes were grouped into four main themes: Initial contact with the source; Admission is inevitable; Moments of care and Always involved, which have been discussed in depth. The information gleaned from these themes can be applied to practice in future.

The safety of patients and staff in an outbreak depends on attention to detail. History taking was identified as crucial for appropriate infection prevention methods to be put in place. Contact tracing and monitoring is key to containing an outbreak. The definition of contacts is based on the risk profile. Successful management requires coordination by a team of multi-skilled senior persons who have the authority to make decisions.

As with all critically ill patients, the participant experienced many emotions. The lack of ability to control situations and care appeared to be important. Feelings of guilt still remain. A different meaning of kindness was exposed.

Infection prevention and isolation is part of routine nursing practice and should be applied if there is an index of suspicion of a contagious disease. Care of patients with VHF is not routinely taught however maintaining basic principles may prevent spread and thus further cases. Support of and communication with all staff in the hospital is important for commitment. The setting in this study was a hospital in the private sector.

The revelations of this case study can be used in future research to develop guidelines for use by the outbreak management team. They are intended to improve the management and emotional support of the health care workers as well as the victims and can be applied to outbreaks of any nature.

Keywords: Arenavirus, Viral Haemorrhage Fever, Outbreak, Reflection, Experience

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CHAPTER ONE

OVERVIEW OF THE STUDY

1.0 INTRODUCTION

This dissertation intends to explore the experience of a nurse who contracted a deadly novel viral haemorrhagic fever whilst nursing a patient admitted with a fever. It also seeks to identify some of the unique challenges for management and the care team that arise from the admission of such patients to a hospital. The outcomes of this study will be used by outbreak management teams to improve the gap in knowledge of holistic nursing care required by these patients.

Patients with complications from severe acute febrile diseases are frequently admitted to intensive care units particularly when the diagnosis is not confirmed and differential diagnoses are a possibility. These patients may be contagious. If so, their admission exposes the health care team and other patients to the risk of secondary transmission of nosocomial infections (Hu, Zhang, Li et al. 2012). Viral haemorrhagic fevers (VHF) are not the first consideration as a possible diagnosis unless there is a strong medical history linking the patient to either the geographical area or contact with a host. Malaria and African tick bite fever are diagnoses far more likely to be considered until proved otherwise. The health care workers are at risk during this period as the isolation and standard precautions differ depending on the diagnosis. Those who work in closest proximity to the patient, the nurses, carry the highest risk of transmission. Fear, uncertainty and inadequacy are some of the feelings described by nurses in the SARS

outbreak in Hong Kong (Chung, Wong, Suen et al. 2005). When caring for a contagious patient without a confirmed diagnosis, even the most experienced person becomes a novice. This may well increase the feelings of uncertainty by those who depend on the knowledge and advice of the experts. Using a social constructivist paradigm, which focuses upon the person's view of themselves (Atwater, 1996), a bounded case study, using exploratory and descriptive methods will collect and analyze data to ensure a rich narrative account of the phenomenon: the experiences of a nurse who contracted one of the deadliest VHF's and survived and the environment and context in which she was cared for.

This chapter presents an overview of the study. The problem statement, purpose of the study, research objectives and questions and the significance of the study will be described. The assumptions of the researcher are be discussed and conceptual terms defined. A brief overview will be given of the methodology, measures of trustworthiness of the study and ethical procedures adhered to. These will be discussed in greater detail in chapter three.

The Harvard Reference Style is used in this dissertation. Because many of the publications contain multiple authors of ten or more, in the initial citing the researcher will include the first three authors. In subsequent citings only the name of the primary author will be used.

All authors will be included in the referencing at the end of the dissertation.

1.1 BACKGROUND OF THE STUDY

Because VHF's are deadly infections with high mortality rates, it is important that the spread of the viral disease is contained and limited to as few patients as possible. In order to ensure that these infections do not become global pandemics, the United Nations (UN) and more specifically the World Health Organization (WHO), a part of the UN, are tasked

with the responsibility of monitoring and putting processes in place to prevent the further spread of the disease. The presence of a suspected case in an area where it has not previously occurred, or in greater numbers than usual, constitutes an outbreak. Since Johannesburg, South Africa, is not an endemic area for VHF this was declared an outbreak. Management according to the WHO guiding document for response to an international outbreak was implemented.

The VHF's are caused by a number of viruses that are endemic to certain parts of the globe, generally the tropical regions, since the natural hosts are found in the tropical belt. The tropical regions of Africa include the countries that lie between the Tropic of Cancer in the north and the Tropic of Capricorn in the south and include countries such as Guinea, Sierra Leone and Liberia in the east to Ethiopia in the west, Mali, Niger, Chad and Sudan in the north to Angola and Zambia in the south. South Africa is not part of a tropical region. These Viral Haemorrhagic Fevers are life threatening with mortality rates from 30%-90% (Ergönül, 2006; Jansen van Vuren, Weyer, Kemp et al. 2012)

The VHF's are divided into four families and include Old World Arenaviruses (Lassa virus and Lujo virus), New World Arenaviruses (Chapare virus, Guanarito virus, Junin virus, Machupo virus, and Sabia virus), Filoviruses (Ebola virus, Marburg virus) Bunyaviruses (Crimean-Congo virus and Rift valley fever virus) and Flavivirus (Dengue virus). Geographically, they are restricted to areas where the host species live. Humans are not the natural reservoirs. The Old World Arenaviruses originate in sub-Saharan Africa and Asia whilst the New World Arenaviruses originate in South America.

As early as the 12th century, a syndrome resembling VHF was described in the area we know today as Tajikistan (Ergönül, 2006). During 1944 –1945, in the wake of World War II, Crimean haemorrhagic fever, now called Crimean-Congo haemorrhagic fever (CCHF), was identified as a clinical syndrome (Ergönül, 2006). The first outbreak of Ebola linked to

hospitals and clinics occurred amongst Belgian missionaries and patients in the Democratic Republic of Congo (DRC, previously known as Zaire) in 1976.

Only CCHF and Rift Valley Fever (RVF) are endemic to South Africa, with RVF first reported during an outbreak in 1950 (Jansen van Vuren et al. 2012). Between 2008 and 2011, over 2000 blood samples were submitted for laboratory confirmation of RVF (Jansen van Vuren et al. 2012). During a similar time frame 19 cases from a total of 49 patients with CCHF died. (Communicable Diseases Surveillance Bulletin, 2012).

The CCHF and RVF are not the only type of VHF's to have occurred in South Africa. Outbreaks of Marburg, Lassa, Ebola, Dengue Haemorrhagic Fever and the novel Arenavirus, Lujo, are a constant reminder of the potential risk from imported cases to the South African health care system. These patients generally require resuscitative measures that include intubation and placement of intravenous catheters. These procedures expose the personnel to blood and other body secretions thus increasing the risk for acquiring nosocomial transmission.

This risk results in the exposure of the entire team of health care workers, to diseases that are associated with a high incidence of mortality. This creates a major challenge of nosocomial transmission to the health care system. (Salama, Jamal, Al Moosa et al. 2013). Because of this, there may be anxiety, fear and feelings of inadequacy amongst the personnel caring for these patients. These concerns are magnified when dealing with an unknown cause.

During the second half of 2008, two patients with an unidentified disease were airlifted from Zambia and admitted to the intensive care unit of a private sector hospital in Johannesburg, South Africa. The admitting diagnosis of the initial or index patient was suspected African tickbite fever. Commonly, Malaria or tick bite fevers are the admitting

diagnoses and the patients are likely to be placed in an intensive care unit due to the severity of the condition on transfer.

The second patient, admitted a week later, was the paramedic who carried out a traumatic intubation on the index patient before transport to SA. According to protocol, both patients were isolated on admission to the ICU. Patients three and four also sustained secondary infections. Patient three was a nurse who attended the index patient and patient four was a member of the cleaning staff who was responsible for cleaning the isolation ward after the death of the index patient. Patient five, a nurse attending the paramedic on the first three days of admission was the only patient to sustain tertiary infection. Four of the five patients died.

Confirmation of a novel pathogenic arenavirus was only released well into the disease process of patient five. The source of the exposure of the index patient to the arenavirus remains unknown (Bird, Dodd, Erikson et al. 2012). Lujo (LUJV) named from the presumed geographic origin of Lusaka, Zambia and Johannesburg, South Africa, has been confirmed as a new member of the Arenaviridae (Briese, Paweska, McMullen et al. 2009). This is the first time in 30 years that a new arenavirus has been identified.

To sum up, patients with febrile conditions and unconfirmed diagnoses are often admitted to intensive care units. In the South African setting these patients may be travellers from the tropical regions north of the South African border and could have been in contact with one of the communicable diseases endemic to these regions. Worse still, this could be a VHF. If suspicion and investigations for VHF do not occur and appropriate infection prevention measures are not put in place, the result is costly both financially and in human resources. This study intends to use the experience of a survivor, who happened to be a nurse, to make recommendations that could be applied in the future.

1.2 PROBLEM STATEMENT

Critically ill patients with various infectious disorders and acute febrile conditions are admitted to intensive care units. These febrile conditions may have a number of differential diagnoses in the South African setting including VHF. Mortality from VHF is high, ranging from 30%-90%. Because they occur rarely in the industrial western world, little is written about the hospitalization and care of these patients. What is known is the potential to cause epidemics through nosocomial introduction in the health care settings, with potential loss of health care workers.

The researcher had been a member of the core outbreak management team for a previous outbreak of the Ebola virus in South Africa. She is considered to be an expert in the field of outbreak management. This resulted in her being called upon to assist in the Lujo outbreak. Presently, research of viral haemorrhagic fever epidemics and outbreaks has concentrated on epidemiological aspects, clinical manifestations and medical management, whilst psychological, nursing and support aspects receive little or no attention. There is thus an interest in and responsibility to learn from the experience and put measures in place to improve the overall management should they be needed in future. In an effort to improve the management, nursing care and emotional support of the victims of such outbreaks, the researcher will focus on the experience of a critical care nurse who survived an outbreak of a novel VHF with a mortality rate of 80% and provide an in depth description of the management of her care.

1.3 RESEARCH QUESTION

What was the experience of a nurse, who contracted a deadly viral haemorrhagic fever, from the time of contact until recovery and what unique challenges were faced by the care team and management during this outbreak?

1.4 PURPOSE OF THE STUDY

The purpose of the study is to explore and describe the experience of a nurse in a private sector hospital after contracting a highly pathogenic novel haemorrhagic fever from a patient and to provide a detailed description of the management of the person and environment through the stages of her illness. The outcomes of this case study will be used to develop recommendations for use by outbreak management teams during outbreaks of any nature.

1.5 OBJECTIVES

The objectives of the study are:

- To explore the experience of a nurse during the monitoring, admission, disease and recovery phases, of a novel arenavirus outbreak.
- To triangulate the information with
    - Documented nursing care of this patient using nursing records and daily documents.
    - Analysis of the “outbreak diary”, compiled by the hospital coordinating team.
- To consider the relevance of the experience during an episode of critical illness and its importance in rendering support to health care workers in similar situations.
- To make recommendations for the care of a patient who has contracted or is suspected of having contracted a VHF

1.6 SIGNIFICANCE OF THE STUDY

Present publications on outbreaks particularly outbreaks of Viral Haemorrhagic Fevers focus on tracing the host and causative organisms (Isaacson, 2001; Gubler and Clark, 1995) the genetic detection, (Bird et al. 2012; Briese et al. 2009), epidemiological and infection prevention management (Hu et al. 2009; Jansen van Vuren et al. 2012) and lastly the medical management (Handy, 2004).

This study contributes knowledge for use by intensive care professionals since these patients generally require intensive care and others. It also should be of assistance to health professionals responsible for infection prevention as well as those involved with managing emotional and social support during outbreaks. Lastly it provides information that willl inform policy makers who will be responsible for maintaining and protecting health care workers and patients who succumb to similar outbreaks in future.

This particular case study has gathered information on the experience from both the perspective of the health care workers tasked with caring for patients critically ill with VHF, as well as the patient who has survived a highly infectious and lethal disease. The participant in this case study is a highly trained nurse with many years' experience, who contracted Lujo, a novel arenavirus with 80% mortality rate and survived. Reflecting on the experience of this nurse will allow for policy makers to include special attention to the emotional needs of patients and their health professionals rendering care in extreme isolation situations. It will inform intensive care nurses of particular aspects of care that become important to the patient when cared for with minimal contact. Health professionals who are responsible for infection prevention will gain insight into daily concerns of the personnel who are exposed to these deadly infections. Since there is no literature with advice on the daily administrative management of an outbreak, or the specific needs of

this type of patient the information gained will hopefully serve as lessons learned and assist in future outbreaks.

1.7 PARADIGMATIC PERSPECTIVES

Paradigms are considered to be perspectives of the real world, in other words, worldviews. (Polit and Beck, 2012). This allows us to make sense of and give meaning to the things of the world (Patton, 2002). All research needs to be placed in a paradigm as it guides the direction and subsequent phases of the study. The paradigmatic perspectives of this study include meta-theoretical, theoretical and methodological assumptions, which are discussed in the next section.

1.7.1 Meta-theoretical Assumptions

Meta-theoretical assumptions are axiomatic statements not intended to be tested by the study. The meta-theoretical assumptions of nursing comprise the person, environment, health and nursing, particularly applied to the speciality critical care nursing in the field of infection prevention.

Roy's adaptation model (Roy, Andrews, 2008) is a systematic logical theory that lends itself to application in the field of intensive care. The model describes the person's interaction with a changing environment and the person's ability to adapt. Adaptive mode processes may be integrated, compensatory or compromised. (Chan, 2004) The nurse assists with and promotes patient adaption by maintaining or removing stimuli depending on the patient's response. (Polit and Beck, 2012). This model provides a framework that is in line with the nursing process commonly used by most intensive care units in South Africa.

- **The Person**

The person is considered a bio-psycho-social being in constant interaction with the changing environment. (Chan,2004). Four modes of adaptation are considered. These include: physiological function, self-concept, role function and interdependence. In addition, Roy describes a person as “having a zone of adaptation” (Chan, 2004). Chan (2004) explains that changes in health that fall within this zone result in a positive adaptation whilst those changes that fall outside the zone will cause ill health.

The patient in this study is critically ill and is vulnerable since the zone of adaptation described by Roy (2008) has been violated in all of the modes of adaptation.

- **Environment**

The environment refers to factors resulting in potential changes as being both within the person or internal as well as from without or external. Both the internal and external stimuli have the possibility of affecting the state of health of the person (Chan, 2004). In this study the environment is a normal ward that has been converted into a specially prepared isolation suite that includes an intensive care cubicle. The stressors associated with isolation and intensive care treatment would play a role in this study.

- **Health**

Health and maladaptive behaviour are the two extremes of the adaptation continuum with health suggesting a state of positive adaptation whilst maladaptive behaviour indicates the inability to maintain health thus ill health ensues. Since this patient was critically ill and well outside her zone of adaptation, she falls into the realm of maladaptive behaviour.

- **Goal of Nursing**

Roy’s adaptive model of nursing explains that humans are systems that are able to change by means of adaptation (Polit and Beck 2008). The role of the nurse, when interacting with a patient, is thus to assist the patient to achieve positive adaptation in

each of the four adaptive modes (Chan, 2004) in order to develop the means to be at one with the environment. Nursing interventions are directed at enhancing the chances of positive adaptation.

- **Nursing activities**

Roy's adaptation model goes on to identify the systematic manner in which nursing care is delivered. Six steps make up this process. They include: First level assessment, Second level assessment, Problem identification, Goal setting, Intervention and finally Evaluation. (Chan, 2004). Nursing activities promote positive adaptive responses by manipulation of certain stimuli. In this study nursing predominantly takes place in the isolation environment however intensive nursing is a pivotal part of this nursing care.

1.7.2 Theoretical Assumptions

Theoretical assumptions can be defined as perspectives that position the researcher within the research. Theoretical assumptions are inclusive of theories and concepts used as a point of departure in the study. Creswell (2009) likens this to a lens through which the theoretical platform forms the picture. References to words and phrases form the pillars to which the research is anchored. Qualitative researchers must address the fact that the data or evidence they collect cannot be separated from the implicit or theoretically explicit assumptions they hold about the nature of the social world, and which therefore will guide the methods they choose to generate their data.

1.7.2.1 Terms of reference

The following concepts are clarified in order to understand how they are applied in the study.

- Outbreak

As defined by the World Health Organisation (WHO), the presence of a suspected or confirmed case of a communicable disease in an area where it has not previously occurred, or in greater numbers than usual, constitutes an outbreak. In VHF infections one case in a new area constitutes an outbreak. The VHF in this study is a novel arenavirus that infected five persons thus it constitutes an outbreak.

- Acute febrile diseases

A term used for an onset of a non – specific illness accompanied by a fever. (Concise Dictionary of Modern Medicine, 2002).

- Index patient

The index patient, also referred to as patient zero, is the initial patient in the population of an epidemiological investigation who shows symptoms of the disease under investigation. (Centers for Disease Control and prevention, 2014; Concise Dictionary of Modern Medicine, 2002). This term is frequently used in outbreaks of communicable diseases. The index patient in this study is a female who was airlifted from Zambia to Johannesburg with an acute febrile disease. The diagnosis of VHF was confirmed post mortem after four more patients presented with the same clinical picture. Patient number five survived and is the centre of this study.

- Health care workers

In terms of Health Act 61 of the Republic of South Africa of 2003, health care workers include nurses, physicians, physiotherapists and radiographers.

- Coordinating team

Gittell (2002) states that coordination is “fundamentally a process of interaction among participants”. Regular, precise and analytical communication is key to the success of

coordination. Coordination however also includes the relationships “of shared goals, shared knowledge, and mutual respect” (Gittell, 2002) between the participants. In this study coordination includes communication, shared knowledge and respect between the members listed below, whose responsibility it is to manage this outbreak of an unidentified VHF. Teams include cooperatively functioning groups of participants whose duty it is to organize and oversee the entire planning and running of all aspects of an outbreak. The coordinating team in this study was divided into a number of smaller teams. These included:

- a hospital management team who maintained and continued with hospital activities,
- a team of the personnel who dealt with media and production of information flyers,
- a technical team,
- a client services team to assist with public queries,
- a contact and monitoring team.
- a group of representatives from WHO and CDC,
- the team who was responsible for patient safety and care. This included the treating physician, the hospital infection prevention nurse, the researcher and the hospital manager. This team reported directly to head office

Organizing an outbreak and care of patients and contacts involves guiding and organizing of personnel and other resources needed to carry out all required patient care activities, and is best managed by the exchange of information among team members responsible for different aspects of care. This occurs alongside the regular business of the hospital.
In particular in this instance was the difficulty of not having a confirmed diagnosis with which to work. The team responsible for the patient care assumed the worst and managed the outbreak as though it was a VHF. This was only confirmed well into the outbreak.

- Private hospital

In South Africa there are two health care provider models. The Private sector hospitals are owned by three large companies and cater for patients who are covered by medical insurance, or private paying patients.

The largest sector is Government owned and serves the majority of the population.

- Infectious and Contagious.

Infectious diseases are caused by microscopic bacteria or viruses that enter the body. Some infectious diseases spread directly from one person to another. Infectious diseases that spread from person to person are said to be contagious. (Pearse, 1997)

1.7.3 Methodological Assumptions

Methodological assumptions reflect the researcher's belief about the nature of the research process. It is also influenced by the nature of the research topic or problem, the researcher's own personal involvement and interest and the scientific body that would have an interest in the study (Creswell, 2009). Creswell (2009) suggests that research is influenced by the researcher's "general orientation to the world". It is the researcher's perspective on the complexities of life and is representative of their philosophical stance. (Polit and Beck, 2012). Creswell (2009) describes four different worldviews into which research can be positioned. Polit and Beck (2008) and others refer to these as paradigms. They include

- Postpositivism
- Constructivism
- Advocacy/Participatory
- Pragmatism

Burns and Grove (2009) classify two broad approaches of research for nursing (quantitative and qualitative). Creswell (2009) includes a third approach. (Quantitative, qualitative and mixed methods).

Qualitative research is an inquiry approach employed by different academic disciplines, traditionally in the social sciences. Qualitative aims to gather an in-depth understanding of human behaviour and the reasons that govern such behaviour. The qualitative design investigates the *why* and *how* of decision making, not just *what*, *where* and *when*. The focus of the investigation is broad and holistic. Smaller but focused samples are more often used in qualitative studies than larger samples. Qualitative research asks broad questions and collects word data from phenomena or participants. The researcher looks for themes and describes the information in themes and patterns exclusive to that set of participants (Creswell, 2009). The final report is supple and adaptable. Within the qualitative research a number of strategies or methods are used. These include phenomenological research, grounded theory research, ethnographic research, historical research, philosophical inquiry, critical social theory and case studies. (Burns and Grove, 2009). Qualitative research was chosen since the experience of the nurse will be explored and described in the context of the management of this illness in a private hospital setting in Johannesburg. In this study context is vital therefore particular attention has been given to details of the setting.

The paradigm selected for this study lies within the worldview of naturalism or constructivism. Constructivists believe the world is independent of human minds, but knowledge of the world is a human and social construction. They oppose the philosophy of objectivism, which enhances the belief that a human can come to truth about the natural world not mediated by scientific approximations, with different degrees of validity and accuracy. They pay attention to deep understanding rather than generalizations (Patton, 2002 pp. 96-99). According to constructivists there is no single methodology in

science, but rather a diversity of useful realities. In other words there are multiple means of exploring different “truths” of realities. (Burns and Grove, 2009). Social constructivism contends that categories of knowledge and reality are actively created by social relationships and interactions. Social activity presupposes human beings inhabit shared forms of life, and in the case of social construction, utilizing semiotic resources with reference to social structures and institutions.

I have chosen to follow a qualitative approach in this case study, in order to ensure the drawing out and understanding of the experience of a nurse who contracted a deadly disease. I have selected constructivism as the paradigm for this case study. Individuals form subjective constructions about their experience (Creswell, 2009). These perceptions become the views and beliefs of the individual (Creswell, 2009). The goal of this research is to rely on the participant’s views and perceptions of her experience together with exploring the management of this outbreak to provide recommendations for future use. This is a complex case study. The view of the participant is vital to the interpretation and understanding of the experience.

1.8 OVERVIEW OF RESEARCH METHODS

The overview of the research method identifies the type of research design selected and introduces the methods used. In this research a case study design is considered the most appropriate and makes use of qualitative phenomenology in an attempt to gather details of the experience of the nurse. This will be set out in detail in chapter three.

1.8.1 Research Design

The research design is a case study design guided by a constructivist paradigm. Exploration and description are linked to the context of this unique study. Within a case

study design, qualitative methods are used to address the research questions. Each aspect of the design is discussed.

This research is a case study, since a bounded single case study will be used in order to capture the experience of the participant. It is considered the most appropriate type of research since in this instance, the case, an infected nurse, is the central point. (Polit and Beck, 2010). In an attempt to improve the understanding and support of personnel in similar situations in future, the researcher will focus on what this nurse experienced during her role as the “nurse” and her time as the patient.

Qualitative research allows the researcher to learn (Patton, 2002). With learning comes deeper understanding that aids the researcher in obtaining information that can be used when planning programs for future use. Phenomenological research attempts to describe the experiences of the study participants (Burns and Grove, 2005). It requires the participants to reflect upon and speak about the phenomenon (Beeby, 2000). The experience allows the researcher to attach meaning to the participant’s experience as perceived by the individual participant. These meanings can then be grouped to identify and understand the perceptions of the participant to the phenomena.

This study is contextual, as the researcher intends to use the sequence of events as they occurred in the study setting. The study setting is a hospital in one of the three largest private sector hospital groups. This hospital is a referral hospital for international patients who have medical insurance privately or through their employer. This particularly applies to patients from Africa who require expert medical treatment and nursing care. In spite of no confirmed diagnosis, the National Institute for Communicable Diseases (NICD) was notified as two patients who had been in contact with each other, had died with similar clinical symptoms.

A single case study cannot be assumed to represent the entire population of health care workers therefore cannot be used as a generalization, however qualitative research is not about generalizations but rather about uniqueness, obtaining richness of data and understanding of the phenomenon (Burns and Grove, 2009)

However this study intends to produce recommendations that can be used to inform future management of outbreaks of VHF as well as the policies that guide practice.

1.8.2 Research Methods

The target population included all health care workers who contracted the Lujo virus. Nonprobability sampling will be enforced since there was only one survivor, thus the sample is limited to a single person, the nursing documents related to her admission and a diary which was maintained by members of the core outbreak team.

In-depth unstructured interviews were used, as the researcher had no preconceived views of the information that will be offered. Using an informal conversation technique the questions were open ended. The informal conversational interview is the most open-ended approach to interviewing (Patton 2002). The intention is to understand the experience in the participant's own words. People's accounts are reconstructions of their experience influenced by their perceptions (Beeby, 2000). The conversation is transcribed and verified at a future interview session as required by Colaizzi's method of data analysis.

In addition, the case notes documented on a daily basis by the nursing staff caring for the patient were analyzed for confirmation of the accounts and to identify any factors that might have played a role in the experience. Lastly the outbreak diary, a document compiled on a twenty-four hour basis by members of the coordination team, was used as reflection of how the outbreak played out.

Thematic content analysis was used. As Colaizzi's framework has been used in two Studies examining the experiences of health personnel during an outbreak of SARS in Hong Kong(Chung et al. 2005) and the H1N1 influenza pandemic in Australia (Corley, Hammond and Fraser, 2010), the researcher uses his framework. Emerging themes will be grouped in keeping with Colaizzi's framework. This allows for comparison of experiences during outbreaks and these themes can then be transformed into practice recommendations for future application.

1.9 MEASURES OF TRUSTWORTHINESS

Guba's model, as described in Lincoln and Guba (1989), for ensuring validity and trustworthiness of qualitative research will be applied. The four main aspects of trustworthiness applied to this study are credibility (truth value), dependability (consistency), transferability (applicability) and confirmability (neutrality).

In order to enhance credibility, method triangulation was applied. "Triangulation refers to the use of multiple referents to draw conclusions about what constitutes truth." (Polit and Beck, 2010). Method Triangulation uses two or more methods of collecting data in respect of the same phenomenon in order to obtain a true and comprehensive understanding. Recordings of conversations with the participant together with the clinical nursing data of the period of admission will be used to enhance credibility. In addition, the data was augmented with excerpts from the written "outbreak diary", thus ensuring data source triangulation as well.

Dependability refers to evidence that is consistent and stable (Polit and Beck, 2012). It refers to reliability that is enhanced by the credibility of the process of data collection. The concept of transferability or "the extent to which qualitative findings can be transferred to other settings" (Polit and Beck, 2012) is improved by increasing the contextual information. This is achieved in this study by thick description. In order to ensure rigor

or confirmability, the study must reflect the participant's experiences and not the researcher's. Since the nurse who experienced the condition will give the account, it will be considered a true reflection of her experience and therefore credible. Tape recording and accurate transcription will provide a record. Probing and crosschecking will be used to confirm her perceptions of the experience. Meanings obtained from the conversation with the participant were confirmed at a further meeting an amended as necessary.

1.10 ETHICAL CONSIDERATIONS

As a registered nurse one adheres to the ethical principles of a profession. The International Council for Nurses (ICN) contains four elements in their code of ethics for nurses. Similarly the South African Nursing Council (SANC) has also published a list of Ethic Principles that have to be "upheld at all times by all Nursing Practitioners" (South African Nursing Council: Code of Ethics for Nursing Practitioners in South Africa. 2013).

- The proposal for this research was submitted for peer review within the Department of Nursing Education before being submitted to the Human Research Ethics Committee of the University of Witwatersrand.

- Ethical approval has been obtained from the Human Research Ethics Committee of the University of Witwatersrand.

- This proposal was submitted to the Faculty of Health Sciences Post Graduate Committee and permission was granted to continue with the study.

- Permission to carry out the research and use of the data has been obtained in writing from the participant.

- Written consent has been obtained from the Management of the hospital concerned, for use of the data.

- Because of the nature of such an outbreak and the concurrent media reports, total anonymity cannot be obtained. The participant will however remain anonymous in the research documents and any publications that follow.

- Anonymity and confidentiality will be afforded to the health care team who were involved with both the management of the outbreak and the care of the participant.

- The management and storage of all data collected will be held in confidence with both the computer and backup devices being password protected.

- A Psychologist has been arranged for consultations should the participant require counselling.

1.11 OUTLINE OF THE DISSERTATION

Proposed chapter layout of the thesis is as follows:

Chapter One:	Overview of the study
Chapter Two:	Literature review
Chapter Three:	Research methods
Chapter Four:	Findings
Chapter Five:	Discussion, recommendations, limitations and conclusions

1.12 SUMMARY

This chapter has presented an overview of the study. The problem statement, purpose of the study, research objectives, and significance of the study has been described. The assumptions of the researcher have been discussed and the operational terms defined. An overview has been given of the research methods, validity and trustworthiness of the study and the ethical procedures adhered to.

The following chapters will include a review of the literature, the methods, data analysis, the description and interpretation of research findings. The final chapter will present limitations of the study, as well as a summary of the study findings, conclusions and recommendations, for future research.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

In the previous chapter a general overview of the study was provided. It Included the background to the study, the problem statement, the research question, the purpose of the study, the research objectives, significance of the study and the paradigmatic perspectives. It also described the theoretical framework and the meta-theoretical assumptions, research methods and ethical considerations briefly.

In this chapter a summary of literature on this topic will be discussed. Previous research was examined. This literature contains predominantly the epidemiology and genetic tracing of VHFs. A few publications discussed different aspects of the management of VHF but only two Lyon, Mehta, Varkey et al. (2014) and Sewlall, Richards, Duse et al. (2014) examine clinical progress and the patients' response to daily treatment.

The literature is organized into three sections listed below.

- What we know about viral haemorrhagic fevers (VHF)
- Clinical and Nursing management
- Outbreak management
    - infection prevention and isolation.
    - contact tracing and monitoring

2.2 SEARCH METHODS

An electronic literature search was conducted using CINAHL, EBSCO, Ovid Medline, Science Direct, Pubmed, Scopus and MeSH. In addition key articles and reports were searched for relevant references. Key words for data searching included: Viral haemorrhagic fever; Lujo fever; Ebola fever; Crimean Congo fever; Lassa Fever; personal protective equipment; infection control and prevention; nosocomial infections, critical care experience; outbreak management and lessons learned. The search was limited to English articles. Initially the timeframe of 1990 to 2013 was selected. Due to the scarcity of current literature on experience of health care workers or patients, earlier articles on VHF outbreaks and particularly the outbreaks of Marburg Fever and Ebola both in Johannesburg, were included. Later, due to the biggest outbreak ever of Ebola in West Africa, relevant publications from 2014-15 were added The decision to include articles was based on the relevance to the study.

2.3 WHAT WE KNOW ABOUT VIRAL HAEMORRHAGIC FEVERS

Viral Haemorrhagic Fevers are caused by a number of viruses that are endemic to certain parts of the Globe, generally the tropical regions. They are life threatening with mortality rates from 30%-90% (Ergönül, 2006; Jansen van Vuren et al. 2012). VHF's are divided into four families and include

Arenaviruses – Old World (Lassa virus and Lujo virus),

- New World (Chapare virus, Guanarito virus, Junin virus, Machupo virus, and Sabia virus)

Filoviruses (Ebola virus and Marburg virus)

Bunyaviruses (Crimean-Congo virus and Rift valley fever virus) and

Flavivirus (Dengue virus).

VHFs are small-enveloped RNA viruses (Paweska, Sewlall, Ksiazek et al. 2009). Geographically, they are restricted to areas where the host species live. Humans are not the natural reservoirs. The Old World Arenaviruses originate in sub-Saharan Africa and Asia whilst the New World Arenaviruses originate in South America. This study will only address the Old World Arenaviruses, Filoviruses, Bunyaviruses and Flaviviruses.

As early as the 12th century, a syndrome resembling VHF was described in the area we know today as Tajikistan (Ergönül, 2006). The hosts of VHF vary from ticks and mosquitoes to rats and bats and some remain as yet unknown (Bird et al. 2012; Paweska et al, 2009; Sewlall et al. 2014). A breakdown of the four families together with the natural host is tabulated below. (Table 2.1)

Table 2.1 Classification of Old World Viral Haemorrhagic fevers

Virus Family	Fevers	Endemic area	Host	Most important reference/s
Arenavirus	Lassa virus	West Africa: Liberia, Sierra Leone Nigeria	Mastomys mouse	Jansen van Vuren et al. 2012
	Lujo virus (LUJV)	Unknown (2015)	Unknown (2015)	Bird et al. 2012; Paweska et al, 2009; Sewlall et al. 2014
Bunyavirus	Crimean-Congo fever (CCHF)	South Africa, Central Africa Asia	Hyalomma tick (Bontepootluis)	Ergönül, 2006. Paweska et al, 2009
	Rift Valley Fever (RVF)	South Africa Egypt, Saudi Arabia Sudan Senegal Yemen	Aedes Mosquitoes and ticks(secondary)	Fyumagwa et al. 2011. Jansen van Vuren et al. 2012.
Filovirus	Ebola Virus Disease (EVD)	Africa: Democratic Republic of Congo, Uganda Gabon Zaire	African Fruit Bat	Hall, Hall and Chapman, 2008. Richards, Murphy, Jobson, et al. 2000.
	Marburg Fever	Democratic Republic of Congo, Angola Kenya,	African green monkey; Bats	Borchert, Boelaert, Sleurs et al. 2000. Ftika and Maltezou, 2013.
Flavivirus	Dengue Haemorrhagic Fever (DHF)	Asia Africa North Australia	Aedes *aegypti* mosquitoes	Centers for Disease Control update, 2015.

*Data included in this table are from many articles, all listed in the references.

Only Crimean Congo Haemorrhagic Fever (CCHF) and Rift Valley Fever (RVF) are endemic to South Africa. RVF was first reported during an outbreak in 1950 (Jansen van Vuren et al. 2012). Between 2008 and 2011, over 2000 blood samples were submitted for laboratory confirmation of RVF (Jansen van Vuren et al. 2012). The first case of CCHF to be diagnosed in South Africa was in 1981 when a young school going male died after being bitten in the North West Province (Gear, 1989). During a time frame of 4 years from 2008 and 2011, 19 cases from a total of 49 patients with CCHF, died. (Communicable Diseases Surveillance Bulletin, 2012). In 2014, five cases of CCHF were confirmed mainly in the Northern Cape and Namibia. (Communicable Diseases Communique, 2014). CCHF and RVF are not the only VHF's to have occurred in South Africa. Outbreaks of Marburg, Lassa, Ebola, Dengue Haemorrhagic Fever and the novel Arenavirus, Lujo, are a constant reminder of the potential risk from imported cases, to the South African health care system.

I will give a brief overview of each of the VHF's that have occurred in the South African setting starting with the two that are endemic to South Africa.

- **CRIMEAN-CONGO HAEMORRHAGIC FEVER (CCHF)**

During 1944 –1945, in the wake of World War II, Crimean haemorrhagic fever was identified as a clinical syndrome (Bird et al. 2012; Paweska et al, 2009; Sewlall et al. (2014). Ergönül (2006) reports that in 1956 a similar and indistinguishable virus was identified in the Belgian Congo. This resulted in the virus being renamed Crimean-Congo haemorrhagic fever (CCHF). CCHF is known to be transmitted by the Hyalomma species of ticks commonly known as the "bontepootluis" in South Africa. These ticks feed on animals and therefore come into contact with humans.

In the South African context, since 1981 there have been reports involving human cases

annually (Jansen van Vuren et al. 2012). During 1985, an outbreak of CCHF occurred at Tygerberg Hospital in the Western Cape (van Eeden, van Eeden, Joubert et al. 1985). Nine patients contracted CCHF in this outbreak. Two died. Some medical management is discussed in this publication however no nursing management was included in any of the four part publication. In 1996 an outbreak of CCHF occurred in Oudtshoorn in the Eastern Cape in which 17 workers from an abattoir were found to be positive for CCHF (Msimang, Weyer, Leman et al. 2013). Passive surveillance has proved a total of 187 laboratory –confirmed cases in the last 30 years (Jansen van Vuren et al. 2012) mainly in the Northern Cape and Free State. In a recent article, Mertens, Schmidt, Ozkul et al. (2013) describe CCHF as "one of the major emerging disease threats spreading to and within the European Union". Mertens et al. (2013) go on to say that over 30 countries have reported cases of CCHF. Ftika and Maltezou (2013) add that in the past ten years the incidence of CCHF has increased in South-east Europe and a number of other African and Russian countries. They mention that the first human cases in Turkey were confirmed in 2002. More recently ticks in Spain have been found to carry the CCHF virus. Endemic areas in South Africa include Eastern Cape, Northern Cape, Western Cape, North West and the Free State. (Jansen van Vuren et al. 2012).

- **RIFT VALLEY FEVER**

Rift Valley Fever is a VHF that is generally associated with animals. An arthropod borne disease, it affects domestic livestock that are frequently in close contact with humans. This disease, named after the Rift Valley in Kenya, was first recognized in 1913 (Fyumagwa, Ezekiel, Nyaki et al. 2011). The incidence among animals increases during periods of heavy rainfall (Fyumagwa et al. 2011; Centres for Disease Control and Prevention and World Health Organization, 2015). Mosquitoes infect animals such as cattle, sheep and goats. During the slaughtering and skinning of the animals, humans become contaminated.

The RVF is found in "most countries of sub-Saharan Africa" (Centres for Disease Control

and Prevention and World Health Organization, 2015). Southern and Eastern regions of Africa are affected.

Rift Valley Fever was first reported in South Africa in 1950 (Jansen van Vuren et al. 2012). Regular outbreaks have occurred in South Africa. No infection to humans was reported in a few instances however most outbreaks confirmed human cases with few fatalities occurring during the outbreaks. Jansen van Vuren et al. (2012) report a widespread outbreak of RVF that occurred between February 2010 and March 2011 in which 302 human cases were confirmed. Twenty five of these patients died. Over 80% of the confirmed cases had exposure to animals. (Jansen van Vuren et al. 2012). Prior to that, a large outbreak occurred in Kenya killing as many as 300 people (Fyumagwa et al. 2011). RVF generally has a low fatality rate of approximately 1% in humans. General guidelines for VHF should be followed in the event of the admission of a patient with RVF. There is no specific treatment for patients testing positive for RVF. Medical management includes administration of Ribavirin, an antiviral drug or nucleoside inhibitor. Fyumagwa et al. (2011) are a group of animal and wildlife researchers particularly interested in RVF in livestock. They have included the interface between livestock and humans in their publication in an attempt to examine the challenges and opportunities gained in an outbreak in 2007. They report that in spite of experiencing a fairly large outbreak of RVF in Tanzania, having the technology and the knowledge, does not result in Tanzania being prepared should another outbreak occur. In their opinion lack of finances and the reluctance of the policy makers to engage with the professional experts are reasons for this. It is more than likely that Tanzania is not alone in this and that many African countries suffer the same dilemma.

- **LUJO FEVER**

In September and October of 2008, an outbreak of an undiagnosed haemorrhagic fever

occurred in a hospital in the Northern suburbs of Johannesburg. Unidentified until day three of admission of the fifth patient, this new arenavirus was responsible for the deaths of three healthcare workers as well as the index patient who was evacuated by air from Zambia. The fifth patient who is the participant in this study is the only survivor. Lujo is a novel arenavirus and is one of two pathogenic arenaviruses found in Africa (Sewlall et al. 2014). It is the first deadly arenavirus to be discovered on the African continent in 40 years (Briese et al. 2009; Paweska et al. 2009; Sewlall et al. 2014). The mortality rate is 80% with four of the five patients dying. This is substantially higher than Lassa Fever, the second arenavirus in Africa, at 20-50%. The fact that no confirmed diagnosis was available probably contributed to this, since infection prevention in line with VHF was not put in place in cases one, two and four. Case three was nursed with standard precautions and barrier nursing. Case five was admitted to an isolation suite prepared for VHF. Although unknown at this point in time (Bird et al. 2012; Paweska et al. 2009; Sewlall et al. 2014), the host is thought to be a rodent since the Mastomys mouse is the host in Lassa Fever. The clinical presentation was similar to Lassa Fever and other VHF's (Sewlall et al. 2014). Lujo differs from Lassa Fever in that the onset is abrupt. In line with Lassa Fever, haemorrhage "was not a prominent feature" (Sewlall et al. 2014). Ribavirin was administered orally initially and then intravenously.

- **EBOLA**

The first outbreak of Ebola linked to hospitals and clinics occurred amongst Belgian missionaries and patients in the Democratic Republic of Congo (DRC, previously known as Zaire) in 1976. In this outbreak 318 cases contracted Ebola with 280 deaths. One of the difficulties with identifying this epidemic was the similarity of the symptoms to Lassa Fever and yellow fever. The community had identified the mission hospital as the source of the infection. History taken from 85 of the cases indicated that they had been given an injection at the hospital within three weeks of presenting with symptoms. "Less than 1% of unaffected family members

received injections" (Breman, Piot, Johnson et al.1978.) Another large outbreak occurred the same year in Sudan with 284 cases reported. In this outbreak, nursing the patient, whether at home or in the hospital was closely linked to contracting the disease. In fact Breman et al. (1978) state that 91 of 213 patients contracted this disease in hospital in Maridi, Sudan. Seventy two were hospital workers who contracted Ebola during the course of duty. Further outbreaks have continued to occur. The 1995 Kikwit Ebola outbreak is one of the best studied and best reported outbreaks of Ebola to date (Hall, Hall and Chapman, 2008). According to Hall et al. (2008) this epidemic had 164 reported cases with 134 deaths. Health care workers made up 38% of the deaths.

This Kikwit outbreak was to result in the first Ebola case being imported into South Africa in 1996 and the subsequent death of a nurse who was in contact with the index patient from Gabon (Gradon, 2000; Richards, Murphy, Jobson, et al. 2000). This outbreak occurred in a private hospital where I was the nursing manager. This was the first Ebola case in South Africa and in a western setting where first class medicine is practiced. My position at the time afforded me the opportunity to get firsthand experience on managing an outbreak in a hospital situation.

These outbreaks however pale into insignificance when compared to the present West African Ebola outbreak in which over 23,000 cases have been reported, 14,028 laboratory confirmed and over 9,000 deaths have occurred (Centers for Disease Control update, 2015). It should be remembered that West Africa is not an endemic area for filoviruses.

Five subtypes of the virus exist, Ebola Zaire, Ebola Sudan, Ebola Bundibugyo, Ebola Cote d'Ivoire (now called Tai Forest ebolavirus) and Ebola Reston which does not affect humans (www.cdc.gov/vhf/ebola; King, 2008 updated November 2014). The first three are responsible for all the Ebola cases in Humans seen on the African continent.

- **MARBURG FEVER**

Marburg Haemorrhagic Fever belongs to the same family as Ebola, the *Filoviridae* family. The

first recorded outbreak occurred in Marburg, Germany and Serbia (formally Yugoslavia) simultaneously in 1967 (Borio, Inglesby, Peters et al. 2002; Ftika and Maltezou, 2013). The virus takes its name from this German town. Thirty two laboratory workers who had handled African Green monkeys that had been imported from Uganda were infected in this outbreak. Seven of these patients died. Since then infrequent outbreaks have occurred in Central Africa and South Africa. Primates are not considered the host as they develop the disease themselves (Borchert, Boelaert, Sleurs et al. 2000). The host is the cave dwelling African Fruit Bat, *Rousettus aegyptiacus.* The first case in South Africa occurred in 1975 when a young Australian male, traveling through Zimbabwe with his partner, presented at the Johannesburg General Hospital with a fever and an acute haemorrhage (Gear, Cassel, Gear et al. 1975). [I worked in the renal unit together with a nursing colleague who contracted the disease after haemodialysing this patient during his illness. This was my introduction to VHF.] The most notable outbreaks occurred in Durba, Democratic Republic of Congo from 1998 to 2000 and Uige Province, Angola in 2004 to 2005. Collectively over 400 persons contracted the disease in both these outbreaks and mortality rates were reported as 83% and 90% respectively.

- **LASSA FEVER**

Lassa Fever, the second of the Arenaviruses in Africa, was first discovered in 1969 in Lassa, Nigeria. As is common practice, the virus was named after the town in which the first cases presented. Both patients were missionary nurses working in northern Nigeria. Many West African countries including Sierra Leone, Guinea and Liberia continue to report outbreaks (Fisher-Hoch, Tomori, Nasidi et al.1995) and the presence of the disease. The host is a rodent known as the Mastomys mouse (Fisher-Hoch et al.1995; Handy, 2004). The two most widely reported outbreaks occurred in Nigeria in 1989 (Fisher-Hoch et al.1995) and 2012 (World Health Organization Global Alert 2012). Fisher-Hoch et al. (1995) carried out a retrospective investigation analyzing the records of patients who had died from December 1988 in two

hospitals where the outbreak had occurred. The researchers were able to trace surviving staff and patients. Bloods were tested for Lassa Fever. In this outbreak that lasted from January to March 1989, thirty four patients were presumed to have Lassa Fever. Twenty two died including three doctors from the two hospitals. A notable observation from the records associated the presence of the disease with the administration of an injection. The researchers commented on the absence of the illness in the community. Sharing of needles was common practice in many African countries. Breman et al. (1978) describe how "Five syringes and needles were issued to the nursing staff each morning for use at the outpatient department, the prenatal clinic and the inpatient wards. These syringes and needles were sometimes rinsed between patients in a pan of warm water. At the end of the day they were sometimes boiled". Members of teams returning from fighting the present Ebola outbreak confirm the poor infection prevention practices and the lack of adequate equipment.

In 2012 the Ministry of Health in Nigeria notified WHO of an outbreak of a disease, later confirmed as Lassa Fever in 108 patients. A total of 623 cases of suspected Lassa Fever (World Health Organization Global Alert 2012) were documented across Nigeria. Seventy deaths were confirmed.

There is no published information about Lassa Fever outbreaks in South Africa, however in 2007, the news and print media ran an article detailing the case of a Nigerian medical doctor who was admitted to a private hospital in Pretoria and tested positive for Lassa Fever. News24 (11 November 2010) announced the "breaking news" of a South African Engineer who became infected and died whilst in Sierra Leone in November 2010.

2.4 TREATMENT AND NURSING CARE OF PATIENTS WITH VHF

Much of the available literature specific to viral haemorrhagic fevers deals with identification of the genomic details of the viruses and the microbiological details (Briese et al. 2009; Bird et al. 2012). Generally the publications describe the historical facts and the epidemiology. Paweska et al. (2009) describe the clinical and epidemiological aspects of this Lujo virus outbreak and include some aspects of infection control precautions. Richards, Sewlall and Duse (2009) have published their concerns on the lack of availability of drugs for the treatment of VHF and the ensuing exploitation in terms of costs, by the pharmaceutical company when approached for a supply. There is some literature available on the attempts to identify the host of Lujo, the novel virus eventually identified in this case study, although to date, the host remains unknown (Bird et al. 2012; Sewlall et al. 2014)

There are a limited number of publications that describe how to manage VHF outbreaks although more are expected in the near future from the West African Ebola experience. At present there are very few publications (Borio et al. 2002; Bühler, Roddy, Nolte et al. 2014; Ftika and Maltezou, 2012; Lyon et al. 2014; Risi, Bloom, Hoe et al. 2010; Sewlall et al. 2014) containing information or advice on clinical, hospital or nursing management. The six publications mentioned each describe different aspects of VHF management.

Borio et al. (2002) deal with the treatment and isolation in the event of use of VHF as a biological weapon. Risi et al. (2010), concerned about the construction of Biosafety level three and four laboratories in Montana, USA, describe how a training programme at the local hospital decreases the level of fear of VHF and increases the willingness of the healthcare workers to accept the responsibility of caring for patients with VHF. Ftika and Maltezou (2012) are in

agreement that healthcare workers responsible for management of patients with VHF should be "specifically trained".

Bühler et al. (2014) report an important aspect of Filovirus outbreaks. They are concerned about the unavailability of evidence due to the lack of documentation of clinical manifestations and evaluation of treatment. This limits the information available for further understanding and research of Filoviruses The experiences and preferences of healthcare workers are examined in this research and recommendations are suggested.

Lyon et al. (2014) and Sewlall et al. (2014) describe the clinical management of patients with VHF. Lyon et al. (2014) describes the symptoms and subsequent management of two patients, one a physician and the second, a missionary, who contracted Ebola during the period when they were assisting in the West African outbreak. Details of early presentation and initial treatment and care until transfer back to the USA are documented. Both the patients received the ZMapp™ antibody cocktail. An improvement was noted in both patients after receiving ZMapp™. Sewlall et al. (2014) describe the clinical management of the Lujo outbreak from which the participant in this study is the sole survivor. The Simplified Acute Physiology Score II [predicted mortality score] was carried out on the five patients included in this study 24 hours after admission. The clinical management includes signs and symptoms and laboratory findings, infection control and supportive therapy. .

2.5 INCUBATION AND COMMON SIGNS OF VHF

The incubation periods differ slightly for each individual VHF but they range from two to twenty one days (Isaäcson, 2001). Ergönül (2006) suspects that this wide range is related to the route of infection and the viral dose.

The signs and symptoms are similar in each of the four families of VHF. They are common non-specific flu–like symptoms and thus a number of differential diagnoses particularly Malaria should be excluded.

With the exception of Lassa Fever in which the onset is gradual and RVF that is sometimes asymptomatic, the onset of fever is abrupt. Ebola and Marburg Fever appear to have a higher–grade fever with temperatures of 40°C frequently monitored (Ftika and Maltezou 2013) Four of the five patients diagnosed with Lujo Fever had temperatures over 38°C. It was believed that the fifth patient was unable to mount an increase in temperature as she was severely immuno-compromised (Sewlall et al. 2014).

The clinical picture frequently commences with headaches, malaise, fatigue, sore throat, nausea, vomiting and diarrhoea (Bah, Lamah, Fletcher et al. 2015; Ergönül, 2006; Isaäcson, 2001; Richards et al. 2000). These non-specific manifestations mask the early diagnosis of Ebola since it is difficult to differentiate between VHF and one of the many other infectious diseases or malaria. The haemorrhagic manifestations are often far less dramatic than the name implies. They range from a petechiael rash progressing to maculopapular rash, conjunctival bleeds, bleeding from long line and injection sites (Bah, et al. 2015; Ergönül, 2006; Ftika and Maltezou, 2013; Isaäcson, 2001; Richards et al. 2000; Sewlall et al. 2014). Both Isaäcson, 2001 and Sewlall et al. 2014 describe the devastating multi-organ failure that frequently follows in the second week of illness. This organ failure may progress to death.

With the exception of Lyon et al. (2015) the literature from the West African outbreak continues to detail the geographical areas and the incidence (Reaves, Mabande, Thoroughman et al. 2014) of Ebola as well as the clinical symptoms (Bah et al. 2015). The gap in the literature not

only applies to the bedside nursing, it includes lack of consideration of the effects on the staff and the emotional care and concerns of the patient (Sewlall et al. 2014).

In an attempt to partially close this gap the researcher has turned to other literature containing information on diseases that constitute contagious, potentially deadly outbreaks. Severe Acute Respiratory Syndrome (SARS) and Avian Flu (H_5N_1) are among diseases that call for outbreak management similar tin the ICU settings VHF outbreaks. Literature describing these endemics has been sourced and referred to. Literature from experiences with the West African Ebola outbreak is beginning to be published and will hopefully decrease the scarcity of information guiding practice in this field.

2.6 OUTBREAK MANAGEMENT

- **INFECTION PREVENTION AND ISOLATION**

Contagious diseases and the resultant increase in both mortality and morbidity are a constant challenge to the health care system of any country particularly if the patient is admitted in the ICU setting. (Daugherty, Perl, Needham et al. 2009). VHF's lie at the upper end of the scale of deadly infections and therefore require immediate attention and proper management if nosocomial transmission is to be avoided. Standard precautions should be applied for any admission. Ippolito, Fusco, Di Caro et al. (2009) look at the recent experiences of highly infectious diseases occurring in Europe since 2000. Aside from 32 cases of SARS, they mention that 15 cases or suspected cases of VHF have been reported. The VHF cases were mainly Lassa Fever, however a number of cases of CCHF have been reported from Bulgaria and Greece. Sewlall et al. (2014) state that although the transmission of Lujo is probably similar to that of Lassa Fever, lack of "barrier nursing practices" may contribute to spread of the disease.

The authors believe that until the importance of infection prevention has been studied in greater depth, precautions used for other VHF diseases should be implemented. Ftika and Maltezou, (2013) state that standard precautions are sufficient in the early stages of the disease. Sewlall et al. (2014) endorsed this practice. It is important to note that VHF's are not considered to be airborne. Rather they are spread by direct contact with blood and body fluids (Fyumagwa et al. 2011; Jarrett, 2015; Paweska et al. 2009; Sewlall et al. 2014). Table 2.2 outlines the Standard and contact precautions.

Table 2.2 Categories of Infection Control

Standard Precautions
Hand Hygiene: washing (40-60 seconds) with soap before and after contact with patients, whether or not gloves are worn.
Gloves, gowns mask and eye protection if exposure to body fluids and blood is expected.
Change gloves after contact with infectious material. A mask (N95 if airborne infection is present) that must be correctly sized and well fitted. A visor or goggles to protect the eyes.
Gowns to protect skin and clothing. They should be impermeable to water.
Aprons may be worn over the gowns for added protection. If VHF is a consideration, use long aprons.
Disposable overshoes or theatre boots should be worn to protect shoes.
Needles and sharp instruments should be disposed of in special containers which can be sealed when full.
Soiled linen should be placed in impermeable bags and labeled if infection control coding is not used. The bag should be kept in the patient's room until collection to prevent transfer of pathogens.
Treat blood, urine, faeces and laboratory waste according to the policies. In some instances (e.g. VHF) decontamination with sodium hyperchloride (Bleach) is required before disposal.
Contact Precautions
Isolation of patients in a single room or together with patients who have the same confirmed infection.
Gloves and gown should be worn if direct contact with the patient is expected. A distance of 2

meters is considered direct contact. Remove all protective clothing before exiting the isolation room.
Droplet Precautions Each patient should be isolated in a single room. Facemask that fits correctly. N95 masks are not necessary for droplet infections although recommended by some institutions. Eye protection is advised if there is the possibility of contact with blood or secretions.
Airborne Precautions Patient should be placed in single rooms that are equipped with negative air pressure units. A mask that has a particle filtering function such as N95 must be worn. The mask must fit correctly and staff should have been fitted for the mask size before entering the isolation room. Goggles or a visor are recommended particularly if the patient has a lot of secretions, is coughing or is intubated.

Early diagnosis becomes imperative and isolation of the patients should be commenced. Van der Wal, Joubert, van Eeden et al. (1985) briefly describe the creation of an area of isolation and triaging of contacts suspected of having CCHF. Ftika and Maltezou (2013) consider the impact of VHF in the healthcare settings. They point out the ease with which VHF can be imported and the potential for person-to-person transmission. They go on to say “Unrecognised VHF cases constitute the main source for spread of infection to other patients and HCWs, almost always in the context of gaps in infection control”. Handy, (2004) describes the implications of VHF in the intensive care setting and advises that notification of Infection Control Consultants, isolation and “strict infection control precautions” are required. Ippolito et al. (2009) point out that the patients in their study were initially admitted to a general ward where there were not sufficient isolation facilities. As they needed to be transferred to strict or “high-level” isolation facilities later, this caused a period of risk to HCWs and was considered to be a weakness in the management.

VHF outbreaks need to be managed in the community setting as well as hospital settings, in poverty stricken countries such as West Africa as well as highly technical state of the art Academic and Private Hospitals in cities with sophisticated medical approaches. Isolation in the community setting during large outbreaks consists of the conversion of entire wards or sections of the local hospital being converted to accommodate the outbreak patients either for treatment or for quarantine (Kerstiëns and Matthys.1999). Whilst this may be the best approach in rural community settings, patients who present to an acute care hospital or who are transported to tertiary hospitals present other concerns (Jarrett, 2015). This may include admission to an intensive care unit. Jarrett (2015) suggests applying hospital policies and procedures. These, she argues should be used in conjunction with the CDC recommendations. Unfortunately many of the hospitals in the endemic areas do not have policies pertaining to VHF infections or other highly infectious diseases. Jarrett (2015) goes on to mention that in the present Ebola outbreak, "Western African hospitals lack sufficient equipment and protective gear to manage the outbreak". The CDC recommendations generally apply to situations in the United States of America or other First World settings.

The real problem remains the risk of admitting a patient with VHF under a different diagnosis as occurred with the first two cases in the Lujo Outbreak (Paweska et al. 2009; Sewlall et al. 2014) as well as the Johannesburg case of Ebola described by Richards et al.(2000). Gürbüz, Sencan, Öztürk et al. (2009) endorse the concern that the risk of transmission to HCWs working with patients who have CCHF is high. Gürbüz et al. (2009) however claim that transmission from patient to patient has not been documented. They describe such a case of transmission of CCHF from one patient to another in an outbreak in Turkey in 2006. In contrast, in the African context, person to person transmission drives the outbreaks. Kerstiëns et al. (1999) explains how stigmatization of Ebola infected patients in Kikwit resulted in patients being nursed at home by family members. Even when the ill were admitted to hospital, Hall et al. (2008) in their

publication on lessons learned from the Kikwit outbreak, describe how the routine needs of patients such as feeding, remain the responsibility of the family thus exposing them to infection. The authors continue to explain that some family members “often slept in the bed with the infected patient”. Clearly a single policy on containment of an outbreak would not suit all circumstances and should be drawn up in such a manner that the principles of management could be implemented in a variety of settings.

- **CONTACT TRACING AND MONITORING**

The incubation period of VHF differs from virus to virus. Handy, (2004) lists the individual incubation period for Lassa Fever, Ebola, Marburg and CCHF. Ebola has the earliest presentation with 2-21 days. The others are CCHF 5-13 days, Marburg 5-10 days and Lassa Fever 7-21 days. CDC Ebola Guidance for Airlines state that monitoring of health should take place for 21 days following exposure. Surveillance of all persons in contact with a confirmed case of VHF should be traced and monitored for a period of 21 days. Kerstiëns et al. (1999) write about an “active surveillance system” although no details of the system are discussed. The purpose of the surveillance was to identify “households” who were known to be at risk or who would not bring family members suspected of having Ebola to hospital. These households were then given a “household kit” that contained masks, chloramine tablets to disinfect the water and rubber gloves amongst other items. Mailles, Blanckaert, Chaud et al. (2013) describe how the contact tracing was carried out during an outbreak of Middle East respiratory Syndrome Coronavirus (MERS-CoV) in France. All persons who had been in contact with the identified patients, both as HCW or lived in the same household or room were included on the contact list. This was similar to the contact tracing used in the Lujo outbreak. Since MERS-CoV has a incubation period of 10 days, contacts were followed up for this period of time.

2.7 WHAT ARE WE MISSING?

Few authors however have reported any studies of the personal experience of the patients affected. Hall et al, (2008) identified that 80% of the survivors of the 1995 Kikwit Ebola outbreak shared their anxiety and concerns about contracting the Ebola virus with their family before confirmation of the diagnosis. Hall et al, (2008) maintain that health care professionals should be sensitive to the frame of minds of patients during viral outbreaks, as well as considering their own responses to the stress.

There are a few publications referring to both the influenza A (H1N1) outbreak in New Zealand (Honey and Wang, 2012) and the SARS outbreaks in Canada (Maunder, Hunter, Vincent et al. 2003) and Hong Kong (Chung et al. 2005) in which perceptions of staff and psychological impacts were studied. Fear, uncertainty and inadequacy are some of the feelings described by nurses in the SARS outbreak in Hong Kong (Chung et al. 2005). There remains however very little information on the actual experiences of either the patients or the health care professionals during an outbreak of VHF.

2.8 SUMMARY

This chapter has presented a summary of literature on this topic. Previous research was examined and the results and recommendations have been highlighted. There is a gap in the literature with respect to the experience of the patients who find themselves removed from their normal environment and isolated for the duration of an illness that is surely one of the most frightening groups of diseases on record. There is also a dearth of information regarding the nursing care of patients with life threatening viral haemorrhagic diseases. This study will examine the experience of a nurse who cared for a patient with VHF before succumbing to the same disease herself. In addition, the research will attempt to add value to the existing

knowledge by exploring aspects previously neglected, in order to make care of patients and health care workers more inclusive and thus less traumatic.

The next chapter explains the research design, the population and sample, the research setting and the data collection technique selected for this research. A case study design with a qualitative multi-method exploratory and descriptive approach is used. Colaizzi's seven-step method is employed for analysis of the data. The chapter will also address trustworthiness and ethical considerations.

CHAPTER THREE

RESEARCH METHODS

3.1 INTRODUCTION

In the previous chapter, the literature was discussed. The purpose of this chapter is to explain the research design, the population and sample, the research setting and the data collection technique selected for this research. A case study design with a qualitative multi-method of exploratory and descriptive approach is used. Colaizzi's seven-step method is employed for analysis of the data. This chapter will also address trustworthiness and ethical considerations.

3.2 AIM AND OBJECTIVES

The purpose of the study is to explore and describe/report the experiences of a nurse in a private sector hospital after contracting a highly pathogenic novel haemorrhagic fever from a patient and to explore the environment and context in which she was cared for.

To allow for consistency, the objectives of the study are repeated.

The objectives of the study are:

- To explore the experience of a nurse during the monitoring, admission, disease and recovery phases, of a novel arenavirus outbreak.
- To triangulate the information with
  - Documented nursing care of this patient using nursing records and daily documents.
  - To analyse the "outbreak diary", compiled by the hospital coordinating team.

- To consider the relevance of the experience during an episode of critical illness and its importance in compiling a programme for the support of health care personnel in similar situations.
- To make recommendations for the care of a patient who has contracted or is suspected of contracting a VHF.

The professional practice of nursing is becoming ever more dependent on evidenced-based practice in order to provide current meaningful care. Patient conditions are more complex and there are emerging diseases with pathophysiologies yet to be explained. Because evidenced-based practice implies that it is the best clinical evidence, there needs to be evidence embedded in and tested by research. A first hand account of the experience of a nurse in a private sector hospital who contracted a highly pathogenic novel viral haemorrhagic fever from a patient and survived the ordeal, supplies evidence that supports clinical practice carried out in this event. So too does an account of the care proffered. This evidence can be used in future outbreaks.

3.3 RESEARCH DESIGN

An overview of the research design and methods used in the study will be discussed.

3.3.1 Research design

“Research is a systematic enquiry that uses disciplined methods to answer questions or solve problems”. (Polit and Beck, 2012) This study is guided from a naturalistic or constructivist paradigm. The constructivist paradigm “holds that there are multiple interpretations of reality” (Polit and Beck, 2012). The interpretation of this reality is embedded within context and the close engagement between the researcher and the participant will enhance the findings. The meanings are numerous and varied. Creswell (2009) advises against reducing the meanings excessively since in doing so the

complexity of views may be lost. The participants' views of the phenomena are of paramount importance to constructivist researchers. In order to obtain depth in the responses, questions should be open ended and broad. This allows the researcher to interpret the meanings within the context. Constructivist researchers acknowledge that the interpretation is fashioned by their own experiences and background.

Each individual study will determine the best-suited methodology according to the research question. A case study is considered the best approach to the research question: What was the experience of a nurse who contracted a deadly viral haemorrhagic fever from the time of contact until recovery? Case study research produces awareness and understanding of the phenomenon since it provides a thick rich account of the event within it's own context (Rule and John, 2011)

In case study design either quantitative or qualitative research may be applied.

In this instance qualitative research was selected since it encourages exploration and an open mind approach. In qualitative research the research design must correspond with or fit the research question (Henning, van Rensburg and Smit, 2004). It denotes the plan that is to be used to obtain the answers to the research question. Qualitative researchers generally start with a broad plan and sharpen the plan as the circumstances unfold. Data are collected in the real-world naturalistic setting (Polit and Beck, 2012). Since the experience of the participant is of principal importance, multiple qualitative approaches including a phenomenological interview approach are used to underpin and guide the study of the participant's experience.

Phenomenology pays attention to the meaning of life experiences of people (Polit and Beck, 2012). Leedy (in de Vos, Strydom, Fouche et al 2005) believes that a phenomenological study offers a description of the phenomena through the "eyes of people who have seen it at first hand". A nurse who admitted a patient with a lethal

unknown disease before contracting and surviving the disease herself must surely have experiences that could be of assistance to managers of outbreaks.

A methodologic assumption, or how evidence is best obtained (Polit and Beck, 2012) is defined from a naturalistic paradigm as an inductive process that seeks in-depth understanding. “The emerging insight is grounded in the participants’ experience”. (Polit and Beck, 2012). The participants construct the reality since it is their experience alone. Knowledge is greatest when the distance between the researcher and the participants is reduced to a minimum. Interaction between the researcher and the participants create the product or findings.

Data for the study is from multiple sources including documents, interviews and a diary. The documents include nursing records, company policies and medical notes. The diary is a management record of actions and concerns that emerged during the outbreak and was complied by all who served on the coordinating team. Merging of the data collection strategies or triangulation was included to obtain depth and richness. Triangulation of data also enhances validity and trustworthiness.

3.3.2 Case Study

Case study research is a well-described form of research particularly in social sciences. Case studies allow the researcher to obtain depth and breadth of information regarding the case under scrutiny. In the words of Rule and John (2011 p 4) “it belongs to a larger category of occurrences: it is *a case of* something”. In addition to ‘case’ Rule and John (2011) also examine the meanings of the word ‘study’. The noun ‘study’ refers to learning or reporting. To ‘study’ a person, event or a system requires deep investigation from many angles using a systematic approach. Rule and John (2011) believe a study is ‘*a particular instance in its context’*.

The unit of analysis or the case itself must be considered (Baxter and Jack, 2008). What exactly is under study? The case may consist of a single person or event, or even a single system. It may also be persons, events or systems that share a commonality or difference that is of interest to the researcher and is worthy of investigation. Provided that the case is a specific entity and not a generalization, it may be considered a case study. This does not mean, however that it is necessarily a stand-alone event. In this case study the phenomenon is the experience of the nurse who survived a deadly disease. Whilst determining what the case is, it is equally important to consider what the case is not (Baxter and Jack, 2008). In an attempt to ensure that the case is well defined Stake (1995) suggests placing boundaries on the case. Baxter and Jack (2008) suggest that cases may be bound according to time and place, Creswell, (2009) time and activity and by definition and context (Miles and Huberman 1994). Boundaries may "be derived from the implicit boundaries of time, geography, place, and event, and are thus almost pre-existing, real and empirically bound" (Ragin, in Luck, Jackson and Usher, 2006). This case study is bound in time and place. The incident took place at a point in time and timeframes such as admission, duration of illness and recovery indicate the periods under investigation. The 'place' is an intensive care unit in a private hospital in the Northern suburbs of Johannesburg.

Two important theorists who guide case study methodology are Robert Stake (1995) and Robert Yin (2009). Their methods are quite different however. Both seek to make certain that the research topic is appropriately examined in depth and "that the essence of the phenomenon is revealed" (Baxter and Jack, 2008). Stake (1995) offers three categories of case studies, intrinsic, instrumental and collective. On the other hand "Yin categorizes case studies as explanatory, exploratory or descriptive". (Baxter and Jack, 2008).

In addition to considering what the case is and the type of case study to embark upon, a single or multiple case study design must be identified. Some phenomena only present in

a single case whereas in other instances phenomena are better understood when considering the phenomena across multiple cases. A single case study strategy was enforced in this instance since only one patient survived this viral outbreak. Yin (2003) in Polit and Beck, (2008) confirms that a single case study is appropriate when "it represents an extreme or unique case".

Yin (2009) stated that case study research has five components, one of which is the propositions. Propositions are used in case study research to maintain the limits of the study (Baxter and Jack, 2008). They give direction during the research and assist with guiding the researcher's search for data. They may come from literature, theories or personal experience (Baxter and Jack, 2008).

Examples of propositions used in this study are:

- Viral Haemorrhagic Fevers are contagious;
- Health Care Professionals are at risk of contamination;
- Infection prevention is the role of the nurse and
- A deeper understanding of the critically ill isolated patient's experience.

Propositions may be likened to hypotheses in quantitative research. They differ in that they do not form part of the case study write-up but are merely used to guide the researcher. Both Yin and Stake suggest that propositions, or issues as Stake refers to them, "are necessary elements in case study research" (Baxter and Jack, 2008).

While a case study allows for intimate assessment and judgment using a wide variety of data, it limits or prevents the researcher from generalizing the results. However Polit and Beck (2008) agree "intensive probing that characterizes case studies often leads to insights concerning previously unsuspected relationships".

Case studies allow the researcher to interrogate an event, program, activity or process involving one or more persons (Creswell, 2009). A case study approach contributes uniquely in attempting to understand the phenomena by means of viewing the

phenomenon from various standpoints using a variety or multiple data sources. In this study data sources included interviews, medical and nursing records and a diary

Polit and Beck (2010) consider that it is appropriate to place the participants at the central point of the research and a case study creates this opportunity.

3.3.3 Qualitative Phenomenology Research

Qualitative research is a systematic enquiry. According to Jolley (2010) qualitative research is "logically determined (well planned) and focused". It tries to explore and find meaning in something and usually addresses areas of human behaviour and existence. Human behaviour cannot be understood in isolation. Reference to the meanings and purposes of the behaviour require knowledge and consideration of the circumstances and the time during which the behaviour occurred.

Qualitative research is associated with naturalistic enquiry in an attempt to explore the ability of humans to build and direct their own experiences within the reality of the situation as they are living it. Qualitative methods facilitate the study of issues in depth and detail (Patton, 2002) and in this case allows for probing in order to obtain the depth of knowledge that leads to richness in understanding the experience.

The principles of phenomenological enquiry including descriptive exploration are used. The origins of phenomenology are closely linked to Greek philosophy. Edmund Husserl considered the founder of the phenomenological movement (Dowling, 2007) developed descriptive phenomenology and applied it in an attempt to understand the meaning of a person's everyday experience. Heidegger, a student of Husserl and also a leader in phenomenology differs from Husserl in that Heidegger advocates the use of interpretation in exploring the lived experience. The purpose of using phenomenology principles in the interviews is to obtain a deep understanding of the situation to which this nurse was exposed. This can then be translated into a dense description. This is not however a phenomenological study as the multiplicity of data falls outside the realm of

phenomenology. In addition, a neutral stance is taken by the researcher in an attempt, as far as possible, to put all perceptions, opinions and prior knowledge of the participant and the circumstances during her infection, diagnosis, treatment and recovery aside. This requires the researcher to withdraw or disengage from the usual and common understanding of the phenomenon. In research this is achieved by bracketing

3.3.4 Context

According to Rule and John, (2011) the research context refers to the specific circumstances within which the event took place. It has relevance to the event since the event is either enclosed within the context or influences the context. It contributes to the uniqueness of the event. In case study research a "case cannot be understood without reference to its context' (Rule and John, 2011).

This event took place in an internationally accredited hospital in the private sector in Johannesburg. Johannesburg is the largest city in South Africa. It is the economic and business capital of the country and hosts many international visitors on a daily basis. It is also considered to be one of the cities with the most sophisticated health service on the continent. Large sophisticated hospitals managed by the Department of Health, as well as many smaller but state of the art hospitals owned and managed by various private sector groups, provide for the health care needs of over 3.6 million (South African Demographics Profile, 2013) people who live and work in the greater city. Knowledge of the medical successes and expertise practised in this city has reinforced its popularity as a referral base for patients requiring sophisticated and advanced medical treatment. Patients from Africa who require expert medical treatment and nursing care are referred to expert Physicians and Surgeons in Johannesburg on a regular basis.

3.3.5 Exploratory

Exploratory research commences with examining the phenomena of interest (Polit and Beck, 2012). The examination includes a full investigation into the phenomenon. Observing and describing the phenomenon is not sufficient. Exploratory research will provide insight into the various aspects of the phenomenon (Polit and Beck, 2012).

3.3.6 Descriptive

Description is important in research (Polit and Beck, 2012). Descriptive research requires detailed and in-depth depiction of the participant's feelings, experience and the phenomena that emerge. A descriptive design was most fitting since this case study attempts to examine the experience of a nurse who finds herself in the role of a patient, infected with an unknown disease from which others have died.

3.4 RESEARCH METHODS

Research methods are techniques used by researchers to structure, gather and analyse information relevant to the research questions. The research methods used in this study include selection of the target population, sampling techniques, data collection and data analysis.

3.4.1 Population and Sample

The population is considered as the entire group of persons or cases in which the researcher is interested (Polit and Beck, 2012). This would include any persons who contracted the Lujo virus and survived the event.

The population in this study consisted of all health personnel who contracted the Lujo virus. This included the index patient, a paramedic, two qualified intensive care nurses and a cleaner, totalling five (N=5).

Sampling is the selection of a portion that will represent the entire population. Small non-

randomized sampling is frequently used in qualitative research (Polit and Beck, 2012). Since qualitative researchers strive to interpret and put meaning to results, generalization is not the prime aim. What is important is the appropriateness and adequacy of the sample. An appropriate sample will ensure that a level of richness is obtained. Adequacy of sampling ensures that sufficient data are obtained from the sample so as to provide a detailed and accurate representation of the phenomenon being studied.

Purposive sampling was the most appropriate and only method that could be applied in this study. The sample for this study was reduced to a single nurse, since the other personnel succumbed to the virus and died. This is therefore an extreme case of sampling but as Patton (2002) explains when defending deviant case sampling, “extreme case sampling is that lessons may be learned about unusual conditions”

3.4.2 Data Collection

Data collection supplies the substance with which the researcher will work in order to have an understanding of what the participant is experiencing. An informal approach was considered appropriate to allow the participant freedom to give in-depth and rich descriptions.

The data collection plan for this case study included

- Informal conversational interviews
- Analysis of case notes recorded daily
- Review of the diary kept by the coordinators of the event

Approval of the University Human Research Ethics Committee was granted (Appendix A) for the study. In addition, permission was obtained from the Hospital manager, the Nursing Executive of the private hospital (Appendix B and C) and the members of the coordinating team to carry out the study.

The participant was given a verbal and written explanation about the study. The participant gave a letter of consent for the interviews as well as permission to record and use the data from the interviews. (Appendix D and E). The interviews were carried out at a setting convenient to the participant. This was usually in an empty office in the HR department of the hospital in which the participant worked. The meetings were set up on days when she was off duty to prevent any interference and distraction from the work environment. Each interview was recorded and transcribed by me personally. This afforded me the opportunity to become fully immersed and comfortable with the content as well as giving me an opportunity to interpret the 'voice nuances' with which the comments were made.

In keeping with Colaizzi's method, these transcriptions were verified at a later interview session. This prevented me from imposing any personal views.

Daily case notes documented by the nursing staff caring for the patient were analyzed together with the outbreak diary to complete the triangulation.

- Planning the interview

The data collection plan for this case study included a number of unstructured interviews. As the researcher had no preconceived views of the information that would be offered the questions were open ended and the interviews were approached as much like a conversation as possible. "The informal conversational interview is the most open-ended approach to interviewing (Patton 2002). The intention was to understand the experience in the participant's own words.

Beeby (2000) is of the opinion that people's accounts are reconstructions of their experience influenced by their perceptions. The informal conversational interview technique is used as suggested by Patton (2000). This type of interview is similar to

casual conversation on a topic. It allows for depth of probing and questions flow easily. The interviewee is made to feel at ease and 'owns' the interview. The interviewer plays a more passive role, however, needs to apply attentive listening skills to keep the interview on track.

Each of the interviews were given a timeframe in order to probe a different period of the event . They included

- the period of admission and initial care of her patient,
- the period of contact monitoring until her own admission,
- the hospitalization and recovery period
- her feelings and experience presently.

- Conducting interviews

Four initial in-depth unstructured interviews of one hour each were carried out. Using the informal conversational technique of interviewing allowed the researcher flexibility to probe the information in order to obtain depth and clarity. In each interview, the participant was encouraged to share her experiences by recalling the incidents and timeframes. The questions were developed according to the content and context as the interview played out with the researcher ensuring that the interview remained focused. The interview method provided the researcher the chance to ensure that the participant remained within the topic. The intention was to understand the experience in the participant's own words as the researcher had no preconceived views of the experience.

The interviews were carried out at a setting convenient to the participant. This was usually in an empty office in the HR department of the hospital in which the participant worked. The meetings were set up on days when the participant was off duty to prevent any interference from the work environment. Once the participant was ready the following questions were asked:

Interview 1. *Tell me what it was like nursing Mr X from admission to his death.*

Interview 2. *Tell me about the period when you were on the contact list and being monitored.*

How did you experience the admission into isolation and what were your feelings particularly as you did most of your own care for a while?

Interview 3 *Tell me what you remember about being the patient including the period you were in ICU and ventilated.*

How did you experience the period of recovery?

Interview 4 *Looking back years later what do you feel?*

What advice do you have for coordinators of future outbreaks?

Interview 5 The contents of the transcriptions were verified according to Colaizzi's framework.

The participant was allowed to reflect on the content of the previous interview and add anything considered important. She was allowed to speak at her own pace and use her own expressions. Facial expressions, body language and language nuances and tones were used as cues for interpretation and depth of meaning. Probing took place if there was any uncertainty and clarity was established. Reflection of key statements was used to enhance reliability. The interviews were recorded and field notes were kept.

- Additional data

In addition, the case notes documented on a daily basis by the nursing staff caring for the patient were analyzed. This was deemed necessary for reflection of the event in relation to the context to be considered. Of particular interest was the medication prescribed and the response to visitations by family members as these may have influenced the overall experiences and possibly the need to survive. Lastly the outbreak diary, a document

compiled day and night over the full period of the outbreak, by members of the coordinating team, was used as reflection of the event.

- Managing the researcher's role

In qualitative research, the researcher becomes the instrument and is "typically involved in a sustained and intensive experience with the participants" (Creswell, 2009)
In case study approach to research the position of the researcher plays an important role. Rule and John (2011) point out that the researcher should be "constantly aware of how you are positioned in relation to the study context and participants". This positioning, they suggest, may influence the data collection, particularly if the role of the researcher is one of seniority.

My role was complex. I was regarded as a nurse with knowledge and previous experience. I had been directly involved with the outbreak as one of the coordinating team members in a private hospital in the Northern suburbs of Johannesburg. As a nurse manager, I had previously been a member of a coordinating team in the same company when a staff member had contracted Ebola virus from the admission of a foreign patient. Since this latest outbreak had occurred in the same hospital group, I was asked to assist. Initially the diagnosis was not known, however all concerned understood that we had an outbreak of 'something'. Entries in a diary regarding personal concerns will be included when appropriate.

As one of the coordinators of the outbreak I was only in close contact with other members of the outbreak team during this time. My contact with the participant was a more formal relationship during this period. As an expert nurse and ethical practitioner, I deemed it important to illicit the patient's subjective understanding in order to improve nursing management of future cases and to deepen my ethical awareness and practice. In basic terms, we know about the management of outbreaks but do we place sufficient attention

on supporting the staff and patients in these circumstances.

I discussed my relationship with the participant both as a staff member and a nursing colleague with my supervisors and was advised to write a diary in which I could document my knowledge of and interaction with the participant for the duration of the outbreak.

3.4.3 Data Analysis

Data analysis is the process of structuring and organising information collected. It is both objective and systematic (Jolley, 2010). The aim of this process is to identify trends and patterns that occur in the data. In qualitative research it is important to be open and non-judgemental about the experience of the participants thus allowing an unbiased interpretation.

- Method of data analysis

The conversational interviews are transcribed verbatim and verified at a later interview session according to Colaizzi's method. This prevents the researcher from imposing any personal views.

In this study data are analysed using Colaizzi's method of thematic analysis. As Colaizzi's framework has been used in two recent studies examining the experiences of health personnel during an outbreak of SARS in Hong Kong (Chung et al. 2005) and the H1N1 influenza pandemic in Australia (Corley et al. 2009), the researcher uses the same framework. This allows for comparison of experiences during outbreaks and these themes can then be considered when creating practice recommendations for future application.

Colaizzi uses a seven-step approach as follows:

Step one: Read and re-read the transcripts several times in order to obtain a general feeling and understanding of the whole content.

Step two: Extract the significant statements that identify and link to the phenomena under exploration.

Step three: Formulate meanings from the significant statements.

Step four: Arrange the formulated meanings into categories, clusters of themes and themes.

Step five: The results should be integrated (to produce) into an exhaustive description of the phenomena.

Step six: Formulate this exhaustive description into an indisputable or unequivocal a statement of identification as possible.

Step seven: Finally, validate the findings with the participant.

Figure 3.1 below illustrates the key tasks for each of the seven steps of data analysis.

The intention of this approach is to obtain a description of the phenomena by recognizing the fundamental themes. Themes are identified from significant statements that are grouped together. The themes are used to examine the experiences and study the phenomena. An important aspect of Colaizzi's method of analysis and where he differs from the other phenomenologists is that he requires that the researcher return to the participants for confirmation and validation of the meanings.

- Immersion in the data.

Immersion involves the researcher becoming sufficiently familiar with the data to the extent that reflection and analytical insight is achieved (Polit and Beck, 2012). This is

particularly important in qualitative research as immersion and familiarity allows for more accurate thematic interpretation. Reading and re-reading the interview transcripts allow the process of immersion to begin. Data collection and data analysis occurred simultaneously. Examining the nursing records and correlating the information with diary entries and interviews adds deeper understanding thus increasing the immersion.



Figure 3.1 Summary of stages of Colaizzi's data analysis framework.

3.4.3.1 The practical approach employed for data analysis in this study.

Before commencing the data analysis, the transcriptions of the interviews were cross-checked with the recordings downloaded on my computer.

Step one: Transcription of the interviews.

During this step, each audio-taped interview is played back on the computer and transcription takes place. Following the transcription, the recording is replayed whilst the transcribed data is read simultaneously for verification. Once the transcriptions are deemed correct, they are replayed and read simultaneously in order to confirm voice nuances. These are noted. My own assumptions and views about the narrative, which resulted from my role as a key member of the coordination team, were set aside and noted. These views will be removed from the analysis by bracketing, a process used to identify and withhold any preconceived opinions about the study phenomena (Polit and Beck, 2012).

Step two: Extraction of significant statements.

This step requires identifying significant statements from the transcripts that link to the phenomena under investigation. Two hundred and eighty two significant statements were extracted from the five transcripts.

Below is an example of how significant statements related to the admission of the participant's patient are extracted. The statements are underlined for further analysis.

A patient from Zambia with a diagnosis of Thrombotic Thrombocytopenic Purpura (TTP) was being flown in for admission.

Participant: *It was my weekend on. I can recall it was a patient from Zambia. He was awake and with it. We connected him to the monitor. I remember his temp*[erature] *was very high. I think that it was like 40° C. We were wearing.. at that time, we had gloves on*

and we had aprons on. We didn't have gowns on (sounded guilty). He had a headache and was nauseous. He had a rash, when we took his T shirt off you could see the rash,like this generalised rash.

Participant continued: *His wife had come in and she was worried that he was not eating. She said to me* [How do you give that ABC food, you know, apples, bananas and carrots for diarrhoea'?] *(Laughing) He had diarrhoea as well now and vomiting. I remember I mashed up the banana and he had eaten it. She* (his wife) *phoned to ask how he was doing. I told her that he was much better and lo and behold just after that he went and vomited all that banana (laughing). Sunday we put in a central line. His platelets were low. On Saturday we were wearing gloves, gowns and masks.*

Researcher: What was the reason you decided to change?

Participant: *Probably we should have before we started 'cause he came from out of Africa. We should have been wearing gloves, gowns and masks since* [from the time] *he arrived.*

He was perspiring profusely all the time, not on admission but after. After we'd given him Perfalgon his temp[erature] *came down. It was never high again.*

Below is a table of how the statements are coded.

Table 3.1 Significant statements

Significant statements from transcript 1	Page No.	Line No.
He was awake and with it.	T1	L15/16
His temp[erature] was very high. I think that it was like 40°C.	T1	L17/18
We were wearing, at that time, we had gloves on and we had aprons on. We didn't have gowns on	T1	L19/20
He had a headache and was nauseous. He had a rash.	T1	L21
He had diarrhoea .	T2	L43
We put up a central line. His platelets were low.	T2	L53/54
We were wearing gloves, gowns and masks.	T2	L55
We should have been wearing gloves, gowns and masks.	T3	L60
He was perspiring profusely all the time.	T3	L62

(See appendix F)

Step three: Formulate meanings for the significant statements.

During this step, meanings were formulated from each of the extracted significant statements within the context and timeframe under consideration. Forty meanings were formulated from the statements. Table 3.2 provides examples of how significant statements were converted into formulated meanings.

Step four: Arranging cluster themes and themes.

After identifying the formulated meanings these meanings were arranged into categories with each category reflecting a unique character pertaining to the phenomena, thus forming cluster themes. Fifteen theme clusters were generated. Each theme cluster includes all formulated meanings related to the phenomenon in question. The table below gives examples of how some of the formulated meanings were grouped together and the cluster theme that evolved.

Table 3.2 Formulation of meanings from the significant statements.

Significant statements	Formulated meanings
[It may have been*] "Something we could have contracted"*	Concern and realization that the staff could be at risk of contracting the disease.
"I got comfort from everybody knowing"	Relationship between colleagues was important. Colleagues would look out for each other and share information.
" I went and told everybody. I had to come in …I was being observed"	Fear and denial. This admission is only for observation. Nothing is really amiss.
"We weren't definitely sure. What were we dealing with"?	Fear and anxiety related to the unknown.
"Sometimes you run and you feel like your leg just gives in beneath you…there was a lot of that".	Recollection of the participant's dreams experienced during her time of ventilation. This is a common phenomenon in intensive care units.

Table 3.3 Cluster themes and themes.

Formulated meanings	Cluster themes	Emergent themes
(1)"Because my temperature had gone up. ..it wasn't high, 37 or 38 but it had gone up." *(2)" I had a headache during that week. I wanted someone to give me a second opinion….it happened to be you".* *(3) "Something going on…..a big unknown disease was happening".*	Reality hits. Realisation that there is chance that the participant has the disease.	Initial contact with source

Formulated meanings	Cluster themes	Emergent themes
(1)"and the family came in all dressed up. I might have had all these symptoms but I wasn't sick". *(2)"I had water in a polystyrene cup. I felt, was this really necessary?"*	Sick but not ill. The participant has some symptoms but does not feel ill.	Admission is inevitable
(1)"They were all put onto this contact list because of me." *(2)"Imagine if something did happen to her* [daughter] *and she really got it."*	Guilt. Feelings of guilt in case she may have spread the disease.	Admission is inevitable

Key: bracketed numbers are used to indicate different statements from the same participant.

Step five: Organising emergent themes into an exhaustive description of the phenomenon under study.

This step requires merging of the themes into an exhaustive description of the phenomenon, the experience of a nurse who survived a highly pathogenic novel arenavirus. Two research experts were consulted, one, a critical care expert researcher and the other, a well respected qualitative research nurse, to review the themes and make amendments where necessary.

Step six: Developing a rich undisputable description of the phenomenon.

The findings that resulted in four emergent themes are scrutinised for misinterpretation, misuse or redundancy. These findings form the fundamental basis for the description of the phenomenon.

Step seven: Return of the description to the participant for validation.

This step involves returning the findings of the data analysis to the participant and discussing the results in order to verify that the results are a true reflection of the participant's experience.

3.5 MEASURES OF TRUSTWORTHINESS

Measures of trustworthiness are aspects of qualitative research that confirm the validity and reliability more commonly used in quantitative studies. Positivists often question the trustworthiness of qualitative research (Shenton, 2004) possibly due to the fact that validity and reliability in naturalistic research differs from the positivists' concept. Sandalowsky (1993) argues that achieving trustworthiness requires good scientific practices in which the researcher makes the research methods clear and thus auditable. Naturalistic researchers, Lincoln and Guba, (1985) identify four criteria that they suggest would confirm trustworthiness in qualitative research. These are credibility, transferability, dependability and confirmability.

3.5.1 Credibility

Credibility or truth-value is the ultimate goal for those doing qualitative research according to Lincoln and Guba (1985). In qualitative research credibility refers to whether the findings of a study are true and certain (Guion, Diehl, and McDonald, 2002). Credibility is obtained when the researcher is able to establish "confidence in the truth of the data" (Polit and Beck, 2012) and the ensuing interpretations of the data. Creswell (2009) argues

that the researcher must verify qualitative validity by making use of certain processes that confirm the accuracy of the findings. In order to ensure credibility certain strategies should be enforced. Some of these include transcription checking, code verification and crosschecking, member checking, triangulation and auditing.

In this study, in order to enhance credibility, method triangulation was applied. Triangulation is a method used in qualitative research to enhance trustworthiness by using more than one data source to support the research problem. (Patton, 2002; Polit and Beck, 2012; Yin,2009) “Triangulation refers to the use of multiple referents to draw conclusions about what constitutes truth.” (Polit and Beck,2010). The method used should reinforce the accuracy of the reality. Method triangulation uses two or more methods of collecting data in respect of the same phenomenon in order to obtain a true and comprehensive understanding. Triangulation contributes to the depth and richness of the study, not because the sources of data necessarily give the same result, but because the differences from the sources create a better understanding of the study. (Patton, 2002)

In an attempt to obtain in-depth information about the experience of living through and surviving infection by a deadly haemorrhagic fever, recordings of conversational interviews with the participant together with the clinical nursing data of the period of admission of the participant were scrutinized In addition, the data is augmented with excerpts from a diary maintained by members of the coordination team, thus ensuring data source triangulation as well.

In this case study, the main arm of triangulation is the conversational interviews. The nurse’s experience is divided into four time frames. The first time frame captures her experiences during the period when she was a ‘high risk contact’ being monitored daily along with colleagues who were included in the high risk group. The second portion deals with the experience of being in isolation, very aware that she probably has contracted this

deadly condition, to the point where she becomes critically ill and the diagnosis of a novel arenavirus, Lujo, is eventually established. Thirdly, the recovery period and return to health more than four weeks after admission, is interrogated. Lastly, her reflection on the event is explored. Tape recordings and accurate transcription provide a record. Probing and crosschecking are used to confirm her perceptions of the experience. Meanings obtained from the conversation with the participant is confirmed at a further meeting and amended where necessary.

The second arm of triangulation includes the nursing documents. All relevant nursing documents completed whilst the participant was hospitalized are scrutinized. These documents include the nursing care from the time of admission to the self-care section of the outbreak ward, through the period of ventilation and intense critical nursing to the period of recovery.

The third arm of triangulation includes the reflection and examination of the contents of a diary kept by the hospital coordinators of the outbreak. Entries are made daily and include various daily duties, patient admissions and results. Concerns of the coordination team are recorded for entire event.

In order to ensure rigor, the study must reflect the participant's experiences and not the researcher's. Since the nurse who experienced the condition gave the account, it is considered a true reflection of her experience and therefore credible.

[In this study the researcher used the approach of conversational interviews that allowed for clarification and confirmation by the participant throughout the interviews. After the fourth interview the meanings and interpretations extracted during data analysis, were verified for correct interpretation by the participant. The researcher also kept field notes during the interviews and these were consulted during the analysis phase.

3.5.2 Transferability

Transferability is the qualitative equivalent of the criterion, applicability.

Applicability refers to the extent to which the "findings can be applied to other contexts and settings" (Krefting, 1991; Shenton, 2004). In other words, can the findings be generalized? Krefting (1991) refers to two perspectives of applicability that are suitable in qualitative research. Firstly, she posits that generalization is often irrelevant in qualitative studies since many research studies are deemed to be unique attempting to describe the phenomena under study, thus generalization is not possible. Krefting (1991) states that Guba(1981) offers a second perspective. This is transferability. Lincoln and Guba (1985) suggest that the naturalist researcher has a duty to supply sufficient information with respect to the data in order to allow other researchers to weigh up the possibility of transferability. Shenton (2004) however believes that transferability is seldom possible as the context in which a study takes place is seldom replicable.

Detailed information on data collection and data analysis is included to afford opportunities for readers and future researchers to apply to similar outbreaks.

3.5.3 Dependability

Dependability refers to stability (Polit and Beck, 2012) or the notion of trackable variability (Guba, 1981). Lincoln and Guba (1985) emphasize the close relationship between credibility and dependability. To deal with dependability, processes used in the study should be adequately detailed to allow future researchers to replicate the work (Shenton, 2004).

3.5.4 Confirmability

"Confirmability refers to objectivity" (Polit and Beck, 2012, p539). This strategy aims to establish that the data are a true reflection of the participants and that the researcher has not introduced any personal bias or influence (Polit and Beck, 2012; Shenton, 2004). In quantitative research, objectivity requires maintaining a respectable distance between the

researcher and the subjects in order to minimise bias (Krefting,1991). Patton (2002) argues that the researcher's intrusion is to be expected. This is in agreement with Krefting (1991) who describes the narrowing of distance between the investigator and the participants in qualitative research as improving the "worth of the findings".

Table 3.4 Measures applied for ensuring trustworthiness

Strategies	Criteria	Application
Credibility (truth value)	Triangulation	Gabby was not feeling well. She had red gums and a sore throat although her temperature was within normal range. Interview two: Gabby's narrative- "*I wanted my platelets to be checked because to me that would be one of the signs that there was something wrong".* Nursing documents: Temperature – 36.4 °C; Platelets – 91,000 /mcl. Diary entry: She is on the contact list. We need to admit her. She probably is infected.
	Reflexivity	I believe she was showing clinical signs and expressed symptoms in keeping with those of the previous patients. I agreed that her bloods should be drawn and sent to the laboratory for analysis.
Transferability (Applicability)	Dense description	A detailed description of the interview, transcription and preparation for analysis is presented. E.g. Each interview was recorded and transcribed by me personally. This afforded me the opportunity to become fully immersed and

		comfortable with the content as well as giving me an opportunity to interpret the 'voice nuances' with which the comments were made. Future researchers can prepare their data in a similar manner.
Dependability (Consistancy)	Dense description of methods Triangulation	Qualitative research will address this research question: The experience of a nurse who survived a highly pathogenic novel arenavirus. Informal conversational interviews triangulated with case notes and a diary is appropriate to enable dependability.
Confirmability (Neutrality)	Triangulation Reflexivity	Gabby's temperature was rising. Gabby's narrative: "*That explains why I took my temperature so many times that day".* Nursing protocol: A rise in temperature requires that the contact should monitor the temperature four hourly. Diary: Although Gabby's temperature is within normal limits it is climbing with each measurement. We must continue to watch it. I think we should prepare her for admission. I will take her home and bring her back to make sure that she does return.

3.6 ETHICAL CONSIDERATIONS

Throughout research projects it is imperative that nurses maintain ethical principles. This concept is underwritten by both the International Council for Nurses in their Code of Ethics, as well as the South African Nursing Council in their Ethic Principles.

3.6.1 Permission to Conduct Research

The proposal for this research was submitted for peer review within the Department of Nursing Education before being submitted to the Human Research Ethics Committee of the University of Witwatersrand. Ethical clearance from the Human Research Ethics Committee of the University of the Witwatersrand was granted (M130432) along with permission from the Faculty of Health Sciences Post Graduate Committee to continue with the study. Written consent was obtained from the Company and the Hospital Manager of the Private hospital where the event occurred, for use of the nursing documents.

3.6.2 Informed Consent

Written informed consent (Appendix G) was obtained prior to the interviews from the outbreak coordination team to explore the contents and reflections of the diary. They were informed that this information would be used in the research. The participant was handed an information sheet (Appendix H), the contents explained and discussion invited to exclude any concerns. Informed consent from the participant was granted for use of the interviews as well as permission to tape record the conversations during the interviews. Recordings were downloaded to the researcher's computer. The researcher herself carried out the transcriptions. The transcriptions were returned to the participant for approval.

3.6.3 Anonymity and Confidentiality

Maintaining complete anonymity of the site and the participant will not be possible. Because of the nature of such an outbreak, where five patients developed an undiagnosed illness that resulted in the death of four, there was heightened international media interest and reporting at the time of the outbreak. The participant and hospital will however remain anonymous in the research documents and any publications during or following the completion of the study. Anonymity and confidentiality will be afforded to the health care team who were involved with both the management of the outbreak and the care of the participant. The management and storage of all data collected will be held in confidence with both the computer and backup devices being password protected. The documents and data will be held for a period of five years in compliance with University requirements. Only the researcher and supervisors will have access to the documents.

3.7 SUMMARY

This chapter has presented the research design, the population and sample, the research setting. A case study design with a qualitative multi-method approach using exploratory and descriptive approaches was selected for this study. Conversational interviews are used for the data collection and Colaizzi's seven-step method is employed for analysis of the data. Trustworthiness of the study is established by the methodology meeting the criteria of credibility, transferability, dependability and confirmability.

The next chapter presents the findings of the data analysis.

CHAPTER FOUR

FINDINGS

4.1 INTRODUCTION

This chapter presents the findings of the study. The aim of the study was to explore and report the experience of a nurse who contracted a highly pathogenic novel viral haemorrhagic fever (VHF) and survived as well as to integrate the management and caring throughout. This was achieved through exploration, description and interpretation using the informal conversational interview technique together with triangulation using the patients documents and a dairy which was maintained by members of the coordination team. Patton (2002) suggests that this method of interviewing which uses open-ended questions offers the most freedom to explore the answers. Using this technique of interviewing allows the researcher flexibility to probe the information in order to obtain depth and clarity. The study is reported in the form of a complex and richly annotated narrative. The questions are developed according to the content and context as the interview plays out with the researcher ensuring that the interview remains focused and assisting the participant to remain within and fully explore the topic.

Four initial in-depth unstructured interviews of one hour each were carried out. The interviews continued until saturation was achieved in terms of the participant's experience. The fifth and final interview was carried out for verification purposes according to Colaizzi's method of analysis.

The study population included all health personnel who contracted the virus, later named as the Lujo virus. This included the index patient, a paramedic, two qualified intensive care nurses and a cleaner, totalling 5 (N=5).

During 2008, two patients were air lifted from Zambia ten days apart and brought to a private hospital in Johannesburg. The initial patient, a female was diagnosed with African tick bite fever, a fairly common Rickettsial infection found in grassland areas of sub Saharan Africa. The second patient, a male was responsible for accompanying her to Johannesburg. He was admitted with a diagnosis of Thrombotic Thrombocytopenic Purpura (TTP). This is a rare condition in which there is anaemia due to red cell fragmentation and thrombocytopaenia. If it is not treated early in the disease process, there is a high incidence of mortality (James and George, 2006). Both these patients died within days of admission. Within the next few weeks, three staff members came down with similar symptoms. Two died after being nursed in other hospitals for two to five days but the last person, a nurse, survived. She is the focal point of this research.

This chapter presents the themes that evolved from the data analysis. Themes and sub-themes are presented and discussed. Triangulation with nursing case notes and a diary maintained by the coordination team supports the themes and informs results of management and care. The development of the themes is substantiated by verbatim quotes from transcripts and field notes. Discussion to substantiate the research findings is found in Chapter five using references to existing literature. Colaizzi's method of qualitative data analysis was followed as described in chapter three, in order to develop a sense of the whole.

Daily case notes documented by the nursing staff caring for the patient are analyzed together with the diary to complete the triangulation

4.2 ENSURING ANONYMITY AND CONFIDENTIALITY

I have chosen to call the participant 'Gabby'. Gabby is the shortened version of Gabriel. Gabriel is the archangel and served as the "Messenger of the Lord". Perhaps Gabby's role is intended

to show us how to bring together all aspects of care of these horrific diseases. Perhaps this event is to offer those of us involved with managing outbreaks, a learning opportunity and a refresher course in preparation for what was to come. At the time of writing, the worst outbreak ever of another VHF, Ebola, is out of control to the north of our borders and the entire world is on alert.

For easy identification, to ensure a measure of anonymity and to facilitate the unfolding of these interviews, I have named the key persons with pseudonyms. In doing so I selected names close to the meaning or interpretation of their given names. The name by which a person is known identifies the energy and character with which this person is associated. (Mehrabian, 1992). I do not wish to make these colleagues strangers and so an attempt is made to retain their character in the selection of pseudonyms.

I have used italic font when quoting verbatim from the interview script. Sections of the transcript that have been omitted are indicated in this manner …… .To enhance the ease of reading, where I have applied triangulation and different sources to reconstruct the story, I have used different colours to differentiate between the coordinating team's diary and the data obtained from the records. Blue indicates the data obtained from the nursing notes and the colour red indicates notes from the diary. As one of the members of the coordination team, I participated in decisions and had access to important information known only by the coordination team. I have permission to share this information. I have included some of the information and decisions where applicable. As I was deeply involved with the management of many facets of the outbreak, I developed my own personal opinions and concerns. In order to highlight these for the reader and prevent them from influencing the study I have bracketed myself.

4.2.1 Description of the participant: The "nurse patient"

Gabby, the nurse was 47 years old at the time. She is a Registered Professional Nurse who has 29 years experience and holds a Diploma in Intensive Nursing Science. She had spent 20 years working in both Cardio-thoracic units and General Intensive Care units when this event occurred. Aside from her duties as a senior member of the staff and her shift leader responsibilities, she has held the portfolio of Infection Control representative as well as Health and Safety Officer for the unit during the time that she worked there. On the day that the second patient, the paramedic, was admitted, Gabby was allocated to look after him. Because this patient was admitted from outside the borders of South Africa with a fever, the patient was isolated according to the protocol of the hospital. This protocol is explained later in the chapter. TTP was the suspected diagnosis with Malaria as an alternative. Gabby cared for this patient for the next two days and assisted with the insertion of an arterial and a dialysis line. Her shifts ended and she was off duty for the next few days. When the second patient died, the outbreak coordinators placed Gabby on the list of contacts as a high-risk contact.

Just eleven days from the first contact and nine days after the last contact with her patient, Gabby reported a sore throat, red gums and a single episode of diarrhoea. She had also had a dull headache for the previous two days. She was admitted to the isolation area of the outbreak ward.

4.3 DISCUSSION OF THEMES EMERGING FROM INTERVIEWS

The purpose of the study is to explore the experience of a nurse in a private sector hospital after contracting a highly pathogenic novel haemorrhagic fever from a patient as well to describe the management and care of the person and the environment. Each interview is considered within its own timeframe. Before commencing the next interview, Gabby had time to reflect on the previous interview and add important omissions.

To interpret Gabby's experience of the entire incident, the interviews are divided into four timeframes - her initial contact with the virus source, her illness timeline, her experience of extreme fragility and the care she received, then finally her continued involvement with this disease.

To facilitate readability, excerpts from the narratives will be quoted in each theme and sub-theme. They are discussed and re-contextualised with references to relevant literature.
All names and identifying particulars of Gabby and other individuals mentioned have been altered in order to maintain a semblance of anonymity and confidentiality, bearing in mind that this incident was extensively reported in the media, both locally and internationally, at the time of the incident. A table guides this discussion.

Table 4.1 . **List of themes and sub-themes**

Theme	Sub-theme
4.3.1 Initial contact with the source.	• Handing over • A growing index of suspicion. • Collegiality networking and support. • Reality hits
4.3.2 Admission is inevitable.	• Preparation for admission. • Sick but not ill • Phases of emotion.
4.3.3 Moments of care.	• Loss of memory, confusion and dissociation • Spiritual connections

	• Communication challenges • Kindness of colleagues
4.3.4 Always involved.	• Being in control • Forgiveness • Rituals with the patient's wife • Gratitude yet unfinished business

4.3.1 Theme One. **Initial contact with the source**

The first timeframe explains the initial contact with this deadly disease. It includes the handing over and admission of Gabby's patient, the suspicion of a connection to a patient admitted one week earlier, the importance of collegial support and finally the period during which reality sets in and Gabby becomes symptomatic.

Anton, a paramedic working in Zambia has been flown to Johannesburg after developing symptoms similar to Emma, a patient he had treated one week earlier. Emma, the index patient had fallen ill with a fever and flu like symptoms. Emma had not responded to treatment in Zambia and was airlifted to South Africa for further treatment. Anton requested to be brought to the same hospital, as he was confident that the staff would know what to do. Anton's paramedic colleagues handed him over to Gabby together with the reports documenting his medical status during the trip. The doctor gave an admission diagnosis of TTP .

Gabby carried out the routine assessment. During our interview she told of the many physical signs present during her assessment of her patient. Physical means pertaining to the body (Dorland's Pocket Medical Dictionary, 2012) and together with physiological signs,

form the basis of a nursing assessment upon which the diagnosis and management of the patient is built.

4.3.1.1 Handing over

Handing a patient over is an important start to treatment and nursing. It forms the basis from which further nursing care is planned. Chaboyer, McMurray and Wallis (2010 p27) quote the Australian Medical Association's (2006) definition of clinical handover as "the transfer of responsibility and/or accountability for patient care from one provider or team of providers to another".

During the initial interview, Gabby spoke about her patient, Anton, a male healthcare professional as well as the index patient, Emma, whom he had accompanied as the attending paramedic, to the private hospital a week earlier. Typical of a conscientious intensive care nurse, Gabby's handover was extensive. She needed to make sure that all the details were included, particularly as the diagnosis was not confirmed on admission. This information therefore made up a large portion of the initial interview and is revisited during the interviews that follow. Clearly these signs and symptoms were very general and have many differential diagnoses. Gabby made sure that she mentioned each one.

> *"His temp was very high… like 40"*
>
> [He had] *"a sore throat……you could see the rash. Like this generalized rash…….. and he was pyrexic"..*
>
> *(He)"had diarrhoea as well……and vomiting."*
>
> *"he was perspiring profusely all the time"*
>
> *"he bled profusely"*
>
> *"His platelets were low, he probably had malaria"*

Generally patients in intensive care units are critically ill. Frequently invasive procedures are carried out along with activities such as the invasive insertion of long lines with the accompanying blood spillage, that increase the risk for infection to healthcare professionals since VHF is blood borne (Centers for Disease Control, 2014; Colebunders, Van Esbroeck, Moreau et al. 2002; Ergönül, 2006;). Gabby remembered this.

> "*We put in a central line, we put in a dialysis line. We had to give platelets…these jolly platelets. He bled a lot".*

4.3.1.2 A growing suspicion

From time to time nurses working in an intensive care environment are exposed to disease conditions that are contagious such as severe acute respiratory syndrome (SARS), Bird flu and VHF (Joynt and Gomersall, 2008). The risk of secondary transmission is high particularly when aggressive procedures such as insertion of long lines are required. The practice of infection prevention plays an important role in containing infection and preventing further nosocomial spread (Daugherty, et al. 2009). Knowledge and correct use of personal protective equipment (PPE) is imperative to prevent or minimize spread to health professionals as well as other patients. (Daugherty et al. 2009). It is the role of the nurse to keep a close watch on any development of infections and act timeously. Because Anton had some signs and symptoms similar to Emma, Gabby was suspicious that the medical diagnosis of her patient Anton was possibly incorrect and that there could be the chance of cross infection between her patient and Emma. This suspicion grew as Anton deteriorated. Anton was admitted with a diagnosis of TTP, a rare disorder in which thromboses form in small blood vessels. Petechiae develop and appear as a rash. As TTP is not contagious, no special infection precautions are required.

Gabby reported that standard precautions were immediately put in place in keeping with the initial medical diagnosis. Standard precautions for non-infective patients included strict hand

hygiene, use of masks, gloves and aprons (Table 2.2) to prevent the transmission of pathogens from patient to patient (Eggimann and Pittet, 2001; Siegal, Reinhart, Jackson et al. 2007). Infection prevention had been part of Gabby's unit portfolio at one stage and so she was familiar with diagnosis dependant precautions. She noted that standard precautions were in place on admission.

"Gloves and masks on…… aprons on. Didn't have gowns on".

Once the link to the index patient was considered, Gabby was concerned that the precautionary measures were insufficient.

"*We should have been wearing gloves, gowns and masks".*

"PPE's". [Protective personal equipment]

[It may have been] "*Something we could have contracted".*

Data from records

Many foreign patients are referred to this hospital as there are world renowned doctors who practice there and it is considered a centre of excellence in Africa. There is thus the possibility of importing contagious diseases. This private hospital group has policies in place to address admission of patients with fevers. The policy (Appendix I) requires any patient from outside South African borders who is admitted with a fever, to be nursed in isolation until the diagnosis is confirmed. This practice helps to prevent the spread of contagious disease. Both Zambian patients have been isolated according to the policy. Anton is the second patient to be admitted from Zambia with similar signs and symptoms but an unrelated medical diagnosis to that of Emma, the index patient, who had been admitted with African Tick Bite fever. They have, however, been in contact with each other.

Coordinators Diary

[As a member of the coordination team, I am aware of the protocols already in place]. In keeping with the initial history, there is no reason to call for any precautions other than what was in place on admission. Isolation and standard precautions are commenced in line with the Company Policy and these are considered adequate. Anton's doctor insists that the diagnosis is TTP, a non-contagious condition.

When in doubt it is good nursing practice to report the possibility of a contagious condition in a patient to the infection prevention authorities, before all who are in contact become infected. Gabby's concern and sense of responsibility drove her to contact the Nurse in charge of Infection Prevention for the hospital.

"*I should notify the nurse in charge of infection prevention".*

"I just felt I had to tell her".

Coordinators Diary

Because of previous experience and awareness that persons who travel in Africa may contract contagious diseases that are uncommon in South Africa, the nurses in this private hospital monitored and are alert to such possibilities. Gabby had been one of the nurses in this hospital when a colleague contracted Ebola from a foreign patient some years prior to the present outbreak. She was aware of the need in that outbreak to trace and monitor all the contacts of the patient who had Ebola.

Not only were the nurses concerned about the similarities between the two Zambian patients, Anton's wife also made the link between Emma and her husband. Gabby tells how the wife was insistent that there was a connection.

"*She wanted to see the admitting doctor".* [of the initial patient]

"She wanted to speak to him. She didn't think things were right".

Data from Records

The admission documentation of both Emma and Anton are scrutinised by members of the coordination team in order to compare any similarities between the two and to obtain a history particularly related to hobbies and travel. Zambia is not a country associated with VHF. The search is an attempt to link Emma to a possible source of a contagious disease. It is already established that Anton, a paramedic, had intubated Emma before evacuation to South Africa and had possibly become contaminated during the process. Emma lived on a smallholding and participated in Polo cross. She may have come into contact with the host during riding or feeding of the horses.

Coordinators Diary

When, after four weeks, a diagnosis of a previously unknown Arenavirus is confirmed, the possibilities of contact with a rodent or rodent excretion are considered. To date the host has not confirmed (Bird et al. 2012; Paweska et al. 2009).

Similarities in the presentation of the condition between Anton and the index patient Emma soon became evident creating the suspicion and suggesting the possibility of a contagious disease. Gabby's concern increased.

> *"He might have been connected to that previous patient".*
>
> [We checked off duties] *"So we knew who had been in contact with both patients".*

Data from Records

Emma and Anton both lived in Lusaka, Zambia. Both had report a headache and flu like symptoms. They both complain of sore throats and diarrhoea and both present with a rash. Tests for malaria return negative and later, the blood tests for VHF also come back negative. Both Emma and Anton had died. From the documentation on the admission of Emma, we know that Anton has been responsible for the intubation of Emma, which he had

described at the time as difficult and traumatic. He had then accompanied Emma in an air ambulance to South Africa.

Coordinators Diary

This is a new VHF, the "first hemorrhagic fever-associated arenavirus from the Old World" (Briese et al. 2009 p 1)

Since Anton describes the intubation as traumatic, perhaps the point when Anton contracted the "disease" was during the intubation procedure. The face of the person intubating a patient is very close to that of the patient during the procedure and unless a mask and goggles are worn, the risk of contamination by secretions is high.

4.3.1.3. Collegiality, networking and support

Collegiality is the cooperative relationship between colleagues (Merriam-Webster Dictionary, 2004). Effective networking is about a two way sharing of information. The team that had been put together to manage this outbreak was multidisciplinary and multi-skilled. It consisted of hospital management, nursing management, the treating physician and selected experts which included a microbiologist and me. We shared a good collegial relationship and respect for each other. Sharing of information is extremely important to maintain current knowledge and to add to it. Collegiality requires trust and should be inter-professional. It is crucial in order to stay abreast of new knowledge and changes. Dense networks of information were built up in this shared endeavour.

As the evidence unfolded and the connections between the patients were confirmed, the situation moved from one of infection prevention to management of an outbreak.

Gabby remembered being asked to help with tracing staff that may have been in contact with either or both Emma and Anton.

> *"We got all the contacts out. Everyone who had worked with both patients"* [was included].

She recalled that I gave instructions about temperature monitoring.

> *"we* [the contacts] *were told to take our temperatures. I've got them written down".*
>
> [and she said]*"because at this stage you must have been aware"*

Coordinators Diary

[I had been called in to assist with the investigation]. I suggest that since we have no diagnosis and based on the similarities of this condition to that of VHF, we should manage this condition as an outbreak of VHF. Contact tracing and self-monitoring of persons who had been in contact with infected patients is carried out to contain any further spread. We start with Contact Tracing. All Health Care Workers and family members both in South Africa and Zambia who had been in contact with either Emma or Anton are placed on the list. There are just over 200 persons. They are asked to monitor their temperature twice daily and phone or mail it through to the nurses responsible for monitoring the contacts. Any other symptoms such as headaches, nausea, sore throat or diarrhoea are also to be reported.

On occasions, medical colleagues of the intensive care team appear to ignore the concerns of their nursing colleagues. They sometimes question the nurses' judgement and also may argue that certain nursing procedures are not necessary. Gabby experienced this and was subjected to anger from the physician who admitted Anton, when he discovered that Gabby had informed the Nurse in charge of infection prevention about her concerns that this patient might have been contagious.

> *"I got a call and he was very very angry with me".*
>
> *"He yelled at me".*

This physician argued that nurses should not be suggesting the type of infection protection to be used. He maintained…

…"We didn't have to wear any kind of protective clothing because it was TTP".

He questioned Gabby's knowledge and authority with regards to the appropriate nursing care.

"Who did I think I really was"?

Data from Records

The reprimand has a definite effect on the infection prevention carried out in the unit and the level drops from the barrier nursing that had been instituted to standard precautions only. This is indicated in Figure 4.1

Coordinators Diary

He appears to be angry that Gabby has used her initiative and reported the possibility of a similarity between the disease processes of two patients. Perhaps this doctor doesS not realise the extent of the nursing Scope of Practice and that infection prevention is a primary function of the nurse (South African Nursing Council: Scope of Practice, 2013).

Included in the network was Anton's wife. Gabby told how she insisted that Anton had a serious disease that was the same as the patient he had brought down to South Africa.

"She didn't think things were right. She [Anton's wife] said *"I don't think it's malaria, I think it's something else".*

"She was really worried".

Data from Records

Although she is not one of our professional colleagues, Anton's wife shares her husband's concerns with Gabby, about the patient Emma whom he had intubated in Zambia. She believes very strongly that there is a connection between these two illnesses.

This constant insistence on the part of Anton's wife remained with Gabby and so Gabby sent her to the consulting rooms of Emma's physician. She was influenced by the strong belief of Anton's wife.

Collegial support enhanced the interaction between the members of the coordination team as well as the staff being monitored.

Data from Records

Between the co-ordination team and management, there is a permanent 'open door' policy for all the staff that are affected by this outbreak. All hospital staff are encouraged to attend information meetings and questions are answered. We called in Academic experts who share their opinions and resources. A psychologist is appointed to offer staff and their families counselling. Some group therapy is arranged for the intensive care staff. Anton's wife and children are also offered this therapy at the expense of the hospital. The therapist went to the home of Anton's wife for these sessions.

Sharing gives one a feeling that everybody is looking out for each other. We all shared the responsibility and the load. Gabby expressed it when sharing her feelings after being told that she would have to be admitted.

> *"I got comfort from everybody knowing"*
>
> *" we[are] all going to be fine. We'll be alright"*

Coordinators Diary

At this stage Gabby presents with signs and symptoms. Her temperature is rising, her gums are red and she has a sore throat. Her platelets are low and we were concerned.

Collegiality and networking between the members of the co-ordination team is good.

Hierarchical traditions within the team are dropped. This enables honesty, communication and interactions to flow freely. It also reinforces respect and creates a real sense of "looking out" for the welfare of other members on the team. Use of collegial networks resultes in sharing of information and opportunities for colleagues from various professions. When faced with a situation such as our outbreak, we all need to learn from each other. We need to expand our knowledge base and become the experts that our colleagues depend on.

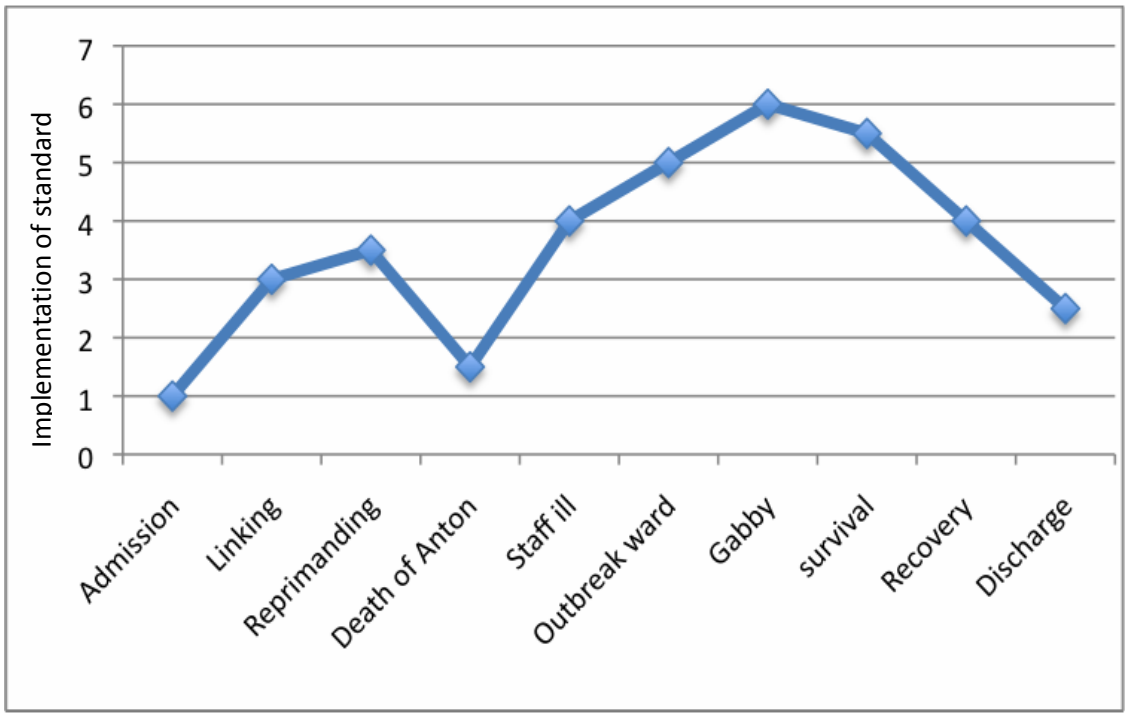

Figure 4.1 Graphic descriptions of changes in Infection control practice in relation to collegial reprimand.

4.3.1.4 Reality hits

Gabby had difficulty considering the possibility that she might have contracted the condition. She believed she had adhered to the infection prevention rules and did not need to be concerned. However as the days pass the reality of possible contamination became more evident. Whilst on the contact monitoring list, Gabby reported some signs similar to those of Anton. She reported this to the coordination team and wanted advice.

> *"Because my temperature had gone up. ..it wasn't high, 37 or 38 but it had gone up. I had looked at my gums…. they looked a bit red. …the temp and*

the sore throat. I wanted my platelets to be checked …..one of the signs that there was something wrong".

Gabby was worried. She wanted verification of her suspicions.

"I was worried then. If there was (sic) something abnormally wrong…the results would be abnormal. I had a headache during that week. I wanted someone to give me a second opinion….it happened to be you".

Coordinators Diary

I examine Gabby's gums, oral mucosa and throat at her request. Her throat is slightly swollen and her gums do appear red. She also tells me about an episode of diarrhoea during the night, [although she does not recall this now]. I feel that these symptoms together with the fact that she is a high-risk contact are reason enough to draw a full blood count and refer her to a physician.

After her bloods were drawn, Gabby related that, while on duty she was asked to step aside by two doctors who were part of the outbreak team. They wanted to ask her some questions.

"*He asked me about ritualistic slaughtering….had any of this taken place at my house? I couldn't understand".* [Surprised] *Asking me if I had monkeys in my back yard".* [Laughing.] [Gabby lives in the suburbs of a city.]

Although amusement was evident in the interview, she told how these questions confused her.

"I thought… what is he going on about? Why does he keep asking me"?

During the first week of being monitored as a contact, Gabby did not believe that she would contract the disease, however she was concerned that there was no confirmed diagnosis.

> *"We weren't definitely sure. It was…..it was unknown".*
>
> *"Something going on…..a big unknown disease was happening".*
>
> *"They still didn't have a definite diagnosis".*

She fully understood that she was most at risk.

> *"I knew....I would be the most likely…….I had had three consecutive days with him".*

In spite of being aware of these possibilities, she was confident that she had adhered to the policies and thus felt that the chances of her contracting the disease were remote.

> "*I definitely didn't think I would get it. I still don't think I really really believed that I had it".*

Data from Records

Gabby is on the contact list as a high risk due to the fact that she was in direct contact with Anton and his secretions. She presents with a rising temperature, diarrhoea and a sore throat. Her blood results show an infection and low platelets and she was at risk of haemorrhaging. The clinical picture is in keeping with VHF. There is no doubt that she has to be admitted and isolated. The bloods that were sent for VHF return negative.

Summary

Theme one deals with the handing over and admission of Gabby's patient, Anton. The link to Emma, the index patient and the growing suspicion that Anton might have had the same

contagious condition, emerges. Experts set up a collegial group consisting of the doctor, hospital management, which included a multi-skilled group of administrative and nursing managers, support groups and regional management. After a few days reality set in and Gabby presented with a similar clinical picture as exhibited by both Emma and Anton had.

4.3.2 Theme Two. Admission is inevitable

Given that both Emma and Anton had died with similar clinical manifestations, when Gabby presented with some of the symptoms it was imperative that she be closely monitored. This meant that admission and isolation became inevitable. In the days to come Gabby would move from being the intensive care sister in charge of caring, to a helpless patient who would need dedicated help from her colleagues for her survival.

This theme describes the preparation for admission, Gabby's conflicting experience of informing the family of her hospitalisation whilst she herself did not feel sick and lastly Gabby's emotions during this period.



Figure 4.2 The isolation suite – a converted ward.

4.3.2.1 Preparation for admission

After confirmation that Gabby's haematology results were abnormal, the physician told Gabby that she has to be admitted. She felt the need to share this information.

"I went and told everybody. I had to come in….I was being observed".

She explained…

"I wanted to go home".

"You said you would take me home…. you weren't too sure if I would come back. I thought if you want me to come back then I'll come back because it's just for observations."

Coordinators Diary

I am a little concerned that once she realises the implications of the admission, she will refuse to return to the hospital. I offer to accompany her home and bring her back. I am not concerned about my own safety as I firmly believe that this is a condition that is spread by contact. My experience leads me to believe that even though we had no diagnosis, there would be more staff infected if it is an airborne infection. Gabby declined my offer and returned of her own accord.

Before returning to hospital Gabby prepared her family and particularly her young daughters. She explained that she would be admitted to hospital for observations.

[It will] *"just be an in and out….don't need much clothing".*

Data from Records

In spite of no laboratory evidence of a contagious disease including negative testing for known viral haemorrhagic fevers in Emma and Anton, the coordination team commences outbreak protocol. According to the CDC definition, an outbreak is the occurrence of more cases of a disease than normally expected within a specific place. It is therefore considered appropriate to set up a ward and assume full outbreak response. This includes a suite that allows for triaging and separating suspect patients according to the degree of risk. High-risk patients such as Gabby are to be placed in private holding wards with an en-suite bathroom. The entire suite is separate from any other hospital patients and access to the suite is limited to specific nursing staff and members of the coordination team. A security officer is placed in position to assist with access control.

Coordinators Diary

Due to the fact that Gabby's temperature has continued to increase during four hourly monitoring, the presence of a sore throat and an episode of diarrhoea, her blood is sent to the laboratory for haematology and biochemical screening. The results show a rise in white cell count (WCC), a drop in platelets, and an elevated D-Dimer. The tests for Ebola, Marburg, Lassa fever, CCHF and Rift Valley fever return as negative (WHO, Global Alert and Response, 2008).

4.3.2.2 Sick but not ill

This period began to be a situation of opposites. Things seemed so normal yet were so abnormal. Initially Gabby displayed the disbelief.

> *"It wasn't like I was sick. I was wearing normal clothes. I was sitting on the bed wondering what I was going to do"*

The isolation seemed unnecessary to Gabby. She laughed when recalling…

> *"I had water in a polystyrene cup. I felt, was this really necessary?"*
> *"and the family came in all dressed up. I might have had all these symptoms but I wasn't sick".*

Data from Records

Her only symptoms are a headache, sore throat and diarrhoea. The signs are revealing but possibly not sufficient to require a medical examination if she had not been on a monitoring list. Her gums are a little red and her throat is swollen. Her abnormal blood results are the most alarming sign (See Table4.2).

[Because Gabby was being monitored, her signs and symptoms were detected early. If we

had not been monitoring the contacts, there was a good possibility that Gabby would have been more severely ill before detection.]

Table 4.2. Blood results on admission

LABORATORY RESULTS	GABBY'S VALUE	NORMAL VALUES
PLATELETS (x 10 glL)	**91**	**140-400**
WCC (10g/L)	**18**	**3.9-10.7**
CRP (mg/dl)	**51**	**0.5 mg/dL**
D-DIMER µ/ml	**2.8**	**300**
PTT (seconds)	**60**	**2-35**

Coordinators Diary

Whilst Gabby does not feel ill her blood results show a different picture. Her platelet levels, D-Dimer and PTT show that she is at risk of haemorrhage. The WCC and CRP levels indicate inflammation.

In spite of reassuring her family, her actions displayed the uncertainty. Gabby complained that she only had two pairs of old pyjamas to take. She made sure that she packed her photographs to take along. Her daughter was confused and points out "but Mom you said you were just going for overnight." Although Gabby did not think that she was infected with the disease, she was worried.

" I was worried at that stage. I didn't want to have it".

And in a moment of common sense she submitted herself to reality.

"*Maybe I knew because why else would I make out a will"*

"If I did die, I wanted there to be a will".

Coordinators Diary

Gabby shows considerable trust and confidence in the ability of the admitting physician, the coordination team and me. She accepts that we would do our best for her.

4.3.2.3 Phases of emotion

Gabby went through stages of emotion similar to the stages of grief described by Kubler–Ross (1969) in her book, On Death and Dying. As explained by Kubler-Ross(1969) in her writing one does not necessarily follow these stages in a particular order nor will everyone experience all of the stages. Gabby did not follow any particular pattern.

- Guilt

According to the Oxford English Dictionary (2012) guilt is a feeling or perception of making an error, or miscalculating the accuracy of an action or decision.

Gabby had emotions, which may have been guilt, about the day Anton was admitted. Anton was perspiring profusely and after washing him, she noticed that he was "*glistening".* Wondering what this was, she felt him with the back of her arm and said in amazement,

"you're perspiring again"!

In a quiet voice, Gabby expressed her suspicion that perhaps this action had led to her contracting the disease. She cannot remember any cuts or abrasions on her skin at that time but she stated reassuringly…

"I know that I did that. I'm very aware of that."

She felt responsible for the inconvenience to her friends and colleagues.

"They were all put onto this contact list because of me."

Coordinators Diary

This includes me. At her request I examine her mouth and throat on the morning of her admission. I look for signs similar to those that Anton had presented with. I note that her gums are red and her throat slightly swollen. It is time to step up the monitoring. I request that she take her temperature hourly. The protocol that the coordination team has decided on was influenced by Emma and Anton's condition and the experience gained by those of us who had participated in the Ebola outbreak in Johannesburg in 1996. It states that the temperature is to be done daily. In the event of a fever, rise in temperature or any other signs and symptoms, the taking of temperature is to be increased to four hourly. Gabby's temperature had been 36.4ºC at home. It climbes to 36.7ºC as she arrives at work and four hours later it is 37.4º C. An increase in monitoring and requesting blood samples is the correct decision.

[Our protocol does not require a high temperature to increase the surveillance, but rather a rising temperature even if it remains within normal limits, together with any symptoms. The Ebola surveillance guidelines published by the Centres for Disease Control in 2013 suggested that the temperature should be elevated however in the latest update (November 2014) this has been amended to either an elevated temperature or other symptoms.]

During the interview Gabby expressed guilt about having been thoughtless and perhaps defiant on the day of her admission. During a visit from her daughters she admitted....

[Her daughter] *"Actually lay on top of me. How crazy was that."*

"Who in their right minds….I mean that was really silly"

"Imagine if something did happen to her and she really got it."

Perhaps the most profound statement indicating her guilt was when Gabby told me about her meetings with Anton's wife. She revealed…

"I feel so sad for her….I'd survived and her husband hadn't".

- Fear and anxiety

Initially the fear was related to uncertainty and the unknown.

"We weren't definitely sure. What were we dealing with?"

"It was a worry".

Gabby related the response of a colleague upon hearing the concerns of the coordinating team about Emma and Anton.

"She took her bags and left. She got such a fright when she realised what was happening."

During a counselling session in which all the intensive care staff was present, Gabby recalled that each person present was reflecting on whether they were scared. When it was her turn she remembered saying...

"I'm not scared; I'm sh- t scared"

Coordinators Diary

Although Gabby does not recall this, during this period when the members of staff were being monitored, Gabby speaks to some of the coordination team about her fear of not knowing what this disease is. She is concerned about how to manage and contain this outbreak if we do not know what it is.

- Shock

The loss of a colleague, Gloria who had been in contact with Emma was a nasty reminder of the lethal effect of this disease.

> *"It was such a shock, Gloria dying like that. I didn't know what was happening. Could it really be something that we could've contracted from somebody else?"*

Data from Records

Gloria an ICU colleague is working an extra shift on the day that Emma dies. Although she is not allocated to Emma she assists her colleagues to wash Emma's body after Emma had died. She too is a stickler for correct standard precautions. A diagnosis of Tick bite fever does not require anything more that standard precautions. This shift is the last time Gloria will work with these colleagues. She is on leave the next day and is going home to her family in a town about 200kms away. When contact monitoring is commenced after Anton's death, she is traced to a hospital in her hometown. She has been admitted with flu – like symptoms and a very swollen throat. I and the nurse in charge of infection prevention request for Gloria to be strictly isolated.

Coordinators Diary

Various members of the hospital staff, her colleagues and the coordination team ask her to transfer to our hospital so that we can take care of her. She refuses as she feels that it is too far for her family to be able to visit. We speak to her daily on the telephone until she is too ill to talk. Sadly she is the third patient to die from the then unknown disease.

- Denial

Fear and denial are closely linked. On reflection, Gabby admitted that there was a lot of denial. At the time however she refused to believe that she might become infected. She

definitely did not want to get it. Even considering it she said...

"It would be a disaster…. so you pushed it aside. You knew all the signs and symptoms and you thought, okay, I'm not going to get it."

"I definitely didn't think I would get it."

Coordinators Diary

This statement is repeated frequently during the interviews and I believe at that moment, Gabby really does not believe that she will contract this condition. She has followed the necessary precautions set down for standard infection prevention.

She was more concerned about what the disease was.

"…it was unknown. What were we dealing with?"

- Acknowledgement

In spite of this outward denial, subconsciously she must have realised that there was a possibility that she had contracted the disease.

"I didn't want to admit it, like a real ostrich mentality" [ostriches are said to bury their heads in the sand]

"I must have been really worried to express that to you" [about an episode of diarrhoea].

"Thank goodness I did tell you"

"*I didn't think I had it but I must have been ready".*

Coordinators Diary

Gabby shows an attitude of disbelief and denial throughout the initial period of admission. I don't think she accepts that she has developed this disease until she is in the recovery phase. She does eventually acknowledge that there is something amiss and that she needs

help.

Summary

Theme two dealt with the period before hospitalisation and Gabby's preparation for admission. It also describes how Gabby is confused when being told that she is sick in spite of not feeling ill. She does not accept that all is not well. Lastly, the stages of emotion experienced by Gabby are described as she experiences emotions similar to those of grief as described by Kubler-Ross(1969).

4.3.3 Theme 3. Moments of care

This theme includes the memories of care including the loss of memory and confusion during the period of critical illness and ventilation. Challenges in communication from Gabby's perspective, dreams, hallucinations and what appeared to be spiritual experiences are detailed. The kindness portrayed by colleagues is included.

Gabby was admitted to a single ward initially. As she deteriorated she was transferred to an intensive care cubicle.

4.3.3.1 Loss of memory and confusion.

Patients with loss of memory and confusion are frequently seen in the ICU setting (Roberts and Chaboyer, 2004; Samuelson, Lundberg and Friedland, 2007; Zetterlund, Plos, Bergbom et al. 2012). Some patients will recall the loss of memory whilst others have no recollection of this phenomenon at all. (Lof, Berggren and Ahlström, 2006; Magarey and McCutcheon, 2005)

After Gabby's hospital admission she could not recall very much of what she did during the day.

> *"I don't have a clue what I did. …The girls* [daughters] *told me all I did was sleep. I don't recall any of this, did I brush my teeth,*[and] *did I wash my*

face?"

"I used to ask Mary [a colleague] *what I did".*

When her physician told her to wear support stockings on discharge, she was surprised that he knew about her varicose veins. She could not recall that the physician had carried out an admission examination and had taken a lengthy history.

"I must admit that I cannot recall clearly after that" [her admission].

"I must have told him all that [the history] *when he came but I don't remember him coming".*

Confusion is more common in the elderly and often occurs during a hospital stay. It is also seen in patients who are under great stress. (Jones, Bäckman, Capuzzo, et al.2007)

Data from Records

Once Gabby has been admitted, the Physician prescribes Lorazopam. Lorazopam belongs to the benzodiazepine family and is a drug used to treat anxiety. At this point we are increasing the dosage of Lorazepam as Gabby deteriorates. This is done in order to reduce her anxiety particularly about her own state of health.

Patients receiving lorazapam don't have a sharp recollection (Samuelson et al. 2007). The depth of sedation may influence the perception of the stressful experience.

Gabby's confusion continued and on reflection she admitted…

" I didn't know why I was there. I know you came and explained to me, I know doctor explained to me ….I don't think I put two and two together".

Coordinators Diary

The Physician is concerned about the psychological trauma that living this disease “blow by blow” will have on an intelligent, highly skilled intensive care nurse. Her lack of memory of some of the events may be influenced by the administration and dosage of Lorazopam. This is the effect that was hoped for.

4.3.3.2 Spiritual connections

Delirium, hallucinations and dreams are well-described phenomena in patients who have been admitted to intensive care (Capuzzo, Pinamonti, Cingolani et al. 2001; Ely, Shintani, Truman et al. 2004; Roberts et al. 2004; Roberts, Rickard, Rajbhandari et al.2005). First, Francis and Pincus, (2004) describe delirium as a sudden event of changes in consciousness during which awareness and understanding are altered. In the intensive care units, delirium is linked to sleep deprivation, acidosis, fever, electrolyte imbalances and drug administration.

Hartmann (2011) suggested that dreams have a quasi-therapeutic function. He described dreams as being linked to the dominant emotions and in patients who have had a traumatic experience, dreaming provides connections to the traumatic event which renders the emotion less powerful thus allowing the event to be integrated into regular life.

Gabby recalled that she had dreams. She described them as being “*quite bizarre”* and *“quite frightening”*. When asked, she agreed to share them with me. She explained that some of the dreams occurred frequently. This was one of them.

> *“Sometimes you run and you feel like your leg just gives in beneath you…there was a lot of that”.*

She remembered that her dreams had “*a lot to do with babies”* and children. Another frequent dream described babies on a conveyer belt.

> *"they* (the babies) *were all in coffins…….on a conveyer belt going round and round and all of a sudden it was like a garage door would open and there would be a light inside and when it closed again, the babies were gone".*

Dreams of babies are sometimes likened to the end of life. On the other hand, they are considered by some to bring new beginnings. Hartmann (2011) associates dreams about children and babies with the helplessness and vulnerability of the dreamer.

The next narrative of her dreams appeared to show a ray of hope.

> *"my mother had given me pearls and* [in the dreams] *there were these handicapped children in wheelchairs all looking for pearls"*

Although during the interview Gabby expresses that this is bizarre, the tone of her voice lightens when talking about the pearls.

Roberts et al (2004) describe how patients may have distortions of body sensations when dreaming. Gabby emphasised that during these dreams she was always hot. She mentioned this sensation on a number of occasions while relating the dreams.

> *"I remember being very very hot".*

A dream that seemed to bother her relates to the source of her viral illness. She recounts the dream.

> *"John or Mark* [she does not remember the name] *had come to visit me. He was going to look for a virus in Africa……There was a woman in a cocoon and* (laughing) *she was with this Mark and he asked me if he could leave her here with me. He said that her name was* [Gabby] *and I thought that if her*

name was [*Gabby*] *then she could stay with me".*

Gabby was amused by the fact that the woman shared her name. This dream was told with warm feelings, amusement and light heartedness.

Coordinators Diary

I am not sure whether this is a dream or a vague memory of reality. A doctor from the World Health Organisation visits her on a number of occasions. There is a discussion at the bedside about where the virus has originated. The nurses working in close contact with Gabby are wearing full protective clothing. This clothing is a full HAZMAT® [hazardous material] bodysuit and may well resemble a "cocoon" to Gabby (see figure 4.2). Whether it is a dream or a vague memory of reality, it appeares that Gabby saw herself as "good" or "acceptable" and another person with the same name should also be good.



Figure 4.2 Nurses wearing Hazmat® suits

Not all Gabby's dreams occurred during the period that she was sedated or ventilated. One of the dreams she recalled occurred during her recovery period. At this time she had been moved from the intensive care unit to the private ward where she was originally admitted. *"This happened when I was better".* She recalls that she had visitors in this ward. During a visit from her sister and a friend, she told them the following.

> *"There was a Taiwanese woman in charge of the toilet* [the toilet in her private bathroom"] [This woman] *" was telling me that her husband had died and she was now in charge of the toilet. Some mornings I could use the toilet first and some mornings I had to wait until after she was finished".*

She emphasised that she was awake and fully aware of what she was saying. She did not however understand why she was thinking this or why she told anybody.

4.3.3.3 Communication challenges

Communication with patients in the ICU has long been an area of concern. There are a number of reasons for this. Sedation and mechanical ventilation are two obvious reasons. In spite of much research the literature suggests that nurses continue to have difficulty when communicating with the ICU patient (Halligan, 2006; Magnus and Turkington, 2006). Gabby explained that whilst on the ventilator the inability to communicate frustrated her.

> *"I was trying to speak to them* [the nurses]. *I wanted them to phone my sister. I was going like this.*

Gabby demonstrated by putting her hand to her ear to make a telephone and then tapping on her shoulders. In South Africa, Registered Nurses are referred to as Sisters and wear distinguishing devices on their shoulders which confirm their qualifications. Tapping on the shoulders indicated the word sister. When the nurse failed to understand Gabby attempted to write it down. She laughed and said,

> "*I did what everybody does who is ventilated, I wrote round and round and round. I couldn't get the name* [written] *down."*
>
> *"I wanted the tube out* [endotracheal tube]*. It made me nauseous and I couldn't tell them".*

The inability to communicate created difficulties for both the patient and the nurses. In Gabby's situation communication was even more difficult since the staff were wearing HAZMAT® suits during this period. Lip reading and listening to the patient was extremely difficult.

4.3.3.4 Kindness of colleagues.

Löf et al (2006), comment on how patients in their study felt that some of the unpleasantness of the admission could be partially lessened by the "caring relationship and nursing actions" during the period in ICU. Although Gabby related that she did not remember large periods of the time before she became critically ill, she had distinct memories of some incidents in which her nursing colleagues showed immense kindness beyond the call of duty.

> *"Then I can clearly remember Denise* [a colleague and friend] *coming*
> [to see me]*. I remember her standing at the door and she had a basket with her. She had a basket of McDonald's breakfast…but I can't remember what she spoke about".*

Gabby deteriorated and was moved into the intensive care section of the outbreak suite. She was intubated and totally dependent on nursing colleagues as many critically ill patients are. She did however remember this:

> *"I remember everyone standing there, standing and singing to me. I didn't know why…but they used to sing.*

[The nurses sang hymns and religious songs at the change of each shift. Management and members of the coordination team joined in sometimes. Although this happened outside the isolation area, Gabby was able to see and hear through the glass and plastic partitions].

Gabby was clearly moved by the kindness of a male nurse colleague. This incident took place during the period after she had been extubated. In a soft voice she said,

> *"Max, he used to play things* [music and videos] *for me….and he would sit with me and chat….then he used to switch the lights off and I had to go to sleep".*

During this interview it is clear that the kindness of her colleagues in spite of a very difficult nursing situation touched Gabby.

Summary

Different dimensions of care and collegial kindness are addressed in theme three. Gabby's loss of memory and confusion may be caused by a number of factors including the medication that was prescribed. During this time Gabby experienced dreams. These spiritual connections are well described in the ICU setting. Communication is a fundamental part of nursing. Communication in an ICU has its challenges. Communication through a bodysuit takes this challenge to new heights. The last theme refers to the extreme kindness received from colleagues. This was not part the caring aspect of nursing. This kindness came from the heart.

4.3.4 Theme four. Always involved

Theme four mainly describes Gabby's experience within the final timeframe. This was the period of recovery and beyond. The theme includes Gabby's attempt to control her own care as she resumes her role as an ICU nurse. Her forgiveness of the doctor who criticized her is disclosed and rituals that continued with Anton's wife are revealed. Finally Gabby shares her

gratitude but is left with unfinished business.

4.3.4.1 Being in control

Nurse led care concerns the role that the nurse plays in patient care. It uses "well defined protocols" to ensure care that is of the highest quality (Albarran, 2005; Cullum, Spilsbury and Richardson, 2005). Nurse led care is commonly used in the intensive care setting.

Weaning from mechanical ventilation is nurse led in many ICU's as is extubation and the need for physiotherapy.

Gabby had been a shift leader for many years and it was natural for her to take control of patient care and therefore initiate nursing and nurse led care. She questioned the care that she was receiving.

> *"Where was the physiotherapist? Why didn't I have a physiotherapist"?*

She was also frustrated at not being able to remember.

> *"I can't remember all these things I should remember. The vital data – they were shouting out the patient's obs* [observations] *and writing it down somewhere else. We don't do that. ……I didn't realise that it was my observations".*

During this period Gabby seems to be disconnected with reality and resumed her role as a nurse.

> *I didn't realise they were doing it on me 'cause I thought I was part of the staff. ….. I thought I was working and I was helping her* [the nurse] *doing all these things. I was part of it all. I wanted to organise the physiotherapist for the patient not knowing I was the patient".*

This extended to duties other than patient care.

I can remember wanting to go home to sleep at night and then come back early for the doctor's rounds. I thought I was nursing a surgical patient".

In spite of her illness Gabby remained a nurse and continued to care for patients.

4.3.4.2 Forgiveness

The doctor who admitted Anton was very angry with Gabby and had an argument with her for reporting that Anton had signs and symptoms similar to Emma, the index patient. Gabby recalled that although initially she was extremely cross with this physician he had apologised.

"When I was sick he phoned me. I didn't want to speak to him".

Later she relented and did take his call. She paused and then continued...

"He asked for forgiveness. He apologised for the way he spoke to me. He apologised for the fact that he didn't believe in what I'd said [about the connection between the two patients]. *He had been praying for me….if something happened to me it would be his fault. I heard him,* [pause] *I listened.* [Longer pause] *I never did speak to him again. Let things be….he had his day. I don't want to badmouth him now. He apologised.*

[Shortly after speaking to Gabby, this physician died of a Myocardial Infarction].

During this interview, Gabby appeared to have let go of the anger displayed during the first interview when she spoke about the doctor's anger and accusations.

4.3.4.3 Rituals with the patient's wife.

Gabby maintained a good relationship with Anton's wife after his death. The wife telephoned Gabby each year on the anniversary of Anton's death.

Gabby identified a degree of apprehension with the initial meetings.

"*I felt sorry for her".*

[In the beginning] "*It was nerve wracking…I'd survived and her husband hadn't survived. We couldn't save him. We didn't actually know what we were dealing with".*

This ongoing relationship seemed to satisfy needs in both women.

"She's [the wife] [has] *been to visit me. I actually have quite a good relationship with her. I feel it's her way of coping".*

"I just like to find out how she's doing, how the children are doing. I feel sad for her".

It would appear as though Gabby had some feelings of guilt that she survived. She felt a sense of responsibility towards Anton's family and liked to make sure all was well with them. This is similar to the nurses who work in Neonatal and paediatric units. They are known to maintain contact with the babies and their families for many years. Macdonald, Liben, Carnevale et al. (2005) describe how parents of children who have died appreciate continued support by the staff particularly "during the bereavement period".

4.3.4.4 Gratitude yet unfinished business

"Gratitude is the sign of noble souls." (Aesop, 2002)

It is "the quality of being thankful" (Oxford Dictionaries, 2012).

Throughout the interviews Gabby expressed how grateful she was for the help and concerns of all who cared for her.

'I'm very thankful and I have a lot of people to be thankful to.

I am just thankful that I am alive".

During the third interview we had a discussion about the nursing staff. I asked whether she knew that the staff had all volunteered.

She replied in a soft voice…

> *"They* [the nursing management] *did tell me that they'd* [the nurses] *volunteered and I just say thank you to them. I will be forever grateful to everybody for what they've done".*

In the final interview I wondered whether there was anything in particular that Gabby felt had contributed to her positive outcome. I asked Gabby if she could identify anything. Without hesitation she said…

> *"The temp*[erature] *monitoring. I am so grateful for the fact that we started monitoring our temperatures when we did,* [I am] *very thankful about the temp monitoring".*

She continued…

> *" ..And I was supported all the way……all the time".*

A diary that the hospital staff had put together particularly touches Gabby. She wanted me to read it.

> **"***That book that everybody gave me, which was such a nice thing to have done. They made the most beautiful book for me. I just look at what people have written to me and sometimes I just feel so emotional. It was just such a special thing to receive".*

Coordinators Diary

During the period of Gabby's illness, the hospital staff creates a diary for her. A notice is sent to all the departments and anyone who wishes to write a note to Gabby is invited to do so. This diary is then handed to Gabby on her discharge. It contains daily wishes and comments from many staff members. Friends and colleagues draw pictures, paste photographs, comment on newspaper articles and generally wish her a speedy recovery. Gabby treasures this diary.

In spite of Gabby's sincere gratitude towards all who participated in her care and successful recovery there remains one aspect of the experience that Gabby cannot come to terms with. She expressed her feeling of guilt. This is said in a sincere manner and she clearly means every word. She had difficulty telling me and I believed she had not shared this information with too many people.

> *"I really and truly felt that um…it was my fault. I had ended up with VHF because I had …… [A long pause] … well I had got it due to my negligence…..I actually got it and I cost the clinic so much money. And then we were all in the news and it was due to me. It was something that I had done wrong along the way with that patient….in my nursing and I had got it".*

I asked her whether she did not consider that lack of a diagnosis and ignorance about the disease was the reason that she contracted the virus. She replies….

> *"Well ignorance or wrong……I had caused all of this and I really did feel responsible for it".*

Coordinators Diary

After Gabby has recuperated we need to integrate her back into the workplace. The coordination team together with the nursing management decide that she should work three

half days for a three week period to allow her to time to adjust to being back at work. She was allocated to the Training department as this was considered less stressful and would hopefully not trigger negative memories.

Before returning Gabby was nervous and said …

> *"I really didn't want to come back and nurse. I don't really know what I wanted. I didn't want to go back to ICU".*

Gabby returned to her previous statements and feelings of guilt.

> *"I thought how can people look up to me? This nursing sister who has been nursing for so long. She actually made a mistake, did something wrong….um…negligence….um….and here I'm back again".*

Coordinators Diary

After about three months Gabby is placed back in ICU.

> *"I did some billing at first and only after a while I got given a patient. Everything came back and I knew what I was doing".*

Coordinators Diary

Allowing Gabby to slowly re-integrate into the ICU setting is deliberate. The coordination team are aware that, like Emma and Anton, Gabby has had a difficult intubation and has been critically ill. We want to ensure that she is able to carry out her nursing duties competently before taking responsibility for full patient care.

[Gabby has resumed her duties as a fully competent ICU nurse and shift leader. She keeps herself informed about VHF and particularly the Ebola outbreak. Although she would not

volunteer to nurse patients with VHF, she confirms that if such a patient is admitted to the ICU where she works, and she is allocated to the patient, she would be fully committed to the nursing care.]

Summary

Theme four discusses how Gabby regains control of her situation and resumes managing patient care. Initially she did not realise that she herself was the patient that she was attempting to "care" for. As she recovered and resumed work, she maintained a relationship with her patient, Anton's wife. [In 2014, Anton's wife tells Gabby that she is involved in a meaningful relationship and is happy. This may be the end of the annual ritual that these two women have shared]. Gabby did not wish to retain any negative feelings towards anyone who may have contributed to the outbreak and spoke of forgiving all who may have played a role. Gabby's overwhelming gratitude for colleagues and friends was strongly expressed. She was very aware that nurses had put their own lives at risk to save her and she expressed her gratitude. However there was one aspect that Gabby had difficulty letting go and that was her belief that she was negligent. This will be dealt with by means of counselling.

Literature.

Very little literature on nursing of patients with Viral Haemorrhagic Fevers is available and most of it reports the period from 1985 to 1995. In 2009, Ippolito, et al. (2009) reported cases of Lassa fever and Crimean-Congo fever that were imported into London, United Kingdom and Turkey respectively. As in our case, these patients did not have a diagnosis of VHF and thus were admitted without appropriate isolation precautions in place. Whilst there were no further cases, Ippolito et al. (2009) revealed that weaknesses in the system were exposed thus placing staff at risk. Our experience supported this and is evidence of the unnecessary loss of life. Honey and Wang. (2012) in their report of an H1N1 study in New Zealand, confirmed that their participants were concerned about the risk of cross infection to team members when observing non-compliance mainly among medical registrars.

Figure 4.1 shows how an unfortunate comment changes the trajectory of a deadly contagious disease.

The second theme discussed Gabby's preparation for admission and the confusing dichotomy of her early days in hospital. The phases of emotion are well described by Kubler-Ross and the findings in this study were similar. As indicated by Kubler-Ross, there was no set pattern in which these emotions occurred. Gabby did not express all the emotions however she experienced most of those described over the full period of her being a patient.

Theme three dealt with the most vulnerable period of her illness. This was the point at which Gabby became a patient requiring intensive care however because of the nature of her illness, she would receive care with a difference - minimal contact. As frequently reported (Lof et al. 2006; Roberts et al. 2004; Samuelson et al. 2007; Zetterlund et al. 2012) and many others describe the loss of memory and confusion experienced by patients in an ICU. This study observed the same phenomena. The fact that the patient was given anti-anxiety drugs will have had an effect on the memory.

An interesting aspect of this period of illness was the dreams. This is well documented (Capuzzo, 2001; Ely et al. 2004; First et al. 2004; Roberts et al. 2004; Roberts et al.2005) Hartmann, (2011) viewed dreams in a slightly different manner and believed that they have a therapeutic effect and reduced the emotion attached to the traumatic event. All the dreams related during the interviews were recalled with clarity.

In this study kindness was reported however the meaning was not connected to the manner in which nursing care was carried out. This kindness was described by the participant as exceptional and beyond that expected during rendering of care. There was mention of this in the literature reviewed.

The last theme dealt with the final timeframe and extended beyond the participant's recovery. Nurse led care is frequently used in the ICU and protocols ensures that a high standard of care is maintained (Cullum et al. 2005). The participant remained a nurse throughout her illness. Unaware that she was the patient she attempted to deliver holistic care to the patient in the bed. After her discharge, the participant maintained a relationship with the wife of her patient. This is not commonly reported in care of adults but is seen in the neonatal units. Macdonald et al. (2005) describe the importance of this continued support during the mourning period of the parents. Finally, the participant expresses her gratitude to those who put themselves at risk for her. However as described by Kubler-Ross, the participant shares her unfinished business and explains that she continues to feel guilty.

4.4 SUMMARY

This chapter has discussed the themes and findings of the data analysis. Colaizzi's qualitative data analysis was used to develop the themes and subthemes. Fifteen subthemes were extracted from the transcribed interviews. Four themes evolve from the subthemes. Triangulation with nursing documents and a diary supported the themes where possible. My privileged information as a member of the coordination team is bracketed. Discussion to substantiate the research findings is found in the next chapter using references to existing literature.

CHAPTER FIVE

DISCUSSION, RECOMMENDATIONS, LIMITATIONS AND CONCLUSION

5.1 INTRODUCTION

This chapter discusses the findings of this study followed by conclusions deduced from the findings and recommendations. The limitations will be identified and commented on.

This research describes an unusual event in which a novel VHF caused an outbreak amongst healthcare workers and resulted in a mortality rate of 80%. The significance of this study was to develop an in-depth understanding of the experience of a nurse who contracted a highly pathogenic novel arenavirus and survived and in so doing, improved the knowledge of caring for patients with VHF. Integration of the management and care of the patient added to the significance and completed the information. In this instance, the opportunity to view the experience from both a nurse's perspective as well as the patient's perspective offered an additional unique opportunity. These goals were achieved by conducting interviews (Appendix F) using the informal interview technique. The study described a patient's attempt and ultimate success in responding positively and adapting to changes in the environment on the health and illness continuum as described by Roy (2008).

This chapter reflects on the lessons learned and identifies the gaps. Literature was used to compare and support the interpretation of the participant's experiences. This included relevant literature available from the West African Ebola experience. The most significant findings from the study were influenced by the four timeframes in which they occurred – Gabby's initial contact with the virus source, her illness timeline, her

experience of extreme fragility and the care she received and then finally her continued involvement with this disease.

The limitations of the study are highlighted. Implications of this study have been discussed. The conclusions of the study end this chapter.

5.2 SUMMARY OF THE STUDY

The purpose of the study was to explore and describe the experience of a nurse in a private sector hospital after contracting a highly pathogenic novel haemorrhagic fever from a patient and to provide a detailed description of the management of the person and environment through the stages of her illness, with a view to offering a baseline from which nurses and hospital management can prepare for an admission of a patient with suspected or confirmed VHF.

The objectives of the study were:

- To explore the experience of a nurse during the monitoring, admission, disease and recovery phases, of a novel arenavirus outbreak.
- To triangulate the information with
  - Documented nursing care of this patient using nursing records and daily documents.
  - Analysis of the “outbreak diary”, compiled by the hospital coordinating team.
- To consider the relevance of the experience during an episode of critical illness and its importance in rendering support of health care workers in similar situations.
- To make recommendations for the care of a patient who has contracted or is suspected of having contracted a VHF.

5.3 DISCUSSION OF FINDINGS

In the previous section, themes identified have been discussed and excerpts given to illustrate the content. The findings were grouped into four themes. Fifteen sub themes were extracted and grouped from the main themes. It was difficult to collapse the themes any further since the interviews covered Gabby's experience over a two-month period and pertained to Gabby's time as an intensive care nurse, a contact on the monitoring list and finally as a patient. Her experience as a patient took her from admission into an isolated suite, then into the intensive care isolation area to be ventilated and lastly into a recovery ward before discharge. She returned to work after a period of three months but was monitored in the workplace before being allowed to resume her duties as an intensive care nurse. Once again, Gabby needed to undergo adaptation as described by Roy (2008) in order to resume her original role as an ICU nurse (Figure 5.1). Roy's adaptation model was found to be very relevant in this context. This complex journey from nurse to patient and back to a nurse, created a variety of experiences, each of which added to the richness of this study. I have identified the main concepts that emerged from each of the four themes. In this section I provide a thick description of these concepts which underpin the themes discussed. The description is supported by references to relevant literature.

Attention to detail

The first concept that came through strongly was the attention to detail in the transfer or handing over of the patient and the history. Transfer of a patient occurs at change of shift when the nurse caring for the patient hands over the care to a nurse from the next shift. Bruce and Suserud (2005) and Chaboyer et al. (2010) both describe the handover as passing the information to the next team. In their study Chaboyer et al. (2010) drew attention to the fact that it was more than just information that was handed over. In fact it included responsibility and accountability for the patient. Details of the care given during that shift and the patient's response generally formed the core of the handover.

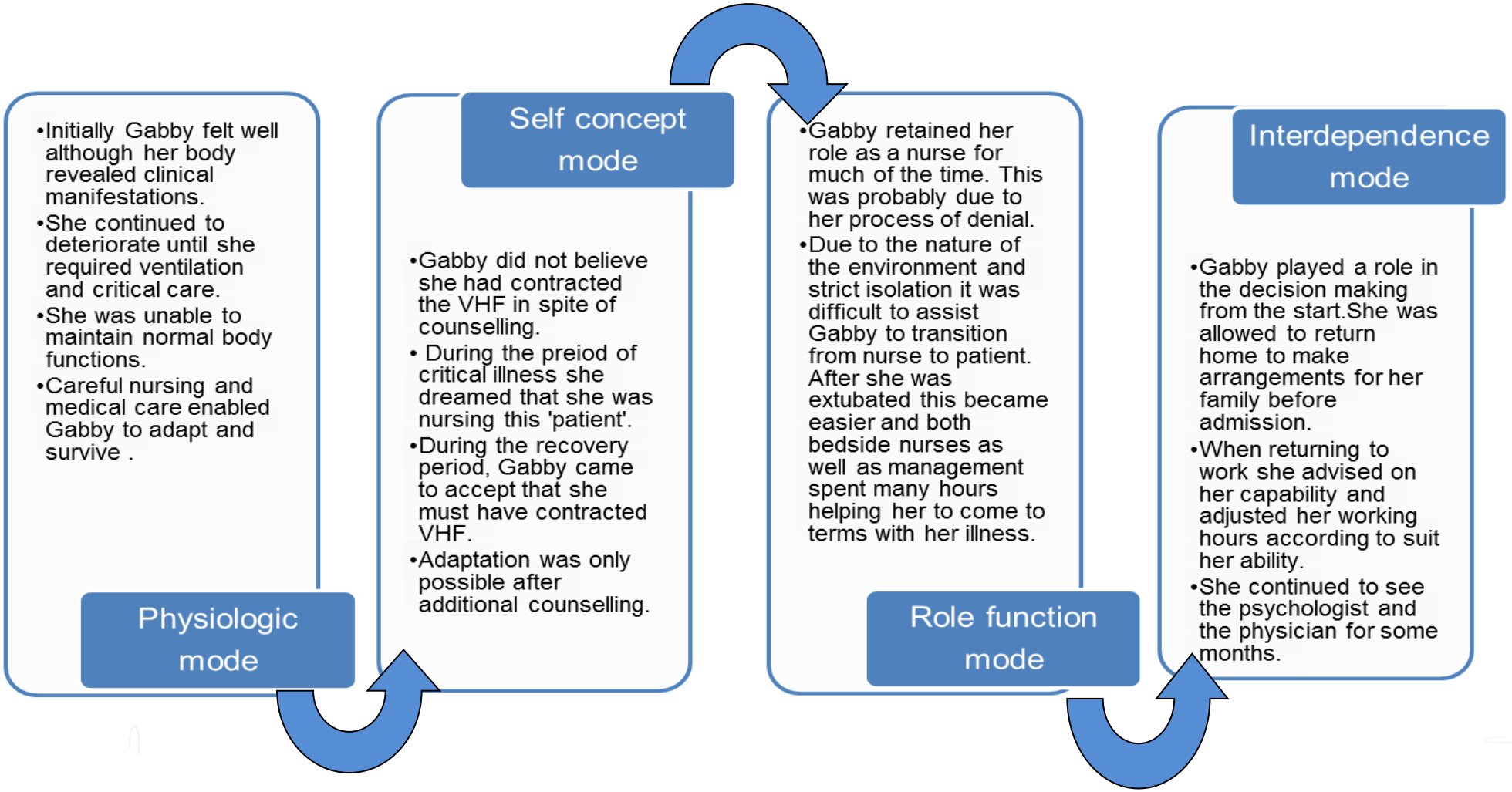

Figure 5.1 Modes of adaptation according to Roy's adaptation model (2008)

An equally important period occurred in this study, during the admission period when the patient was admitted and handed over from the ambulance and air evacuation transfer team.

Anton had arrived by air from Zambia and was admitted to the intensive care unit. Gabby demonstrated the importance of attention to detail in her account of the hand over. She was very particular with the details of the clinical manifestations. The way that she described them emphasized the fact that they were important to her. Bruce and Suserud (2005) and Philpin, (2006) agree that this information forms the baseline from which future treatment will be established thus resulting in continuity of care. As confirmed by Bruce and Suserud (2005) the clinical presentation and the interpretation thereof would be the starting point for the care plan that Gabby would put in place.

Along with the need for an accurate and detailed handover was the importance of obtaining a relevant history. Jarrett (2015) confirmed that a history linking the patient to VHF was essential. Reaves' et al. (2014) however considered a case to be suspect if there was an acute fever together with three other symptoms was present. One must bear in mind that the criteria in Reaves et al. (2014) study was set during outbreak conditions in countries with limited resources and therefore the risk was significantly greater than in the Northern suburbs of Johannesburg. Similarly Frieden, Damon, Bell et al. (2014) highlighted the importance of history taking to avoid continued spread of the Ebola outbreak in West Africa. Another example which confirmed the need for delving into history was described by Richards et al. (2000) when extensive history was required in order to trace the index patient and the exposure of the first Ebola patient in South Africa. She had never been outside the borders of this country. Weaknesses in the system of not recognizing and therefore not isolating patients remain a concern (Ippolito et al, 2009). With the chance of VHF in mind Gabby was asked about possible contamination by blood of slaughtered animals. She was also asked whether she kept primates on her property.

To control the transmission of a fatal virus depends on vigilance and was another aspect of attention to detail. The two initial patients who were admitted from Zambia had unrelated medical diagnoses and thus a contagious condition was not considered. This put the healthcare workers at risk of cross infection particularly when the correct infection control and use of PPE was not in place. This concern was confirmed in Gabby's narrative. Similarly, Mailles et al. (2013) described an outbreak of Middle East Respiratory Syndrome Corona virus (MERS-CoV) in France in 2013 and highlighted the challenges that staff faced when patients presented atypically. They stated that this increased the risk of staff contracting the illness and that it pointed to the need for more knowledge about the particular virus and disease. Corley et al (2010) found during an H1N1 pandemic in Australia in 2009, that the staff responsible for patient care was confused about when the patient was infectious or non-infectious. They also reported that nursing staff perceived that there was no policy to guide the confirmation of the patient's infectious status and advice was sometimes conflicting. Infection prevention requires distinct actions in order to diminish the chances of cross contamination. Daugherty et al. (2009) described the importance and the use of PPE in controlling the impact of infection among ICU staff in respiratory diseases such as SARS and influenza and in doing so, maintaining a healthy workforce. These researchers pointed out the importance of using the correct PPE, in the correct manner for each transmissible disease. In contrast to Daugherty's et al. study, the hospital group in which the Lujo outbreak occurred had policies that guided practice both for patients admitted with a fever from beyond South African borders as well as patients with suspected VHF. The policy relating to patients from beyond the South African borders was put in place but it was insufficient to control the spread of VHF.

The findings in this study suggested that managing contagious outbreaks required specific skills and input from senior staff that were in a position to make decisions or change policy should this be necessary. A number of researchers managing outbreaks of

SARS or influenza agree strongly. Hospital preparedness for outbreaks of infectious diseases is questionable in any setting. This is highlighted by the international media in the recent Ebola outbreak, not only in West Africa but in Europe and America as well. Maunder et al (2003) report an outbreak of SARS in Toronto, Canada in which a command centre is established with “key senior administrators”. A senior nurse and the “Chief Information Officer” led the team. Medical staff was also represented by a senior member. These researchers explain how additional experts, such as microbiologists, were included as the need arose.

Control of outbreak diseases included contact tracing. No outbreak can be brought under control if it cannot be contained. Very little appears in the literature about contract tracing or surveillance. Maltezou, Andonova, Andraghetti et al. (2010) mentioned that in 2010 there were no details for contact tracing of CCHF in Europe. Van der Wal et al.(1985) offered one of the earliest and possibly most descriptive procedures of contact tracing. This procedure was very similar to the way in which contact tracing and surveillance was carried out in our outbreak study. These authors described how a team of senior nurses were responsible for controlling a list of persons who were in contact with known patients and the ward area. They carried out daily screening on an “outpatient” basis and arranged for symptomatic contacts to be examined and admitted to a “high security” area, until diagnosis was confirmed. The timeframe for this monitoring was not discussed.

Mailles et al. (2013) has offered a definition of “contacts” used in the MERS-CoV. This differed from the definition used in the Lujo study as transmission of MERS-CoV is airborne. These contacts measured their own temperatures twice daily. Frieden, et al. (2014) and Reaves et al.(2014) mentioned that the contacts were traced and monitored for 21 days after exposure to an infected person. This is what is considered correct for VHF contacts and it was what was done in this study. Jarrett (2015) and Sewlall et al. (2014) simply mentioned that name taking and contact tracing was carried out. The

manner in which contact tracing and surveillance should be done needs more research. In the present Ebola outbreak some countries wish to quarantine all health care workers returning from duties in West Africa. Dr Craig Spencer, a survivor of the West African Ebola outbreak believes this is over stepping the mark since only symptomatic patients are contagious (Spencer, 2015). The threat of quarantine may drive people underground (Kerstiëns and Matthys, 1999; Jarrett, 2015), a dangerous possibility since as Frieden et al. (2014) point out, only one missed case may start “another chain of transmission”.

Fortunately the hospital in this study has a nurse at management level whose main responsibility included infection prevention and it is this nurse to whom Gabby reported her concerns. The coordination team was assembled consisting of the hospital manager, a senior nursing manager, the infection control manager, an intensivist physician, myself as the expert nurse, managers to deal with hospital communication, clients, media, finances, and senior nurses to drove the contact tracing.

Support and criticism - the good and the bad

Collegial support and advice was considered another important aspect in this study. Collegiality implies equal power is given to all members of the collegial group and this was how the coordination team in this study operated during the outbreak.

Sharing of information is cornerstone to the smooth running and successful management of an outbreak. Multi-disciplinary and cohesive teams are necessary to make decisions which are sometimes difficult and may result in ethical dilemmas.

Sewlall et al. (2014) confirmed when reporting on the Lujo VHF outbreak, that a decision “not to admit to ICU” was made by the treating doctors of Case 3 in the outbreak because of the limited facilities and circumstances available at that hospital. Ethical dilemmas relating to withholding of treatment are not addressed in literature discussing outbreaks.

Just as the staff need support in caring for patients with VHF, this study showed that support was equally important to the patients.

The need for sharing was displayed by Gabby when, prior to admission, she told all her friends and colleagues about her situation. She was comforted by their rallying around her. Maunder et al. (2003) confirmed this. They studied the psychological and occupational impact of the SARS outbreak in Toronto in 2003 and stated that just knowing that your friends were there for you was sufficient to get through the crisis.

Support and encouragement resulted in positive outlooks. Criticism breaks down the morale and drive of the staff. This was shown clearly in Figure 4.1 when there was questioning and criticism by a doctor related to the infection prevention and use of PPE initiated by the nurses. This reprimand had a negative effect on the management of infection prevention resulting in the prevention regime being reduced to standard precautions and as noted by Ergönül, (2006) and Jansen van Vuren, (2011) staff are placed at risk of infection. Ergönül (2006) described how hospital health care workers are at "serious risk of transmission" during an outbreak of CCHF in South Africa as they were exposed to bleeding patients.

Emotional passage

The findings in this study suggested that fear of the unknown influenced the nurse's ability to control and thus rendered the nurse powerless for a while. These findings were consistent with Chung et al. (2005) and Corley et al. (2010). In their study on caring for SARS patients, Chung et al. (2005) discussed the nurses' account of "the sense of powerlessness" as a central element of emotion and related this to the fact that they were dealing with was unknown. Corley et al. (2010,) on writing about the experiences of health care workers during the H1N1 influenza outbreak, identified that there was fear of the disease itself. This resulted in the staff feeling vulnerable. Maunder et al. (2003)

described how uncertainty influenced and increased the perception of “personal danger”. As in the Lujo outbreak, the perceived danger was heightened by the dramatic reporting in the media (Maunder et al. 2003).

Loss of control appeared to be an important finding. This feeling was possibly exaggerated by the fact that ICU nurses were more comfortable being in control of their environments and patients. Admitting that she had made out her will was a sign that Gabby acknowledged both fear and the fact that she was no longer in control. As an extremely good and competent ICU nurse with many years experience, it was strange for her not to be controlling the situation. This need to control emerged again in the final theme when Gabby was ventilated She shared with me that on a number of occasions she thought she was nursing the patient (herself) and questioned why the patient was not receiving physiotherapy. Anecdotal evidence suggests that health care workers are difficult patients because they judge the care that they receive. This may be their attempt at being in control. This concept of loss of control could not be found in the literature.

Guilt is a feeling that patients express usually in relation to inconveniencing family and staff. This was confirmed in these findings. Gabby had guilt feelings for a number of reasons. Initially she believed that it was her own fault that she contracted the disease. The inconvenience to her family and friends added to her guilt and this was increased when all her contacts were placed on a list and monitored for 21 days.

Chiang (2011) examined the perceptions and experiences of ill patients and “their main family carers or support persons” in an ICU setting. Chiang’s (2011) study suggested that there was involvement with the patient and their carers which continued after discharge from hospital. In this study Gabby told how she continued seeing Anton’s wife for a period of nearly five years after his death. This practice of reunions with family of a patient is common between the parents and neonatal nursing staff but not commented on in the

literature concerning adult patients. When asked why the contact continued, Gabby immediately mentioned that she had survived and Anton had not. She maintained that she felt sorry for his wife who had to raise small children. This symbiotic relationship seemed to have benefited both women and may have decreased the guilt Gabby was feeling thus resulting in a mutual healing process.

In this study an additional cause of guilt to Gabby was the cost of the outbreak and she expressed that she still felt this guilt. Although Gabby was referring to financial loss to the company as a result of her illness the real cost of outbreaks of VHF is far larger. The outbreak in this study occurred in the private sector and thus the costs of equipment and supplies were borne by the hospital group. The only literature contributing to financial costs discussed the opportunistic response of a pharmaceutical company who charged Gabby $ 45 000 for the intravenous Ribavirin course (Richards et al, 2009). However as I was part of the coordination committee, I am aware that an amount of close to R2, 000,000 was spent. This does not include loss of earnings due to the decrease in admissions and theatre business for the duration of the outbreak nor the cost of additional staffing. The cost of outbreaks such as the latest Ebola outbreak in West Africa is multifaceted and includes loss of other medical treatment such as malaria prevention, (www.who.int/mediacentre/news/releases/2014/malaria-control) due to closure of clinics and hospitals, loss of trade resulting in “catastrophic” economic hardships (World Bank Group, Press release, 8 October 2014) and worst of all great loss of life amongst healthcare workers.

Finally after a period of nearly four months, Gabby was able to return to the ICU and take full charge of both patient care as well as managing the unit.

Kindness

This study identifies kindness as one of the actions of key importance to the critically ill

patient. Kindness is a word not often used in nursing literature. Good nursing care is considered to be in place if competence, compassion and commitment to the patient is present. There is an abundance of literature describing compassion and empathy in ICU patients particularly if they are ventilated (Granberg, Bergbom Engberg, and Lundberg, 1998; Hofhuis, Spronk, van Stel et al. 2008; Magnus and Turkington, 2005. Samuelson et al. 2007).

In these findings the use of the word kindness did not relate to good nursing care. The examples used by Gabby imply a much deeper meaning and include actions way beyond the call of duty. Gabby's examples of this kindness include a colleague bringing a McDonald's breakfast in a basket, the hymns sung daily outside her ICU ward by the staff at change-over and the soft music played to her by a colleague whilst chatting at her bedside. This made a lasting impression on Gabby.

In literature on the caring of patients with cancer, kindness is linked to spiritual care. Johnston Taylor, 2003 states that when giving patients spiritual assistance, the initial response should be "kindness and respect". In her study, the participants felt spiritually nurtured when kindness was shown. They maintain that "this kindness and respect is shown in very simple ways".

5.4 RECOMMENDATIONS

This chapter makes recommendations based on the findings of the study. This research examined the experience of a nurse who contracted a deadly novel VHF and attempted to identify some of the unique challenges for management and the care team that arise from the admission of such patients to a hospital. It explores the particular needs of patients who are nursed in strict isolation and thus totally dependent on the nurse for survival. The study identifies the importance of infection prevention and suggests that nurses at

management level should ensure that these policies are available and that these are available to nurses at ward level. The recognition of needs and support given to the staff at the bedside includes frequent visits by a management or coordination team members who play a supportive role in the bigger picture of the outbreak.

The recommendations have been grouped into three sections, those that will influence direct nursing care, those that require decisions and assistance from managers or require insertion into a training programme and lastly those that beg more research.

5.4.1 Recommendations for Nursing Practice

The nurse's role in this study emerges as multifaceted. Routine and basic nursing principles are highlighted as turning points in outbreak control. The experience in this study emphasizes the importance of history taking, patient assessment and the handover when dealing with the unknown. Care plans based on the information acquired assist with improving the condition of the patient. Patients may present with what appears as harmless symptoms if early monitoring is in place. This study revealed significant changes to the patient's blood profile when very few symptoms were present reinforcing the need for accurate monitoring.

The study suggests that use of correct infection prevention techniques was central to the control of the outbreak. Infection control policies should be available at ward level and staff needs to be aware of standard procedure. Special training is required for donning the Hazmat® suits and re-training should continue throughout the outbreak. Isolation and limiting the number of staff exposed results in less contacts and thus less possibility of infecting HCW.

5.4.2 Recommendations for Nursing Management

Lack of hospital preparedness was identified as a serious concern in the SARS

outbreaks. Policies should be put in place that address managing and guiding practice in the event of an outbreak. The hospital in this study fortunately had a policy in place.

Selecting a coordination team to address the day to day managing of the outbreak is important. This team forms the core of the many arms of outbreak management. The findings of this study suggest that the members should be selected for their skills and should include members of hospital and nursing management, medical practitioners, technical staff communications personnel and a financial manager. They should be senior enough or be given the authority as a result of experience, to make decisions regarding patient treatment and isolation, placement of suspected and confirmed patients, maintaining a supply of PPE, arranging support for staff such as counseling, attending to communication both within the hospital as well as supplying Media with accurate information managing the deceased and the list grows.

One of the earliest responsibilities is to trace and monitor contacts. This requires a dedicated group who will be solely responsible for identifying all contacts and maintain the surveillance. They should report to the coordination team.

This research identified many emotions that caring for patients with VHF had induced. The uncertainty of the diagnosis prompted anxiety and fear. This was followed by a feeling of loss of control and powerlessness. Guilt was a prominent emotion that was complex. This guilt was still present at the time of the interviews. Some comfort was achieved by sharing the information with colleagues and family. Counselling is recommended from early in the outbreak and as the findings of this study show, this should continue for some time after the event.

5.4.3 Recommendations for Nursing Research

Viral haemorrhagic fevers are uncommon and in that lies their greatest impact. The

majority of countries will never experience these dreaded diseases. However it only takes one patient with VHF to create devastation in the health system. This study has explored the softer and less dramatic side of outbreaks, the patient's experience, as well as the important aspects of successfully managing and resolving an outbreak. The findings exposed areas that require further studies.

Ethical dilemmas will arise during outbreaks. The countries most affected are under resourced and many do not have facilities to care for the critically ill patient with VHF. Supplying PPE takes funds that would normally be used for maintaining the health system. Should treatment be withheld in the critically ill patient?

The literature reports that visitors should not be allowed in or should be restricted. This study allowed the family including teenage children to visit, provided that they were dressed in PPE. The benefits of visitation were considered important for both the patient and the family. Did this put them at unreasonable risk?

Literature studied does not describe the concept of kindness as expressed in this study. The closest comparison was identified in oncology literature however it remained good nursing care rather than caring beyond nursing. This warrants further study as I believe it does exist when the patient and nursing staff share a special relationship.

5.4.4 What this study adds.

The results of this study reveal some aspects which are important to managers and nursing staff dealing with outbreaks of VHF. The fear of contracting and transmitting the disease, adequate infection control measures, morale levels, availability of counselling, education and communication are highlighted.

The findings and recommendations will provide valuable information for health care workers and policy makers in assisting them to plan adequately for future outbreaks.

5.5 LIMITATIONS OF THE STUDY

This study was a case study with a single participant. This method may be criticised for various reasons including that one cannot generalise from a case study, however, it offers depth of information and thick description and herein lies it's strength. This information will help fill the gap in literature.

The fact that the patient was strictly isolated with minimal contact by nursing staff resulted in the reduction of some nursing activities. There was therefore less data collected in the early stages before a diagnosis was confirmed and this had an impact on the process of triangulation.

The researcher accepts that there may be different interpretations and thus different themes extracted from the narratives in other contextual settings.

5.6 CONCLUSIONS

Because viral haemorrhagic fevers are contagious diseases with a high mortality, particularly among healthcare workers, it is essential that the diagnosis is confirmed without delay. Appropriate PPE should be commenced even if evidence is not available but a high index of suspicion is present. Infection prevention and isolation is part of nursing care and policies should be in place to guide nursing practice. In this study, the nurse became the patient and so valuable information was able to be obtained from the participant in real time settings. The participant's experiences in the four timeframes give valuable information about aspects of outbreaks of VHF that are seldom shared and shed light on how the patients live through the event.

This study shows the importance of paying attention to the smaller details particularly

during history taking. Misdiagnoses and atypical presentations may and do occur and this places healthcare workers at risk. The knowledge and then wearing of the correct personal protective equipment is paramount and hospitals should set down policies in line with WHO and CDC guidelines. Policies however are meaningless if not accompanied by training.

Tracing of contacts of confirmed cases is important to contain the outbreak. Once identified, surveillance, which requires monitoring of temperatures twice daily, is carried out for a period of 21 days. The idea of quarantining contacts tends to drive the suspected cases underground and may start a fresh transmission.

Collegial support was identified in this study and the contribution to the success of managing the outbreak is highlighted. Ethical dilemmas could be addressed collectively and reduce the burden carried by individuals. Support for the patients is also important. The role of family, friends and colleagues and contact with them becomes important. Allowing access to these support groups in patients isolated for VHF needs to be explored.

Emotional upheaval in ICU patients is well documented in the literature. This applies to any critical illness even if the patient is not in an ICU environment. Fear of the unknown, feelings of powerlessness and loss of control were central elements in this study as was feelings of guilt. The findings suggest that the guilt may linger on for years and patients may require further assistance. Kindness beyond that expected as part of good intensive nursing care, was a novel finding in this study and is worthy of future research.

The 2014 outbreak in which over 23,000 persons have contracted Ebola, just under 10,000 have died and more than 3000 HCW contracted the disease (www.cdc.gov/vhf/ebola/health) is a reminder of how devastating a VHF outbreak can be.

Although the outbreak started in West Africa, Spain, United Kingdom, America, Nigeria and Senegal were affected by imported cases, proving the need for preparedness.

This study has shared the experience of a colleague who contracted a deadly disease and survived. It confirms that she behaved as one would expect many ventilated ICU patients to behave. The study however exposes the gaps in the literature when the ICU patient has contracted a VHF and nursing requires skills that are not necessarily taught during nursing training. The unique findings in this study include the need for more research on the perception of kindness and methods of dealing with a wide display of emotions whilst nursing in extremely difficult conditions of isolation. Ethical dilemmas related to admitting this type of patient to ICU in resource poor countries can be debated. However, how can you refuse admission when in Gabby's own words, "your normal daily job becomes deadly".

In order to fulfill the purpose of this study four objectives were set and they have been achieved.

5.7 ADDENDUM

Because, VHF outbreaks generally occur in the tropical regions, it is unusual to admit a patient to a hospital in other geographical areas. For completeness and because of my experience with outbreaks, I have included a guide in the form of a checklist (Appendix J) for readers who may be required to assist in outbreaks. It can be altered to suit the situation and context. This guide did not form part of the study but has been added to assist in containing future VHF outbreaks.

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R14/49 Ms Andrea Hayward

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M130432

NAME: (Principal Investigator) Ms Andrea Hayward

DEPARTMENT: Department of Nursing Education
CM Johannesburg Academic Hospital

PROJECT TITLE: The experience of a Nurse who Survived a highly Pathogenic Novel Arenavirus

DATE CONSIDERED: 26/04/2013

DECISION: Approved unconditionally

CONDITIONS:

SUPERVISOR: Dr Gayle Langley

APPROVED BY: _____
Professor PE Cleaton-Jones, Chairperson, HREC (Medical)

DATE OF APPROVAL: 24/05/2013

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 Secretary in Room 10004, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. I agree to submit a yearly progress report.

_____ _____
Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix B

Letter to the Mediclinic Morningside hospital manager.

Mediclinic Morningside
c/o Hill and Rivonia Streets
Morningside
SANDTON

16 April 2013

Dear Mr. Erasmus

Re: PERMISSION TO CONDUCT RESEARCH FOR MSc (NURSING)

I, Andrea Hayward, am currently registered as a student with the University of Witwatersrand for the degree of Master of Science in Nursing (Dissertation). I would like to request permission to conduct a research study at Mediclinic Morningside.

This study pertains to the Lujo Outbreak of 2008 and the research proposal is attached for your perusal. I have also attached the approval from the Ethics Committee of the University of the Witwatersrand.

Since Mediclinic Morningside is a referral hospital for critically ill patients from the whole of Africa, this research will benefit both the hospital and the community at large and the results will add value to the management of similar patients in future.

Yours sincerely

Andrea Hayward

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MEDICLINIC

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31 May 2013

Ms A Hayward
7 York Road
PARKTOWN
2193

Dear Andy

PERMISSION TO CONDUCT RESEARCH AT MEDICLINIC MORNINGSIDE

Your research proposal entitled *"The experience of a nurse who survived a highly Pathogenic Novel Arenavirus"* refers.

It is in order for you to conduct your research at Mediclinic Morningside, and I wish you success with this project.

Yours sincerely

Estelle Jordaan
ESTELLE JORDAAN
Nursing Executive

Appendix D

Permission from the participant.

THE EXPERIENCE OF A NURSE WHO SURVIVED A HIGHLY PATHOGENIC NOVEL ARENAVIRUS

I agree to participate in this study. I have read the proposed method of data collection and understand that I will be able to make alterations during the process, should I not agree with the interpretation. I also understand that the researcher will maintain my privacy.

I know that the Human Research, Ethics and Publications Committee of the Faculty of Health Sciences, University of Witwatersrand has approved the study and I am aware that the results will be used for scientific purposes and will be published.

I hereby agree to participate in the study.

…….

Name of participant

…….. ……

Signature Date

Appendix E

Permission from the participant.

THE EXPERIENCE OF A NURSE WHO SURVIVED A HIGHLY PATHOGENIC NOVEL ARENAVIRUS

CONSENT FORM FOR RECORDING A CONVERSATIONAL INTERVIEW

I have been given the information about this study. I have read the proposed method of data collection and understand that this will include a tape recording of the conversations.

I will be able to make alterations during the process, should I not agree with the interpretation.

I consent to the researcher recording the interview and understand that my name will not appear in any documentation.

…….

Name of participant

…….. ……

Signature Date

…….. ……..

Witness Date

Appendix I

TRANSCRIPT ONE
SIGNIFICANT STATEMENTS

A. Ok Gabby, I think lets start and you can stop if you need to or if you want a break. Let's start with your experience of the admission of Anton. You admitted him didn't you?

G. Yes.

A. So lets start from there.

G. Okay. Um..he was admitted on the Saturday. We were expecting him. It was Dr XXXX's patient. I think it was just after lunchtime I can recall. The patient was from Zambia and he was coming in with what he'd [doctor] said was a septicaemia. He came on the 27th of September. I remember it was my weekend on [duty]. He [patient] was awake, was with it. The paramedics brought him in. He...we connected him to the monitor. I remember…… his temp[erature] was very high. I think that it was like 40 C .

We were wearing, at that time, we had gloves on and we had aprons on. We didn't have ....gowns on [maybe a bit of guilt] . He still said he' d had a headache and was nauseous. He had a rash. Those are the things that I can recall. I didn't write those notes down on admission

A. That doesn't matter for this interview.

G. He did have a rash when we took..... we took the t shirt off...you could see the rash. Like this generalized rash on his body and ...and he was pyrexic..and that's all that I can really remember from when he first got there. His wife was there later on. But she was just worried about him and that's it. She didn't think that things were right and she was really worried that he might have been connected to that previous pt that he'd brought down to South Africa. Who [hesitated] was diagnosed with tick bite fever.[smiled].... who had passed away.. who was diagnosed

with tick bite fever. She[wife] was worried that there was this connection. I must admit that I hadn't seen the patient that he brought down. I was nursing another patient when she was here, I was looking after a ventilated baby so I didn't have much to do with her at all other than the fact that I was there. Dr XXXX did that brain death test ...the students were there and they wanted to see it and .....I was there when that was done.

A That was on the woman ?

G...yes.. what was her name...

A. Emma

G. And then for him I was there that Friday, Saturday and Sunday that he was admitted. He was nauseous . He had diarrhea. He didn't eat much...didn't want to eat, he was just nauseous all the time. Shame and I can remember the one day that..um.. his wife had come in and she was worried that he was not eating and that night she said to me...how do you give that “ABC” food.. You know apples bananas and carrots when you had diarrhoea [laughing] he had diarrhoea as well. And vomiting and I remember I had mashed up the banana and he'd eaten it and she phoned to ask...how was he doing and I told her that he was much better. And lo and behold just after that he went and vomited all that banana and everything..[laughing] ..but ..that was just it.

that was the sat and the sun and I think sun we put up the central line. His platelets were low and then...that's right ....and then On the Saturday evening we were wearing gloves, gowns and masks.

A. What was the reason you decided to change?

G...because probably we should have[done so] before we started because he came from out of Africa and in actual fact it was on handover that night that Florence said to me.. we should have been

wearing gloves,gowns and masks since[from the time that] he arrived. We did that straight away then.

Um. Another thing, he was...he was perspiring profusely all the time. You could see it. Not so much when he got there but after that he was perspiring. After we'd given the Perfalgon his temp came down. It was never high again. I mean as what it was on that first day, from what I could recall. Um...so we were wearing these PPE's and I know that during this time I couldn't believe.....we just washed him and we changed the linen and just after that he had this like glistening.. and I thought what is going on now and I felt him with the back of my arm. And I said (amazement) you're perspiring again. I can remember that...?

A Did that worry you?

G. Um...well after saying that, maybe...this was the way that um I had contracted it. Maybe it could have been.

A. So now in retrospect do you think that might have been the contact point?

G. It could've been. I know that I did that, I know that I was in contact...but at the same time I don't know of any cuts or abrasions that I could have had at that time. Um I'm very aware of that. Um that I ....that is what I did.

We put in a central line, we put in a dialysis line and he bled profusely from those lines. I cant remember if it was with insertion or later. Um Dr YYYY was adamant that um it was a um what do they say....a TTP. His blood (the patient's) even went up to the lab(oratory). He (doctor) went to go get it himself. To go get the platelets. That kind of thing and he was absolutely adamant that it was that kind of thing (TTP) that we were dealing with. And I know that at one stage he'd said as well that we didn't have to wear any kind of protective clothing because that is what it was.

A. So what did he say it was?

G. Um....a TTP. That's what he was adamant about then, that it was a TTP. In actual fact I can remember we had to give platelets before we put up the central line but the platelets had arrived the night before and we only gave them the next morning.
It was like a whole big story….(laughs)....with these jolly platelets. Previously people had put them in the deep freeze …we had to leave this lot out so there that we could give them.
That was Saturday.

Appendix G

Mediclinic Morningside
c/o Hill and Rivonia Streets
Morningside
SANDTON

16 April 2013

Dear Mr J Erasmus and Mrs J Erasmus

RE: PERMISSION TO USE THE CONTENTS OF THE OUTBREAK DIARY.

I, Andrea Hayward, would like to request permission to use the contents in the 'Outbreak Diary' as a source of reflection as part of the research methodology for my MSc Nursing.

This study pertains to the Lujo Outbreak of 2008 and the research proposal is attached for your perusal. I have also attached the approval from the Ethics Committee of the University of the Witwatersrand.

Since Mediclinic Morningside is a referral hospital for critically ill patients from the whole of Africa, this research will benefit both the hospital and the community at large and the results will add value to the management of similar patients in future.

Yours sincerely

Andrea Hayward

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Appendix H

INFORMATION SHEET

Good day. My name is Andrea Hayward. I am conducting research for the purpose of obtaining a Masters degree in Nursing at the University of the Witwatersrand. In this study my focus is on the experience of Health Care Professionals when they have contracted a disease from a patient. In this particular instance I will report on the experience of you as a staff member who has contracted a highly pathogenic novel haemorrhagic fever virus. There are many studies that look at the disease epidemiology of viral haemorrhagic fevers, however, to date there is very little research on how the Health Care Professionals experience the event. This research project aims to explore in greater depth, this experience as perceived and lived by you, a front line nurse. I hope that the results of this research will identify issues that are important for the support of Health Care Professionals and that they can be included in the planning and clinical protocols of future outbreaks. May I invite you to participate in this study? Should you agree, your participation will entail being interviewed by me at a time and place that is convenient to you. The interview will last for approximately 1 hour. The interview will be recorded, with your permission, in order to obtain maximum accuracy of the research. Your participation is voluntary and you may decline should you not wish to participate with no consequences. You may refuse to answer any question and you may choose to withdraw from the study at any point. An example of the type of question would be: “Tell me about the period that you were being monitored as a high risk contact”.

Although complete confidentiality or anonymity cannot be guaranteed as the episode was widely published in the media at the time, every attempt will be made to keep your responses confidential. I intend to audio record the interview. All the digital audio recordings and transcripts used in this study will only be accessed by me and my research supervisors. The interview material will be kept in a secure location at all times and all electronic transcripts will be password protected. The nursing documents are held by the management of the hospital and I will not remove any from the hospital premises. Once I have written up the research, the

transcripts, recorded material and interviews will be retained in a secure location at the University
of the Witwatersrand for a period of 6 years if no publication ensues, or for 2 years following publication in an accredited academic or professional journal.

The results of this research will be reported in a dissertation. A summary of this dissertation will be made available to you on written request.

Should you wish to contact me, or if you require any additional information, my contact details are below.

Kind regards

Andrea Hayward

Contact details:
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Tel: 011 4884271
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MEDICLINIC

CORPORATE POLICY

MANAGEMENT OF A PATIENT WITH A VIRAL HAEMORRHAGIC FEVER

Purpose

The purpose of this policy is to provide guidelines to the personnel caring for patients with a suspected or confirmed viral haemorrhagic fever in order to prevent horizontal transmission to other patients and personnel.

The policy includes:

- Clinical features/mode of transmission of a viral haemorrhagic fever (VHF)
- Guidelines pertaining to standard and transmission-based precautions
- Guidelines pertaining to the collection and transport of specimens
- Guidelines pertaining to the follow-up of contacts
- Guidelines pertaining to the cleaning and disinfection of the isolation room

Scope

This policy is applicable to:

- Housekeeping personnel
- Medical practitioners
- Members of the multi-disciplinary team
- Nurse practitioners
- Relevant service providers
- Visitors

Policy statement

Infection prevention and control precautions are to be adhered to, to prevent the transmission and contamination of the environment, patients, visitors and personnel with a viral haemorrhagic fever.

Responsibilities

Person	Responsibility
Clinical risk manager (CRM)	• Assist with the identification and setting up of an area that can be utilised for the isolation of a patient with a VHF • Assist and advise on the implementation and adherence to isolation precautions in the designated isolation area • Inform the Department of Health telephonically of a suspected and/or confirmed VHF case • Complete the GW17/5: Notification of notifiable medical conditions and fax to the Department of Health • Liaise with the Department of Health regarding the management of the patient and the follow-up of contacts (including household contacts) • Notify the Mediclinic Infection Prevention and Control Specialist • Ensure that all contacts are identified and monitored • Provide feedback to the members of the hospital multidisciplinary team • Provide guidance to the donning and removal of personal protective equipment (PPE) • Provide “on the spot” training in collaboration with the training and development consultant • Supervise personnel during the care of the deceased, in the event of death • Supervise and advise nursing personnel when the room(s) are terminally cleaned and terminally disinfected • Assist client service manager in providing the correct information to the media • Contact healthcare risk waste (HCRW) removal contractor and make arrangements for immediate removal of HCRW
Client services manager (or delegated person)	• Liaises with media • Prepare media- and press releases • Liaise with the clinical personnel (treating medical practitioner, clinical risk manager or expert on VHF) involved in the treatment of the patient before providing any information to the media • Coordinate meetings with the multidisciplinary team where indicated
Hospital manager	• Liaise with the media in collaboration with the client services manager • Liaises with the client service manager on media releases • Liaise with Mediclinic Exco if indicated • Support nursing team

Continued...

Responsibilities, continued

Housekeeping	Adhere to correct cleaning methods where applicable • Housekeeping **personnel must not take the primary responsibility for the cleaning of the isolation area** (it is the responsibility of the nursing personnel) • Daily cleaning of the isolation room **must be done by the nursing personnel working in the area** • Housekeeping personnel are not responsible for the first terminal cleaning and disinfection of the high risk patient area • Ensure that separate cleaning equipment is used and discarded after the final terminal disinfection • Wear appropriate PPE • Cleaning and terminal disinfection of the room must be monitored
Infection prevention and control specialist (corporate office)	• Assist and support the CRM • Acts as a resource/ reference • Liaises with the clinical governance committee • Liaises with Mediclinic Exco in the event of an outbreak • Liaises with the DoH and NICD if indicated • Monitors the process
NICD or expert on VHF / Infectious diseases physician	• Acts as a resource/ reference of expertise • Advises on the isolation precautions and duration of isolation of the patient [depending on the type of viral haemorrhagic fever (VHF)] • Advises on the duration of contact follow-up (depending on the type of viral haemorrhagic fever) • Advises doctors and personnel on the treatment of the patient and the contacts
Nursing manager	• Liaises between hospital management and the members of the hospital multidisciplinary team • Ensures adequate personnel provision • Coordinates contact tracing and provide resources for the tracing and follow-up of contacts • Ensure adequate provision of PPE • Provides continuous information and support to personnel • Makes the necessary arrangements according to the Corporate policy: Care of the deceased with a communicable disease in the event of death
Medical practitioner	• Liaise with the National Institute of Communicable Diseases (NICD) • Contact an expert in the field of VHF if necessary (NICD) • Liaise with the members of the hospital multidisciplinary team • Adhere to isolation precautions • Provide daily feedback on the condition of the patient to the multidisciplinary team
Microbiologist/ Laboratory manager	• Assist with the collection and transport of the specimens to the NICD • Follow protocol on VHF in own laboratory • Ensure that own personnel who were contacts are followed up

Responsibilities, continued

Nurse practitioner	• Adhere to IPC principles and isolation precautions • Wearing of appropriate PPE • Ensure adequate cleaning and disinfection of equipment and the isolation room (not to be done by housekeeping personnel) • Responsible for the first terminal disinfection of high risk patient area (not to be done by housekeeping personnel) • Ensure that healthcare risk waste (HCRW) are removed and incinerated promptly by responsible persons • Ensure the correct management of contaminated linen

Observer /"Runner"	• Needs to be a **more senior member** of the health care team
	• Assists the nurse practitioner in donning and removal of PPE
	• Observes the nurse practitioner regarding the safe caring of the patient
	• Functions as a "runner" to fetch items that are required in the isolation room
	• The observer plays a very important role:
	  • Be present at all times to evaluate and comment on practices
	  • Inform the healthcare worker involved of any unsafe practices that may place her at risk
	  • Collects equipment and supplies
	  • Communicates information and passes on messages
	• Provides an important link to the outside world whilst the healthcare worker(s) are caring for the patient in the isolation area

Occupational health practitioner **or** delegated responsible person	• Assists with the identification of contacts • Classifies, follows up and monitors the contacts of the patient with VHF • Informs the CRM/Nursing manager of any contacts that are presenting with signs and symptoms of the disease
Pharmacy	• Ensures adequate supplies of PPE at all times • Ensures the prompt provision of the required medication as prescribed by the treating medical practitioner
Social worker/ Counsellor	• Arranges for a social worker/counsellor if indicated • Provides emotional support to the patient, family and personnel • Makes use of telephonic communication through a glass partition, as far as possible • Adheres to transmission-based precautions and the wearing of appropriate PPE, under the direct supervision of the CRM or nursing personnel, where necessary to counsel the patient
Training and development consultant	• Assists in setting up an isolation area for the patient with VHF • Assists with monitoring of adherence to VHF transmission-based precautions in the patient care unit • Assists with "on the spot" training • Provides information sessions to personnel • Assists with contact tracing

Responsibilities, continued

Unit manager	• Ensures provision of PPE • Ensures that there is adequate staffing to care for the patient • Supports personnel • Supervises all persons coming into contact, direct or indirect, with potential infectious agents or patients • Ensures that all personnel adhere to transmission-based precautions and that appropriate PPE is worn at all times • Ensures that the housekeeping and other non-nursing personnel are informed about the infectious status of the patient and that housekeeping are not responsible for cleaning the patient room • Ensure correct disposal of HCRW • Restrict visitors and control access to isolation area

Key principles

1. The moment a diagnosis of VHF is suspected, the patient must be isolated in a single room with adjacent sluice or en-suite bathroom facilities.
   - If available, a room with negative pressure must be used.
2. **If the diagnosis is confirmed and the clinical condition of the patient is stable, it is strongly recommended that the patient be transferred to a healthcare facility with a special isolation unit (P4) that is equipped to handle the case.**
3. If the patient is a transferral or admission from outside the hospital, **the hospital should be informed in advance that a suspected VHF case is expected.** The patient must be isolated in the prepared isolation area **directly** from the ambulance. It is preferred that patients suspected of having VHF are admitted directly into a P4 unit and not transferred from another healthcare facility into a Mediclinic hospital.
4. **Contact and droplet precautions must be implemented for a suspected VHF case, in addition to the standard precautions at all times**.
5. Effective hand hygiene is essential at all times.
6. Correct removal of PPE is essential to prevent cross infection.
7. Full respiratory protection (visor and N95 respirator) is essential during invasive procedures due to the risk of aerosolisation of the virus in body fluids. **No visible skin must be exposed.**
8. Meticulous cleaning and disinfection of the environment with dedicated and disposable equipment is essential to prevent the transmission of VHF.
9. Extreme caution must be taken when in contact with blood, body fluids, secretions and excretions.
10. Extreme caution should be taken when sharps are handled to prevent percutaneous injuries.
11. Limit all invasive procedures and reduce the number of injected or intravenous medication.
12. All blood or body fluids spillages or normal excreta (e.g. urine) must be covered with a **1: 10 000** ppm (parts per million) hypochlorite solution (4 sachets in 1 litre of water) for 10 minutes prior to being discarded.

    Note: Hypochlorite 1:1000 ppm should be used for disinfection of surfaces and **1:10 000 ppm should be used on blood and body fluid spills.**
13. Effective and continuous communication between all relevant parties is essential at all times.
14. Do not allow any patient documentation to enter the room.
15. Each hospital must have a supply of FED packs readily available and all the personnel need to know where it can be found.

Management of a viral haemorrhagic fever in a healthcare setting

1.	Early recognition of VHF is essential utilising the reporting system of high risk factors, a detailed history and microbiological confirmation to ensure prompt diagnosis.
2.	The early signs and symptoms of VHF are non-specific and a **careful travel history** is always very important.
3.	Prompt, effective isolation and implementation of VHF contact and droplet precautions in addition to standard precautions must be implemented.
4.	Monitor the adherence and compliance of wearing of PPE.
5.	Monitor adherence to hand hygiene.
6.	Monitor the adherence and compliance of : • Environmental cleaning • Cleaning and disinfection of equipment and • Management of used linen • Healthcare risk waste removal (HCWR)
7.	Patient and visitor education is essential.
8.	Education of healthcare workers (HCWs) and housekeeping personnel is vital to prevent transmission of the virus.
9.	It is important to follow up and monitor contacts to identify and isolate secondary cases.

Risk factors for viral haemorrhagic fever

Possible contact with the virus

1.	History of travel to a high risk area/endemic area for VHF.
2.	History of being bitten by a tick or having crushed a tick with bare hands.
3.	Having had direct contact with: • fresh blood or • other tissue of livestock or • game within the past ±3 weeks
4.	Having resided in or visited a rural environment where contact with livestock or ticks was possible, without a specific incident constituting exposure being identified.
5.	Having been camping, hiking, sleeping outside on the ground.
6.	Contact with rodents and or their excretions in endemic areas.
7.	Visiting caves or contact with bats or bat droppings in endemic areas.
8.	Contact with a suspected or confirmed VHF patient or contact with a person with pyrexia of unknown origin within the past ±3 weeks.

Clinical features of a viral haemorrhagic fever

1.	Sudden onset of symptoms.
2.	Abdominal tenderness.
3.	Bleeding: (**not always immediately present** with all VHF's) • Bleeding of eyes and/or gums • Epistaxis • Haematemesis • Haematuria • Petechiae • Vaginal bleeding • Bleeding from any orifice
4.	Fever of 38℃ and above **on more than one occasion**.
5.	Feeling of malaise.
6.	Myalgia (muscle tenderness and pain).
7.	Gastro-intestinal symptoms, e.g. nausea, diarrhoea, vomiting.
8.	Presence of a skin rash.
9.	Experiencing severe headache/s.
10.	Signs and symptoms of renal failure.
11.	Development of Leucopenia or Leucocytosis.
12.	Thrombocytopenia – Platelets: • More than 50% decrease in either white cell count (WCC) or platelet count within 3 days
13.	Abnormal Prothrombin Time (PT) or INR and Partial thromboplastin time (PTT).
14.	Transaminase elevation (AST > ALT).

Diagnosis of viral haemorrhagic fever

1.	A clinical diagnosis can be based upon a positive history and clinical manifestation of the disease.
2.	The Criteria for Clinical Diagnosis of Crimean-Congo Haemorrhagic Fever (R. Swanepoel, S. Harvey. J.H. Mynhardt- 1987) may be used to do a risk assessment for the clinical diagnosis of Crimean-Congo Haemorrhagic Fever (CCHF). **See Addendum 1**
3.	Patient must be managed as a positive VHF case and isolated until diagnosis has been confirmed.
4.	Laboratory diagnosis: • Specific diagnostic tests for Viral Haemorrhagic Fevers are only performed at the Special Pathogens Unit of the National Institute for Communicable Diseases (NICD). **See Addendum 5**

Types of viral haemorrhagic fevers

Family	Example of VHF	Primary Vector Source	Incubation Period	Human to human transfer	Duration of contact follow-up
Arenaviridae	Lassa	Rodents	5- 16 days	Yes	21 days
Filoviridae	Ebola	Unknown	2- 21 days	Yes	21 days
	Marburg	Unknown	5- 10 days	Yes	21 days
Bunyaviridae	Crimean-Congo	Ticks	3- 12 days	Yes	14 days
	Rift Valley	Mosquitoes	2- 6 days	Not recorded	Not needed
Flaviviridae	Yellow	Mosquitoes	3- 6 days	Not recorded	Not needed
	Dengue	Mosquitoes	3- 15 days	Not recorded	Not needed

Determining the risk level of viral haemorrhagic fever

1.	Blood and body fluids are an infection risk, e.g. saliva, blood, vomitus, pus, urine, stools, semen.
2.	High risk: • Severely ill and Heamodynamically unstable • Fever and other signs and symptoms suggestive of VHF • Haemorrhage • History suspicious of VHF Moderate risk: • Febrile disease suggestive of VHF • Not severely ill • History suspicious of VHF Low risk: • Febrile disease suggestive of VHF • Not severely ill • No history suspicious of VHF

Contacts of patients with a viral haemorrhagic fever

1.	**Persons** who have had close physical contact with the patient, especially where exchange of body fluids may have taken place.
2.	**Personnel** who had close contact with the patient and/or body fluids, especially without wearing the necessary PPE.
3.	Persons who were present with invasive procedures (e.g. drawing blood, insertion of lines, intubation etc.)
4.	Contacts are classified according to the exposure risk and followed up. **See the section on the guidelines for the follow-up of contacts.**

Mode of transmission

The patient is admitted to the healthcare facility with the VHF virus present in the body fluids.
▼
All personnel who are exposed to the patient and his/her environment in the health care facility are at risk of exposure to VHF.
▼
The virus is transmitted during direct/ indirect unprotected contact with a VHF patient (alive or deceased) OR Through the inhalation of aerosolized blood/body fluid droplets.
▼
The virus is also transmitted during unprotected contact with VHF infectious body fluids **OR** Contaminated medical equipment and supplies **OR** As a result of an accidental needle stick injury or accidental exposure to infectious body fluids.
▼
The exposed person carries the virus back to the community. Transmission continues if there is Direct person-to-person contact **OR** Any unprotected contact with infectious body fluids

Immediate actions when VHF is suspected

Identification of an isolation area for a suspected/confirmed VHF patient

1. The moment a diagnosis of VHF is suspected, the patient must be immediately isolated in **a single room** with **en-suite bathroom** facilities.

2. Consider a room:
• In a private ward area, with washable floor and surfaces
  • With negative pressure ventilation
  • **If ventilation is part of a central ventilation system, the ventilation must be switched off**
• With an adjacent sluice and/or en-suite bathroom facility
• With vacant rooms on both sides
• With a window (if possible) to observe the patient.

3. Arrange for the area to be **set up** as specified in "**Setting up an isolation area for a suspected/confirmed VHF patient"** in **Addendum 8.**
4. Remove all unnecessary furniture and equipment not yet in contact with the patient, **before patient admission.**
5. Seal equipment (e.g. telephone, electronic monitors) in the room with transparent plastic bags and rubber bands or tape where possible (to protect the equipment), before admission of the patient.

Continued...

Immediate actions when VHF is suspected, continued

Identification of an isolation area for a suspected/confirmed VHF patient

6. Communicate with medical practitioners, nursing management, bed bookings and nursing units regarding the identified area.

7. Ensure that a means of communication is present in the room, such as a hand bell, telephone or intercom.

8. If the patient is transferred or admitted from outside the hospital, **the hospital should be informed in advance that a suspected VHF case is expected.**
   - The patient must then admitted and isolated in the prepared isolation area **directly from the ambulance.**
   - **Do not admit the patient in the emergency centre.**

   NOTE: It is preferred that a patient with VHF is admitted into a healthcare facility with an isolation unit (P4 unit) specifically equipped to manage these cases.

9. Apply strict **contact and droplet precautions** in addition to **standard precautions** at all times.

   NOTE: These isolation precautions must continue until a diagnosis has been confirmed.

10. Limit the number of personnel accessing the isolation area and ensure access control with no contact with other patients or visitors.

11. Arrange for adequate staffing and provide a "Runner"/Observer to help with dressing e.g. putting on tape and undressing.

12. Arrange for an adequate supply of PPE from pharmacy.

13. Send for the pre-packed FED (Formidable Epidemic Disease) **packs**
   - **Note:** It is strongly advised that FED packs are made up and are ready in a designated place (e.g. emergency centre or emergency cupboard) for personnel to call for.
   - **The Management team and all personnel** must be aware of where to locate the packs if required. This avoids confusion and time wastage.
   - All hospitals **must have at least 3 FED** packs and more in areas were VHFs are endemic or in rural hospitals, where it will be problematic to source additional PPE on short notice.
   - **See Addendum 7 for suggested contents**.

14. **Note: Collection and transport of specimens**
   - **NB:** Avoid unnecessary invasive procedures if not extremely necessary (e.g. drawing of blood).
   - Inform the laboratory manager or clinical microbiologist on call of the suspected VHF.
   - All private laboratories have systems in place and are able to collect, pack and transport the specimens to the NICD.
   - The private laboratories communicate with the NICD.
     - The treating physician needs to communicate with the NICD about which specimens should be collected. (Use NICD Hotline to enquire: see **Addendum 5 for contact details**)
     - **In the event of specimens already being sent to a private laboratory, the laboratory manager must immediately be informed about the potential risk**.
   - It is important to notify the blood bank if a blood sample of a suspected VHF patient is or was sent for cross matching.
   - See the section on drawing of blood, handling and transportation of specimens.

Notification and communication related to the suspected/confirmed VHF patient on admission

1. The unit manager or person in charge of the nursing unit notifies the following people:
   - Nursing manager or person in charge of the hospital
   - CRM
   - Hospital manager
   - Occupational health practitioner
   - Client services manager
   - Catering department
   - The rest of the multi-disciplinary team where necessary at the time.

2. The clinical risk manager notifies:
   - Housekeeping department.
   - Department of Health (DoH) – telephonically and complete the GW 17/5: Notification of Notifiable medical condition form and fax to the DoH.
   - National Institute for Communicable Diseases (NICD) after consulting the admitting doctor (to inform them of the specimen and the condition of the patient). **This should preferably be done by the treating medical practitioner.**
   - Infection prevention and control specialist of Mediclinic Southern Africa.
   - **Refer to Addendum 5** for telephone numbers.
   - Confirm all telephonic conversations with fax or e-mail.

3. Classify all patient contacts based on their level of exposure and follow up. Use the associated documents as a guide.
   - Addendum 2, 3 & 4

4. The occupational health practitioner (or delegated personnel) and training and development consultant completes the **Communicable Disease Exposure Register (N3485)** of all personnel contacts immediately.

5. Identify an area where the Occupational health practitioner or delegated person classify and follow up personnel contacts.
   - This includes an area where family/close contacts other than personnel can be counseled and educated.

6. Inform client service manager or delegated person of the management team to prepare a press release if necessary and manage media queries.

7. If possible, take an adequate **history** of the patient or ask a family member.
   - **Pay special attention to the travel history and possible exposure.**

8. Avoid hysteria as far as possible; arrange and make use of counselors timeously if indicated.

Communication guidelines

Effective communication to personnel, family, doctors and all other services is of utmost importance in case of admitting a patient with VHF.

1. Information to all personnel (including technical department and subcontractors e.g. housekeeping, catering).
2. Daily communication and updates to: • Personnel in the form of a newsletter and visits to the units (during both shifts) • Heads of departments • Medical practitioners • MCSA IPC specialist • DoH
3. Good record keeping of dates and time of conversations. • Keep record of all faxes, e-mails and telephone calls • Follow telephonic conversations up with an e-mail.

Education of personnel before entering the isolation area

1. Clinical risk manager to liaise with the training and development consultant to provide training and education to personnel involve in the management of the patient on the following matters: • Donning of PPE • Removal of PPE **NB**: Observers/runners must be included in the training
2. All personnel need to receive training on the risks involved in non-adherence to isolation precautions and the wearing of PPE.
3. Provide personnel with VHF fact sheets.
4. It is advised that hospitals where VHFs are endemic and where there are regular transfers from other African countries should have dedicated personnel who are trained in the management of patients with VHF and donning and removal of PPE.

Setting up of an isolation area for a suspected/confirmed VHF patient

Selection of an isolation area

1. Consult other members of the nursing management team to select an isolation area (restricted area) which ideally has three cubicles:
   - A "clean change" area for the health care worker team to change into PPE before going into the isolation room. (This area must not be directly accessible from the post-contact area)
   - A "patient care" area (high risk area), preferably with negative pressure ventilation facilities
   - **If ventilation is part of a central ventilation system, the ventilation should be switched off**
   - A toilet/sluice adjacent to or leading off the "patient care" area
   - **NB**: A "post contact" change area where the healthcare workers can remove and disinfect (e.g. re-usable visors, plastic boots), where applicable, the protective equipment after caring for the patient
     - This room must have a hand wash basin to perform hand hygiene and privacy for undressing

2. **NOTE:** If structural problems make the above impossible, one room can be used and **divided into a pre- and post- contact area.**

   Work on the principle of separation between clean and dirty.
   - Personnel can dress into scrubs **prior** to entering the pre-contact area where the PPE is donned.
   - Removal of the PPE **must take place in the post-contact area.** Nobody that exits the isolation area is allowed to remove PPE in the pre-contact area.

   Note: The room should preferably have window through which the patient and healthcare worker can be monitored

3. Ensure the emergency trolley is accessible, but is not positioned in the restricted area.

4. Set up a security barrier - **"Restricted area"** to cordon off the isolation area.
   - Entry must be restricted

5. Use the pre-packed FED packs.

Plan and stock the isolation area as follows:
Clean change area

This area may be off-site, if there are not three dedicated cubicles available

Make nine stations in sequence from entrance to the room • Place adequate supplies of PPE at each station. • Place a notice for reminding personnel to wash hands prior to entering the area.
Station 1: • Scrub suits (various sizes) from theatre. • Provide an area for outer clothes of personnel.
Station 2: • Theatre balaclavas/caps (if full body suits are not used).
Station 3: • Gloves for under the gown/suit – non sterile latex/latex free (**not** plastic). • Long cuffs and good quality and strength.
Station 4: • Gowns – Long sleeved, water repellent, disposable or • Protective suits – choose one size bigger than normal size to ensure comfort and decrease restriction of movement.
Station 5: • Boots / Over shoes (more than one layer, especially if the patient is bleeding).
Station 6: • Long/extra length (below knee) single-use plastic aprons of good quality plastic.
Station 7: • Gloves – non sterile and good quality with adequately long cuff and strength
Station 8: • Masks – N95 respirators and/or surgical masks.
Station 9: • Protective eye wear – full face visors / goggles- preferably disposable.

Patient care area (where the patient is isolated)

1. **NB: Remove all unnecessary items and equipment prior to admission.**

2. Cover and seal the necessary patient care equipment (e.g. telephone, electronic monitors) in the room with transparent plastic bags and rubber bands or tape where possible.

3. Do not allow any patient documentation to enter the room.
   - If documents were already in the room with the patient, it could be contaminated and must be placed in quarantine.
   - All follow-up records must be kept outside the room after the diagnosis was made.

   NOTE: Patient documentation must always be kept outside of the isolation room.

4. **Ensure the following:**
   - Hand washing facilities with paper towels (hands free) and antibacterial soap (Chlorhexidine)
   - 70% Alcohol surface disinfectant (only for disinfection of thermometers)
   - Baumanometer
   - Stethoscope
   - Thermometer
   - Plastic mattress and pillow covers intact
   - Condemned/disposable linen if available.
   - Oxygen and suction, patent and with necessary equipment
   - Sharps container, securely attached to the wall (Replace with disposable if re-usable us used e.g. Daniels Sharpsmart reusable containers for sharps)
   - Working surface
   - Wall clock with second hand
   - Bedpan/urinal/receiver
     - Use disposable if available, but **do not put in macerator. It needs to be placed in the healthcare risk waste container after use**
   - Disinfection station for boots at exit to “post contact” area, if boots are worn. Otherwise first layer of footwear should be removed and discarded
   - Cleaning equipment, e.g. plastic bucket and dedicated disposable cleaning cloths
   - Mop which can be disposed after use
   - Hypochlorite sachets
   - Extra roll of paper towels - to be used in event of spillage
   - Healthcare risk waste container
     - It must be rigid
     - It must have a washable surface
     - Do not use cardboard boxes (not leak proof)
   - Linen contaminated with blood and body fluids needs to be placed in the healthcare risk waste container to be incinerated
   - If the linen is **not contaminated** with blood and body fluids, it can be regarded as infectious linen and washed separately on a hot cycle with a disinfectant added

Continued...

Patient care area, continued

5. Use a linen container with a yellow plastic bag for linen that **is not contaminated with blood and body fluids.**
   - Life support equipment, such as saturation monitor, ventilator, etc. (on standby outside the room)
   - Furniture (only essential)
   - Cot sides
   - Extra gloves
   - Aprons, extra long

6. Telephone (covered in plastic)

5. Set up the following station at the exit of the isolation room
   - Poster against wall on the decontamination steps of PPE (if re-usable visors and boots are used)
   - 70% alcohol hand rub
   - Container with hypochlorite 1:1000 ppm for the disinfection of boots (If rubber boots are used)
   - Healthcare risk waste container for used overshoes (first pair of overshoes need to be removed here).

Post contact change area

1. Divide this room into a “clean” and “dirty” side. The dirty side must be the nearest/adjacent to the exit from the patient room.
   - **Yellow bags** must be placed in a linen container for the used scrub suits
   - **Red bags** for contaminated waste e.g. masks/respirators, visors, disposable gowns, overshoes
   - **Disinfectant station for boots**, if rubber boots are used or goggles
   - Staff disrobe in the “dirty” side, wash hands at the basin and dress into clean scrubs or their own clothes in the “clean” side of the “post contact” change area **(Clothes brought from “clean” change area by runner)**

2. Set up the following stations:

Station 10:
- Removal of gowns

Station 11:
- Disinfect gloved (inner gloves) hands with alcohol hand rub after touching gown

Station 12:
- Remove eyewear, head cover and mask.

Station 13:
- Remove boots

Station 14:
- Remove inner pair of gloves. Wash hands

Station 15:
- Remove scrub suit and dress. If possible a shower should be taken prior to dressing

Station 16:
- Wash hands with an antibacterial soap (chlorhexidine) under running water and dry with paper towel
- Exit from area

General rules

1. Adequate PPE is needed to protect the HCW against possible transmission of the disease.
2. The level of risk determines the level of protection. (If the patient is bleeding actively, more protection is needed.)
3. Place “station” signs above each item of clothing **(available from FED pack).**
4. Put up posters on the sequence of donning **(to be printed from the policy and laminated and available in FED pack)** and removal of PPE in the applicable areas.
5. Ensure an adequate supply of:
   - Red and yellow bags
   - Sachets of hypochlorite granules and a guide on the dilution (**1:10 000 ppm** for **spillage of blood and body fluids** and **1:1000ppm for disinfection of surfaces**)
   - Measuring jug
   - Disposable cleaning cloths
   - Roll of masking tape (or similar product) for securing protective clothing.
6. Tray (stay outside of the patient care area at all times) - used to exchange goods between staff (inside and outside the patient care area) to prevent hand contact between personnel (touch free).
7. Support the personnel.
8. Arrange for the observer/runner to assist with dressing of the healthcare worker e.g. putting on tape, ensuring that all skin is covered, monitor practices and undressing, etc.
9. Remove watch, valuables and jewellery and put in safekeeping.
10. **Note**: It is important to go to the bathroom and drink some fluid prior to dressing.
    - The HCW cannot undress or drink anything after he/she has entered the **Isolation area.**
11. **Duration of Isolation:**
    - Once the haematological and biochemical parameters have normalized and there is no longer bleeding, together with clinical improvement, the patient can be discharged from the hospital.
    - The virus however, remains detectable in human blood for up to 2 – 6 weeks after the onset of the illness (depending on the type of VHF).
    - Although there is no proof that the virus continues to be excreted in body fluids, patients should refrain from intimate contact with other people for 6 weeks after recovery from the disease.
    - **Note:** The patient should be isolated until discharge from the hospital.
      - Once the bleeding has stopped and the clinical picture improves it is adequate to **continue with contact precautions** (long aprons, gloves and masks/visors when a procedure is performed where there is a risk of aerosolisation).
      - **The patient should preferably stay in the same room until discharge.**

Principles of Personal Protective Equipment

No exposed skin should be visible after donning of PPE The layers of PPE depend on the risk of contamination If the patient is bleeding excessively -more protection is required

First layer



High risk (Excessive bleeding)	**Low risk**
Theatre scrubs	Theatre scrubs
Normal shoes **NB-** no open heels or toes	Normal shoes **NB-** no open heels or toes

Second layer



High risk (Excessive bleeding)	Low risk
First layer PPE	First layer PPE
Balaclava	Balaclava
N95 Respirator with visor/ eye protection	Surgical mask with visor/ eye protection and N95 respirator when aerosolising procedures are performed
Plastic apron (only if a gown is worn)	
Single-use overshoes	Single-use overshoes
Gloves: 1st pair	Gloves: 1st pair

Third layer



High risk (Excessive bleeding)	Low risk
First & second layer PPE	First and second layer PPE
Single-use gown/suit (long sleeved & fluid repellent)	Single-use gown (long sleeved & fluid repellent)
Full face visor (preferably disposable)	Full face visor only when procedures are performed
Plastic apron (that can be removed and replaced) when soiled	Plastic apron
Gloves: 2''d pair	Gloves: 2''d pair
Plastic/ water repellent overshoes or Gum boots (or plastic bags followed by paper overshoes to prevent slipping)	

Guidelines for the removal and decontamination of PPE (Single-use PPE must be used as far as possible)

1. Before leaving the patient care area:

1. Wash hand with antibacterial soap (Chlorhexidine) over both pairs of gloves.
2. Move to exit of room.
3. If re-usable items are used (e.g. visor) it should be wiped with paper towel and hypochlorite solution (1:1000 ppm).
4. Remove plastic apron by tearing the band around the neck and remove in a rolling movement (without touching the outside) and discard in the healthcare risk waste container.
5. Remove water repellent overshoes (first layer) and discard in healthcare risk waste container.
6. Remove 2nd (outer) pair of gloves with cross hand action and discard.
7. Wash/disinfect hands with 1st pair of gloves on.
8. Move into **post contact dirty area.**

Before leaving the post contact dirty area:

1. Wash/disinfect hands with 1st pair of gloves on.
2. Remove visor.
3. Place full face visor in bucket with hypochlorite (1:1000 ppm) solution and soak for 10 minutes (if not single-use) or discard in healthcare risk waste container.
4. Remove gown/suit with cross-arm technique- roll-up soiled side inside and discard.
5. Remove mask/ respirator without touching the front part and discard in healthcare risk waste container.
6. Remove balaclava/cap and discard in healthcare risk waste container.
7. If an apron is worn under the gown (in the event of severe haemorrhage) remove apron by tearing the band around the neck and remove in a rolling movement with the soiled side inside and discard in healthcare risk waste container.
8. Remove paper overshoes and discard in healthcare risk waste container.
9. Remove gloves with cross-hand action and discard.
10. Wash hands with antibacterial soap and water and dry with paper towel.
11. Move into **post contact clean area.**

Before leaving the post contact clean area:

1. Wash hands properly with an antibacterial soap and running water and dry with paper towel.
2. Remove scrubs.
3. Shower if possible.
4. Dress in normal uniform / clean scrubs.
5. Scrubs or uniform worn in Patient Isolation Area must be washed before re-use.

Disinfection of equipment and the environment

1. **Use single-use items and equipment which can be discarded after use as far as possible.**
   - Only take the most essential equipment into the Isolation room
   - Keep life support equipment on standby, but **do not take** it into the Isolation room
   - PPE should be worn at all times during the cleaning process
   - Remove all organic matter with a detergent and water (An enzymatic cleaner, e.g. Endozyme®, must be used)
   - Disinfect with a Hypochlorite solution 1:1000 ppm
   - Place the equipment into double paper bags and then in a red plastic bag, marked **'HIGHLY CONTAGIOUS"** and send to the CSSD
   - Sterilise with Ethylene Oxide or autoclave if possible (According to Manufacturers guideline)
   - **NOTE**: Notify the CSSD supervisor **before the items leave the isolation area**.

     The transport of the items should be supervised by a responsible person.

     Ensure that the CSSD personnel wear adequate PPE when they decontaminate the equipment.

2. Cutlery and crockery
   - Use disposable cutlery and crockery and discard into the red healthcare risk waste container.

3. Personal protective equipment
   - Poster against wall on decontamination steps of PPE (if re-usable visors and boots are used)
   - Container with hypochlorite 1:1000 ppm for the disinfection of boots (If rubber boots are used)
   - Remove first pair of overshoes and place in a dedicated healthcare risk waste container for used overshoes.

3. **Bedpans and other containers for secretions/excretions such as blood an vomitus**
   - Treat contents with disinfectant (hypochlorite 1:10 000 ppm) for at least 10 minutes and discard directly into a drain (toilet/sluice)
   - Care should be taken not to spill or splash
   - It is preferred to use single use containers that can be incinerated after use
   - If Vernacare® products are used, it should **not be discarded in the macerator**, but incinerated
   - If a single-use container is not used, the container must be washed with a detergent and water and then disinfected with hypochlorite 1:10 000 ppm after the content is discarded.

4. **Ventilator**
   - A closed system must be used and all products must be single use.
   - A HEPA filter (bacterial/viral) must be used
   - Remove the breathing circuit, expiration valve, flow sensor and filter at the back of the ventilator and treat as healthcare risk waste (to be incinerated)
   - Disinfect the outside of the ventilator with a hypochlorite solution 1:1000 ppm
   - Contact the manufacturer of the specific ventilator for further instructions
   - The ventilator must be disinfected and quarantined according to the manufacturer's guidelines.

Continued...

Disinfection of equipment and the environment, continued

5. **Dialysis machine**
   - In the event of dialysis, disposable components must be used as far as possible
   - Contact the Dialysis Company for cleaning guidelines of their equipment when it was used on a patient with VHF.

6. **Disinfection of the environment**
   - Wear PPE
   - Use a separate set of dedicated equipment for each area
   - Start at the area with the lowest risk ('clean' to 'dirty')
   - Discard cloths after use

   Concurrent
   - Disinfect the area twice a day using a Hypochlorite solution 1:1000 ppm
   - ("**Patient care" area to be cleaned by nurse practitioners)**

   Terminal
   - Wear full PPE and a double layer of gloves
   - The CRM must be present and monitor the cleaning process
   - **Note**: If there are high amounts of body fluids from a patient who was haemorrhaging, cleaning is a very high risk procedure and extreme care should be taken. After cleaning the area should be disinfected with a Hypochlorite solution **1:10 000 ppm**
   - **A hydrogen peroxide fogger can also be used to first fog the area before the initial cleaning process commence, to reduce the risk of transmission of the virus.**

Management of healthcare risk waste

1. Treat all waste as contaminated and place in the red healthcare risk waste container.
   - **Do not place cardboard boxes in patient care area, as they cannot be disinfected**
2. Double bag waste into special container for **immediate removal** by service provider.
3. Mark **"BIO HAZARDOUS".**
4. The person colleting the waste must wear PPE: double gloves, disposable gown and/or long apron.
5. **NB:** The service provider must be contacted regarding special handling and guaranteed immediate incineration of this waste.
6. **An incineration certificate must be provided.**
7. If the VHF diagnosis is only suspected, waste can be sealed and kept in the patient care area.
   - If the diagnosis subsequently proves to be of a non-infectious nature the waste can be released and processed normally.

Drawing of blood and handling of specimens

1. Specific diagnostic tests for viral haemorrhagic fevers are performed **only** by the Special Pathogens Unit of the National Institute for Communicable Diseases (NICD).
2. The medical practitioner must personally consult the contact person at the NICD to confirm the specimen tubes to be used and that they should expect a specimen. **See Addendum 5.**
3. The medical practitioner must complete the NICD request form, Investigation of suspected viral haemorrhagic fever form. **(Addendum 6)** or available at the following link: • http://nicd.ac.za/assets/files/VHF_test_request_form.pdf
4. Contact the manager or microbiologist on call to inform them of the possible VHF.
5. The person obtaining the blood specimen must be accompanied by somebody that can assist and observe unsafe practices. • Droplet and contact precautions must be taken in addition to standard precautions at all times.
6. Take extreme care when blood is drawn, PPE must be worn.

Packaging of specimens

1. The laboratory will collect and pack the specimens. (Specimens of suspected patients must never be transported in the vacuum system [“Shute”] of a hospital).
2. Packaging will be done by the laboratory personnel if there is a laboratory on site, and otherwise by a senior member of the Health Care Team.
3. Label all specimens clearly.
4. Wrap each specimen tube in sufficient absorbent material (e.g. paper towel) to absorb the entire contents in the event of leakage.
5. Place each individual tube into a biohazard plastic bag and seal.
6. Pack tightly into a rigid walled container (Container No 1).
7. Seal the lid of the rigid walled container with broad adhesive tape and label as “**HIGHLY CONTAGIOUS”.**
8. Place one copy of the laboratory request form for suspected VHF’s in a strong plastic sleeve and wrap around this container (as per **Addendum 6** – need two copies). • **NICD Request form: Investigation of suspected VHF**
9. Place the first rigid walled container into a plastic specimen container (bucket), pack tightly with absorbent material e.g. foam chips, shredded paper. (Container No. 2) • Seal the lid with broad adhesive tape and label as **“HIGHLY CONTAGIOUS”**
10. Place the sealed plastic specimen container in a polystyrene container with cold packs (the size used by blood banks). (Container No. 3) • Place the **“HIGHLY CONTAGIOUS”** label on all four sides
11. The doctor provides the clinical history of the patient (Addendum 6 – second copy) • Tape the completed form under the handle of the polystyrene container

Continued...

Packaging of specimens, continued

12. Place the polystyrene holder finally in a cardboard box (Container No 4) • Once again pack tightly with sufficient absorbent material. Seal the box and label as **"HIGHLY CONTAGIOUS".**
13. Wrap the cardboard box in brown paper. Seal all the folds with broad adhesive tape. Ensure that all folds are sealed.
14. Label parcels on top with: • Special Pathogens Unit (**Provide name of person with whom the doctor spoke concerning the specimen)** • National Institute of Communicable Diseases • Modderfontein Road • Sandringham • JOHANNESBURG • Telephone (011) 386-6000
15. Stick a **"HIGHLY CONTAGIOUS"** label on all sides of the box.
16. Indicate the topside with black arrows.
17. The courier must sign in the patient's records that he has taken the package and insert waybill number.
18. It is important that the CRM/laboratory follow-up on the specimen to ensure that it arrived at the NICD. • Refer to die waybill number during communication

Transport of blood specimens to the National Institute for Communicable Diseases in Johannesburg

1. The private laboratory arranges transport through their courier. • The driver must be made aware of the bio-hazardous nature of the contents of the package
2. The NICD laboratory request form, as well as a dangerous good declaration and a clinical history, completed by the treating physician must accompany the specimen. • The courier forms also need to be completed.
3. It is essential to inform the Special Pathogens Unit at the NICD in advance when urgent specimens are dispatched. • Use the Hot line and supply the waybill number. **(For telephone number see Addendum 5)**
4. The waybill number, a flight number and the time and date that the parcel leaves as well as when it arrives in Johannesburg must be recorded.
5. The information in point 4 must be faxed to the contact person who was informed about the samples at the NICD.

Management of accidental blood and body fluid exposure

This includes accidental needle stick injuries, splash exposures from blood and body fluids, secretions or excretions

1. Encourage free bleeding and clean the injured site liberally with water where mucous membranes are affected by the incident.
2. Do not apply caustic agents or antiseptic agents to the wound, because they may injure the viable tissue and facilitate transmission.
3. Notify the occupational health practitioner or nurse manager in charge and the clinical risk manager immediately after exposure to blood or body fluid.
   - In addition to the above steps, refer to the **corporate policy: Management of blood and body fluid exposure**
4. The person affected will need close follow up and monitoring for any signs and symptoms of acquired infection.
5. Any injury sustained during patient care must be reported immediately.

Classification and follow-up of contacts

1. The purpose of tracing all VHF contacts and placing them under observation is to prevent and control the spread of the infection.
2. Prepare a register (N3485) of all known contacts even though the diagnosis of the patient has not been verified.
   - List all the nursing units involved
   - Base the criteria on the case definition provided by the NICD
3. The duration of contact follow up is based on the incubation period of the specific VHF.
   - It is counted from the day of last exposure onwards
   - Contact the NICD for the specific time that contacts need to be followed up
4. Divide the contacts into high, medium and low risk.
   - **Low risk contacts** have had indirect contact with the VHF patient or other source of infection on a single or few occasions, e.g. all the patients and personnel in the ward at the time of admission, who have not had contact with the patient's blood or body fluids
   - **Medium risk contacts** have had close and prolonged contact with the VHF patient or other source of infection. This includes intimate friends of a VHF patient, relative and medical personnel
   - **High-risk contacts** have had definite exposure to blood and body fluids of a person confirmed with VHF
   - A sharps injury and contact with blood and body fluids is a high-risk incident.
   - Porters, ambulance personnel, X-ray department, cleaning personnel, physiotherapists, blood bank and laboratory personnel are also considered to be contacts, especially if contact was made or specimens were taken before verification of diagnosis. **(Use Addendum 4 as a guide)**
   - **NOTE: The risk classification will depend on the disease and case definition**
   - **High risk contacts should be followed up with personal interviews. Low risk contacts may be interviewed telephonically**

Continued...

Classification and follow-up of contacts, continued

5. **NB:** All personnel who fulfill the criteria for high risk contacts must report daily to the area where contacts are followed up. • Failure to report must be followed up
6. The occupational health practitioner or dedicated person records relevant information e.g. monitors temperatures **twice a day** and criteria related to signs and symptoms of high risk contacts: • During the period of isolation and • For the duration of the incubation period of the specific haemorrhagic fever • Low risk contacts can be followed up telephonically **(Use Addendum 2)**
7. High risk contacts must be kept under close observation for the duration of the follow-up period and monitored for any signs and symptoms of the disease • If necessary, they need to be admitted, isolated and monitored closely
8. Any contact that develops fever (temperature of 38℃ or more) or any signs or symptoms suggestive of VHF, must be place in isolation and treated as a suspected case • The necessary laboratory investigations need to be done if indicated
9. Liaise with and notify the Department of Health • Provide the names and contact details of all contacts • Provide a daily update of the temperatures and condition of the contacts • The DoH assists with the follow-up of community contacts

Deaths related to a viral haemorrhagic fever

In the event of death of a suspected or confirmed case of Viral Haemorrhagic Fever the following must be done:

1. The doctor notifies the family of the demise of the patient and explains that the body is highly contagious. • Access to the body is not advised • If access cannot be avoided strict supervision by medical/nursing personnel is critical • The CRM must supervise the procedure
2. The hospital manager/nursing manager/clinical risk manager must notify the Department of Health.
3. If the diagnosis of suspected VHF has not been established, the minimal specimens such as needle biopsy or liver and heart blood are taken and submitted to the Special Pathogens unit at the NICD to confirm the diagnosis. • The person collecting the specimen must wear full PPF
4. The family is requested to indicate an undertaker and the Hospital Manager or the Nursing Manager should make the necessary arrangements.
5. The body must be buried or cremated immediately.
6. The undertakers must be informed of the infectious status of the body. This is essential as they have to bring a special casket.

Laying out procedure

1. Lay out the body as soon as the doctor and the Department of Health give their permission • Follow the procedure for management of an infected corpse. Refer to the **Corporate policy: Care of the deceased with a communicable disease** • **Note:** It is essential that 2 persons attend the body with a "runner" available
2. The personnel who are to layout the body wear full PPE as were used during isolation of the patient.
3. Do not wash the body.
4. Seal all sites draining body fluids or likely to drain fluids with adhesive dressings.
5. Place the body in a shroud and then two body bags, each sealed with tape and washed down with Hypochlorite Solution 1:1 000 ppm. (The first body bag should be transparent for identification purposes) Apply "Hazardous" stickers and identification stickers to the bags.
6. The undertakers should go directly to the unit to remove the body in the special casket.
7. Record in the patients file to whom the body was handed over. • A name and signature of the person receiving the body must be obtained • Record the fact that this person was informed about the infectious state of the body
8. Discard protective clothing as per isolation protocol prior to leaving the room.

Terminal disinfection of the room after discharge/ transfer/death of a patient with suspected/ confirmed viral haemorrhagic fever

1. Wear full PPE.
2. An observer (CRM) must be present to: • Monitor and evaluate the cleaning process • To alert the person who cleans if an unsafe practice was observed
3. Discard all disposable items in the room (used and unused items).
4. **Clean and disinfect all items being sent for sterilisation before leaving the room.**
5. Sterilise the items that are not discarded, using Ethylene Oxide or steam, if permitted.
6. Place the items in 2 paper bags and then in a red plastic bag, marked **'HIGHLY CONTAGIOUS"** and send to the CSSD. • Notify the department supervisor before the items leave the isolation area. The transportation of the items should be supervised by a responsible person
7. Discard all linen into contaminated waste containers. • Linen contaminated with blood and body fluids must be incinerated
8. Wash equipment and furniture that cannot be sterilised with an enzymatic detergent (Endozyme®) and water and then disinfect with a hypochlorite solution 1:1000 ppm.
9. Wash the walls and floor with hypochlorite 1: 1000 ppm solution.
10. Disinfect equipment according to manufacturer's instructions.
11. Technical to replace the filter in the air-conditioner and clean the socket. • Full PPE must be worn when the filter is replaced

Definitions

Term	Definition
Body fluids	Any substance/ fluid from the body, including: **blood, excretions, secretions, exudates or biological samples.** • Excretions: urine, stools, vomit, meconium, Lochia • Secretions: saliva, mucous, sperm, milk and colostrum, tears, wax, caseosa (until first bath) • Transudate/exudate: pleural fluid, cerebrospinal fluid, ascites fluid, synovial fluid, amniotic fluid, pus, **with the exception of sweat** • Biological samples: samples taken from the body (including tissue samples, the placenta, cytological samples or bone marrow)
Communicable disease	Transmission of an infectious agent or its toxic product from an infected person, animal or reservoir to a susceptible host (a disease that can be communicated from one person to another).
Contact	It is a person who had contact with the affected patient at any time for the duration of the disease, from the onset of the disease. Contact can be in the following ways: • Sharing the same residence • Face-to-face contact (within one meter) • Skin or mucous membrane contact or • Penetrating injury with the patient's secretions, excretions, blood or other tissues • This would include similar exposure to animal tissues in situations where such exposure is considered to be the source of infection
Contact precautions	Precautions to prevent the direct or indirect transmission of micro-organism. • Direct-contact transmission involves skin-to-skin contact and physical transfer of micro-organisms to a susceptible host from an infected or colonised person or source e.g. when health care workers perform patient-care activities that require physical contact, such as turning or bathing the patient • Direct-contact transmission can also occur between two patients • Indirect-contact transmission involves contact of a susceptible host with a contaminated object in the patient's environment e.g. equipment or contaminated wash basins
Contamination	The presence of a potentially infectious agent on a surface.
Decontamination	Decontamination is a general term for the destruction or removal of microbial contamination to render an item safe. • It can also cover removal of non-microbial matter. This will include methods of cleaning, disinfection and sterilisation as appropriate

Continued...

Definitions, continued

Personal protective Equipment (PPE)	Equipment used to protect the user from transmission of infection. • This includes the use of a mask/respirator, plastic apron, protective eyewear, disposable gloves and boots, where necessary, to protect from potential contamination or spills
Standard precautions	Routine precautions that reduce the risk of transmission of micro-organisms from both recognised and unrecognised sources of infection in healthcare settings. Precautions to be applied in all patients and in all situations, regardless of diagnosis or possible infectious status to protect the health care worker from occupational exposure to patient's blood and/or body fluids. **Includes the following:** • Optimum hand hygiene (Hand wash or alcohol hand rub) • Use of appropriate PPE (e.g. gloves, aprons, etc.) when there is a possibility of exposure to blood and body fluids • Safe injection practices • Safe, immediate discard of used hypodermic needles and sharps • Healthcare risk waste management (colour coding and disposal) • Maintaining a clean environment • Handling of used linen • Decontamination and sterilisation of medical devices between patient use
Viral hemorrhagic fevers (VHFs)	It refers to a group of diseases that are caused by several distinct families of viruses, namely: Arena viruses, Filo viruses, Bunya viruses and Flavi viruses. • The term "viral hemorrhagic fever" is used to describe a severe multisystem syndrome and therefore multiple organ systems in the body are affected • The overall vascular system is usually damaged and the body's ability to regulate itself is impaired • These symptoms are often accompanied by haemorrhage (bleeding) • The bleeding is itself rarely life-threatening Some types of hemorrhagic fever viruses can cause relatively mild illnesses, but many of these viruses cause severe, life-threatening disease.

Associated documents and records

Title	Number	Location
Mediclinic infection prevention and control policies		Intranet
Mediclinic corporate policy: Care of the deceased with a communicable disease		Intranet
Mediclinic corporate policy: Isolation precautions		Intranet
GW 17/5 Notification Report		DoH
Communicable Disease Exposure Register	N3485	Intranet

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Criteria for Clinical Diagnosis of Crimean-Congo Haemorrhagic Fever

(R. Swanepoel, S. Harvey, J.H. Mynhardt – 1987, reproduced with permission from Prof. R. Swanepoel, National Institute Virology)

	Score	
History of Exposure	**Less than one week**	**More than one week / undetermined**
Bitten by tick/s or crushed tick/s with bare hands	3	2*
Had direct contact with fresh blood or other tissues of livestock or game animals	3**	2***
Had direct contact with blood, secretions or excretions of confirmed or suspected CCHF patient (including needle pricks)	3	2
Resided in or visited a rural environment where contact with livestock or ticks was possible, but a specific incident constituting exposure cannot be identified	2	1
Signs and Symptoms		
Sudden onset	1	
Fever more than 38℃ on at least one occasion	1	
Severe headache	1	
Myalgia	1	
Nausea and / or vomiting	1	
Bleeding tendency: Petechial rash, Ecchymosis, Epistaxis, Haematemesis, Haematuria or Malaena	3	
Clinical pathology during the first 5 days of illness	1	
Leucopoenia or Leucocytosis WCC <3 x 10^9/L or >8 x 10^9/L	1	
Thrombocytopenia Platelets <150 x 10^9/L Platelets <100 x 10^9/L	2	
More than 50% decrease in either WCC or platelet counts within 3 days.	1	
Abnormal PT/ INR	1	
Abnormal PTT	1	
Raised Transaminase AST>100 IU/L ASL >100 IU/L	1	
Explanation *** South African tick-borne Typhus must be excluded** **** Rift-Valley Fever must be excluded** ***** Brucellosis, Q-Fever and Anthrax must be excluded**		

A score of 12 points would constitute an indication of treating the patient as a case of CCHF

Addendum 2

Contact: Initial Questionnaire

Name _____ Date of Contact _____

Address _____ Age _____Gender M F

_____ Telephone _____

_____ Cellular _____

Date of first contact with patient _____

Date of last contact with patient _____

Name of patient _____

Do you feel well? Yes No

Signs and symptoms if does not feel well

Fever	Yes	No
Headache	Yes	No
Generalised Aches and Pain	Yes	No
Nausea / Vomiting / Diarrhoea	Yes	No
Cough	Yes	No
Conjunctivitis	Yes	No
Abnormal Bleeding (Malaena / Epistaxis/ Vaginal bleeding/ Haematemesis)	Yes	No
Rash	Yes	No
Other		

Degree of contact

Live in same home	Yes	No
What kind of contact did you had with patient? Specify		
Was primary care provided to the patient: Specify	Yes	No
Assisted with care: Specify	Yes	No
Did you wear PPE: Specify:	Yes	No
Gloves	Yes	No
Mask	Yes	No
Visor/Goggles	Yes	No
Apron	Yes	No
Gown	Yes	No

Continued…

Degree of contact, continued

Did you assist with invasive procedures	Yes	No
Direct/indirect exposure to blood / body fluids	Yes	No
If “yes”, specify:		
Where you involve during resuscitation of the patient	Yes	No
What did you do: Specify		
Sharp injury?	Yes	No
If “yes” : Action taken		

Questionnaire completed by: _____

- Active surveillance _____
- Passive surveillance **(telephonic only)** _____

Date: _____ Signature: _____

On advice of NICD/medical officer/Department of Health, identify criteria which indicates high risk (to be monitored in person) and low risk to be monitored telephonically

Addendum 3

Contact: Follow-Up Questionnaire

(To be filed behind Initial Questionnaire)

Information is to be entered on Addendum 3 or 4 according to High or low risk.

Name _____ Date of Visit _____

Address: _____

_____

_____

_____

	Yes	No
Do you feel well	Yes	No
If no: signs and symptoms	Yes	No
• Fever	Yes	No
• Headache	Yes	No
• Generalised aches and pains	Yes	No
• Nausea/vomiting/Diarrhea	Yes	No
• Cough	Yes	No
• Conjunctivitis	Yes	No
• Abnormal bleeding (Malaena/Epistaxis / vaginal bleeding /Haematemesis	Yes	No
• Rash	Yes	No
Other:		

Completed by: _____

Action taken: _____

_____

_____

Date _____ Signature: _____

Tracing of contacts

Complete the following questionnaire. Each person identified in the questions will have to provide further information as on the contact list.

Date of admission: _____

Time of admission: _____

Escorted by whom: _____

Did any admission officer take down his details? Yes No

If yes, please provide name? _____

Did a porter or any other person/s aid him to gain admission into the nursing unit/ outpatient department/emergency services department?

_____

Who received the patient in the above department? _____

Who did his admission observations? _____

Did anybody examine the patient in the above department? _____

Who else had contact with the patient in that department? _____

What treatment /special investigations/X-Rays did the patient have?

_____

Who was involved in the treatment/investigations above? _____

Was any blood or other specimens sent to the laboratory? Name the type of specimen.

_____

When was he transferred to the nursing unit where he is at present?

_____

Who assisted in the transfer procedure? _____

List all the persons known to have had direct contact with the patient and check that they are listed on either Addendum 3 or 4.

_____ _____

_____ _____

_____ _____

Contact telephone numbers - Management of a patient with viral haemorrhagic fever

Contact person	Location	Telephone nr.	Cell number
Prof Lucille Blumberg	National Institute of communicable Diseases	011 386 6337	082 807 6770
Dr Juno Thomas	National Outbreak Unit, National Institute of communicable Diseases	011 555 0392	082 940 4780
Laboratory enquiries: Dr Jacqueline Weyer	Senior Medical Scientist, Centre of Emerging and Zoonotic Diseases	011 386 6376	082 903 9131
NICD Outbreak Hotline	Available 24 hours		082 883 9920
NICD Address	National Institute for Communicable Diseases 1 Modderfontein Road Sandringham 2131 South Africa	011 386-6000	

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SPECIAL PATHOGENS UNIT

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REQUEST FORM: INVESTIGATION OF SUSPECTED VIRAL HAEMORRHAGIC FEVER
Completed form must ;ccompany specimens

Referring doctor .·.....· Address .·...·..·..Code Tel (W) ..· Tel (Al!Horcellular) -·.....· Fax.....	Patient ..... AQe·.....·....·.....·.Sex·.. Hospital nmber.·.· Hospital ..·.....·.·.·.·..·.....Ward Date of admission .·. .....· Mecl'ic.JI fund .....·..... No.....

Account to: ..... Code .....

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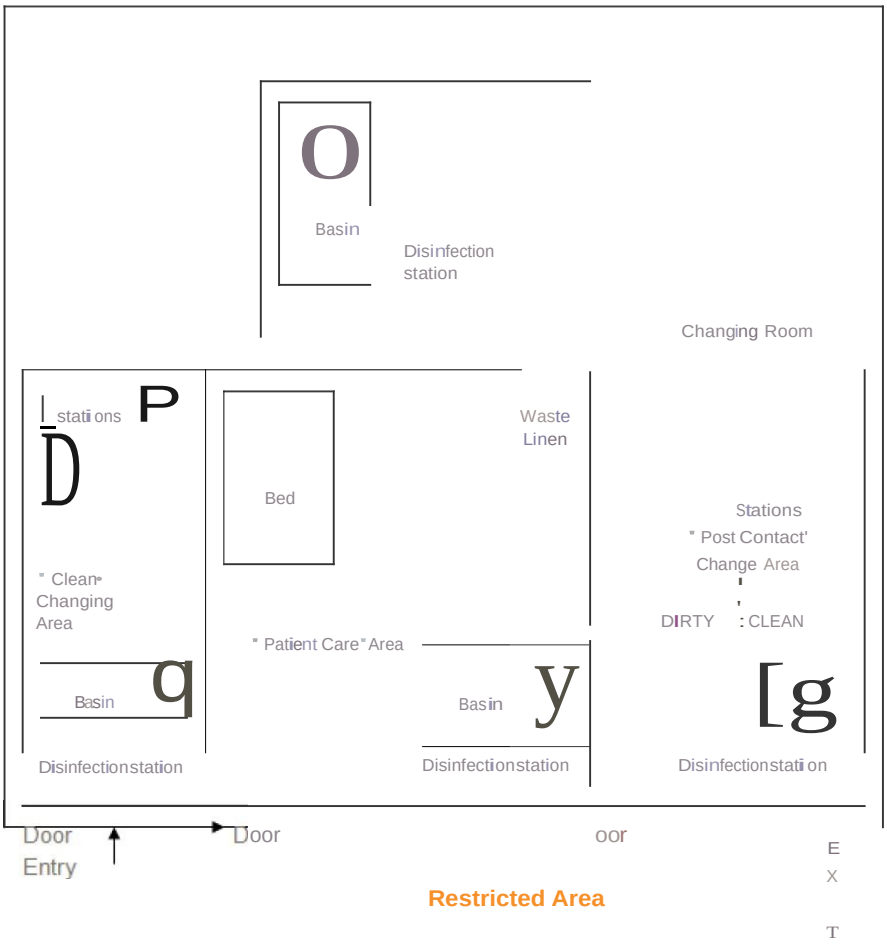
Complies with ISO 17025 1999 No. M 0029

Addendum 7

Management of patient with viral haemorrhagic fever
Suggested contents of FED pack (formidable epidemic disease pack)

Copy of the corporate policy: **Management of a patient with a suspected or confirmed viral haemorrhagic fever.**
Signage: (Laminated) • Restricted Area • Hand-washing before entry • Stations 1 - 9 • Hypochlorite Dilution Sheet • Posters showing sequence for dressing and undressing of PPE
Masks: • N95 respirators and surgical masks
Gloves: • Sterile and disposable (good quality, longer sleeve)
• Condemned theatre scrubs
Gowns / Protective Suits • Disposable long sleeved Gowns • Water repellent, with cuffs • Protective Suits
Roll of tape – Broad adhesive (Masking tape/ Packaging tape) to secure gloves
Goggles/Visors – Close fitting
Boots/Overshoes/Knee high overshoes
Balaclava caps
Bio-hazardous labels/stickers
Red and yellow plastic bags
Red and white striped tape for demarcation of the areas
Hypochlorite tablets/sachets (1 box) and measuring jug
Condemned linen (fill up when available)
Incontinent sheets
70% Alcohol hand disinfectant
Disposable below knee aprons
List of relevant telephone numbers
Hand Bell

Setting up an isolation area for a suspected/confirmed Formidable Epidemic Disease e.g. Viral Haemorrhagic Disease



Appendix J

CHECKLIST FOR OUTBREAK MANAGEMENT

ACTION		TICK
Identification of suspect	Clinical recognition of possible case – 1st line of defense.	
Set up coordination team	Outbreak coordinator (preferably a nurse); Experts with outbreak experience; Contact coordinator; Hospital Manager; Nursing Manager representative Medical Clinician; Laboratory Services; Communications; Support services; Department of Health; CDC/WHO representatives.	
Establish a working diagnosis	Based on history and probability, endemic area; travel; occupation; lateral thinking.	
Infection and transmission Prevention	Standard precautions; Contact precautions; Droplet precautions; Airborne precautions.	
Staff related management	Volunteers; Limited rotation; Sufficient staff:- Nurse and relief, Buddy, Runner.	
Manage the rest of the Hospital including Doctors, Nurses, Cleaners; Coffee Shops,	Daily meetings; Night rounds by coordination team Member; news brief; FAQ's for patients/family; Education; Acknowledgement; Open door policy.	
Support of staff in isolation unit	Confidentiality; Frequent visits to staff; Counselling; Stock levels; Special meals; Sufficient drinks; Leisure activities; Abandon Hierarchical platforms.	
Patient related management	Honesty; reassurance; management visibility; Alternative options.	
Communication	Staff and other patients; Other clients; Media; DoH; Head office liaison; Family.	
Contact management	Operational definition of risk:- high, medium and low; Only aerosol exposure. Lists:- First contact date; Last contact date plus 21 Days; Staff on duty; Staff not listed on allocation lists; Supportive services; Special investigations; Persons at point of origin; Family and friends.	
Ethical Dilemmas	Whether or not to admit to ICU; When to withdraw Treatment. Cost of treatment.	