# PRESSURE ULCER MANAGEMENT IN OMAN: NURSES' KNOWLEDGE AND VIEWS

**By**

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# Author's Publications and Presentations:

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# Abstract


## Background:

Pressure ulcers (PrUs) have a significant impact on health system expenditure and patient's quality of life. It is a global problem. Many studies were undertaken in regard to PrU prevention and management. In Oman, no studies have been conducted to investigate nurses' knowledge on prevention and management of PrUs. The purpose of this descriptive sequential explanatory mixed-method study was to explore the nurses' level of knowledge in relation to prevention and management of PrUs in Oman.

## Methods:

A mixed method design was used and the study was conducted over two Phases. In Phase I, a questionnaire was developed to explore nurses' knowledge on PrU, policy, and resources. The main section of the questionnaire was the Pieper-Zulkowski Pressure Ulcer knowledge test (PZ-PUKT) which tests the knowledge on PrU. Another two sections were developed including questions about wound policy and resources available for PrU prevention and management in Oman. The questionnaire was distributed to nurses who were working in surgical, medical, orthopaedic, CCU, and ICU wards/units in seven hospitals.

In Phase II study, semi-structured qualitative interviews were conducted with 16 of the questionnaire respondents. Interviews took approximately 30 minutes, were recorded and transcribed verbatim. Qualitative data were analysed using the Knowledge, Attitudes and Practice (KAP) model as the *a priori* framework.

## Results:

In Phase I, 478 questionnaires were analysed. The knowledge test results showed the overall mean percent score for correctly answered questions was 51% suggesting a low level of knowledge. There was a significant relationship between nurses' knowledge and

age (*P*=0.001) and between knowledge and years of experience (*P*=0.001) with knowledge increasing with age and years of experience.

In Phase II, four themes were identified from the interviews: knowledge, attitude, and practice (framework themes) and perception of role. Findings indicated positive and negative attitudes towards the care of PrUs. Some nurses stated feeling rewarded when they see wounds improving while others said they could not work with patients independently because they lacked the knowledge and the skills needed. There was variation in the management of PrU between hospitals.

Both studies indicated that the wound management policy did not include enough information to guide nurses.

## Conclusion:

Overall the nurses' level of knowledge on PrU was relatively low. Most nurses were not familiar with wound management policy or different PrU prevention and management strategies. Nurses are aware of the risk of PrUs and try their best to manage them with the available resources however more training is required.

# Table of Contents

# List of Tables

# List of Figures

# Acknowledgement

*"Keep your dreams alive. Understand to achieve anything requires faith and belief in yourself, vision, hard work, determination, and dedication. Remember all things are possible for those who believe".*
*(Gail Devers quotes)*

One of my main aims regarding my future was to peruse my PhD study and to have the degree. I knew it was not easy, but I dreamt to have it one day. When I started my PhD, I thought I have made a wrong decision, but soon later I realized it wasn't. This doesn't mean it was easy, but it means that the person should be very patient and know in his heart with persistence, dreams can become true.

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# Author's Declaration

'I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for another degree at the University of Glasgow'.

Signature: ____Amal_____

# Abbreviations

PrU - Pressure Ulcer

EPUAP/NPUAP/PPPIA – European Pressure Ulcer Advisory Panel/ National Pressure Ulcer Advisory Panel/ Pan Pacific Pressure Injury Alliance

MOH – Ministry Of Health

PZ-PUKT – Pieper – Zulkowski Pressure Ulcer Knowledge

HAPU – hospital- acquired pressure ulcer

RASs – risk assessment scales

TPN – topical negative pressure

RCTs – Randomised Control Trials

PMBRA – plasma – mediated bipolar Radiofrequency ablation

MRSA – methicillin resistant staphylococcus

VAC – vacuum – assisted closure pressure

NPWT – negative pressure wound treatment

RNs – registered nurses

NAs – nursing assistants

UAE – United Arab Emirates

HCs – Health Centres

GPs – General Practitioners

NHS – National Health Services

EHCs – Extended Health Centres

SQUH – Sultan Qaboos University Hospital

ENT – Ear, Nose and Throat

QAD – Quality Assurance Department

ICD – Infection Control Department

LAMA – Leave Against Medical Advice

OPD – Out-Patient Department

KAP – Knowledge-Attitude-Practice

PI – Primary Investigator

ICU – Intensive Care Unit

CCU – Coronary Care Unit

MW – Medical Ward

SW – Surgical Ward

OW – Orthopaedic Ward

HOD – Head of Department

DNMA – Directorate of Nursing and Midwifery Affairs

RAs – Research Assistants

SD – Standard Deviation

n – Number

NJHA – New Jersey Hospital Association

CVA – Cerebrovascular accident

TVN – Tissue Viability Nurse

ICIS – Institute for Clinical Improvement Systems

CPD – Continuous Professional

# Chapter One: Introduction

## 1.1 Problem Statement

Pressure ulcers (PrUs) are considered a global problem, they affect patients with different health problems and across different age groups, i.e., young, adult, and elderly. Patients with mobility restrictions have a higher risk of PrUs development. PrUs are considered a major challenge to health care providers worldwide (Anders et al. 2010; Steinberg 2012). PrUs have different stages of development and the treatment depends on the grade of the PrU. For example, grade 1 will heal faster than grade 4 where it is more complicated to treat (NPUAP, EPUAP & PPPIA 2014). The treatment of PrUs is very costly and they take a long time to completely heal (Dealey et al. 2012).

A PrU is a localized injury to the skin and the underlying tissue over the bony prominence as a result of pressure which may be combined with shear force (EPUAP & NPUAP 2009). PrUs are one of the common problems that healthcare providers in all the health care institutions in Oman and worldwide face when providing care for patients. PrUs are considered a significant problem in all health care settings affecting both the hospitalized and community-living patients (Coleman et al. 2013). The number of patients who develop PrUs is increasing worldwide (Heinhold et al. 2014); this increase has also been reported anecdotally by the nurses working in the Infection Control Department (IND) and the Quality Assurance Department (QAD) in Oman.

There are different factors that lead to the development of PrUs. These can be considered as intrinsic or extrinsic risk factor (García-Fernández et al. 2014). Intrinsic factors relate to the physical and psychological characteristics of the individual and are dependent on his/her level of resistance (García-Fernández et al. 2014). They can affect the response mechanisms or explain alterations in structural components or tissue perfusion. Intrinsic risk factors include immobility, respiratory and circulatory alterations, predisposing

disease, dehydration, and malnutrition (García-Fernández et al. 2014), age, weight, and inactivity (Petzold et al. 2014). In contrast, extrinsic factors include substances to which the individuals are exposed (like drugs, perfumes, talcum powder, and cleaning agents), humidity and room temperature, the surface on which the patient lies or sits, moisture in areas subjected to pressure and friction (García-Fernández et al. 2014), and treatment with certain drugs like analgesics, sedatives or hypnotics that induce sleeping and sedation which increase the time the patient will be lying in bed (Petzold et al. 2014).

PrUs have many consequences which can be divided into: the costs of treatment and the effect on the patient's quality of life. The costs of the treatment can be further divided into three different levels: individual, society and family and the cost to the healthcare system (Augustin et al. 2012). As an example, patients with PrU, who have mobility restriction, cannot work and they need support from their families and they become a burden on the society as well.

In terms of healthcare consequences, the cost of PrU care is very high. The estimated costs of PrUs treatment range from £43 to £57 per day for uncomplicated PrUs to £43 to £374 per day overall (Bennett et al. 2004). This cost is excluding the patient's standard care which is provided during the admission period (NICE 2014). The different resources that are included in the direct cost of the treatment are: the nurse time, dressing materials, antibiotics administered, diagnostics tests performed, and the pressure redistributing devices used (NICE 2014). According to Bennett et al 2004, the nurse and healthcare assistant time accounts for 90% of the overall costs for treating PrUs (Bennett et al. 2004). PrUs also adversely affect the patient's quality of life as identified in the systematic review and meta-synthesis by Gorecki and his colleagues (Gorecki et al. 2009) (details in chapter 2, section 2.12). Due to the PrU some patient's can't work and this affects their emotional status as they may become more isolated and have low self-esteem (Spilsbury et al. 2007). In addition, Gorecki et al., suggested that PrUs represent a major burden to patients and

may lead to negative psychological, physical, and social consequences that may affect their well being (Gorecki et al. 2009). Also, these patients may have pain with varying degree depending on the number of PrUs the patient has and its stage (Spilsbury et al. 2007). In Oman, PrUs cases are recorded and monitored by the ICDs and QADs in each hospital. As stated by two nurses' in-charge of the ICD and QAD, in two different hospitals, the number of PrU cases in Oman is high and still increasing and the reasons for that are multi-factorial. The treatment of PrUs is very costly and consumes a lot of resources. In interviews expert nurses expressed a view that nurses who care for patients with PrUs should be very well trained to manage them effectively and be able to provide holistic care to the patient with PrU, this care includes consideration of social, physical, and psychological issues (Varga & Holloway 2016).

Although no previous study has examined PrUs in Oman, anecdotal evidence from clinical staff suggests that the health team members lack awareness of the development, prevention, and treatment of PrUs. For this reason there was a need to find out the knowledge of the nurses on PrUs prevention and management.

## 1.2 Purpose of the study:

The purpose of this study was to explore the nurses' level of knowledge and views about PrU care and practices in order to describe the management of PrUs in Oman and guide the strategic planning for adopting new prevention and management strategies.

## 1.3 Aims of the study:

1. To assess the level of nurses' knowledge regarding PrUs and their prevention and management
2. To explore the nurses' attitudes towards PrU prevention and management
3. To evaluate the nurses' knowledge regarding the policies in use for PrU management

4. To identify the nurses' knowledge regarding training for PrU prevention and management
5. To assess the nurses' knowledge about the resources available for prevention and management of PrUs
6. To identify the relationship between nurses' characteristics and their knowledge about PrUs
7. To find out the nurses' views regarding the existing policies, resources, and the training related to PrU management

## 1.4 Overview of the phases of the study:

A descriptive sequential explanatory mixed-method design has been used in this study. This study was implemented in different phases with each phase conducted after the previous phase had been completed. Before starting the research study, there was a need to obtain a baseline data about PrUs in Oman. A preliminary audit was conducted in December, 2012 to determine the incidence rate of PrUs in hospitals in Oman (chapter 3).

The results of preliminary audit led to the planning of the study Phases (i.e. Phase I study and Phase II) (chapter 5). The aim of phase I was to identify the nurses' level of knowledge regarding PrU prevention and management. This was achieved by sending questionnaires to nurses in seven hospitals in Oman. The aim of Phase II was to investigate the issues raised from the results of the questionnaire (Phase I) in more depth. To that effect individual interviews were carried out with sixteen nurses in Oman.

## 1.5 Thesis layout:

The previous section provided a general introduction and rationale for the study. Chapter Two illustrates the search strategy followed, reviews the literature on PrUs historical background, epidemiology and costs, definition, causes, pathophysiology, staging, risk factors for its development, its assessment, prevention and management strategies, and the

recent studies examining the knowledge, attitudes and practice of nurses of PrU prevention and management.

Chapter Three presents the preliminary audit done in Oman before implementing the research study. It consist of the following: the geographical regions of Oman, numbers and types of health institutions, governmental health facilities other than the Ministry of Health (MOH) facilities, funding of health care in Oman, the policy available on PrU care, the people involved in PrU care and the information on the performance indicators. It also presents the methods followed to gather the data on PrUs from seven different hospitals in Oman. The chapter includes analysis and recommendations from the preliminary audit and a justification for the need to conduct the quantitative study (Phase I).

Chapter Four discusses the theoretical framework underpinning the study and the reason for its selection and an overview of the undertaken study.

Chapter Five outlines the methods of the first Phase of the study, the quantitative study (Phase I). In this phase, a questionnaire was used to gather data. The aim of this Phase was to identify the nurses' level of knowledge on the prevention and management of PrUs and their knowledge on the policy, training and resources available. The chapter includes the study design, ethics and research development approval, data collection instrument, study sites and access, ethical considerations, sampling technique, inclusion and exclusion criteria, justifications for the selection Pieper-Zulkowski Pressure Ulcer knowledge test (PZ-PUKT), pilot study, data collection procedure, and finally the data analysis.

Chapter Six is the results of the quantitative study which are presented under the following headings: response rate, analysis of demographic data (that includes the respondents' general characteristics, their training, their knowledge update on PrU), results on PrU knowledge (Pieper-Zulkowski Pressure Ulcer Test – PZ-PUKT), its overall scoring and

scores of the three sub-scales, the results of the nurses' knowledge on the polices and resources used for PrU management in Oman.

Chapter Seven is the discussion chapter for Phase I; the quantitative study; which discusses findings in relation to previous literature. The discussion focuses on nurses' knowledge on PrUs, on policy, on training, on resources, then on the relationship between nurses' characteristics and their knowledge of PrUs, the limitations of quantitative study (Phase I), and finally the link to the qualitative study (Phase II).

Chapter Eight presents the methods of the second phase of the study, the qualitative study (Phase II). In Phase II, interviews were done with sixteen nurses who had completed the questionnaire and therefore self-selected to participate in this Phase. The aim of this Phase was to explore the nurses' views on PrUs prevention and management, and the policies, training, and resources available in Oman. The chapter includes the study design, ethics and research development approval, data collection instrument, study sites and access, ethical considerations, sampling size, pilot of the interview questions, data collection procedure, the data preparation and analysis and data analysis.

Chapter Nine presents the results of the qualitative study. It includes the participants' demographic data, findings on the pre-set themes (i.e. knowledge, attitudes, and practice) and the sub-themes (i.e. policy, training and resources). It also includes the emerging theme (i.e. perception of role), nurses' overall opinion on the practice of PrU management in Oman, and the recommendations of nurses in relation to PrUs prevention and management.

Chapter Ten is the discussion chapter for the qualitative study (phase II) which discusses findings in relation to previous literature. It consists of discussion on the nurses' level of knowledge, nurses' attitudes, nurses' practice (i.e. the pre-set themes), and the policy,

training, and resources (the pre-set sub-themes). Discussion on the emerging theme (i.e. perception of role) and the limitation of the qualitative study (Phase II) is also included.

Chapter Eleven discusses the results of Phases, I and II, comparing and contrasting the results. It also discusses what did the study added to the field of knowledge, the recommendations of the study and the final conclusion.

# Chapter Two: Literature Review

## 2.1 Introduction:

A literature review helps the researcher to determine the worthiness of studying a particular problem, and assists in narrowing the scope of inquiry (Creswell 2013). The aim of this chapter is to review the previous literature that is relevant to PrU prevention and management in general and more specifically nurses' knowledge, attitudes and practice in this area. The literature review also explores PrU prevalence and incidence, PrU risk assessment scales (RAS), and PrU grading systems.

### 2.1.1 Search strategy:

The search strategy was based on the nature of inquiry. The literature was searched using specialised databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), Ovid MEDLINE, Cochrane Database of Systematic Reviews (CDSR), Ovid EMBASE, and Web of Science. These databases included the related subjects and journals that were relevant to the area of inquiry. In addition, Google scholar was searched for additional literature that was not available in the databases. A manual search of relevant reference lists was also conducted to make sure no relevant study was missed during the search.

The search was conducted using the key words "pressure ulcer", "decubitus", "pressure sore", "bedsore" or "bed sore" combined with the following terms: risk assessment scales (RAS), National Pressure Ulcer Advisory Panel (NPUAP) and knowledge, attitude, and practice which were combined using Boolean operators e.g.: (decubitus OR bed sore OR pressure sore OR pressure ulcer) AND (nurses or nursing).

### 2.1.2 Inclusion and Exclusion criteria:

Papers were included in the literature review if they:

- Were written in the English language

- Involved Humans
- Full text articles were available
- Were empirical studies, both quantitative and qualitative
- Were systematic reviews
- Studies of Adults

The exclusion criteria were:

- Papers in any other language except English
- Studies on paediatric populations
- Opinion papers and conference abstracts

### 2.1.3 Search results

The search resulted in a large number of references. Titles and abstracts were then screened for relevance. The studies that did not match the inclusion criteria were excluded and the studies which were potentially relevant were obtained for further screening. For example, the final number of studies included for RASs was 18 and for the nurses' knowledge, attitudes and practice was 22; which included both primary studies and literature reviews. The initial literature search was conducted in February 2013. Additional searches were carried out in December 2015 using the above mentioned databases and new relevant studies and systematic reviews were then included.

## 2.2 Overview

Pressure ulcers (PrUs) are also known as bed sores, decubitus ulcers, pressure sores (Wake 2010) and pressure injury (Carville et al. 2012). According to Wake, these terms imply that this condition can only develop in non-ambulatory patients who are confined to bed (Wake 2010) although this is not always the case. Hospital-Acquired Pressure Ulcers (HAPU) and Nosocomial pressure ulcers describe PrUs that develop during a patient's hospital admission period (Alderden et al. 2011). Despite recent advances in treatment and wound management, and vast improvements in technology, PrUs still represent a significant

challenge for the nurses and physicians who manage them (Steinberg 2012). A patient who develops a PrU suffers pain and discomfort which can lead to physical and emotional problems, especially if the PrU is present for a long time.

Skin is the first line of defence of the immune system as it protects against many toxins and chemicals that surround the human body. Skin is considered to be the most vital and largest organ as it accounts for approximately 15% of the total adult body weight (Kolarsick et al. 2005). It maintains the temperature of the body by regulating fluid loss and protects the body from heat and light (Kolarsick et al. 2005). Skin is composed of three layers: the epidermis, the dermis and subcutaneous tissue. In the case of PrUs, layers of skin are destroyed due to pressure accompanied by shear and friction forces. The degree of skin damage depends on the amount of force as well as the duration the force is applied.

## 2.3 Historical Background

PrUs have been a recognised condition for more than 400 years in the medical field. Two French surgeons identified and studied PrUs, which at that time they called decubitus ulcers. Ambrose Pare (1510-1590) treated PrUs using an approach similar to that followed today. His approach involved following a comprehensive nutritional plan, treating the underlying disease, using pressure relieving measures, wound debridement, applying local dressings and providing psychological support to the patient (Levine 1992). On the other hand, Jean-Martin Charcot (1825-1893) had a different opinion regarding the cause of PrUs. He developed his own theory concerning the leading cause of PrUs, which he called the “neurotrophic theory”, in which he suggested that PrUs develop due to damage to the nervous system (Levine 2005). Florence Nightingale (1820-1910) worked with different categories of patients during wartime and peacetime. She considered the development of pressure ulcers to be the fault of the nurses and believed that the development of PrUs was avoidable. She wrote in her book entitled “Notes on Nursing” in 1859 that “If he has a

bedsore, it's generally not the fault of the disease, but of the nursing" (Nightingale 1859). Even today, PrUs are seen as an indicator of poor quality patient care (Lyder 2003).

## 2.4 Epidemiology and Costs of PrUs

Many studies have been undertaken to determine the incidence and prevalence rates of PrUs worldwide. Different studies have reported a range of incidence rates from 0.78% to 39.3% (Petzold et al. 2014; Tayyib et al. 2015). Many international studies have presented prevalence rates ranging from 4.3% to 25%;i.e. in Germany 4.3% (Kottner et al. 2010), Republic of Ireland 9% (Moore & Cowman 2012), USA 9.5% and Sweden 17.6% (Gunningberg et al. 2012) and United Arab Emirates 25% (Tariq 2014).

A cross-sectional study in Germany reported that the prevalence of PrUs, including stage 1-4 and deep tissue injuries, ranged from 4.3% in nursing homes to 7.1% in hospitals (Kottner et al. 2010). The occurrence of PrUs varies depending on whether the patient is in a hospital or a nursing home. One study conducted in the USA compared the prevalence of PrUs in patients newly admitted to hospital from nursing homes and those admitted from their homes. The results showed the prevalence of pre-existing PrUs at the time of admission was 26.2% among patients admitted from a nursing home compared to 4.8% in patients admitted from their homes (Keelaghan et al. 2008).

The cost of PrU care varies depending on the stage of the wound, and increases with wound severity and duration of the healing process. For example, in UK the cost of treating PrUs in one patient can range from £1,214 for a stage 1 wound to £14,108 for a stage 4 wound (Dealey et al. 2012), with an annual costs to the NHS of around £1.7 million (Stinson et al. 2015).

In Oman, the number of patients who have PrUs is not known. The researcher's clinical experience witnessed that some patients were admitted without PrUs but developed them during their admission period, while other patients were admitted with one PrU and ended-

up with multiple PrUs. No previous studies of PrUs have been undertaken in Oman and as such there is a clear need for further exploration.

## 2.5 Definition

PrUs are defined as a localised injury to the skin and/or underlying tissue, usually over a bony prominence, as a result of pressure or pressure in combination with shear (NPUAP, EPUAP & PPPIA 2014). The PrU develops from a local breakdown of the soft tissue as a result of compression between a bony prominence and an external surface (NPUAP, EPUAP & PPPIA 2014). The severity of PrUs varies from redness or erythema of intact skin to tissue destruction involving the skin, subcutaneous tissue, muscle and bone (NPUAP, EPUAP & PPPIA 2014).

According to Bauer and collegues (2007), terms such as bed sores and decubitus ulcers should not be used as bed sores imply that PrUs result only from lying in the supine position. They argue that, whilst tissue destruction occurs over the sacrum, scalp, shoulders, calves and heels when the patient is in a lying position, it also occurs over the tuberosities when a patient is wheelchair-bound, which makes pressure sore the most suitable term to use (Bauer et al. 2007). The term PrUs will be used in this study.

PrUs also develop on the iliac crest, trochanters and the helix of the ear when the patients is lying on their side (Anders et al. 2010). Taken together, this indicates that PrUs develop from prolonged pressure due to sitting or lying in the same position. This often occurs when a person is unwell, immobile, unconsciousness or has a lack of sensation where in this case they cannot move or change their position frequently and become at risk for developing PrUs. It is important to emphasise that uneven pressure on the skin can lead to the development of PrUs regardless of the position of the person. Furthermore, Anders and collegues (2010) state that a PrU is a wound that develops in the upper layers of the skin as a result of sustained, externally applied pressure; the wound then enlarges both radially and into the deeper tissue layers, unless specific measures are taken to counteract the process.

PrUs constitute a common and serious health problem; they are associated with high costs on an economical level and can adversely affect an individual's quality of life (Baldi et al. 2010). They increase the burden on the health care system, especially when patients develop complicated PrUs which are difficult to treat and take a long time to heal. At the patient level, PrUs have an emotional and social effect on the individual and may affect their ability to participate in their usual activities.

## 2.6 Causes of Pressure Ulcers

As stated by the NPUAP (National Pressure Ulcer Advisory Panel) and EPUAP (European Pressure Ulcer Advisory Panel) PrUs are caused by unrelieved pressure, shear, friction or a combination of these factors (NPUAP, EPUAP & PPPIA 2014). Duration of pressure can lead to destruction in different layers of skin due to a lack of blood supply to the affected area (NPUAP, EPUAP & PPPIA 2014).

Other physical factors that can lead to skin damage include friction at the skin surface and shearing forces (lateral displacement of skin layers that differ in their firmness) (Anders et al. 2010). Moreover, primary extrinsic factors – pressure, ambient temperature, moisture and hygiene – can also lead to the development of PrUs (Lindgren et al. 2004).Also, according to Oomens et al (2014) tissue deformation can lead to cell death with or without ischemia (more details in the next section).

## 2.7 Pathophysiology

Different experiments and models have been introduced to explain the development of PrUs. In 2003, Bouten et al proposed a new approach that helped to explain the basic pathways in which the mechanical loading leads to soft tissue injury. Their hierarchical system involved model systems with cultured cells, in *vitro* tissue engineering model systems, animal models and studies with human volunteers for the purpose of identifying the aetiology of PrUs. Their work investigated the relationship between the global

mechanical loading at skin level; the resulting local internal mechanical conditions within the soft tissue layers; and the pathophysiological response to loading. The response was assessed in various functional tissue units involved in soft tissue breakdown (i.e., cells, interstitial spaces, blood and lymph vessels) (Bouten et al. 2003). The authors suggested that their findings would develop new fundamental knowledge about the aetiology of PrUs that would aid in their identification and prevention.

In 2008, Stekelenburg et al. summarised the outcome of Bouten et al. (2003) approach. The authors concluded that there are two damaging processes which may occur in the tissues above a certain deformation threshold. These processes were a rapid structural damage that

may occur within minutes of the deformation-induced insult and ischemic damage, which has a more gradual effect and is relatively slow process as a result of glucose depletion and tissue acidification (Stekelenburg et al. 2008).

Oomens et al (2014) investigated the aetiology of pressure-induced deep tissue injury. In their approach, they adopted a model that ranged from single cells in culture, tissue engineered muscle to animal studies with small animals (Oomens et al. 2014).The outcome of this approach has led to a clear understanding of two damage mechanisms that are associated with the development of deep tissue injury (DTI). The two damaging mechanisms are: 1) the direct deformation, which results from high, relevant strains on the tissue and is a process that leads to the first signs of cell damage within minutes; and 2) the ischemic damage that resulted from the occlusion of blood vessels but takes several hours to develop (Oomens et al. 2014).

The outcome of these models and approaches are similar. It has changed the previous concept of PrU development in which the ischemia was thought to be the only responsible cause and shifted to the concept of tissue deformation that leads to cell death, with or without the ischemia.

As explained by the models above and by other studies, during PrU development, tissue destruction occurs as the compression reduces the blood supply to the tissue (NPUAP, EPUAP & PPPIA 2014). When the capillaries are compressed enough it impedes perfusion, which leads to tissue necrosis (Lyder & Ayello 2005). The normal blood pressure within capillaries ranges from 20 to 40 mm Hg (Lyder& Ayello, 2005). For patients who are critically ill, the hemodynamic instability and co-morbid conditions result in these patients being susceptible to the development of PrUs, even with minimal pressure applied to the skin (Lyder & Ayello 2005). There is individual variation in terms of tissue tolerance to ischemia, and hence the development of PrUs, relates to, for example, the age, malnutrition status, coexisting disease, skin condition and mobility of the patient.

The key to PrU prevention is the identification of patients who are at-risk of PrU development as the condition can occur within minutes due to tissue deformation (Oomens et al. 2014) or two to six hours of continuous pressure on the skin (Lyder & Ayello 2005). For this reason, patients at risk of developing a PrU should have individual plans devised in terms of changing their position.

## 2.8 Risk Factors for Pressure Ulcer Development

Patients at risk of developing PrUs are generally bedridden, paralysed and debilitated and those with cardiovascular and neurological disease (Maslauskas et al. 2009). PrUs are more common among elderly patients, patients in orthopaedic units and patients with other medical conditions (Moore & Cowman 2010). According to the literature, more than two-thirds of PrUs develop in patients above 70 years of age (Maslauskas et al. 2009).

According to Anders and colleagues (2010), immobility is the dominant risk factor for the development of PrUs in all types of patients. The risk factors of PrU development can be divided into intrinsic (i.e. physiological) and extrinsic (i.e. non-physiological) factors (Lyder & Ayello 2005).

Coleman et al (2013) undertook a systematic review that aimed to identify risk factors that are independently predictive for PU development in adults. They conducted their literature search using fourteen databases.They included 54 studies which matched the eligibility criteria, seventeen of those studies were high or moderate in quality. Thirty seven studies had inadequate numbers (they did not define 'inadequate number' here) of PrU and had other methodological limitations (Coleman et al. 2013). From the review the most frequently emering risk factors as independent predictors for PrU development included: mobility/activity; perfusion; and skin/PrU status. Other risk factors were identified but these were not as frequently stated: age, skin mositure, nutrition, haematological measures and the general health status. The authors identified that more search is requred related to body temperature and immunity as risk factors for PrU development. Furthermore, there was limited evidence about the importance of race and gender as PrU risk factors (Coleman et al. 2013). The review concluded there was no single risk factors resposible for PrU development and that a complex interplay of factors increases the possibility of its development.

### 2.8.1 Intrinsic risk factors

Intrinsic or physiological risk factors are associated with impairment of the microcirculation system. During illness, microcirculation is affected as it is controlled by sympathetic vasoconstrictor impulses from the brain and secretions from localised endothelial cells, making the patient susceptible to ischemic organ damage (Lyder & Ayello 2005). Examples of these risk factors include diabetes mellitus, peripheral vascular disease, cerebral vascular accident, sepsis, hypotension, old age, smoking, dry skin, low body mass index, immobility, altered mental status, malnutrition, urinary and faecal incontinence, history of PrUs and malignancy (Lyder & Ayello 2005).

### 2.8.2 Extrinsic risk factors

Extrinsic or non-physiological risk factors include external pressure accompanied by shear and friction. PrUs develop when the skin surface is exposed to external interface pressures that are higher than the pressure in blood capillaries in the skin which leads to capillary closure. Persistence pressure can cause tissue necrosis (Lyder 2003). Shear force is produced when the skin surface remains static while patient drags parts of their body against a support surface like the bed or chair which can lead to breakdown of the blood capillaries between the static skin and moving bones. The broken capillaries cannot transport oxygen and nutrients to tissue, which eventually leads to tissue ischemia. Friction occurs when skin is rubbed over the supporting surface as the body moves. This can cause intra-epidermal blisters that can create erosions in the epidermal layer and leads to skin breakdown (Lyder 2003). In addition to the friction and shear forces; heat, moisture and posture are another extrinsic risk factors for PrUs development.

A study which included a large cohort of patients (n=581) has shown that in patients with spinal cord injury significant risk factors include being underweight, smoking, drinking alcohol, suicidal behaviours, drug use, taking pain medication (Fisher et al. 2004). All of these factors should be considered while assessing a patient's risk of PrUs and included in planning the care.

## 2.9 Risk Assessment Scales (RASs) of PrUs

Over the years, many risk assessment scales (RASs) have been developed to prevent the development of PrUs. These tools include the Norton Scale, Gosnell Scale , Braden Scale , Knoll Scale and Waterlow Scale (Ayello & Braden 2002). The PrU Prediction scale was developed in 1987 and the Walsall scale in 1993, but neither were used widely. The Norton and Waterlow Scales were developed in Europe and are still in use today while the Braden Scale , Knoll Scale and Gosnell Scale were created in the United States (Ayello & Braden

2002). The Norton Scale was developed in the 1960s by Norton (Norton 1989) while the Waterlow Scale was developed in 1985 (Waterlow 1985).The most used RASs as found from the literature review were the Norton Scale, Braden Scale and Waterlow Scale. The Waterlow Scale and the Braden Scale have been translated into Brazilian Portuguese and validated in Brazil (Serpa et al. 2011).

### 2.9.1 Norton Scale

The Norton Scale was developed based on the need to monitor patient's health status systematically in relation to PrU risk (Norton 1989). The risk assessment Scale was designed to assist nurses identify the clinical features and professionally judge the patient's health status based on the calculation score and thus their estimation of PrU risk (Norton 1989). The Norton Scale consists of five components: the patient's general condition, activity level, mobility status and incontinence level. With each component scored from 1 to 4 the score ranges from 5 to 20, with higher scores indicating higher risk of the PrUs. The Norton scale served as the basis for the development of other instruments, such as the Waterlow scale and the Braden scale.

### 2.9.2 Braden Scale

The Braden Scale was created by Barbara Braden and Nancy Bergstrom in 1984, however, the first paper about it was published in 1987 (Braden & Maklebust 2005) and the Scale has since been translated into many languages (Ayello and Braden 2002).The Braden Scale has six subscales: sensory perception, moisture, activity, mobility, nutrition and friction/shear (Bergstrom et al. 1987). Five subscales are rated from 1 to 4 (1 least favorable and 4 most favorable) while the friction and shear subscale are rated from 1 to 3. Thus the maximum score from the six subscales is 23 (Bergstrom et al. 1987). The first study of the predictive validity of Braden Scale in the mid-1980s determined that a total score of 16 was the balance between sensitivity and specificity that is known as the "cut-offs core" thus patients who score less than 16 points are at risk of developing a PrU

(Braden & Maklebust 2005). In the early 1990s, a new "cut-off score" was identified based on the results of a large, multi-center study which found a score of 18 points to be more accurate "cut-off score" (Bergstrom et al. 1998). As a result, the following levels of risk of developing PrU were identified: 9 or below indicates very high risk; 10 to 12 indicates high risk; 13 to 14 indicate moderate risk and 15 to 18 indicate at risk (Braden & Maklebust 2005).

Three studies have been undertaken to determine the inter-rater reliability of the Braden Scale but were published together in one paper (Bergstrom et al. 1987). The reliability study I was conducted to determine the Scale's inter-rater reliability when administered by registered nurses (RN) and a graduate student (GS). Twenty patients were included in the study. Both the RN and GS rated the patients for a period of 1 to 7 weeks. The Pearson product moment correlation between observers was r=.99, $p$< .001which showed an excellent inter-rater reliability (Bergstrom et al. 1987).

The aim of the reliability study II was to determine the reliability of Braden Scale used by licensed practice nurses (LPN) and nursing assistants (NA) for assessing elderly in-patients. The LPNs and the NAs were not trained on the use of this Scale prior to the study. There was some variation between the ratings of the LPN and NA. The total Braden Scale scores assigned by them were correlated using the Pearson product moment correlation that ranged from a low of r = .83, $p$<.001 for both the LPNs and NAs on the day shift to high of r = .87, $p$ < .001 for NA on the day and evening shifts. The study results showed high correlations which demonstrated a good reliability of the Braden scale (Bergstrom et al. 1987).

The reliability study III aimed to determine the reliability of the Braden in a skilled nursing facility in different regions. Four raters in different shifts took part. The correlations were the following: r = .93, $p$<.001 for LPNs on day and evening shifts, r = .94, $p$< .001 for the

LPN and NA on day shift (Bergstrom et al. 1987). The results of this study demonstrated a high correlation and indicate of the Braden Scale to be very reliable.

In conclusion, the findings of the three studies demonstrated that Braden Scale was a highly reliable instrument when used by nurses of different grades (i.e., registered nurses, primary nurses and graduate students) (Bergstrom et al. 1987).

### 2.9.3 Waterlow Scale

The Waterlow Scale came about as a result of one study conducted at Musgrove Park University in the UK, in the 1980s (Serpa et al. 2011). The Waterlow Scale consists of eight subscales: body mass index, skin type/visual risk areas, gender/age, continence, mobility, appetite and special risks (tissue malnutrition, neurological deficit, major surgery/trauma, medication and smoking) (Waterlow 1985).

The Waterlow Scale was produced as a card designed as a practical aid to assist nurses to remember and be aware of the risk factors associated with PrUs, offer a method for determining risk assessment , grading of PrUs and deciding on the type of treatment required (i.e., preventive or active treatment) (Waterlow 1985). The Waterlow Scale was tested with 650 patients in the medical, surgical, orthopedic, geriatric, rehabilitation, trauma, coronary and intensive care wards (Waterlow 1985). Nurses were motivated by the theme 'prevention is better than cure' and became interested in the changes occurring in the patient's score as a result of using the Waterlow Scale. In addition, there was no patient who develop PrU has scored below 12 (Waterlow 1985). The results demonstrated that the Waterlow Scale was a valuable risk assessment tool for assessing patients on admission and facilitated implementation of the appropriate preventive measures (Waterlow 1985).

In the Waterlow Scale total scores of 10 or less indicate low risk, scores of 10 to 14 indicate risk, scores of 15 to 19 indicate high risk and scores of 20 or higher indicate very high risk (Serpa et al. 2011). The Waterlow Scale was found to be a useful instrument for

identifying patients at risk of PrUs at admission, thus allowing nurses to apply the preventative measures stipulated in the instrument (Serpa et al. 2011).

### 2.9.4 Reliability and validity of RASs

Reliability and validity of each RASs have been reported (reliability and validity are defined in chapter 4, section 4.4). Furthermore, predictive validity is calculated by measuring the following: sensitivity, specificity and predictive value (Lindgren et al. 2002), where sensitivity is defined as the percentage of patients who are classified as having the risk for developing PrU and develop a PrU and specificity is defined as the percentage of patients who are classified as not being at risk for developing PrU and do not develop a PrU (Lindgren et al. 2002). On the other hand, predictive value is divided into predictive value with positive test and predictive value with negative test. Predictive value with positive test means the probability of PrU development among patients at risk for development and predictive value with negative test implies the probability of not having a PrU in patients who does not have the at risk of development (Lindgren et al. 2002).

Many studies have been conducted to validate the effectiveness of these risk assessment tools for PrUs. However recent systematic reviews have shown different findings discussed below.

#### *2.9. 4.1 Studies discussing the Reliability, Validity, Sensitivity and Specificity of RASs:*

A recent systematic review and meta-analysis aimed to develop the groundwork for the predictive validity of the Braden Scale and included articles published between 1966 and 2015 (Park et al. 2015). Different databases (e.g., Ovid Medline, Embase, CINAIL, KoreaMed, NDSL) were searched using “pressure ulcer” as a keyword (Park et al. 2015). Twenty-one diagnostic studies with high methodological quality were included and involved 6070 patients. The meta-analysis showed that the pooled sensitivity was 0.72 and

the pooled specificity was 0.81 which suggest that the Braden Scale has a moderate predictive validity (Park et al. 2015). Further analysis showed that age and reference standards were the factors that affected the Braden Scale diagnostic accuracy (Park et al. 2015). The study concluded that more studies should be conducted to evaluate other RASs and to develop a new tool with higher predictive validity (Park et al. 2015).

Another systematic review was conducted in Turkey. The study aimed to reach scientific generalizations in regard to the assessment of PrUs risk based on the results of previous studies that used Braden Scale (Baris et al., 2015). The literature search for the systematic review was undertaken between March 2012 and August 2012 and included studies that used Braden Scale and published between 1998 and 2012 (Baris et al. 2015). The study results showed there was limited evidence of effective risk assessment by the Braden Scale (Baris et al. 2015). This study supports the findings of the systematic review by Park et al. (2015) in that the Braden Scale needs to be developed further to improve its validity. Kelechi et al (2013) performed a literature review that aimed to describe the PrU RASs used for adults (i.e., Norton scale, Waterlow Scale and Braden Scale) and pediatric (i.e., Braden Q, Starkid and Glamorgan). The literature was searched for meta-analyses, systematic reviews, and randomized clinical trials in the following databases: CINAHL, MEDLINE, EMBASE, Cochrane Database of Systematic Reviews, Cochrane Central Register of Controlled Trials databases, and clinical publications and guidelines published by various organizations in the Agency for Healthcare Research and Quality National Guideline Clearinghouse (Kelechi et al. 2013).

The results showed that Barden Scale is the most widely cited RAS followed by Waterlow Scale and then Norton Scale (Kelechi et al. 2013). In addition, authors declared that the Braden Scale had been tested in the largest number of studies, compared to the other scales. It has demonstrated higher reliability and validity indicators in a variety of settings. Its sensitivity ranged from 38% to 88% and specificity ranged from 68% to 92% in

different studies in various adult patient populations. In relation to the Waterlow scale, Kelechi et al. found it was studied in fewer patient groups than the Braden Scale. They also stated data were lacking regarding its reliability and validity and that is the most unreliable of all 3 adult RAS in the review. The Norton Scale has been studied in multiple patient populations, for example, oncology, intensive care, and patients with spinal cord injuries. Recently reported intraclass coefficients (ICCs) ranged from 0.57 to 0.83 and suggest that the Norton Scale has moderate to good reliability. Moreover, the authors of this review found that the Norton Scale was less frequently cited in the literature over the past 5 years.The study concluded that there is a need for continued work on testing and improving these Scales, especially in terms of their reliability (Kelechi et al. 2013).

Walsh & Dempsey (2010) conducted a systematic review to examine the reliability and validity of the Waterlow Scale. The search was conducted using different databases including the Applied Social Science Index and Abstracts and CINAHL. In the search, the following terms were used: pressure ulcer, pressure sore, bedsore, decubitus ulcer, Waterlow, risk assessment, reliability, validity, and nurses (Walsh & Dempsey 2010). The study findings showed that despite the availability of over 40 assessment tools, the Waterlow Scale was the most frequently used. It suggested that Waterlow Scale was an unreliable method for assessing PrU development as all the studies indicated poor inter-rater reliability. Also, in terms of validity the Waterlow Scale was judged as having high-sensitivity but low-specificity (Walsh & Dempsey 2010).

Balzer et al (2007) undertook a study that compared the sensitivity and specificity of the Norton, Waterlow, and Braden Scales in identifying patients at risk for PrU development. This study was part of a prevalence study that involved 754 patients in three hospitals in Berlin. The results showed that the Waterlow demonstrated the highest sensitivity (0.86) and the Norton Scale demonstrated the highest specificity (0.75) (Balzer et al. 2007).

In conclusion, the above studies have shown that the RASs need to be tested more to examine their validity and reliability and to calculate their sensitivity and specificity.

#### *2. 9. 4. 2 Studies discussing the use of RASs and clinical judgment:*

Garcia-Fernandez et al (2014) undertook a systematic review with meta-analysis that aimed to determine the capacity of RASs and nurses clinical judgment to predict development of PrUs. The databases were searched for papers published between 1962 to 2010 on studies regarding validity and predictive capacity of PrU RASs (Garcia-Fernandez et al. 2014). They measured the predictive capacity as relative risk (RR) with 95% confidence intervals (Garcia-Fernandez et al. 2014). The meta-analysis resulted in the following pooled predictive capacity indicators: Braden (RR= 4.26); Norton (RR= 3.69); Waterlow (RR= 2.66); Cubbin-Jackson (RR= 8.63); EMINA (RR= 6.17); Pressure Sore Predictor Scale (RR= 21.4); and clinical judgment (RR= 1.89).The study concluded that the predictive capacity of the PrU RASs was significantly higher than the nurses' clinical judgment. It also confirmed that the nurses' clinical judgment was found to be inadequate when used alone and recommended clinical judgment be used in combination with a validated scale (Garcia-Fernandez et al. 2014).

Moore & Cowman (2010) undertook the first literature review update that aimed to determine whether using structured, systematic PrU risk assessment tools, in any health care setting, reduces the incidence of PrUs or not. The original review did not identify any study that met the inclusion criteria which were randomised controlled trails (RCTs) that compared the use of structured, systematic, PrU RASs with no structured RASs, or with unaided clinical judgment, or RCTs that compared the use of different structured RASs (Moore & Cowman 2010). They searched the following data bases: Cochrane Wounds Group Specialized Register; the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library 2010, Issue 3); Ovid MEDLINE; Ovid EMBASE and

EBSCO CINAHL (Moore & Cowman 2010). Their search resulted in one study only that matched the inclusion criteria.

Moore & Cowman (2014) conducted their second update on RASs which are used for PrU prevention. The search was done in 2013 in the following databases: the Cochrane Wounds Group Specialised Register; the Cochrane Central Register of Controlled Trials (CENTRAL); Ovid MEDLINE; Ovid EMBASE; and EBSCO CINAHL. In this review, two studies matched the inclusion criteria. One of these studies had been identified in the previous review (Moore & Cowman 2014). The first study (identified earlier in the first review) was a small clustered randomized study which reported no statistical differences in PrU incidence in three groups of patients that were assessed by: A) nurses using the Braden Scale (i.e., they received a mandatory study day on wound care management, training program on PrU prevention and specific training on the application of Braden scale) (n= 74); B) trained nurses using unstructured risk assessment tool (i.e., they received similar training to group A but were not asked to use the Braden Scale) (n= 76); and C) nurses using unstructured risk assessment tool alone (i.e., received only mandatory study day on wound care management) (n= 106). Group C therefore depended on their clinical judgment in regard to the assessment of PrU (Moore & Cowman 2014). The results demonstrated no statistical significant differences in PrU incidence when patients assessed for PrU risk using the Braden scale compared with a risk assessment following PrU prevention training, or when comparing risk assessment with using clinical judgment alone (Moore & Cowman 2014). Moreover, this study had some methodological limitation related to the randomization of the patients who were included in the study.

The second study was large, single blindrandomised controlled study. The effect of risk assessment on PrU incidence was compared using the Waterlow Scale (n= 411), the Ramstadius risk screening tool (n= 420) and no formal risk assessment (n= 420). The study resulted in no statistical differences in PrU incidence in the three groups (Moore &

Cowman 2014). In conclusion, both studies suggest that the use RASs does not reduce the number of patients who develop PrU.

O'Tuathail & Taqi (2011) (details section 2.9. 4.1) reviewed the literature on the three most commonly used RASs (i.e., Braden Scale, Norton Scale and Waterlow Scale). The results of this review were similar to the results of the review by Walsh & Dempsey (2010) where they reported that the Waterlow Scale is the most widely used in UK and Ireland. However, there was no evidence to suggest it was more effective than the Norton or Braden Scales. Similar to the reviews of Garcia-Fernandez et al. (2014) and Moore & Cowman (2014), this review also illustrated that the use of RASs is not beneficial without the nurses' clinical judgment (O'Tuathail & Taqi 2011).

Although the literature overall suggests that the Braden and Norton Scales are effective in predicting the risk of PrU (Balzer et al. 2007), one study which compared the predictive value of the Braden and Norton Scales to clinical judgment concluded that the effectiveness of these two tools was low and that new Scales should be developed (Defloor & Grypdonck 2005). The results of the study showed that the use of effective preventive measures decreased the predictive value of the RASs and nurses predicted the PrU development less well than the Braden and Norton Scales (Defloor & Grypdonck 2005). As such, further studies should be conducted to establish the reliability and validity of these tools for patients who do not exhibit all of the risk factors that can lead to the development of PrUs.

The above discussed studies concluded that the use of RASs is not effective alone in the predication of PrU development. They suggested that the nurses' clinical judgment is important and helps in deciding the type of preventive measures that should be used. They did not agree on a single RAS as the best tool for assessing the risk of PrU development. All studies suggested that that the nurses' clinical judgment is important and should be used in combination with the RASs.

In Oman, the Braden and Norton Scales are used for the risk assessment of PrUs in the health institutions as directed by the Ministry of Health.

## 2.10 Staging of PrUs

Over the years, different classification systems for the grading and staging of PrUs have been developed. The first system was developed in 1955 by Guttmann. In 1959, Campbell developed a new classification system, followed by Barton in 1981. Shea developed a further classification system in 1975 and Daniel et al. introduced others in 1981 and 1985 (Black et al. 2007). Shea in 1975 introduced the first well-documented staging method which consisted of a numeric classification system based on pathology (Black et al. 2007). In her definition, Shea defined each stage by the extent of damage to the skin and divided her system into four grades (Black et al. 2007). Shea's system proved popular and it was used in United States until the late 1980s (Black et al. 2007).

### 2.10.1 NPUAP

In 1989, the National Pressure Ulcer Advisory Panel (NPUAP) developed a four stage system which has been widely used since. They defined a Stage I PrU as

> "non-blanchable erythema of intact skin, the heralding lesion of skin ulceration" and Stage IV as "full-thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone, or supporting structures (e.g., tendon, joint, capsule) and also undermining and sinus tracts may be associated with Stage IV" (Black et al. 2007).

This NPUAP staging system has continued to be updated (last updated in 2014) (NPUAP, EPUAP & PPPIA 2014). There is little difference between the classification systems developed by the NPUAP and the European Pressure Ulcer Advisory Panel (EPUAP).

## 2. 10.2 EPUAP

In 1998, the EPUAP developed a grading system for PrUs which consists of four grades.

Grade1 PrU was defined as

"non-blanchable erythema of intact skin. Discolouration of the skin, warmth, oedema, induration or hardness may also be used as indicators, particulary with darker skin"

Grade 2 was defined as

"Partial-thickness skin loss, involving epidermis, dermis or both. The ulcer is superficial and presents clinically as an abration or blister" and

Grade 3 as

"full-thickness skin loss involving damage or necrosis of subcutanous tissue that may extend down to, but not through, underlying facia".

Grade 4 was defined as

"extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structures with or without full thickness skin loss".

## 2.10.3 NPUAP/EPUAP Guidelines

In 2007, the NPUAP/EPUAP redefined the definition of PrU and its stages adding two more stages on deep tissue injury and unstageable PrUs. This change was the results of more than 5 years of work that began in 2001 with the identification of deep tissue injury (EPUAP & NPUAP 2009).

The most recent changes to the PrU classification system were made by the international NPUAP, EPUAP and PPPIA (Pan Pacific Pressure Injury Alliance) in 2014 (NPUAP, EPUAP & PPPIA 2014). This new classification system is the most used system worldwide today.

- Stage I: Intact skin of non-blanchable redness of localised area usually over bony prominence. Darkly pigmented skin may not have visible blanching; its colour may differ from the surrounding area.
- Stage II: Partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled blister.
- Stage III: Full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon or muscle is not exposed. Slough may be present but does not obscure the depth of tissue loss. May include undermining and tunnelling.
- Stage IV: Full thickness loss with exposed bone, tendon or muscle. Slough or eschar may be present on some parts of the wound bed. Often include undermining and tunnelling.
- Unstageable: Full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, grey, green or brown) and/or eschar (tan, brown, or black) in the wound bed.
- (Suspected) Deep Tissue Injury: Purple or maroon localised area of discoloured intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue(NPUAP, EPUAP & PPPIA 2014).

## 2.11 Strategies for prevention and management of PrU:

### 2.11.1 Strategies for prevention:

Assessment is done to identify patients who are at risk for PrU development. Prevention strategies are support devices, positioning and nutrition. These strategies are used in both prevention and management. Some studies have discussed them as prevention and others as prevention and management.

#### *2.11.1.1 Support Devices*

The aim of using specialised support surfaces like mattresses, beds and cushions is to reduce or relieve the pressure exerted by the patient's body on the skin and the underlying subcutaneous tissue as it presses against the surface of a bed or chair (Reddyet al 2006). Compromised mobility with continuous pressure can lead to impaired circulation and the development of PrU (Reddy et al. 2006). There are many types of pressure-reducing surfaces, such as mattresses and mattress overlays that are applied on top of the standard mattresses; they can be filled with air, water, gel, foam or any combination of these (Reddy et al. 2006). There are also dynamic support surfaces that mechanically change, and thereby reduce, the pressure under the patient; these include alternating-pressure mattresses, low-air-loss beds and air-fluidised mattresses (Reddy et al. 2006). The ripple mattress was developed in 1967 and since then many different types of mattresses have evolved (Clancy 2013). It is not used very frequently nowadays.

According to Reddy and colleagues (2008), treating PrU can be both costly and complex. They note that there are hundreds of mattresses and local wound care products in use but that few have been evaluated in randomised controlled trials (RCTs). In other words, many treatments are used but some may be ineffective in PrU healing, thus potentially increasing the cost and time for the PrU to heal. Clinicians who take care of patients with PrU should be familiar with the effective strategies and when to use them (Reddy et al. 2008).

McInnes and colleagues (2012) undertook a systematic review that aimed to assess the effect of pressure-relieving support surfaces in the prevention of PrU. The search was conducted in five databases and included randomised controlled trials and quasi-randomised trials. The search identified 53 eligible trials. The analysis results showed that 1) the use of foam alternatives to the standard hospital foam mattresses reduced the incidence of PrUs in patients at risk; 2) Australian standard medical sheepskins prevent PrUs compared to standard care; 3) the pressure-redistributing overlays on the operating

table reduced the postoperative PrU incidence compared to standard care (McInnes et al., 2012). In conclusion, the review showed there is good evidence that high specification foam mattresses, sheepskins, and some overlays in the operative setting are effective in preventing PrUs but there is less evidence on the value of seat cushions, limb protectors and various constant low pressure devices which indicate a need for more robust trials to address these research gaps (McInnes et al. 2012).

Another systematic review was undertaken by Colin et al. (2012) that aimed to define the type of support surfaces to use in prevention and treatment of patients at risk and/or have PrU. The search was conducted in three databases and included papers from 2000 to 2010. They included 145 articles based on their relevance. The results showed that in the prevention of PrUs: 1) a structured foam mattresses is more efficient than a standard hospital mattress; 2) an alternating pressure mattress is more effective than a visco-elastic mattress in limiting the occurrence of heel PrUs while a low-air-loss bed is more efficient than a mixed pulsating air mattress in the prevention of heel PrUs; 3) some types of sheepskin can reduce the incidence of sacral PrU in orthopaedic patients; and 4)the use of an overlay on an operating table limits the occurrence of preoperative and postoperative PrUs (Colin et al. 2012). This review is a non Cochrane review which does not meet the quality criteria for a high quality systematic review and it has only a limited search period of 10 years.

In relation to treatment, the results showed that an air-fluidized bed improves the healing of PrU. The authors stated that the data in the literature are not always relevant and do not help clinicians to decide which types of support surface to use because the level of evidence is frequently weak and it is hard to conduct studies of adequate methodological quality are. They also acknowledged that there were methodological limitations of many studies and that there were a relatively small number of trials available (Colin et al. 2012). Finally, they concluded that the use of support surfaces are recommended in prevention

and treatment of PrU for patients who are at risk or have developed PrUs and these should be included in the overall management of the patient (Colin et al. 2012).

In 2013, McInnes et al undertook another systematic review that aimed to review the effectiveness of pressure redistributing support surfaces in the treatment of PrU. Five databases were searched for randomised controlled trails and eighteen trials were identified (McInnes et al. 2013). The results showed there was no statistically significant difference of the low air loss devices compared with foam alternatives in relation to PrU prevention. The authors concluded that there was no good evidence to support the superiority of any pressure relieving device in treatment of PrU and they recommended more trials to be undertaken to ascertain the types of support surfaces that are most effective in the treatment of PrUs (McInnes et al. 2013).

Another systematic review, undertaken by Chou et al. (2013), aimed to review the comparative effectiveness of preventive interventions in persons at higher risk of developing PrUs. The authors searched six databases for randomised trials and observational studies. Five studies were identified, 1 good-quality and 4 fair-quality randomised trials. The review found more advanced static support surfaces were associated with lower risk for PrUs compared with standard mattresses (Chou et al. 2013). They also found that evidence on the effectiveness of low-air-loss and alternating air-mattresses was limited (Chou et al. 2013). The conclusion for this review was that advanced static support surfaces were more effective for preventing PrUs in higher-risk patients than standard mattresses (Chou et al. 2013).

A recent systematic review was undertaken to identify the state of art approach that uses software to support the prevention of the PrUs (Marchione et al. 2015).The search was conducted in six databases and 36 articles were included based on the inclusion criteria. The involved studies used approaches to monitor patients in order to get information about the exposure to pressure, temperature level, humidity level and body position in bed that

provide risk factor intensity charts and maps. Sensors on the mattress were used for monitoring however these have replaced recently by electronic sensors and tactile sensory coils but there is no evidence available yet on these new sensor system (Marchione et al. 2015). The authors concluded that, although these approaches provide relevant information that help in prevention of PrUs, other matters like the patient's comfort and hygiene or replacement of equipment due to the risk of infection should be considered (Marchione et al. 2015).

In summary, three of the above mentioned systematic reviews discussed the use of support devices as prevention strategies (McInnes et al. 2012; Chou et al. 2013; Marchione et al. 2015) while another systematic review showed it was used as mamangement strategies (McInnes et al. 2013) and another systematic review discussed its use as both a management and prevention strategy. The review by McInnes et al (2012) concluded that high specification foam mattresses were better than standard mattresses and sheepskin and some overlayes were effective in prevention of PrUs development. Further trials should be conducted to determine the most effective support device.

#### *2.11.1.2 Positioning*

Positioning and surface support methods, used to reduce related tissue damage, are very important elements of prevention and treatment of PrUs (Whitney et al. 2006). The aim of positioning and repositioning is to reduce pressure on the skin, thus helping to maintain microcirculation to the body regions at risk of PrU development (Reddy et al. 2006). Also, the NICE guideline recommendations for patients who are at risk of PrU development, state that assessment should be carried by a trained healthcare professional followed by repositioning and the use of pressure redistributing devices (NICE 2014).

The positioning of the patient is based on the individual care plan; moving and turning the patient at specified intervals is very helpful in reducing pressure on areas, especially bony

prominences, and thus reducing the risk of developing PrUs (Whitney et al. 2006). The typical turning interval is two hours for all patients who are at risk (Reddy et al. 2006). A study assessed the effectiveness of changing a patient's position every two hours, the results of which showed that, even when this regime is followed strictly and is carried out by an experienced nurse, bedridden patients still have areas which will not be benefited from pressure relief (Peterson et al. 2013).

Also the results of the systematic review by Chou et al. (2013) (detailed in section 2.11.1.1) confirmed what Peterson and his collegues (2013) suggested earlier and concluded there was limited evidence on the effectiveness of repositioning versus usual care. They also highlighted the methodological shortcomings of the studies which doesn't support a strong conclusion. There is a need for more trials to explore effectiveness of the repositioning for prevention and treatment of PrUs.

#### *2.11.1.3 Nutrition*

In addition to positioning and the use of effective mattresses, nutrition and wound care are critical in terms of prevention and healing of PrU. A nutritional assessment should be conducted on patients who are at risk of developing PrUs, and on those who have already developed PrUs. Good nutrition should include proteins, carbohydrates, vitamins and minerals, all of which are essential requirements for PrU healing (Whitney et al. 2006). The nutritional plan is formulated according to the patient's needs, to aid the faster healing of PrUs. There is evidence that the nutritional support offered by a high protein oral diet is effective in reducing the incidence of PrUs in patients who are at risk by 25% (Crowe & Brockbank 2009). Many studies have examined the effectiveness of nutritional supplements for patients who are either at risk or who already have PrUs, all of whom benefitted from substantial improvements in the healing of their PrUs compared to patients in the control group (Crowe & Brockbank 2009). However, the systematic review (details in section 2.11.1.1) concluded that there was little evidence on the effectiveness of

nutritional supplementation versus usual care (Chou et al. 2013).So like other areas of PrUs prevention and management, more trials on the effectiveness of nutritional supplements in patients with PrU are needed.

## 2.11.2 Strategies for management

The first step in the management of PrUs is the assessment, followed by a decision as to the most suitable strategy to be implemented. Selection of the most suitable strategy is very important in the healing process of PrU (Reddy et al. 2008). More than one strategy can be used in combination for the best effect. Strategies for the management of PrUs include: topical agents, nutrition, wound debridement and Topical Negative Pressure (TNP). Each of the above strategies is discussed in the following sections.

### *2.11.2.1 Topical Agents*

Many different products are used to treat PrU and selection of the most appropriate products depends on the assessment findings and the grade of the PrU. Maintaining a moist wound environment is important to promote PrU healing (Thomas 2014). Wet dressing is better than dry gauze and promotes faster wound healing. Moist wound healing allows wounds to resurface up to 40% faster than exposed wounds (Thomas 2014). Occlusive dressings aid the maintenance of a moist environment as they control the transmission of water vapour from the wound to the external atmosphere (Thomas 2014). Occlusive dressings can be categorised as polymer films, alginates, biomembranes, hydro gels, polymer foams and hydrocolloids (Thomas 2014). Each of these dressings has advantages and disadvantages so the choice of dressing should be based on the wound type and whether it is highly exudative.

One study was undertaken to compare the healing of chronic wounds, including PrU, with honey versus Povidone-Iodine dressing in adult patients for 6 weeks, where patients had to attend a wound care clinic in Surgical Out Patient Departments in India. The results

showed that 42 patients, out of 45 patients, completed the follow-up. Two patients developed adverse reactions to Povidone-Iodine and were not included in the outcome results. Of patients in the honey group, 31.82% achieved complete healing at the end of the 6 weeks while none of the patients had complete healing in the Povidone-Iodine group at the end of the same period (Gulati et al. 2012). In conclusion, the honey was more effective than Povidone-Iodine in achieving complete healing, reducing pain and wound surface area, and increasing comfort in subjects with chronic wounds including PrUs.

A recent systematic review (Tricco et al. 2015) aimed to identify effective interventions to treat complex wounds, including PrU wounds. Three databases were searched on October2012.After screening, 99 systematic reviews were included that matched the inclusion criteria, from which 54 were systematic reviews with meta-analysis (Tricco et al. 2015). They identified promising interventions for complex wounds from the reviews with high quality (AMSTAR score >8). In relation to PrUs, they found that hydrocolloid dressings were more effective than usual care, electrotherapy was more effective than sham therapy, air –fluidized beds were more effective than standard care or conventional mattresses and alternate foam mattresses were more effective than standard foam mattresses (Tricco et al. 2015). This was the most recent review on topical agents.

#### *2.11.2.2 Wound Debridement*

In the healing of PrUs, wound debridement should be carried out if the wound is infected and has exudates, alongside the prescribing of antibiotics. Wound debridement involves the removal of foreign material and necrotic tissue from a wound to stimulate wound healing (Kamolz & Wild 2013). There are different methods of debridement depending on the type of wound (Kamolz & Wild 2013): sharp surgical debridement, mechanical debridement with the use of dry gauze, autolytic debridement with occlusive dressings and the application of exogenous enzymes (Thomas 2014). One study was conducted to compare the effectiveness of various wound debridement including hydro-surgery and

plasma-mediated bipolar radiofrequency ablation (PMBRA) on reducing bacterial growth and wound healing; the results showed that all treatment groups experienced a statistically significant reduction in methicillin resistant Staphylococcus aureus (MRSA) counts relative to no debridement being carried out ($P< 0.005$) (Nusbaum et al. 2012).

#### *2.11.2.3 Topical Negative Pressure (TNP)*

Topical Negative Pressure (TNP) – also known as Vacuum-assisted closure (VAC) and Negative Pressure Wound Treatment (NPWT) – is used to promote the healing of surgical wounds by using suction to drain excess fluid from wounds, especially wounds that are infected or not healing (Thomas 2014; Ubbink et al. 2008). The following benefits can be attributed to the use of TNP: removal of excessive fluid from the wound, removal of bacteria, reduction of wound volume, and stimulation of granulation and epithelial growth mechanically (Thomas 2014). TNP is currently used widely in the treatment of PrUs as it reported to be very effective in treating infected and chronic PrUs (Thomas 2014). Moreover, the results of the systematic review (detailed in section 2.11. 2.1) confirm the effectiveness of the TPN and VAC as a promising intervention for treating infected surgical wound (Tricco et al. 2015).

## 2. 12 Quality of Life and PrU:

PrUs have a significant impact on the patient's quality of life. They influence the patient's life from different dimension (i.e., physical, psychological, emotional, financial, spiritual and social) (Repić & Ivanović 2014). Patients with PrUs have mobility restrictions that prevent them from living normally which affects their psychological and emotional state. Different studies have explored the impact of PrUs on QOL using various methodologies.

A systematic review and meta-synthesis of primary research was conducted in the UK to identify the impact of PrUs and their interventions on health-related quality of life (HRQL) (Gorecki et al. 2009). Combined synthesis of qualitative (10 studies) and quantitative (21

studies) research was performed using content analysis to generate categories and themes from findings. The search was conducted in thirteen electronic databases. A further search was undertaken through hand searching, cross-referencing, contact with experts, and online search. The review included studies of adult patients with PrUs in acute, community, and long-term care settings around Europe, Australia and United States. Thirty one studies were included in the review, 2,463 participants with PrUs aged from 17 to 96. The review identified certain concerns that were reported by patients about their experience of living with PrU and impact of its interventions on HRQL. The study identified 293 findings, 46 categories and 11 themes emerged: the physical impact, social impact, psychological effect, PrU symptoms, general health, and other impacts of PrUs (Gorecki et al. 2009). The study revealed that PrUs and their interventions have a great effect on the HRQL and cause a significant burden on patients (Gorecki et al. 2009).

## 2.13 Studies Examining the Nurses Knowledge, Attitudes and Practice of PrU Prevention and Management

There are a range of factors that impact on PrU prevention and management. Many studies discussed nurses' knowledge, attitudes and practice and demonstrated how these factors are inter-related and affect PrU prevention and management. Different methodologies were used in these studies. Some studies focused on knowledge only and/or in combination with attitudes or practice while others include them all (i.e. knowledge, attitudes, and practice). In this section, studies will be discussed beginning with the studies that covered the knowledge aspect alone followed by the studies that included knowledge and attitudes, then attitudes alone, and finally all the three.

Smith & Waugh (2009) conducted a non-experimental, descriptive study in USA using the Pieper Pressure Ulcer Knowledge Test (PPUKT) developed by Pieper and Mott in 1995. The aim of the study was to assess the knowledge level of RNs in relation to PrU risk and

prevention, staging and wound description and to identify the barriers perceived by RNs to the provision of effective prevention and treatment of PrUs (Smith & Waugh 2009). The results of the study showed that nurses' level of knowledge was significantly higher when they were exposed to educational materials such as articles and books. There was no relationship between test scores and the age of the nurses, years of experience or the nursing degree obtained. The nurses' common perceived barriers to effective treatment were overweight patients, time restrictions and inadequate numbers of nurses (Smith & Waugh 2009). The results of the study highlight there was no relationship between the demographic data and the level of knowledge. Although the study investigated the nurses' level of knowledge, the researchers did not adequately report on it which is considered a limitation. In addition, the sample included was not very large (n=96) which raises the question of generalisability.

In 2010, Claudia et al conducted a descriptive co relational study in Canada with the aim of exploring the relationship between nurses' level of knowledge on PrUs, certain characteristics of nurses and the preventive care administered. A multi-method approach was followed and a questionnaire was utilised to measure the nurses' levels of knowledge (n=256) and chart audits (n=235) were conducted for the purpose of identifying the types of PrU prevention implemented (Claudia et al. 2010). The first population consisted of 256 nurses, who each completed a questionnaire adapted from the Pieper and Mott test (the Pressure Ulcer Knowledge Test); the second population were patients in the units where the first population had been randomly selected. Patient files were consulted in order to track the nursing care that was provided and documented to prevent PrUs (Claudia et al. 2010).

The results demonstrated a relationship between the nurses' knowledge of PrU prevention and treatment, the nurses' socio-demographic and professional characteristics, and the type of preventive care used. The average knowledge score of nurses was 33.98, with the

maximum score of 45 being the highest level of knowledge. A positive relationship was identified between training time and higher levels of knowledge. Comparisons were made between what nurses knew and what they actually did to prevent PrUs. The nurses were found to have good knowledge of the risk factors, except in relation to the friction/shear risk factor, nutrition and moisture.

Overall, the nurses were found to carry out few preventive interventions based on the identified risk factors. The study concluded that training is very important and should be continued but highlighted that new knowledge is not transferred automatically into practice. Other factors should also be considered in the prevention of PrUs, such as the perception of healthcare assistants and nurses own level of knowledge. The study recommended the implementation of a programme to improve nursing practice which should encompass training and educating the staff about PrUs (Claudia et al. 2010).

A descriptive cross-sectional study was undertaken in an insurance hospital in Alexandria, Egypt, which aimed to assess nurses' knowledge of PrU prevention and management (El Enein & Zaghloul 2011). An interview questionnaire format was used for the purpose of the study which consisted of questions on useful and non-useful preventive measures. Data collection began in May 2010 and ended in June 2010. The results demonstrated a poor level of knowledge among the nurses in relation to the prevention and management of PrUs. The authors stated that the nurses' level of knowledge was below the minimum acceptable level but they did not state what the level and how it was determined. The mean score for nurses was below 70% for nine measures of PrU prevention. These measures were measure 2, 5, 6, 7, 8, 10, 12, 14, 15 out of 15 preventive measures on the questionnaire, which accounted for 60% of the questionnaire (El Enein & Zaghloul 2011). The study concluded that there was a need to implement a comprehensive, systematic approach to raising the nurses' level of knowledge of PrUs in order to help reduce the high

prevalence rate of PrUs in the hospital in which this study was undertaken (El Enein & Zaghloul 2011).

The number of nurses who participated was not disclosed in this study but it was mentioned within the limitations section that the number was low. In this case, the results cannot be generalised and further studies are necessary to examine the issue using a larger sample. Another issue concerned language barriers. The nurses experienced difficulty understanding the guidelines as they were in a different language (i.e., English) and used complex medical terminology. This should be also considered when conducting future studies, to ensure that all questions are clear. Moreover, the questionnaire used was developed by the researchers themselves, had not been used previously (although it had been through an expert review) and was not validated. Pilot-testing was however conducted on a small number of nurses (n=10).

In Jordan, a cross-sectional study was conducted to determine the nurses level of knowledge of PrU prevention and treatment, frequency of utilization of PrU prevention and treatment interventions in clinical practice and variables associated with nurses' use of the interventions (Saleh et al. 2013).A questionnaire was used to collect data from 460 nurses between June 2010 and November 2010. The findings of the study demonstrated an association between knowledge and education in relation to the implementation of prevention strategies while there was no association between demographic variables and the implementation of prevention strategies (Saleh et al. 2013). In conclusion, nurses with more knowledge and education were more likely to implement the prevention strategies.

Across-sectional study that aimed to examine the knowledge and the use of preventive measures for PrU among nurses in Dutch and German nursing homes was undertaken in January 2009. Six hundred questionnaires were distributed to nurses who were working in 10 Dutch nursing homes and another 578 questionnaires in 11 German nursing homes with a response rate of 75.7% in Netherlands and 48.4% in Germany (Meesterberends et al.

2013). The questionnaire consisted of two parts. Part one included demographic characteristics about the respondents, such as age, gender and position. In part two they used the 2003 Pressure Ulcer Questionnaire (PUQ-2003) developed by Hulsenboom et al. (2007) in order to assess nursing staff's knowledge and the use of PrU preventive measures. The questionnaire was based on the Dutch national pressure ulcer guideline that was developed in 2002. The guideline included 29 PrU preventive measures divided into two sections: section one comprised 16 measures (useful for PrUs prevention for patients at risk of its development) and section two compared13 measures that are not useful to PrUs prevention. Furthermore, the PUQ-2003 includes two parts: part one requires participants to evaluate the usefulness of the preventive measures for patients who are at high risk of PrU development (the answering options were: 'useful', 'sometimes useful', 'not useful' or 'do not know') and part two asks participants to judge their practice in relation to preventive measures applied in their unit for all patients at high-risk (always), preventive measures applied only for individual patients at high-risk (sometimes) or preventive measures that are never applied (never). The PUQ-2003 was translated into German. The content of the questionnaire was validated by the German investigators. The preventive measures, both recommended and non-recommended, corresponded also with the German Expert Standard for Pressure Ulcer Prevention (Meesterberends et al. 2013).

The results of the study revealed that the knowledge of useful preventive measures was good with an average of 71.3% (the Netherlands) and 66.3% (Germany) of correctly answered questions. On the other hand, nurses had poor knowledge on the use of non-useful preventive measures in both countries (19.2% in the Netherlands and 24.6% in Germany) while the results on the use of useful PrU preventive measures showed average results of 68.1% (the Netherlands) and 63.1% (Germany). Finally, the results showed the use of non-useful PrU preventive measures (for e.g., sheepskin, massage, application of

warm compress) are still used in clinical practice according to the respondents in both countries (Meesterberends et al. 2013).

A descriptive, comparative multicentre study was performed in hospital wards and universities from four Swedish county councils that aimed to describe and compare registered nurses (RNs), assistant nurses (ANs) and student nurses (SNs) knowledge regarding prevention of PrUs (Gunningberg et al. 2013). The authors used the Pressure Ulcer Knowledge Assessment Tool (PUKAT) which was developed to examine basic knowledge about PrU prevention. The tool was completed by 415 participants and data were collected during January and February 2012. The results illustrated that the RNs and SNs scored higher on "aetiology and causes" than ANs and SNs scored higher on "nutrition" than RNs and ANs. The authors concluded that nursing staff in Sweden had some knowledge deficit on PrU prevention. They recommended the initiation of a major education campaign for nurses in the hospital settings and in nursing education (Gunningberg et al. 2013).

Another study, also using PUKT, was undertaken in two teaching hospitals in Iran and aimed to assess orthopaedic nurses' knowledge of PrUs (Iranmanesh et al. 2013). From the sample of 68 nurses, 57 nurses participated giving a response rate of 84%. Data collection was performed between November and October 2011. The results showed that 70% of 41 items in the questionnaire were correctly answered. Furthermore, 65% of the questions in the PrU classification/onset section were correctly answered, 72% of questions concerning wound characteristics, and 74% of questions under the prevention section (Iranmanesh et al. 2013). The authors concluded that orthopaedic nurses had insufficient knowledge about PrU but they did not state any cut-off score on which the level of knowledge score can be ranked.

A descriptive, cross-sectional, multi-centre study was conducted in Jordon to 1) explore nurses' knowledge of preventive modalities and risk factors of PrU and 2) explore the

reported preventive practice used in clinical settings (Tubaishat & Aljezawi 2014). They included registered nurses and associate nurses in three hospitals and requested them to complete a self-administered questionnaire. Of the 386 questionnaires sent, 263 were returned giving a response rate of 52.9%. The results showed that nurses' knowledge of PrU risk factors was good. There was a high agreement regarding the preventive methods judged as "always useful" and a lesser degree of agreement regarding those which should be used in individual cases only and those which should not be used. The results also revealed that a significant number of nurses were unaware that some methods like "massage" are now no longer used (Tubaishat & Aljezawi 2014). The study suggested the nurses knowledge and practice of PrU prevention needs to be improved and recommend that national guidelines be adapted since nurses were relying on outdated practices like massage (Tubaishat & Aljezawi 2014). Moreover, they recommended continuous education for nurses and adding PrUs into the nursing curriculum which will help to increase nurses' knowledge and aid in their future career.

A cross-sectional survey was conducted in a large Australian health service district that employed more than 10,000 nurses in full and part-time jobs that aimed to assess nurses' knowledge of PU management in order to identify knowledge gaps(Lawrence et al. 2015).The authors used a modified version of PUKT as the data collection tool. The study was advertised throughout different facilities using posters, computer screen savers and emails. The number of nurses who completed the questionnaire was 827 and most of the participants had more than 5 years of experience (Lawrence et al. 2015). The data was collected online with some collected manually (i.e., using paper-based questionnaires) in the period of time between April and November 2012. The results of the study identified knowledge deficits on PrUs and they recommended that nurses would benefit from focused educational strategies (Lawrence et al. 2015).

There were few qualitative studies that explored nurses' knowledge, attitudes and practice in relation to PrUs. A study was undertaken in Sweden in two hospitals and one community care facility (Athlin et al. 2009). The study explored hospital and community nurses' understanding of factors affecting prevention and care of PrUs. In-depth individual interviews were carried with 15 nurses from the hospitals and another 15 nurses from the community care facility (Athlin et al. 2009). The interviews were audio-recorded and included semi-structured open-ended questions which addressed the discharge process, progression and regression of PrUs, and barriers in providing care. The findings of the study included three categories: 1) the patient (physical, psychological, and place of work), 2) health care personnel (views and values, knowledge and competence, cooperation and communication, responsibility and commitment), and 3) structure of health care (resources, organization and routines) (Athlin et al. 2009). The authors concluded that the nurses understood prevention of PrUs but seldom incorporated prevention into practice and highlighted that PrU care was performed by licensed practical nurses (LPNs). They also found that nurses were interested in the treatment of PrUs rather than prevention. Moreover, the nurses identified perceived barriers to prevention and care as the following: lack of time and shortage of nurses, disagreement on the prevention interventions, and lack of continuity of care (Athlin et al. 2009).

There were few systematic reviews that explored the nurses' knowledge, attitudes and practice. (Waugh 2014) undertook a systematic review on nurses' attitudes towards PrU. The review included four databases (i.e., Pub Med, the Cochrane Libray, CINAHL, and PsychInfo) and included articles in English that were published from 2007 to 2012. Specific terms included in the search were: pressure ulcer, decub*, pressure sore, and nurs* and attitudes. Seven studies were identified as being relevant and fulfilled the inclusion criteria. The findings of this review were similar to the reviews that were conducted by Beeckman, Defloor, Damarre, Van Hecke, and Vanderwee (2010) and Samuriwo (2010)

(Waugh 2014). The author concluded that there is a lack of understanding of nursesattitudes towards the PrU prevention (Waugh 2014) and has emphasized that the findings of this review is relevant to nurses who work with PrUs. Five from the identified studies in this review were included in this literature review as they are relevant (i.e., Athlin et al. 2009, Samuriwo 2010, Källman & Suserud 2009, Strand & Lindgren 2010, Beeckman et al. 2011).

A descriptive, qualitative study was conducted in Wales, UK that aimed to determine the values of nurses' in relation to the prevention of PrUs (Samuriwo 2010). The participants were recruited from a sample populations of 300 nurses who were working in non-acute medical units in 14 hospitals and 50 nursing students from a local university who were on placement at the target hospitals (Samuriwo 2010).Semi-structured interviews were undertaken and analysed using Straussian grounded theory. In the beginning, six nurses and three nursing students from 2 hospitals were interviewed and data were analyzed. It became clear that there was a need to collect data from different sample so more participants were recruited which included a nurse lecturer and nurse mangers from another 12 hospitals (Samuriwo 2010). The reason for recruiting participants from hospitals of different sizes in different locations was to enable the researcher to identify whether the values that the nurses held were consistent irrespective of the clinical setting (Samuriwo 2010). Collection of data was stopped when no new themes emerged. The study identified the following themes: a) participants placed high value on prevention of PrU and were more proactive in preventing it than colleagues, b) some environmental factors were identified by the participants as barriers for the implementation of PrU prevention (bed management, other nurses values on PrU prevention, lack of time), c) delegation of prevention to nursing students and NAs, d) nurse's value of PrU prevention influenced their performance in carrying out the interventions (Samuriwo 2010).

Moore & Price (2004) undertook a cross-sectional study in 2001 in the Republic of Ireland that aimed to identify nurses' attitudes, their behaviour, and their perceived barriers towards PrU prevention. The sample population (*n*=300) was randomly selected from nurses working in an acute care setting in six teaching hospitals in an urban area (Moore & Price 2004). A questionnaire was used for data collection which was piloted. The results of the study revealed that nurses demonstrated a positive attitude towards the prevention of PrUs but the prevention practices were not implemented effectively and not implemented for all patients. The main barriers identified by participants were lack of time and shortage of staff (Moore & Price 2004). There were other factors which were identified as barriers, like patient specific problems, lack of aids, lack of equipment and unstable patients. The authors concluded that positive attitudes don't help in changing clinical practice. They recommend the implementation of further research to investigate the relationship between the nurses' level of knowledge and their attitudes to prevention of PrU.

Strand & Lindgren (2010) conducted a cross-sectional, descriptive study whereby a questionnaire was used to investigate the knowledge, attitudes and perceived barriers and opportunities in regard to PrU prevention of RNs and ANs working in four ICUs in a Swedish hospital. The total number of distributed questionnaires was 315. The questionnaire consisted of different types of questions: multiple-choice questions to test the knowledge, Likert scale for attitudes, and open-ended questions for barriers and opportunities. They were distributed to nurses working in Thoracic Surgical ICUs, Burn ICUs, Neurosurgical ICUs and General ICUs. The completed returned questionnaires totalled 146 (46% response rate). The results showed that the prevention of PrUs was viewed to be an important aspect of care in ICUs but that time restrictions and severe mobility issues presented as barriers to the implementation of PrU prevention. The knowledge level of the participants was acceptable but needed to be improved in terms of identifying PrU categories. Participants also reported important barriers, such as a lack of

time and nursing staff. The recommendations of this study were to improve knowledge among nurses and to make PrU prevention a priority while implementing patient care (Strand & Lindgren 2010).

A cross-sectional study, conducted in Belgium surveyed 145 nurses and nursing assistants to assess their knowledge and attitudes about PrUs prevention and to study the correlation between knowledge, attitudes, and the compliance with PrU prevention guidelines in nursing homes (Demarré et al. 2011). Data collection was undertaken in March 2008. The results showed that nurses and nursing assistants knowledge about PrUs was insufficient (Demarré et al. 2011). The mean knowledge score of nurses was 29.3%and 28.7% for nursing assistants. The overall attitude score was 74.5%. Nurses have more positive attitude towards PrU prevention than nursing assistants, 78.3% and 72.3% respectively. A more positive attitude was a significant predictor of compliance to the PrU prevention guidelines provided to residents at risk of PrUs in nursing homes. There was no significant correlation between the attitudes of nurses and nursing assistants towards PrUs and the application of prevention interventions in compliance with guidelines (nurses: r=0.07, *P*=0.62; nursing assistants: r=0.02, *P*=0.84).

Across-sectional multicentre study was conducted in a Belgian hospital that aimed to 1) study the knowledge and attitudes of nurses about prevention of PrU and 2) explore the correlation between knowledge, attitudes and the application of adequate prevention (Beeckman et al. 2011). Fourteen hospitals were randomly selected; these hospitals contained 207 wards from which 94 wards were randomly selected. The number of patients was 2105. The researchers performed clinical observations to evaluate the adequacy of PrU prevalence and prevention. At least five nurses participated in each of the selected wards. The nurses completed a validated instrument. In total 553 nurses participated. Data collection was done in April 2008. The results demonstrated that prevalence of PrU was 13.5% and 30% (625/2105) of patients were at risk for PrU development. The knowledge

and attitude scores were 49.7% and 71.3%. A low proportion of patients (13.9%- 87/625) received adequate prevention while in bed or while seated. There was a significant correlation between the application of adequate prevention and attitudes of nurses (OR=3.07, *P*=0.05) but no correlation between knowledge and application of adequate prevention (OR=0.75, *P*=0.71). The authors concluded that knowledge of nurses about PrU prevention in Belgian hospitals was inadequate while their attitudes towards its prevention were significantly correlated with the application of adequate prevention (Beeckman et al. 2011).

Källman & Suserud (2009) undertook a study within a Swedish healthcare setting. The study aimed to investigate the attitudes, knowledge and practices of Registered Nurses (RNs) and Nursing Assistants (NAs) regarding PrU prevention and treatment. The questionnaire consisted of two instruments that were developed and validated by Moore & Price (2004) and Lewin et al. (2003). The instruments were translated from English to Swedish and then back from Swedish to English. More questions were added for the purpose of the study and some other questions were excluded as they were not meaningful to the study. Then the instruments were approved by a group of experts. Piloting of the questionnaire was done before data collection with minor corrections in some of the new questions made in response to the findings of the pilot study. The final questionnaire consisted of 47 questions which were divided into six sections. The questions were mixed between statements on a five-point Likert scale and open-ended questions that tested the attitudes and knowledge on prevention and management of PrUs; questions on the perceived possibilities and barriers regarding PrU prevention, and questions on upgrading the nurses' competencies. The head nurses at the study units were requested to cooperate in the distribution of the questionnaires. Participant Information sheet and a stamped returned envelope were attached with the questionnaire (Källman & Suserud 2009). The total

number of returned completed questionnaires was 154 out of the 230 that were distributed to eligible participants (67% response).

The results showed that both RNs and NAs had a good level of knowledge on PrU prevention and treatment and that they consider it to be an important issue in nursing practice. The nurses were not convinced that the use of PrU assessment tools was better than using their own clinical judgement alone. They also considered PrUs to be a rare problem nowadays; however, Swedish records showed high rates of PrU incidence.

Both RNs and NAs exhibited positive attitudes towards PrU prevention. The majority of the nurses(95%) felt that they should concern themselves with PrU prevention in their work and many (94%) considered most PrUs to be preventable (Källman & Suserud 2009). There was an organisational weakness concerning the use of available prevention strategies which could affect the quality of care provided for patients with PrUs and a gap was identified between the research and the practices carried out in this hospital. There were a number of barriers to PrU prevention that were cited by participants: lack of time, patient's condition and lack of equipment or resources while the most cited barriers perceived possibilities of carrying out PrU prevention and treatment were: knowledge, prevention routines, good teamwork and access to pressure relieving facilities.

There are some limitations regarding the tool used for this study. First, questions were changed to meet the aims of the study, which may affect the validity of the tool. Second, the tool consisted of six sections, comprising open-ended questions. It is unclear how honest the nurses were; and given they had two weeks to complete the questionnaire this allowed them plenty of time to refer to the literature, although they were requested not to do this. This study has highlighted the same barriers that were identified from the previous study (i.e., Moore & Price 2004).

In Nigeria, a non-experimental cross-sectional descriptive survey was conducted. The study aimed to assess nurses' knowledge, attitude and practice of PrU prevention (Uba et al. 2015).The questionnaire (developed and validated by the researchers) was used on a sample of 99 nurses who participated in the study. The findings of the study showed that nurses had low level of knowledge, had positive attitudes towards PrU prevention practices but a low level practice of prevention (i.e., rarely implementing prevention strategies) (Uba et al. 2015).The results were compared with the McDonald's standard of learning outcome measured criteria that calculated the level of knowledge and practice as the following: very low <60%, low 60 to 69.99%, moderate 70 to 79.99%, high 80 to 89.99%) (Uba et al. 2015). While comparing the results of the study with the McDonald's standard, the mean percentage of the correctly answered questions by the nurses was 61.03% which is low. In addition, there was a significant relationship between nurses' work experience and practice of PrU prevention. The authors suggest that nurses should increase their knowledge regarding prevention of PrU which will lead to improvement in nursing practice and prevent PrU development.

Across-sectional survey was undertaken that aimed to assess nurses knowledge, practice and factors associated with PrU prevention in Gondar University Hospital in North-west Ethiopia (Nuru et al. 2015). Data were collected from March to April 2014 among 248 nurses using a structured and pretested self administered questionnaire which was prepared in English. The study results showed that 54.4% of nurses had good knowledge (which means nurses who scored above the mean score of the knowledge questions) and 48.4% of them had good practice on prevention of PrU (Nuru et al. 2015) suggesting that both knowledge and practice of nurses in relation to prevention of PrUs was insufficient . Moreover, nurses with a higher educational level, who had attended formal training and who had more experience had higher knowledge while shortage of equipment and facilities, inadequate number of staff nurses and dissatisfaction with the nursing staff

incharge all showed negative association with the practice of nurse's PrU prevention. Finally, the authors emphasized that in-service training and upgrading courses are considered important steps to improve nurses' knowledge and practice on the prevention of PrUs (Nuru et al. 2015).

In summary, the above discussed studies have identified very similar findings. In relation to studies that examined the nurses' knowledge, four studies (i.e., Tubaishat & Aljezawi 2014, Källman & Suserud 2009, Källman & Suserud 2009 Nuru et al. 2015) showed that nurses have a good level of knowldge on PrU prevention and managment while nine studies (i.e., Claudia et al. 2010; Saleh et al. 2013; Meesterberends et al. 2013; Gunningberg et al. 2013; Iranmanesh et al. 2013; Lawrence et al. 2015; Athlin et al. 2009; Demarré et al. 2011; Beeckman et al. 2011) showed that nurses had insufficient knowledge on PrU and need more education and training. On the other hand, two studies (i.e., El Enein & Zaghloul 2011; Uba et al. 2015) illustatred that nurses have poor knowledge.

Five studies (i.e., Samuriwo 2010; Moore & Price 2004; Strand & Lindgren 2010; Demarré et al. 2011; Beeckman et al. 2011) demonstrated that nurses have positive attitudes towards the implementation of PrU prevention strategies but that positive attitude was not enough in itself for applying the prevention measures. Moreover, three studies (i.e., Källman & Suserud 2009; Uba et al. 2015; Nuru et al. 2015) assessed the nurses' practice of the application of PrU prevention measures. The results of these studies showed there was an organizational weakness that affected their application and led to low level of the practice of prevention strategies. Moreover, two studies (i.e., Källman & Suserud 2009; Uba et al. 2015) assessed the nurses knowledge, attitudes, and practice and their results showed nurses had good level of knowledge in one study (Källman & Suserud 2009) and low level of knowledge in the other study (Uba et al. 2015) while both studies showed positive attitudes from nurses towards the prevention of PrUs but had low level of practice towards its implementation.

Different tools have been used in studies. Three studies have used similar formats of the tool which was devloped to examine the nurses' basic knowledge on PrU. For example, Smith & Waugh 2009, Gunningberg et al. 2013 and Iranmanesh et al. 2013 have used PPUKT, PUKAT, and PUKT respectively which was devloped and tested prior to use.

In addition, five studies (i.e., Athlin et al. 2009; Samuriwo 2010; Moore & Price 2004; Strand & Lindgren 2010; Källman & Suserud 2009) assessed the barriers to the implementation of PrU prevention strategies. Lacks of time and staff shortage were the main findings. However other barriers such as the patient's condition, lack of equipment, disagreement of prevention strategies and lack of aids were also identified. Also, in relation to the use of assessment tools, one study (i.e., Källman & Suserud 2009) identified that nurses were not convinced that its use was better than their clinical judgment alone.

## 2.14 Conclusion

This chapter reviewed the previous literature on PrU; historical background, epidemiology and costs, definition, causes, pathophysiology and staging. Unfortunately the search strategy did not used the previously established terms for PrU literature searching (Ubbink et al. 2008; Carville et al. 2012) which may have affected the literature included.

Comparison of the incidence and prevalence figures between studies was difficult because the studies had different methodologies and settings. However the incidence and prevalence are high. For the pathophysiological changes, previously it was thought that ischemia was the only reason for the development of PrU and it may take up to one hour to develop. This has changed based on the new theory on the tissue deformation that can lead to soft tissue injury within minutes, and this tissue deformation can lead to PrU development.

RASs assist in identifying patients at risk of PrU development which allow nurses to implement effective prevention strategies. From the literature it was identified that the

Waterlow, Braden and Norton scales were the most used RASs. The reliability and validity of the RASs was explored which again was challenging due to methodological differences between studies. Different systematic reviews have concluded that the Braden Scale has higher reliability and validity. Also, it was most cited, has been tested in the largest number of studies and has higher sensitivity and specificity. For the staging systems, few studies have assessed the reliability and validity of the grading systems. These studies too had methodological differences making it difficult to compare them.

Literature about the strategies for PrU prevention and management was also reviewed. A large number of studies were found which included prevention modalities like support devices, positioning and nutrition. Overall, these modalities are effective but further trials should be conducted. According to the findings of the discussed studies, these modalities were used in both prevention and management. The management modalities include topical agents, wound debridement and TNP. Topical agents and wound debridement were proved to be effective in PrUs healing but less evidence on the use of TPN as a treatment modality for PrUs. Further experimental studies need to be conducted. Overall, both modalities, prevention and treatment, were effectively preventing PrU and assist in its healing.

Finally, the literature was searched for studies that explored nurses' knowledge, attitudes and practice of PrU prevention and management. There were a numerous studies using different methodologies that had given strong evidence on the importance of knowledge and some studies have used mixed method design which strengthens the findings of those studies. The findings of these studies had identified different ranks of the knowledge (i.e., good level, insufficient level and poor knowledge) and the overall conclusion was that there is a need for more education and training for nurses on PrUs.

For attitudes of nurses towards PrU, positive attitude was identified but it was not always enough for application of prevention strategies. On the other hand, the practice of

prevention and management strategies implementation for PrU was not always maintained due to managerial issues and barriers to its implementation like shortage of staff and lack of resources. In addition, these studies had some limitations that can be summarised as follows: the tool implemented for the study was not validated; the sample size was small, the language barriers and the time allowed for the completion of the questionnaire was too extensive. Also, these studies suggested that there is a need to continue to assess the PrU knowledge, attitudes, and practice for nurses who provide care for patients who are at risk and those with PrU.

This literature review helped to determine the present study's main concepts and aimed to explore the nurses' level of knowledge and views about PrU care and practices in order to describe the management of PrUs in Oman. In addition, the discussion of different studies and their methodologies helped to shape the present study. For all of these reasons, and due to the fact that no previous study has been undertaken in Oman to explore this issue, there is a need to conduct a study in that country.

# Chapter Three: Preliminary Data- Current Status in Oman

## 3.1 Introduction

The Sultanate of Oman is a country located in Southwest Asia; it has borders on the Arabian Sea, Gulf of Oman and Persian Gulf, and falls between Yemen and United Arab Emirates (UAE) (Ministry of Foreign Affairs 2013). Oman is situated in the south-eastern quarter of the Arabian Peninsula and covers a total of 309,500 square kilometres. The land area is composed of a variety of topographic features, including valleys and deserts which account for 82% of the land mass, mountain ranges which account for 15% and coastal plains making up 3% (Ministry of Foreign Affairs 2013).

The Sultanate of Oman is flanked by the Gulf of Oman, the Arabian Sea and the Rub' al Khali (Empty Quarter) of Saudi Arabia, all of which contribute to the country's isolation. Throughout history, Oman has maintained contact with the rest of the world by way of the sea, which has not only provided access to foreign lands but has also linked the coastal towns of Oman to each other. The Rub' al Khali, which is still difficult to cross even with modern desert transport, forms a barrier between the Sultanate and the Arabian interior. The Al Hajar Mountains, which form a belt between the coast and the desert from the Musandam Peninsula (RasMusandam) to the city of Sur at Oman's easternmost point, represent another geographic barrier, one which has kept the interior of Oman free from foreign military attack and invasion (Ministry of Foreign Affairs 2013).

## 3.2 Geographical Regions

Oman's natural features has divided the country into seven distinct areas: Ruus al Jibal, including the northern Musandam Peninsula; the Al Batinah plain running southeast along the Gulf of Oman coast; the Oman interior behind the Al Batinah coast comprising the Al Hajar Mountains, their foothills, and desert fringes; the coast from Muscat-Matrah

around the Rasal Hadd point and down the Arabian Sea; the offshore island of Masirah; and finally the barren coastline south to the Dhofar region in the south. With the exception of foggy and fertile Dhofar, all of the coast and lowlands around the Al Hajar Mountains form part of the Gulf of Oman desert and semi-desert, while the mountains themselves are a distinct habitat. The map below illustrates the different regions (Figure 3-1).


Figure 3-1 Sultanate of Oman Map

Eloise and Jerry's Travels, 2013.*Oman map*. Available at: http://jerryccoiner.blogspot.co.uk/2012/08/oman-other-part-of-arabia.html[Accessed January, 2013].

Since 28 October 2011, the Sultanate of Oman has been administratively divided into 11 governorates (muhafazah) with 61 Wilayats (provinces). Prior to this date, Oman was formed of five governorates and six regions. These 11 new governorates are: Ad Dakhliyah, Ad Dhahirah, Ash Sharqiyah North, Ash Sharqiyah South, Al Batinah North,

Al Batinah South, Al Wusta, Al Buraymi, Muscat, Dhofar and Musandam (Ministry of Health 2012b). The below map illustrates the administrative divisions of Oman (Figure 3-2).


Figure 3-2 The Administrative Division of Sultanate of Oman
Retrieved from (http://www.moh.gov.om/en/)

## 3.3 Numbers and Types of Healthcare Institutions

According to the Annual Report of the Ministry of Health as of December 2011, the number of healthcare institutions in Oman totalled 236; comprising 50 hospitals and 186 health centres. The hospitals are sub-divided into Regional Referral Hospitals, Wilayat (province) hospitals and local hospitals, and the health centres are divided into extended health centres (24), health centres with beds (70) and health centres without beds (92) (Ministry of Health 2012b). Figure 3-3 below illustrates the division of health care institutions in the Ministry of Health (MOH) in Oman.

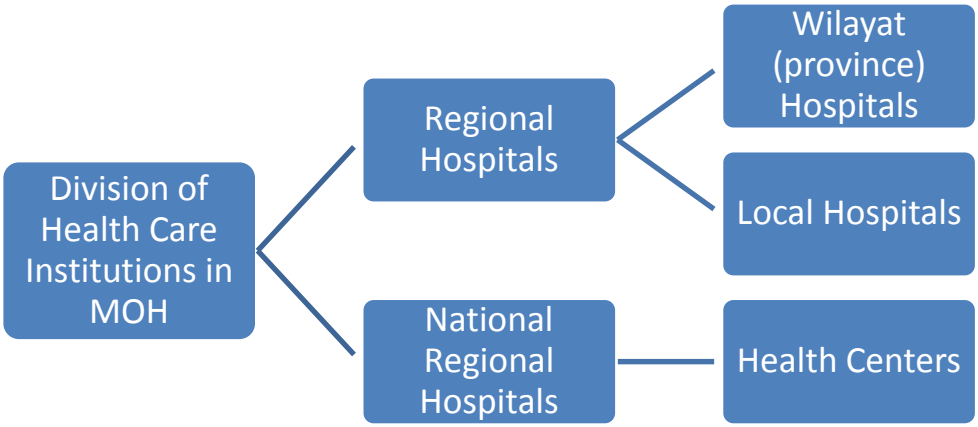


Figure 3-3 Divisions of Healthcare institutions in the MOH, Oman

### 3.3.1 Primary healthcare institutions

In Oman, health centres (HCs) are considered the basic healthcare units, providing primary healthcare services at the first level of care. The Ministry of Health has established a network of HCs which are distributed extensively throughout the Sultanate of Oman (Ministry of Health 2012a). As part of their function, HCs provide ambulatory curative and first-aid emergency services to the population in their catchment area. Generally, HCs have general practitioners (GPs) who examine the patient, provide the necessary care and treatment, and then decide if the patient will be discharged home, be given a further appointment, be referred to another hospital or transferred directly to another hospital; these decisions will be based on the patient's condition and whether they are deemed in need of secondary or tertiary care.

Some HCs are equipped with observation beds and normal delivery (maternity) services. This type of HC is known as a 'HC with beds'. The others provide primary health care and are known as 'HCs without beds'. In Scotland, the National Health Service (NHS) is similar to that found in Oman, and follows the same healthcare system divisions. NHS patients in Scotland can seek healthcare from a wide range of independent contractors including GPs, dentists and pharmacists (NHS UK 2013). Extended health centres (EHCs) in Oman (also known as polyclinics) provide primary, ambulatory and secondary

healthcare services which are offered in the EHCs' specialty clinics. In contrast, while local and Wilayat hospitals provide primary health care, some also provide curative and secondary healthcare services including inpatient, outpatient and emergency care (Ministry of Health 2012a). In comparison, in Scotland, there are no HCs with beds.

### 3.3.2 Secondary healthcare institutions

Regional Referral Hospitals are available in all the governorates of the Sultanate and are responsible for the provision of secondary healthcare services. The Regional Referral Hospitals located in Sohar, Nizwa and Sur have affiliated EHCs/polyclinics that offer outpatient secondary healthcare services in addition to primary health care services. Additionally, Regional Referral Hospitals offer all major clinical specialties and are equipped with the technical expertise, equipment and medication required to fulfil the needs of the majority of patients within the regional bounds. Recent upgrades to some of the Regional Referral Hospitals have led to a significant reduction in tertiary healthcare facilities. In the capital (Muscat), tertiary healthcare hospitals provide both secondary and tertiary healthcare services to the population of the Muscat Governorate (Ministry of Health 2012a).

In Scotland, secondary care (known as acute healthcare) delivers elective or emergency care to patients. Elective care is where a patient has planned medical or surgical care, usually following a referral from a primary or community health professional such as a GP (NHS UK 2013).

### 3.3.3 Tertiary healthcare institutions

Tertiary healthcare services are provided through four national, regional hospitals operating under the MOH: Royal Hospital, Khoula Hospital, Al Nahdah Hospital and Ibn Sina Hospital. One further hospital, Sultan Qaboos University Hospital (SQUH), also provides tertiary healthcare services to patients throughout the country. The Royal

Hospital and SQUH provide advanced surgical, medical and cancer treatment for all patients in the country. Khoula Hospital is considered a trauma and plastic centre, and receives patients from all the hospitals in the country. Also, Al Nahdah Hospital provides advanced treatment for eye problems and ENT (ear, nose and throat) care. On the other hand, Ibn Sina Hospital provides psychiatric care and psychological treatment for all patients in the Sultanate. Moreover, all of these hospitals work collaboratively with Regional Referral Hospitals to deliver care to all patients needing these services (Ministry of Health 2012b).

## 3.4 Governmental healthcare facilities other than Ministry of Health facilities

There are a few governmental healthcare facilities, in addition to those of the MOH, which are responsible for providing healthcare to employees working in their Ministries. These hospitals include SQUH which belongs to the Ministry of Higher Education, the Royal Police Hospital which belongs to the Royal Oman Police, and the Armed Forces Hospital which belongs to the Armed Forces Medical Services. The Royal Police and Armed Forces Hospitals collaborate with Regional Referral Hospitals under the MOH and receive patients (and their families) from the whole country who works in the Royal Oman Police and Armed Force Services, for primary, secondary and tertiary healthcare treatment. SQUH also provides care for all patients, regardless of where they work or in which region of the country they are based (Health Services in Other Health Care Providers, MOH 2008).

## 3.5 Funding of healthcare in Oman

In Oman, healthcare services are provided free to all Omani patients. The patient has to pay the sum of 1.2 Omani Rail (equivalent to £1.90 Great British Pounds) during the first registration and 0.2 Omani Rail for each visit thereafter; other than this, all treatments

and investigations are free. All funding for the healthcare system in Oman is covered by the government. The private sector runs other healthcare facilities which follow the same policies and procedures as those implemented by the MOH. Patients can access any of these private clinics or hospitals but they are responsible for payment for the treatment; there are insurance policies that individuals can apply for if they wish. In addition, some private companies offer health insurance for their employees, whether Omani or expatriate. The companies enter into a contract with certain private hospitals or clinics so their employees can get treatment paid for by the, insurance company. In comparison, in Scotland treatment is free but the NHS is funded through National Insurance contributions although some individuals and companies choose to pay private insurance which provides them and their employees with private health care in addition to the health services that are provided by the NHS.

## 3.6 Policies available in Oman related to PrU prevention and care

The MOH in Oman has produced the following guidelines and policy document relevant to PrUs:

a. Guidelines for Wound Care, May 2001 (Professional Nursing Core Group for Wound Care), Ministry of Health
b. Policy on Wound Care (Dressing a Wound), 2004, Ministry of Health Policy Manual.

The Guideline for Wound Care was approved in May 2001 and even though it has not been updated since that time. This guideline relates to wound care generally rather than PrU care specifically. The guidelines for wound dressing were last updated in 2004. There is no specific document that presents guidelines for PrU care.

At the MOH level, a Core Group was formed in June 2012. This group consists of representatives from all healthcare institutions under the umbrella of the MOH, representatives from other governmental healthcare facilities, and representatives from

the College of Nursing at Sultan Qaboos University. The Core Group is responsible for reviewing and updating manuals, guidelines, protocols and policies regarding wound care, including PrUs. It is still in the process of developing the Wound Assessment and Management Policy, which will include care for all wound types, including PrUs.

## 3.7 Performance Indicators

In 2008, the Department of Health Affairs in the Directorate General of Health Affairs developed 12 performance indicators to measure the effectiveness and quality of healthcare provided to patients. The purpose of these indicators is to: (1) measure the quality of care provided in the hospitals, (2) develop a unified measuring tool for each indicator and compare each indicator with those of developed countries, and (3) determine the reasons for the high results of some indicators and find solutions.

These indicators are evaluated by the Quality Assurance Department (QAD) in all the hospitals. This department is responsible for the collection of the data, and for reporting to the MOH. These indicators are the following:

1. Unplanned return to the operating theatre
2. Unplanned return to ICU within 48 hours of discharge to the general ward
3. Unplanned and unexpected re-admission within 48 days to the same hospital
4. Cancelation rate of booked elective surgery
5. Waiting time for routine speciality OPD (out-patient department) appointments
6. Average length of stay for patients in the Accident and Emergency Department
7. Rate of Hospital Acquired Infection
8. Rate of patient falls
9. Percentage of LAMA (Leave Against Medical Advice)
10. In-patients who develop one or more pressure sores during their hospitalisation
11. Adverse transfusion events

12. Staff turnover rate

These indicators are measured and collected every year although these statistics are not included in the Annual Statistics Report. PrUs are listed at number 10 in the above indicators. Despite PrU development being one of the performance indicators, at the time of this study there was no clear mechanism of monitoring it effectively in the hospitals and no statistics on PrU development were available. Based on that, a preliminary audit was planned to assess the current situation of PrU practice in Oman.

## 3.8 Methods

### a) Preliminary Audit:

The initial plan was to determine the scale of the problem by investigating the prevalence and incidence of PrU development in Oman. No statistics were found in the MOH website or in the MOH Annual Health Report. Due to the lack of available statistics, a meeting was held with the Director of the Directorate of Nursing and Midwifery Affairs (DNMA), MOH, to discuss ways to acquire this information.

### b) The outcome of the meeting:

The Director of the DNMA suggested sending a formal letter from his department to a number of hospitals asking for their data on PrUs. He identified eight hospitals which varied with regard to bed capacity, geographical location in the country, type of care provided (i.e., secondary and tertiary healthcare and including regional; referral hospital and a national, referral hospital). The letter was sent in December 2012. The letter was addressed to the Head of Nursing and Administration in each hospital. The letter requested PrU data for the years 2009-2012 and focused on three dimensions: (1) the number of patients admitted with PrUs, (2) the number of patients who developed PrUs during their period of admission, and (3) the reason for the development of the PrUs in both categories of patients.

Data was received from seven hospitals (see section 3.9).To maintain the confidentiality of the hospitals concerned, codes were used to secure their identity. The bed capacity was requested to enable comparison of PrU data between different hospitals, relative to their size. Even though bed capacity is included for each hospital, unless individuals work in the hospital administration department or the MOH they are unlikely to know bed capacities of different hospitals and as such individual hospitals should not be identifiable.

## c) Meeting with key staff:

The Director of the DNMA also advised the researcher to meet with two nurses who were working as wound management nurses in the capital city and gave his permission to contact them. Both were assisting in the teaching and training of nurses on wound care including PrU. The aims of the meeting with the two nurses were to: 1) explore the type of education and training they provide to other nurses in relation to PrUs and 2) advice the researcher on the current practice of PrU prevention and management.

The nurses were contacted and a meeting with each one was arranged. During the meeting with the first nurse, she identified another nurse who was working as a diabetic foot nurse in another hospital but she was interested in PrU care and advised the researcher to contact her. Then she identified another four nurses who were working as community nurses and said meeting with them would give information on management of PrUs in the community. Meetings with these nurses were arranged.

All the nurses, with whom the researcher met, were based in the capital city as it was difficult to travel to meet with staff from other hospitals. However the two wound management nurses had some information about the situation in the other hospitals, outside the capital, as they assisted in teaching and training of nurses on wound management in these areas.

Overall, meetings were conducted with two nurses (i.e., one diabetic foot nurse and one wound management nurse) in two different hospitals, one wound management nurse and four community nurses in one polyclinic. These meetings were carried out on different days depending on the availability of staff. A total of seven nurses were involved in these meetings. The following was discussed with them: people involved in the care of PrUs; the available policies and guidelines on PrU management; treatment and prevention methods that are used; the use of PrU risk assessment; and training courses for nurses on wound care generally and PrUs specifically.

From these meetings, it was found that all staff nurses are responsible for the care of patients with PrUs. There was no prior training, apart from that undertaken as part of the undergraduate programme. Some hospitals, especially those in the capital city, provided more training opportunities than those in regional hospitals. The nurses from the hospitals in the capital city stated that they followed the policies and guidelines approved by the MOH. According to the nurses, no other international or national guidelines were being used. According to one staff member working as an infection control nurse in a hospital, a document was prepared in relation to PrU care, but it was not approved at MOH level and was only used by nurses in that particular hospital. In another hospital, the nurse responsible for wound care has adopted staging system from the NPUAP/EPUAP guideline for PrUs (NPUAP/EPUAP 2009) – and she follows their assessment and treatment guidelines as well.

There was general agreement that there were little or no resources for the treatment and prevention of PrUs (i.e., topical treatment and pressure relieving devices). Treatments available in some areas included cleansing solutions such as normal saline and potassium permanganate.

The nurses reported that a risk assessment tool is available but is not used for all patients; even where it has been used in the nurses' opinion it was not used correctly due to the

lack of knowledge and experience of the staff. Training courses have been offered but they are very limited and are not available for all staff nurses in direct contact with patients with PrUs, or even patients with any type of wound. At the time of the meeting, only two nurses in the whole of Oman had undertaken advanced training on wound care and had the designation of wound management nurse. They both received their training abroad. These two nurses also ran a wound care training course for staff in other healthcare institutions.

The diabetic nurses reported that she takes care of all types of wounds, including PrUs, and community nurses take care of all patients who are at home and in need of care, including PrUs. The infection control nurses said that all the nurses were responsible for managing those who develop PrUs; these nurses felt that a specific wound management nurse was required as the number of patients is increasing and staff members are not sufficiently trained on wound management care.

## 3.9 Audit Results (Reported prevalence and incidence of PrUs):

From the eight letters which were sent to hospitals in Oman (as explained in section 3.8) data were returned from seven hospitals.

### 3. 9.1 Hospital A

Hospital A is a regional hospital with 243 beds. In this hospital, there was some variation in the number of patients who were either admitted with PrUs or who developed a PrU during their admission for the period 2009-2012 (Table 3-1). Between 2009 and 2010, there was a drop of one third in the number of patients admitted with PrUs. The reasons for this are not known.

Table 3-1 Numbers of patients who developed PrU in Hospital A

| Year | Number of patients admitted with PrUs | Number of patients who developed PrUs during admission | Total |
|---|---|---|---|
| 2009 | 31 | 7 | 38 |
| 2010 | 21 | 3 | 24 |
| 2011 | 24 | 4 | 28 |
| 2012 | 22 | 2 | 24 |

The reasons for the development of PrUs in both categories, as stated by the wound management nurse who returned the data, were as follows:

1. The age of the patient was above 55 years
2. An increase in the number of inpatients together with a shortage of staff led to the inability of the staff to change patient positions every two hours
3. Improper technique of lifting and turning the patients
4. Lack of care from relatives and sometimes no relatives with the patient at home

### 3.9.2 Hospital B

Hospital B is also a regional hospital and has a 150 bed capacity. Few people in Hospital B developed PrUs during hospitalisation or at home. The reasons for the development of the PrUs as stated by the Acting Head of Nursing and Midwifery were:

1. PrUs that developed prior to admission resulted from the neglect of the patient by family members
2. During hospitalisation, the available air mattresses were old and the quality of care was low during 2009 and 2010
3. The reduction of PrUs during admission in 2011 and 2012 was due to the new air mattresses which improved quality of care

The table below sets out all the data gathered from Hospital B (Table 3-2). The numbers shown in hospital B are very low compared to those gathered from Hospital A. This may

be related to the lower bed capacity and the availability of new resources (i.e. air mattress).

Table 3-2 Numbers of patients who developed PrU in Hospital B

| Year | Number of patients admitted with PrUs | Number of patients who developed PrUs during admission | Total |
|---|---|---|---|
| 2009 | 3 | 1 | 4 |
| 2010 | 2 | 1 | 3 |
| 2011 | 3 | 0 | 3 |
| 2012 | 1 | 0 | 1 |

### 3.9.3 Hospital C

In Hospital C, a regional hospital with 301 beds, the number of patients who developed PrUs was collected by the QAD. There was no data available on PrUs during 2009 and no reason was given for the lack of data. Table 3-3 presents the data from this hospital, which shows a wide variation from the figures reported by the other hospitals. Given the size of this hospital, there was relatively small number of patients developing PrUs. Also, the name of the person responsible for gathering and recording this information was not mentioned; it was collected by the QAD and sent by the Head of Nursing and Midwifery.

Table 3-3 Numbers of patients who developed PrU in Hospital C

| year | Number of patients admitted with PrUs | Number of patients who developed PrUs during admission | Total |
|---|---|---|---|
| 2009 | Not Available | Not Available | 0 |
| 2010 | 2 | 4 | 6 |
| 2011 | 1 | 5 | 6 |
| 2012 | 0 | 2 | 2 |

The reasons for the development of PrUs as stated by QAD in Hospital C were:

1. Restricted movement of the patients
2. Vascular problems

3. Neurological deficits
4. Co-morbid conditions
5. Unavailability of air mattresses and other special mattresses

### 3.9.4 Hospital D

Hospital D is a regional hospital with 191 beds. It provided very limited data on PrUs. It provided the total sum of patients who were admitted with PrUs from home between 2009 and 2012 as 74, without specifying the number in each year. They stated that seven patients with PrU were transferred from other healthcare institutions.

The hospital stated that no patients developed PrUs during hospitalisation in 2009, 2010 and 2011 and that there was only one case during 2012 which was related to a long-stay road traffic accident patient. In this hospital, the data were sent by the Acting Head of Nursing and Midwifery without mentioning the person responsible for its collection.

### 3.9.5 Hospital E

Hospital E, a regional hospital with 363 beds, included patients who developed PrUs both at home and during hospitalisation, as well as those who were transferred with PrUs from other hospitals. The highest figures were those in relation to PrUs that developed at home. According to the infection control nurse, data concerning the development of PrUs in 2012 was complete, apart from those relating to the month of December.

The data show that, between 2009 and 2012, the number of patients admitted with PrUs was higher than the number of patients admitted with PrUs, those who developed PrUs during hospitalisation and those who were transferred with PrUs). In 2009 the number of patients who developed PrUs during admission was the highest of the four years. The reason for this was not mentioned. The data for Hospital E is presented in Table 3-4 below.

Table 3-4 Numbers of patients who developed PrU in Hospital E

| Year | Number of patients admitted with PUs | Number of patients who developed PrUs during admission | Number of patients transferred from other hospitals with PrUs | Total |
|---|---|---|---|---|
| 2009 | 160 | 61 | 3 | 224 |
| 2010 | 170 | 32 | 5 | 207 |
| 2011 | 151 | 36 | 7 | 194 |
| 2012 | 147 | 32 | 0 | 179 |

The reasons for the development of PrUs, as stated by the infection control nurse, were divided into reasons before hospitalization and during hospitalization. The reasons before hospitalization were:

1. Absence of a care giver
2. Poor hygiene
3. Incontinence
4. Poor nutritional status
5. Lack of mobility

While the reasons for developing PrUs during hospitalization were:

1. Unavailability of designated nurse to monitor and take care of wounds (wound management nurse)
2. Lack of risk assessment tool (pressure prediction scale)
3. Lack of resources, e.g. air mattresses

### 3.9.6 Hospital F

In Hospital F, a regional hospital with 450 beds, the data provided by the Acting Head of Nursing and Midwifery did not include all units in the hospital and it was stated that the data were not up to date. The only reason stated for the development of PrUs, either in hospital or at home, was patients being bedridden. Table 3-5 presents the data of Hospital F.

Table 3-5 Numbers of Patients who developed PrU in Hospital F

| Year | Number of patients admitted with PrUs | Number of patients who developed PrUs during admission | Total |
|---|---|---|---|
| 2009 | 14 | 0 | 14 |
| 2010 | 15 | 2 | 17 |
| 2011 | 16 | 0 | 16 |
| 2012 | 11 | 1 | 12 |

The figures of Hospital F are probably under-estimated compared to the number of beds in this hospital. This may be due to the same reasons stated for Hospital C above.

### 3.9.7 Hospital G

Hospital G is a tertiary hospital with 485 beds. The number of patients who developed PrUs at home or were transferred from other healthcare institutions exceeded the number of patients who developed a PrU during hospitalisation. The data were collected by the diabetes foot nurse and were sent by the Superintendent of Nursing and Midwifery. The factors that are believed to have contributed to the development of PrUs during hospitalisation were:

1. Shortage of ripple mattresses, limited number of electrical mattresses and most mattresses being of standard design
2. Shortage of staff nurses especially in the critical care units
3. Nature of patients (neurosurgical and orthopaedic patients, the majority of whom were bedridden)

The reasons provided for the development of PrUs in patients at home were:

1. Family members having a lack of knowledge regarding PrU prevention and care
2. Lack of community health nurse
3. Obesity, diabetes and hypertension / non communicable diseases as a predisposing factor for the development of PrUs

4. Lack of support and resources provided to patients discharged home with a high risk of developing PrUs

Table 3-6 below presents the data from Hospital G. The number of patients, who developed PrUs in 2009, either during admission or at home, was low compared to the following three years. The reason for this is not known.

Table 3-6 Numbers of patients who developed PrU in Hospital G

| year | Number of patients admitted with PrUs | Number of patients who developed PrUs during admission | Total |
|---|---|---|---|
| 2009 | 89 | 26 | 115 |
| 2010 | 118 | 47 | 165 |
| 2011 | 118 | 43 | 161 |
| 2012 | 138 | 42 | 180 |

## 3.10 Summary

From the above data collected from seven hospitals, it can be seen that there is a wide variation in the numbers of patients who develop PrUs during hospitalisation and at home, and who are transferred with existing PrUs from other healthcare institutions. There are a number of possible reasons for this variation, some of which have been considered above:

1. Lack of trained staff on wound management.
2. The resources necessary for the prevention and treatment of PrUs were insufficient or variable between hospitals.
3. The number of patients who develop PrUs was relatively small in some hospitals with a high bed capacity. Explanations for this could be that: the figures are not accurately recorded and reported; the care could genuinely be excellent; all necessary resources are available; and/or staff members are trained on how to care for patients at risk of PrUs.

While analysing the above situation of PrU care and management in Oman, it appears that this condition is not recognised as a major problem in most of the hospitals although it is one of the performance indicators. This might be due to inaccuracies in the statistics recorded of the number of patients who develop PrUs either at home or during their hospitalisation. Another reason may be the lack of knowledge and experience of the nurses regarding the assessment, prevention and treatment of PrUs. Moreover, the lack of resources in some hospitals, out-dated policies and guidelines, and the shortage of trained staff nurses may compound the problem.

## 3.11 Rationale for undertaking Phase I study (quantitative study)

These findings led the researcher to plan the proposal for phase I of the study. Having the data from the above audit highlighted certainly a need to further explore PrU prevention and management in Oman. The aim was to assess the nurses' level of knowledge in relation to PrU; the policies used for PrU care, and the resources available for the prevention and management of PrU which includes both the preventive measures (i.e., the devices and the nursing care) and the topical treatments used in the management of PrUs.

# Chapter Four: Conceptual Framework

## 4.1 Introduction

The framework is the conceptual underpinning of a study (Polit & Beck 2010). Although, not every study is based on a theory or conceptual framework, every study has a framework (Polit & Beck 2010). If a study is based on a theory, its framework will be referred to as a theoretical framework while if the study has a specific conceptual model then the framework will be called a conceptual framework (Polit & Beck 2010). This chapter presents the conceptual framework of the study, the reason for its selection and an overview of this study.

## 4.2 Conceptual Framework

The three concepts examined in this study were nurses' knowledge, attitudes and practice (KAP) in relation to PrUs. KAP studies are used to identify what people know about a subject (Knowledge), how they feel about it (Attitude) and what they do about it (Practice) (Vandamme 2009). These concepts are defined as follows: knowledge refers to a person's understanding of a certain topic, attitude refers to their feelings towards the same topic, while practice refers to the way in which they demonstrate both their knowledge and attitude which are reflected through their actions (Kaliyaperumal 2004). Bloom's Taxonomy and KAP (knowledge-attitude-practice) formed the conceptual framework for this study.

## 4.3 Bloom's Taxonomy

Bloom's Taxonomy has been used widely since its development by Benjamin Bloom and his colleagues (Bloom et al. 1956). It was developed in order to promote a higher level of thinking in education, such as in the analysis and evaluation principles, concepts, procedures and processes, as opposed to simply remembering facts (Bloom et al. 1956).

Bloom's Taxonomy was revised by another group of psychologists led by Lorin Anderson (a former student of Bloom) during the 1990s (Pickard 2007). The new taxonomy is known as the Revised Bloom's Taxonomy (RBT).

Bloom's Taxonomy consists of three domains of educational activity: cognitive (knowledge) meaning mental skills, affective (attitude) meaning growth in feeling or emotion and psychomotor (skills) meaning manual or physical skills (Bloom 1956). Trainers and educators call these domains categories and refer to them as KSA (Knowledge, Skills, Attitudes) (Bloom 1956). In this study, knowledge, attitudes and practice will represent the three domains of Bloom's Taxonomy respectively (figure 4.1).

The cognitive domain includes two dimensions which are the knowledge and cognitive processes (Krathwohl 2002). Knowledge according to Bloom is considered the simplest level, where the individual should show the gaining of some form of knowledge after being taught (Bloom et al. 1956). The knowledge dimension in the Revised Bloom's taxonomy (RBT) refers to the three original dimensions of Bloom's Taxonomy – factual, conceptual and procedural – and a fourth category, which is metacognitive (Krathwohl 2002). The cognitive dimension consisted of six categories. These were retained in the RBT but with a change in the name of the first three categories and a change in the order of a further two. The new categories were: remember, understand, apply, analyse, evaluate and create (Munzenmaier & Rubin 2013). In this study, the focus is on the first three levels of cognitive domain as they are the basis of knowledge (Krathwohl 2002). Remember means to retrieve relevant knowledge from long-term memory, understand refers to constructing meaning from instructional messages – including oral, written and graphic communication – and apply is defined as carrying out or using a procedure in a given situation (Munzenmaier & Rubin 2013). Nursing students has been taught using the above mentioned levels of knowledge to acquire knowledge that will aid in mastering a skill and performing it accurately.

Affective domain is the second domain in Bloom's Taxonomy. It includes the manner in which we deal with things emotionally (Bloom et al. 1956). Krathwohl has developed the model to include five levels: receiving, responding, valuing, organising and characterization (Allen & Friedman 2010). Acording to Bootzin et al. (1983), attitudes are beliefs and values as they are connected with our cognitive component. Both the affective and cognitive components give us our long range measures for dealing with the world.

Having the competency to perform a task does not mean having the desire (attitude) to perform it correctly. This means that competencies give us the ability to perform a task, while attitudes give us the desire to perform it. Attitudes change frequently in response to various events in a person's life and these emotional changes vary in the length of time they last.The five categories have been listed from the simplest behaviour to the most complex behaviour. Also, it represents the affective domain and means an internal feeling and emotion or a selective behavior (Bloom 1956). In this study, nurses 'attitude' towards PrUs will be explored in order to identify the reason for it and how it can affect the practice of PrU care.

The first three levels of the affective domain have been included in this study as they cover the attitude aspect here. The first level is receiving which means awareness and willingness to hear. Selected attention, the second level, is the responding behavior, which means to attend and react to a particular phenomenon. The third level is valuing which is defined as an internalization of a set of specified values that are expressed in the individual's overt behaviour (Bloom 1956).

The third domain in Bloom's Taxonomy is the psychomotor domain which refers to the physical movement, coordination and use of motor-skill areas (Simpson 1972). In this study, practice represents the psychomotor domain and refers to the application of the knowledge and rules that leads to the action (Bloom 1956). The psychomotor domain is

categorised into five levels: imitation, manipulation, precision, articulation and naturalisation (Dave 1975). Practice (as in the KAP) or skills (as in Bloom's Taxonomy) is used to represent the expertise developed during a course of training and experience. It includes not only craft skills acquired by apprenticeship, but high-grade performance in many fields, such as professional practice, the arts, games and athletics (Gregory 1987). In this study, the focus is on the first three levels, which are defined as follows: (1) imitation is observing and patterning behaviour after someone else, (2) manipulation refers to the ability to perform certain actions by memory or by following instructions, and (3) precision is the performance of an activity exactly right with high quality and without assistance (Dave 1975).

## 4.4 Measuring Knowledge Attitude and Practice

Cross-sectional KAP studies aim to identify the knowledge, attitude and practice of a particular population regarding specific phenomena. The method was used first in 1950s in the field of family planning and population studies (Launiala 2009). It continued to be used in 1960s and 1970s for understanding the perspectives of family planning in Africa (Launiala 2009). Launiala (2009), a project officer for UNICEF from 1998 to 2001 in Malawi, discussed the appropriateness of using KAP surveys to help understand and explore health-related knowledge, attitudes and practices, and the major challenges encountered when implementing a KAP survey. The KAP survey method was used because Malawians were trained on survey and quanatiative research, it was easy to conduct, and it was assumed that results could be generalised nationwide. She concluded, however, that using a KAP survey alone is not enough and that the use of a muliple-method design allows contextualisation of knowlgde and help to understand the reasons behind certain practices (Launiala 2009).

A literature review conducted by Vandamme (2009)identified three main objectives for undertaking KAP studies: a) diagnostic purposes to describe the populations current

knowledge, attitude and practice; b) identification of current situation problems to help design appropriate interventions; c) an evaluation tool to evaluate the effectiveness of specific interventions (Vandamme 2009).

On the basis that there is no standardized methodology for conducting a KAP study, (Vandamme 2009) proposed that it may be more appropriate to perceive KAP as a conceptual framework to study human behavior rather than a specific methodology. However, she concluded that the KAP survey remains a useful tool in studies that aim to measure perceptions and behavior which should be the first step in the development or evaluation of any program or intervention (Vandamme 2009).

The characteristics of a KAP study are that it is: an easy (straightforward) design, it gives a quantitative interpretation and presentation of results, results can be generalized to a wider population even with small sample and can be implemented within short period of time (Launiala 2009). A limitation is that it can be difficult to obtain reliable data on knowledge and attitude specially in quantitative studies (Vandamme 2009). This limitation can be overcome by including a qualitative data collection method such as focus group or interviews as done in this study (see chapter 8).

As stated earlier, one objective of using the KAP method is to diagnose the current knowledge, attitudes and practices of the population on certain things (Vandamme 2009). The primary investigator (PI) aimed to explore nurses' level of knowledge and views about PrU care and practices in order to describe the management of PrUs in Oman and, in doing so, help guide the strategic planning for adopting new prevention and management strategies.

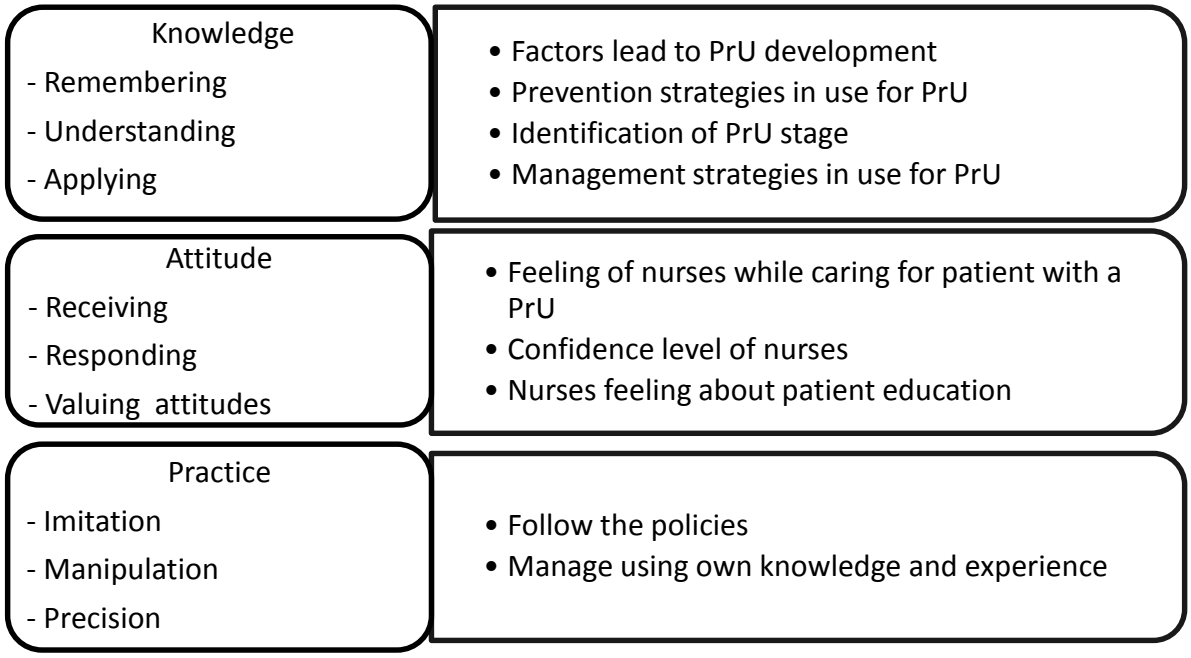


Figure 4-1 Conceptual framework of nurses' Knowledge, Attitude and Practice concerning PrU prevention and management

In this study, the domains of KAP represented the following: (1) the knowledge of nurses relating to factors leading to PrU development, prevention strategies used for PrUs, identification of PrU stage, and management strategies used for PrUs, (2) the attitudes of nurses regarding the feelings of nurses while caring for patients with PrU, nurses' confidence level, and nurses' feelings towards patient education concerning PrUs and (3) the practice of nurses in relation to PrU prevention and management in relation to following the policies, and managing PrUs using their own knowledge and experience (Figure 4-1).

As stated by Bloom, the first, and most basic, level of knowledge is a prerequisite to the next level (Bloom et al. 1956), meaning that one cannot address the more complex higher level before acquiring knowing or learning at the lower level. For example, a certain level of knowledge can affect or influence an individual's ability to perform certain actions. Also, attitude affects an individual's practice. Similarly, both knowledge and attitude bring changes in human behaviour. Finally, based on observation in practice, it

can be argued that the integration of knowledge, attitude and practice represents and leads to good quality nursing practice.

Nurses are trained to perform task-oriented nursing actions which require each of these domains: adequate knowledge, positive attitude and good practice. For that reason, there is a need to assess whether nurses possess them at an appropriate level. The KAP and the Revised Bloom's Taxonomy (Figure 4-1) are used in this study to examine these three domains as they are inter-related, meaning that a person should have certain knowledge in order to perform specific actions, and attitudes influence the person towards practice. At the same time, both knowledge and attitude can shape an individual's behaviour and reactions in specific situations.

In this study, the main focus is nurses' level of knowledge of PrUs and the attitudes they have towards their prevention and management, which will be reflected in their actual practice.

## 4.5 Overview of the study

A mixed methodology has been used in this study to achieve the research aims (Chapter 1). The study has been conducted over two phases (Figure 4-2). A descriptive explanatory sequential mixed-method design has been used. This design can helps help each data collection method to build on the results from other (Klassen et al. 2012). The reason for selecting a mixed methodology is to enrich the areas of inquiry and enhance the evidence base through triangulation of quantitative and qualitative data (Polit & Beck 2010). Phase 1 implemented a quantitative method. This was followed by a qualitative method in phase 2 to explore the findings of Phase 1 and explain the quantitative results in more depth (Klassen et al. 2012). These methods were used to complement each other in order to increase the credibility of the findings and achieve the research aims. The KAP concepts and RBT domains, as described above, provided the conceptual framework for this study.

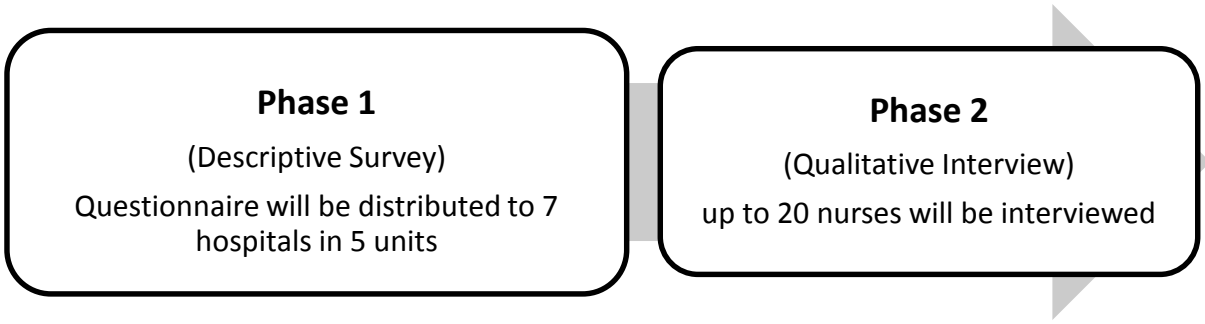


Figure 4- 2 Summary of the study phases

# Chapter Five: Quantitative Study Methods

## 5.1 Introduction

This chapter describes the study design for the phase I study (quantitative study), study site and access, ethical approval and research development considerations, sample and sample size, data collection tool, pilot study, data collection process, and data analysis.

The objectives of this study were:

1. To assess the Omani nurses' level of knowledge about PrUs prevention and management
2. To assess nurses' knowledge regarding the policies in use for PrUs management
3. To identify nurses' knowledge regarding training for PrUs prevention and management
4. To assess nurses' knowledge about the resources available for prevention and management of PrUs
5. To identify the relationship between nurses' demographic characteristics (e.g., age and years of experience) and knowledge of PrUs prevention and management

## 5.2 Study design

For phase I, a questionnaire was used to assess the nurses' level of knowledge in relation to PrUs; the policies used for PrUs care, and the resources available for the prevention and management of PrUs.

## 5.3 Ethics, Research and Development Approval (Phase I)

Ethical approval for the study was received from the Ethics Committees in the Ministry of Health (MOH), in Oman and the College of Medicine, Veterinary and Life Sciences Ethics Committee at the University of Glasgow. First, the proposal was submitted to the Ethics Committee in MOH in Oman. It was returned for minor corrections and

clarification and amendments were made and forms resubmitted. After receiving the MOH approval, the letter was submitted to the College of Medicine, Veterinary and Life Sciences Ethics Committee at the University of Glasgow with the proposal and their approval was subsequently received.

## 5.4 Data Collection Tool (Construction of the Questionnaire)

A structured questionnaire was developed for use in the present study (Appendix 1). The questionnaire covered the following areas: 1) the Pieper-Zulkowski Pressure Ulcer knowledge test (PZ-PUKT) for demographic data and to examine the nurses knowledge (Pieper & Zulkowski 2014), 2) the nurses knowledge about policies for PrUs care in Oman, and 3) the nurses knowledge about the resources used in their hospitals either for prevention or treatment of PrUs. The original version of the PZ-PUK tool was obtained directly from the authors (i.e. Dr Barbara Pieper and Dr Karen Zulkowski in 2013). Validity and Reliabilty of the tool are discussed in section 5.8.

Section 1, the Pieper-Zulkowski Pressure Ulcer Knowledge Test (PZ-PUKT), has two parts (demographic and knowledge). The first part covered the demographic data of the participants, which included place of work, age, gender, job category, years of experience, highest degree held, and certification in clinical speciality. It also included questions about further training on PrUs care such as: last time respondents attended or listened to a lecture on PrUs, last time respondents read an article or book about PrUs, and if the respondent had read the NPUAP/EPUAP guidelines (Pieper & Zulkowski 2014). The second part consisted of 72 questions that measure knowledge on PrUs prevention (20 questions), staging (25 questions) and wounds description (27 questions). Each questions is answered as true, false, or don't know. In terms of scoring, each question is scored as correct or incorrect.

For the purpose of the study, a further two sections of questions were included. Section 2 consisted of three questions about the policies used in Oman in relation to wound management in general. The questions were a multiple-choice type and respondents were asked to select the answer that best explains what they have or know. Section 3 included two questions about the resources used for PrU prevention and treatment that were available in the participants' units/wards. The questions consisted of a list of items that nurses could select from and had the option to add other answers that were not included in the list. The rationale for adding these two sections was based on the findings from the preliminary work (Chapter 3) which showed a variation in the type of guidelines used for PU prevention and management and the resources available in each hospital.

## 5.5 Study site and access

This study was conducted in seven hospitals which are under the MOH, in Oman. Nurses who were working in the following five wards/units were selected to participate in this study: Intensive Care Unit (ICU), Coronary Care Unit (CCU), Medical ward (MW), Surgical ward (SW), and Orthopaedic ward (OW). The reason for selecting these wards and units is because the incidence rate for PrU development is higher in these compared to other clinical areas.

In order to access potential recruiting sites, different steps were followed. First, the Ethical approval was received from the Ethics Committee in the MOH and the Ethics Committee at the University of Glasgow. Second, the approval letter was sent to the Head of Department (HOD) of nursing in each hospital where the proposed study would be conducted. Research assistants were requested from each hospital through the HOD. The Directorate of Nursing and Midwifery Affairs (DNMA) in the MOH were informed as well.

## 5.6 Ethical Considerations (Consent and confidentiality)

For the questionnaire, each participant chose either to complete the questionnaire or not. Completion and return of the questionnaire was taken as consent for the study. There was no risk or direct benefits for the participants taking part in this study. All the nurses who were working in the seven selected hospitals, specifically in the 5 wards and units, had an equal and fair opportunity to participate in the study. The confidentiality and anonymity of participants was maintained. The returned questionnaires were given an identification code for the purpose of data analysis and for maintaining confidentiality. All the questionnaires were stored in a locked cabinet. No identification information was required from the participants. The questionnaire data were coded and saved on a password-protected computer at the University of Glasgow.

## 5.7 Sample and sample size

The study was conducted at the same hospitals from which the preliminary data was collected (Chapter 3). The seven chosen hospitals are located in different regions of Oman and provide different levels of care. For example, one of these hospitals is a national/regional hospital which provides secondary and tertiary care to patients living in Muscat (capital city of Oman) while providing tertiary care for patients from other regions and governorates of the country. All the remaining six hospitals are regional hospitals and provide secondary and tertiary care as well as other services to patients in their catchment area.

The participants in this study were selected based on the inclusion criteria (below). The HOD in each hospital provided the number of nurses in each unit/ward of the selected hospital at the time of the study. The total number of nurses who were working in the five units/wards was 1006 (ICU: n= 265; CCU: n=115; MW: n=220; SW: n=221; OW:

n=185). There were no previous studies that explored nurses' knowledge on PrUs in Oman to guide the sample size however in an attempt to ensure a representative sample and ultimately transferability of results the aim was to recruit a relatively large sample.

To be included in the study participants had to fulfil the following inclusion and exclusion criteria:

Inclusion criteria:

1. Nurses working in the ICU, CCU, MW, SW, and OW
2. Nurses qualified with at least a Diploma in Nursing
3. Nurses willing to participate in the study

Exclusion criteria:

1. Nurses working in paediatric wards
2. Nursing tutors

## 5.8 Justifications for the selection Pieper- Zulkowski Pressure Ulcer knowledge test (PZ-PUKT)

A search was conducted to find a suitable tool to address the aims of the study. Few tools were identified from the search. Most of them were used in only one paper, and were developed for a specific study.

The study by Meesterberends et al. used a questionnaire to gather data on nurses knowledge about PrUs (Meesterberends et al. 2013) (more details about this study in section 2. 13). The first part of the questionnaire includes demographic characteristics such as: age, gender and position. The position classification from Simoens et al (2005) was applied to facilitate the comparison between nursing staff in Netherlands and Germany: registered nurses, practical nurses and nurse aides. In the second part of the questionnaire, the 2003 Pressure Ulcer Questionnaire (PUQ-2003) developed by Hulsenboom et al. (2007). It was used to assess nursing staff's knowledge and use of PrU preventive measures (Meesterberends et al. 2013) which is based on the Dutch national

PrU guideline, that was developed in 2002 (Centraal Begeleidingsorgaan voor de Intercollegiale Toetsing 2002). The guideline includes 29 PrU preventive measures that are divided into two sections. Section one comprises 16 measures that are useful to prevent PrUs for patients who are at risk for its development, such as ensuring good hygiene. Section two includes 13 measures which are not useful to prevent PrUs, such as using warm compresses (Meesterberends et al. 2013).

Furthermore, the PUQ-2003 is divided into two parts. Part one requires the respondents to evaluate the usefulness of specific preventive measures for patients at high risk of PrU development. Answering options for each measure were ‘useful’, ‘sometimes useful’, ‘not useful’ or ‘do not know’. Part two asks the respondents to indicate how frequently/commonly these measure are used in their practice in terms of preventive measures applied in their ward/ department as follows: for all high-risk patients (always), preventive measures applied only for individual high-risk patients (sometimes) or preventive measures that are never applied (never) (Meesterberends et al. 2013). The questionnaire used by Meesterberends et al. (2013) was not felt to be appropriate for the present study as it measured the nurses' knowledge on the usefulness of preventive measures used for PrU while the current study measured nurses knowledge on the PrU itself. Also, the original version of this questionnaire was in Dutch and then it was translated in English in which some of the importance data may be missed during translation. Moreover, this questionnaire was based on Dutch national PrU guideline which means it was specific to this country and may not be suitable for use in other countries.

Strand & Lindgren (2010) in evaluating the knowledge of, and attitudes towards, PrUs in nurses working in intensive care used a questionnaire which was based on questions tested for use in a Swedish setting by Källman and Suserud (2009), which in turn were based on questions developed and validated by Moore and Price (2004) and Lewin et al.

(2003) (described in section 2.13). Some alterations were made in the wording of questions to fit an intensive care environment before using the questionnaire was employed in the study. The questionnaire was tested in a small pilot-study which revealed a high non-completion rate in open-ended questions regarding knowledge. These questions were therefore replaced by more closed question where respondents were asked if they agreed or disagreed with statements regarding specific risk factors for PrUs. For determining the attitude towards pressure ulcer prevention statements were provided which respondents rated from strongly agree to strongly disagree on a five point Likert type scale (Strand & Lindgren 2010). Strongly agree rendered a score of five for positive statements and one for negative statements. The maximum score was 55 and the minimum was 11. Measurement of knowledge was achieved through multiple-choice questions. Also, respondents were asked to identify the EPUAP categorisation of PrUs from a written description. Open- ended questions were used to identify perceived opportunities and barriers in pressure ulcer prevention (Strand & Lindgren 2010).

The questionnaire used by Strand and Lindgren was also not felt to be appropriate for the current study as it had a number of open questions, which as discussed above, were often left blank by respondents and which are known to take longer for respondents to complete. To ensure a good response rate it was felt to be important that nurses could complete the questionnaire in a relatively short period of time.

The search however identified many studies that used the PUKT (i.e., Pressure Ulcer knowledge test) tool e.g., Lawrence et al. 2015, Iranmanesh et al. 2013, Smith & Waugh 2009, Claudia et al. 2010, Gunningberg et al. 2013 which is expalined in chapter 2 section 2.13. This tool was developed and tested in 1993 (Pieper & Mott 1995). It has been used for more than 20 years and has been translated into different languages (Pieper & Zulkowski 2014). It was developed from the literature and the guidelines for the purpose of evaluating nurses' knowledge on PrUs (Pieper & Zulkowski 2014). It

consisted of 47-items that were answered as either 'true' and 'false' (Pieper & Mott, 1995). The items included in PUKT were divided into 3 subscales: prevention/risk (33 items), staging (7), and wound description (7 items) (Pieper & Zulkowski 2014). The cutoff score was set as 90% of correct score for passing becasue the content was basic information for care (Pieper & Zulkowski 2014).

In 2012, Dr Pieper & Zulkowski revised the original PUKT in light of research published in the last 5 years and content/recommendations in the NPUAP/EPUAP's, Pressure Ulcer Prevention and Treatment Clinical Practice Guideline and the Wound, Ostomy, and Continence Nurses' Guideline for Prevention and Management of Pressure Ulcers (Pieper & Zulkowski 2014). The updated version considered new research findings in relation to the new update on PrUs prevention/risk, staging and wound description as well as the changes in its management. The authors revised and edited the PUKT tool and re-named it the Pieper- Zulkowski Pressure Ulcer knowledge test (PZ-PUKT) (Pieper & Zulkowski 2014).

The revision was made over two phases (Pieper & Zulkowski 2014). Phase 1 consisted of editing and adding new questions that resulted in 115 questions divided into three sub-scales (40 questions about prevention/risks, 20 about PrUs staging, and 55 about wounds description). In phase 2 the PZ-PUKT was administered to registered nurses who were attending the New Jersey Hospital Association (NJHA) PrU conferences in 2012 and then in 2013. Each year, since 2005, at the same conference, the original PUKT was administered as a method of tracking nurses' knowledge (Pieper & Zulkowski 2014). Nurses were informed that they were helping to validate the new version of PUKT. Testing in 2012 resulted in deletion of the following: 20 questions from prevention/risk sub-scale, 25 questions from staging sub-scale, and 27 questions from wound description sub-scale. At the NJHA conference in 2013 the nurses who attended were asked to complete the re-evaluated tool that consisted of 72 items (Pieper & Zulkowski 2014).

Face validity was established through revision of all the questions by the authors that resulted in 100% congruence on wording/content (Pieper & Zulkowski 2014). The response modes for PZ-PUKT were 'True', 'False', and 'Do not know' (Pieper & Zulkowski 2014). The advantages of using this answering format are: quick selection of the answer, easy to score, versatile and easily transferable for international use and the possibility of reliability testing (Pieper & Zulkowski 2014). The option 'Do not know' is included as it provides a more accurate picture of knowledge by reducing guessing in which half of the items would be expected to be correct by chance and increases reliability (Pieper & Zulkowski 2014).

The new tool therefore consisted of 72 questions. Subsequent work investigated the reliability of the 72 item revised questionnaire resulted in a Cronbach's $\alpha$ result of .80 for the total score, and for the subscales: staging .67; wound description .67; and prevention/risk .56 (Pieper & Zulkowski 2014). The questionnaire however is not without its limitations. There is a need to test again the validity of this tool because the sample size was small (n=95) (Pieper & Zulkowski 2014). The authors argue state that, due to the frequent use of the PUKT and alterations that are made to it by other researchers/ clinicians/ educators who have used it, the comparisons between studies are difficult. Another limitation is that there is no cut-off score for passing/failing for the PZ-PUKT and the authors are asking other researchers/ clinicians/ educators according to set a cut-off score according to their project goal (Pieper & Zulkowski 2014). No other studies have been identified that used the PZ-PUKT except the one which was conducted by its authors (Pieper & Zulkowski 2014).

Dr Barbara Ann Daters Pieper and her colleague Dr Karen Zulkowski, who developed this questionnaire, were contacted by email and gave permission to use this test. At that time, the PI was informed that there was a new version of the PUKT tool i.e. the PZPUKT (described above). They sent a permission slip to the PI for signing. The

permission slip stated that no changes should be done to the tool and the results should be sent to Pieper and Zulkowski after finishing the data analysis.

## 5.9 Pre-test / Pilot study

Pilot testing of the questionnaire was conducted after the ethical approval letter was received from the MOH Ethics Committee. The questionnaire was tested on 22 nurses in three different hospitals, who were not participating in the main study and in wards/units similar to those of the study. The nurses completing the questionnaire were asked for their comments about its clarity, its logical flow, and the time needed for its completion. Nurses were asked to provide written feedback about the questionnaire to the PI. Some of them however gave verbal feedback. The feedback from the nurses was generally positive and the only comment which required further consideration was that the questionnaire took 25-30 minutes to complete rather than 15-20 minutes initially estimated. Thus participants in the main study were informed that the questionnaire would take approximately 30 minutes to complete.

## 5.10 Data Collection Process

The Directorate of Nursing and Midwifery Affairs (DNMA) in MOH were asked to help with the data collection. The DNMA identified Research Assistants (RAs) in each hospital to assist with data collection. The selected group of RAs was trained by the DNMA as researchers in their hospitals. The leader of the research team training in the DNMA nominated the RAs based on their skills. The RAs who were recruited were Omani, could speak and write Arabic and English very well, had good communication skills, and were able to organize and manage tasks effectively. The HOD of nursing in each hospital was contacted by email and informed about the study, selection of RAs and their responsibilities, and were asked for their help and support to distribute them to their staff.

A meeting was conducted in the Institute of Health Sciences in Muscat (i.e. the capital city of Oman). This was arranged by the DNMA, to orient the RAs to the study. The orientation included an explanation of the study purpose, procedure of filling in the questionnaire, ethical considerations, collection process and arrangements for identifying a place where the nurses could complete the questionnaire. Then, the questionnaires were given to the RAs. The numbers of questionnaires given was determined according to the number of nurses in each hospital, as some of the selected hospitals had fewer nurses and others had high numbers, with a minimum of 50 and maximum of 100 questionnaires given for each hospital. In total 640 questionnaires were sent to the hospitals. The reason for having large sample was to improve the generalization of the findings (Parahoo 2006). Also, previous research indicated questionnaire response rates to be 50% (Sandelowski 2000). The RA's responsibility, with the help of the HOD and administration in each hospital, was to arrange a room for nurses to use to complete the questionnaire. In the room, the RA kept the box which was given to them by the PI along with the questionnaires, for the purpose of collecting the completed questionnaires.

Nurses were informed about the study verbally by the RAs and the HOD in each ward and unit in different hospitals. The RA's distributed the information sheets (Appendix 2) and the questionnaires to the specified wards/units and the nurses were asked to read the information sheet first and if they were willing to participate in the study then they were asked to complete the questionnaire and drop it in the box when they were finished. The RAs conducted the data collection over a period of four to six weeks. Nurses were informed not to refer to the internet or any books for completing the questionnaire. There was a sheet attached to the front of the questionnaire which stated clearly what the participant should do, however there was no way to guarantee that each nurse completed the questionnaire only once.. Also, participants were invited to participate in Phase II of the study and an invitation page was attached at the end of the questionnaire (Appendix

3) and those who were interested were asked to complete the form and give it back to the RA. Participants were informed that the questionnaire would take approximately 25-30 minutes to complete and, as stated above, there was no consent form as the return of the questionnaire was considered consent to take part in the study. During the data collection process, the PI visited each hospital where the study was carried out to check if the data collection was going smoothly and to help solve any problems that the RAs had. Finally, the completed questionnaires were returned back to the DNMA in the MOH in sealed boxes which were then returned to the PI.

## 5.11 Data Analysis

Each questionnaire was checked to see whether it had any missing data. Questionnaires with one or more incomplete pages were excluded from the analysis. The data were entered into an Excel spread sheet, the data were then cleaned up by omitting the results of any questionnaires which had one page or more incomplete. The data were then transferred to SPSS (Statistical Package for Social Sciences) version 21.0 for data analysis (IBM 2012). All electronic data were saved in a computer that was password protected. Descriptive statistics were used for describing and analyzing the quantitative data. Means and percentages were calculated to describe the demographic data and the level of knowledge on PrUs. In Section 1, regarding nurses level of knowledge, each question was coded as correct or incorrect or "Do not know" (Pieper & Zulkowski 2014).

Normality tests were performed using the Kolmogrov-Smirnov test to find out if data were normally distributed. For data which were not normally distributed ($p<0.05$), non-parametric tests were used. The Kruskal-Wallis test was used where there were three or more categories. This test was used to find if there was any statistical difference between the nurses' level of knowledge regarding PrUs and the nurses' age, gender, and number of years of experience. The significance level was taken to be $p<0.05$. Then, where differences existed, post-hoc tests were done using Mann-Whitney tests with associated

Bonferroni corrections. Mann-Whitney tests were used to test if there was any statistical difference between the nurses' level of knowledge regarding PrUs and whether nurses had read the NPUAP/NPUAP guidelines and the sites (hospitals) where the study was conducted. The results are presented in Chapter 6.

# Chapter Six: Quantitative Results

## 6.1 Introduction

This chapter presents the results of phase I of the study and consists of four main sections. Section 1 includes a description of the response rate and demographic data analysis, which further includes details of respondents' general characteristics (i.e., place of employment, qualifications and experience and training, and their updating of their knowledge on PrUs. Section 2 consists of all PZ-PUKT results in terms of the three subscales – prevention, staging and wounds – and tests the association between knowledge and demographic characteristics. Section 3 presents the findings of the nurses' level of knowledge in relation to the wound management policy followed in Oman while section 4illustrates the nurses' knowledge of the resources available and used.

In the data analysis, the 'Total' number of questionnaires is different in some of tables/analysis due to some of the questionnaires being incomplete and thus missing data from individual responses.

## 6.2 Response Rate

Alphabetical codes were assigned to each hospital in order to maintain the anonymity of each hospital. Six hundred and forty questionnaires were sent to the seven hospitals. The total number of returned questionnaires was 489, making a response rate of 76.4%. However, 11 of these questionnaires had one page or more incomplete and thus this data was not included in the analysis (Table 6-1).

Table 6-1 Numbers of questionnaires sent, returned and analyzed

| Hospital code | Number of questionnaires sent | Number of questionnaires returned * | Number of questionnaires analysed |
|---|---|---|---|
| A | 60 | 37 | 34 |
| B | 45 | 36 | 36 |
| C | 110 | 77 | 76 |
| D | 60 | 30 | 30 |
| E | 130 | 102 | 96 |
| F | 90 | 90 | 89 |
| G | 145 | 117 | 117 |
| Total | 640 | 489 | 478 |

(*Total number of questionnaires returned, whether or not complete)

## 6.3 Demographic Data

### 6.3.1 Respondents' General Characteristics

#### *6.3.1.1 Age, Place and Employment*

The target group in this study consisted of nurses who were working in the five chosen clinical areas of MW, SW, OW, ICU and CCU in seven hospitals. These hospitals provide secondary and tertiary care to people in their catchment area.

The actual number of analysed questionnaires was 478 (74.7%). The results show that 98.7% (n=443) of the respondents were working in the hospital setting. Only 1% of nurses reported that they worked in areas such as long-term care, home care, or private care, and 0.4% provided a "don't know" response to this question. It is not clear why

nurses selected these options while they are working in the wards/units specified in the inclusion criteria (section 5.7). The age of respondents ranged from 21 to 57 years, with a mean of 30.8 years (SD 6.4 years). More than half (n=229) of the respondents were between 21 and 30 years of age. Most were female (n=83%) (Table 6-2).

#### *6.3.1.2 Qualifications and Experience*

The majority of the respondents (91.7%) were Registered Nurses (RN) and 82.8% held a diploma certificate in nursing as their highest qualification. Qualifications were dichotomised into lower qualifications (i.e., diploma, associate and baccalaureate) and higher qualifications (i.e., master, doctorate and medical doctor). The majority of the nurses' held a lower qualification: 385 had a diploma, four had an Associate qualification and 72 had a baccalaureate. In comparison, few nurses had higher qualifications: two had a master's degree, one nurse had a doctorate, and one was a Medical Doctor (MD). One was a Medical Doctor who retrained as nurse (discussed in chapter 7, section 7.7). Most of the respondents (56.2%) had more than one year but less than 10 years of experience, 37.9% had more than ten years and just 6% had less than one year (Table 6-2).

Table 6-2 Demographic characteristics of respondents

| Characteristics | Response number | Category | n | % |
|---|---|---|---|---|
| Type of Working Area | 449 | Hospital<br>Others<br>Not known | 443<br>4<br>2 | 98.7<br>0.9<br>0.4 |
| Age (years) | 407 | 21-30<br>31-40<br>41and above | 229<br>143<br>35 | 56.3<br>35.1<br>8.6 |
| Gender | 469 | Male<br>Female | 80<br>389 | 17.1<br>82.9 |
| Job Category* | 457 | RN<br>LPN<br>Others | 419<br>26<br>11 | 91.7<br>5.9<br>2.6 |
| Number of Years in Practice | 470 | <1 year<br>1 year< 10 years<br>10 years and above | 28<br>264<br>178 | 6.0<br>56.2<br>37.9 |
| Highest Degree** | 465 | Lowerqualification<br>Higher qualification | 461<br>4 | 99.1<br>0.9 |

*Job Category: RN: Registered Nurse, LPN: Licensed Practice Nurse
**Highest Degree: Lower qualification includes Diploma, Associate and Baccalaureate; and Higher qualification includes Master, Doctorate and MD: Medical Doctor

#### *6.3.1.3 Certification and Wound Care Training*

Table 6-3 shows the characteristics of respondents with training in wound care. The number of certified nurses in any clinical speciality was low (14.7%), as was the number of certified wound specialists (n=10), one respondent was from Hospital A; five were from Hospital E, three from Hospital F and one from Hospital G. It is not clear if the nurses 'certified in any clinical speciality' included nurses 'certified as a wound specialist'.

Table 6-3 Respondents' training in wound care

| Characteristics | Response Number | Category | (n=) | % |
|---|---|---|---|---|
| Certified in Any Clinical Specialty | 408 | Yes<br>No | 60<br>348 | 14.7<br>85.3 |
| Certified as Wound Specialist | 424 | Yes<br>No | 10<br>414 | 2.4<br>97.6 |

#### *6.3.1.4 Respondents' Updating of Knowledge of PrUs*

In relation to the respondents' updating of knowledge on PrUs, 32.5% had listened to/attended a lecture within the previous year. Less than half (47.4%) had read a relevant article or book within the previous year. Furthermore, 45.9% had sought information from the Web about PrUs. Fewer (20.7%) had read the National Pressure Ulcer Advisory Panel/ European Pressure Ulcer Advisory Panel (NPUAP/EPUAP) international PrU prevention and treatment guidelines (Table 6-4).

Table 6-4 Respondents' updating of knowledge on PrUs

| Item | Response Number | Category | N= | % |
|---|---|---|---|---|
| Last time listened to lecture on PrUs | 458 | One year or less<br>Greater than 1 year and less than 2 years<br>Greater than 2 years and less than 3 years<br>4 years or greater<br>Never | 149<br>84<br>94<br>76<br>55 | 32.5<br>18.3<br>20.5<br>16.6<br>12.0 |
| Last time read an article or book about PrUs | 456 | One year or less<br>Greater than 1 year but less than 2 years<br>Greater than 2 years and less than 3 years<br>4 years or greater<br>Never | 216<br>109<br>66<br>43<br>22 | 47.4<br>23.9<br>14.5<br>9.4<br>4.8 |
| Used Web to seek information on PrUs | 458 | Yes<br>No | 210<br>248 | 45.9<br>54.1 |
| Read the NPUAP/EPUAP guidelines?* | 454 | Yes<br>No | 94<br>360 | 20.7<br>79.3 |

(*NPUAP/EPUAP: National Pressure Ulcer Advisory Panel/ European Pressure Ulcer Advisory Panel)

## 6.4 Pressure Ulcer Knowledge (Pieper-Zulkowski Pressure Ulcer knowledge Test-PZ-PUKT):

### 6.4.1 Components of the Questionnaire

Details relating to the construction of the questionnaire and its different sections are provided in section 5.4 of Chapter 5.

### 6.4.2 Scoring of the Questionnaire

The PZ-PUKT is divided into three different subscales. Each subscale consists of a number of questions designed to measure specific knowledge of PrUs. Participants answered each question in the PZ-PUKT by selecting “true”, “false” or “don’t know”. There were72 questions which were divided into three subscales, measuring three sets of knowledge regarding PrUs: prevention (22 questions), staging (26 questions) and wounds (24 questions). The missing data were calculated separately for the purpose of identifying the actual number of those who answered 'false', 'don't know' or left it blank.

#### *6.4.2.1 Prevention*

Table 6-5 presents the total score for the prevention subscale. The total number of "incorrect" and "don't know" answers have been calculated separately and then summed together. As illustrated in Table 6-5, there was a high number of incorrect and "don't know" responses to some questions. Overall, on average, 54.6% of those who answered the questions gave the correct answer.

Table 6-5 Total score and percentage for prevention

| Question number | The correct answer | Total correct answers | % of correct answers | Total incorrect answers | Total don't know answers | Total of incorrect and don't know answers | Missing data |
|---|---|---|---|---|---|---|---|
| 2 | False | 321 | 67.2% | 141 | 12 | 153 | 4 |
| 4 | True | 312 | 65.3% | 117 | 37 | 154 | 12 |
| 5 | True | 332 | 69.5% | 38 | 94 | 132 | 14 |
| 8 | True | 341 | 71.3% | 90 | 36 | 126 | 11 |
| 9 | True | 364 | 76.2% | 59 | 46 | 105 | 9 |
| 13 | False | 186 | 38.9% | 239 | 39 | 278 | 14 |
| 15 | True | 397 | 83.1% | 39 | 25 | 64 | 17 |
| 23 | True | 350 | 73.2% | 56 | 62 | 118 | 10 |
| 25 | False | 41 | 8.6% | 280 | 72 | 352 | 85 |
| 26 | False | 56 | 11.7% | 360 | 47 | 407 | 15 |
| 32 | False | 390 | 81.6% | 54 | 15 | 69 | 19 |
| 33 | False | 267 | 55.9% | 186 | 9 | 195 | 16 |
| 35 | False | 208 | 43.5% | 169 | 89 | 258 | 12 |
| 43 | False | 105 | 22.0% | 317 | 43 | 360 | 13 |
| 44 | True | 309 | 64.6% | 82 | 67 | 149 | 20 |
| 45 | True | 392 | 82.0% | 38 | 33 | 71 | 15 |
| 46 | True | 314 | 65.7% | 89 | 56 | 145 | 19 |
| 50 | False | 98 | 20.5% | 305 | 56 | 361 | 19 |
| 53 | False | 123 | 25.7% | 249 | 80 | 329 | 26 |
| 56 | False | 231 | 48.3% | 175 | 40 | 215 | 32 |
| 58 | True | 275 | 57.5% | 56 | 114 | 170 | 33 |
| 65 | True | 334 | 69.9% | 81 | 35 | 116 | 28 |
| Mean | | 261 | 54.6% | | | | |

Table 6-6 presents the questions that were answered correctly by the highest and lowest percentage of respondents in terms of the level of knowledge in connection with the prevention of PrUs.

Table 6-6 Responses to prevention questions correctly answered with the highest and lowest percentages

| | Answer | N | % |
|---|---|---|---|
| **Questions to which the highest percentage of nurses answered correctly** | | | |
| Q15. Dragging the patient up in bed increases friction. | True | 397 | 83.1 |
| Q45. Patients with spinal cord injuries should be taught weight shifts and support surface factors | True | 392 | 82.0 |
| Q32. A blister on the heel is nothing to worry about | False | 390 | 81.6 |
| Q9. A pressure ulcer scar will break down faster than unwounded skin | True | 364 | 76.2 |
| Q23. The home care setting has unique considerations for support surface selection. | True | 350 | 73.2 |
| **Questions to which the lowest percentage of nurses answered correctly** | | | |
| Q25. Donut devices/ring cushions help to prevent pressure ulcers | False | 41 | 8.6 |
| Q26. A pressure redistribution surface should be used for all high risk patients | False | 56 | 11.7 |
| Q50. Persons who can be taught should shift their weight every 30 minutes while sitting in a chair | False | 98 | 20.5 |
| Q43. Massage of bony prominences is essential for quality skin care | False | 105 | 22.0 |
| Q53. Selection of a support surface should only consider the person's level of pressure ulcer risk. | False | 123 | 25.7 |

#### *6.4.2.2 Staging*

Table 6-7 illustrates the total score for the staging subscale. The total of "incorrect" and "don't know" answers have been calculated separately and then summed together. The average number of correct answers for the staging subscale was 271, thus 56.7% of the total respondents answered each question correctly.

Table 6-7 Total score and percentage for staging

| Question Number | The correct answer | Total correct answers | % of correct answers | Total incorrect answers | Total don't know answers | Total of incorrect and don't know answers | Missing Data |
|---|---|---|---|---|---|---|---|
| 6 | False | 202 | 42.3% | 233 | 35 | 268 | 8 |
| 12 | True | 237 | 49.6% | 113 | 97 | 210 | 31 |
| 14 | False | 217 | 45.4% | 205 | 43 | 248 | 13 |
| 16 | True | 382 | 79.9% | 30 | 55 | 85 | 11 |
| 18 | True | 396 | 82.9% | 53 | 17 | 70 | 12 |
| 19 | True | 236 | 49.4% | 69 | 149 | 218 | 24 |
| 20 | False | 143 | 29.9% | 276 | 46 | 322 | 13 |
| 21 | True | 373 | 78.0% | 35 | 63 | 98 | 7 |
| 22 | True | 432 | 90.4% | 19 | 22 | 41 | 5 |
| 24 | False | 176 | 36.8% | 156 | 138 | 294 | 8 |
| 28 | True | 427 | 89.3% | 25 | 13 | 38 | 13 |
| 30 | True | 382 | 79.9% | 52 | 19 | 71 | 25 |
| 37 | False | 179 | 37.5% | 238 | 47 | 285 | 14 |
| 41 | True | 254 | 53.1% | 140 | 69 | 209 | 15 |
| 42 | True | 229 | 47.9% | 127 | 104 | 231 | 18 |
| 47 | True | 395 | 82.6% | 27 | 43 | 70 | 13 |
| 48 | False | 154 | 32.2% | 211 | 94 | 305 | 19 |
| 49 | True | 350 | 73.2% | 75 | 35 | 110 | 18 |
| 51 | True | 335 | 70.1% | 76 | 44 | 120 | 23 |
| 52 | True | 191 | 40.0% | 128 | 130 | 258 | 29 |
| 57 | False | 323 | 67.6% | 109 | 24 | 133 | 22 |
| 61 | True | 311 | 65.1% | 104 | 44 | 148 | 19 |
| 62 | False | 137 | 28.7% | 239 | 74 | 313 | 28 |
| 63 | True | 178 | 37.2% | 98 | 154 | 252 | 48 |
| 68 | False | 227 | 47.5% | 137 | 86 | 223 | 28 |
| 71 | False | 182 | 38.1% | 119 | 138 | 257 | 39 |
| Mean | | 271 | 56.7% | | | | |

The five most commonly correctly answered questions in the staging sub-scale with its highest and lowest response percentages can be seen in Table 6-8.

Table 6-8 Responses to staging questions correctly answered with the highest and lowest percentage

| | Answer | N | % |
|---|---|---|---|
| **Questions to which the highest percentage of nurses answered correctly** | | | |
| Q22. When possible, high-protein oral nutritional supplements should be used in addition to usual diet for high risk patients | True | 432 | 90.4 |
| Q28. Persons at risk for pressure ulcers should be nutritionally assessed (i.e., weight, nutrition intake, blood work) | True | 427 | 89.3 |
| Q18. An incontinent patient should have a toileting care plan. | True | 396 | 82.9 |
| Q47. In large and deep pressure ulcers, the number of dressings used needs to be counted and documented to ensure all dressings are removed at the next dressing change | True | 395 | 82.6 |
| Q16. Small shifts in positioning may need to be used for patients who cannot tolerate major shifts in body positioning | True | 382 | 79.9 |
| **Questions to which the lowest percentage of nurses answered correctly** | | 137 | 28.7 |
| Q62. Skin tears are classified as stage II pressure ulcers | False | | |
| Q20. Stage II pressure ulcer may have slough | False | 143 | 29.9 |
| Q48. All patients can be turned onto a reddened body area if the pressure was removed from that area for 1 hour. | False | 154 | 32.2 |
| Q24. An Unstageable pressure ulcer will be classified as a Stage II when necrotic tissue is removed | False | 176 | 36.8 |
| Q37. Bone, tendon, or muscle may be exposed in a Stage III pressure ulcer | False | 179 | 37.5 |

### *6.4.2.3 Wounds*

Table 6-9 presents the total scores for the wounds subscale which included questions about dressings of wounds. The total of "incorrect" and "don't know" answers have been calculated separately and then summed together. The average number of correct answers for the wounds sub-scale was 198, meaning that a mean of 41.4% of the total number of respondents answered each question correctly.

Table 6-9 Total score and percentage for wounds

| Question Number | The correct answer | Total correct answers | % of correct answers | Total incorrect answers | Total don't know answers | Total of incorrect and don't know answers | Missing Data |
|---|---|---|---|---|---|---|---|
| 1 | True | 401 | 83.9% | 40 | 26 | 66 | 11 |
| 3 | False | 180 | 37.7% | 132 | 148 | 280 | 18 |
| 7 | False | 118 | 24.7% | 210 | 135 | 345 | 15 |
| 10 | False | 88 | 18.4% | 265 | 111 | 376 | 14 |
| 11 | False | 215 | 45.0% | 117 | 126 | 243 | 20 |
| 17 | True | 182 | 38.1% | 88 | 198 | 286 | 10 |
| 27 | True | 203 | 42.5% | 106 | 144 | 250 | 25 |
| 29 | True | 120 | 25.1% | 95 | 242 | 337 | 21 |
| 31 | True | 252 | 52.7% | 70 | 127 | 197 | 29 |
| 34 | True | 323 | 67.6% | 82 | 60 | 142 | 13 |
| 36 | True | 200 | 41.8% | 182 | 76 | 258 | 20 |
| 38 | False | 123 | 25.7% | 194 | 132 | 326 | 29 |
| 39 | True | 195 | 40.8% | 208 | 50 | 258 | 25 |
| 40 | True | 246 | 51.5% | 87 | 120 | 207 | 25 |
| 54 | False | 144 | 30.1% | 90 | 213 | 303 | 31 |
| 55 | False | 212 | 44.4% | 136 | 99 | 235 | 31 |
| 59 | True | 318 | 66.5% | 109 | 28 | 137 | 23 |
| 60 | True | 348 | 72.8% | 34 | 71 | 105 | 25 |
| 64 | False | 83 | 17.4% | 144 | 218 | 362 | 33 |
| 66 | True | 118 | 24.7% | 294 | 42 | 336 | 24 |
| 67 | True | 205 | 42.9% | 96 | 142 | 238 | 35 |
| 69 | False | 107 | 22.4% | 228 | 114 | 342 | 29 |
| 70 | True | 246 | 51.5% | 59 | 126 | 185 | 47 |
| 72 | False | 120 | 25.1% | 148 | 181 | 329 | 29 |
| Mean | | 198 | 41.4% | | | | |

Table 6-10 presents the five questions with the highest and lowest percentages of respondents who answered questions correctly regarding knowledge of wounds.

Table 6-10 Responses to wounds questions correctly answered with the highest and lowest percentages

| Level of PU knowledge related to wounds | Answer | N | % |
|---|---|---|---|
| **Questions to which the highest percentage of nurses answered correctly** | | | |
| Q1. Slough is yellow or creamy necrotic /devitalized tissue on a wound bed | True | 401 | 83.9 |
| Q60. Hydrocolloid and film dressings must be carefully removed from fragile skin | True | 348 | 72.8 |
| Q34. Early changes associated with pressure ulcer development may be missed in persons with darker skin tones | True | 323 | 67.6 |
| Q59. A dressing should keep the wound bed moist, but the surrounding skin dry. | True | 318 | 66.5 |
| Q31. Blanching refers to whiteness when pressure is applied to a reddened area. | True | 252 | 52.7 |
| **Questions to which the lowest percentage of nurses answered correctly** | | | |
| Q64. Hydrocolloid dressings should not be used with a filler dressing | False | 83 | 17.4 |
| Q10. Pressure ulcers progress in a linear fashion from Stage I to IV | False | 88 | 18.4 |
| Q69. Film dressings absorb a lot of drainage | False | 107 | 22.4 |
| Q66. Pressure ulcers can be cleansed with water that is suitable for drinking | True | 118 | 24.7 |
| Q29. Biofilms may develop in any type of wound | True | 120 | 25.1 |

### 6.4.3 Summary

In summary, on average 51.1% of the respondents answered the questions correctly (Table 6-11). In addition, an average of 54.6% of the respondents answered each question correctly under the prevention subscale, 56.7% under the staging subscale and 41.4% under the wounds subscale (Table 6-11). So the wounds sub-scale showed the lowest level of knowledge.

Table 6-11 Overall totals of the PZ-PUKT and scores for each sub-scale

| | Mean | SD | Range | % Correct |
|---|---|---|---|---|
| Overall Score [72 questions] | 36.9 | 9.3 | 57 | 51.0 |
| Prevention Score [22questions] | 12.1 | 3.1 | 17 | 54.6 |
| Staging Score [26 questions] | 14.8 | 4.0 | 21 | 56.7 |
| Wounds Score [34 questions] | 10.0 | 3.7 | 19 | 41.4 |

## 6.5 Differences between the Nurses' Level of Knowledge and Demographic Characteristics

A Kruskal-Wallis test was conducted to examine the statistical differences between the nurses' level of knowledge of PrUs, in the overall total and in the three sub-scales (prevention, staging and wounds), in relation to the nurses' age, years of experience and the hospital in which they are working.

### 6.5.1 Differences between the Nurses' Level of Knowledge of PrUs and Age

Table 6-12 presents the mean and the standard deviation between the nurses' level of knowledge and their age. Age consisted of three categories: 21-30, 31-40, and 41and above. In all sub-scales and total score, level of knowledge increases with age category.

Table 6-12 Mean and standard deviation of level of knowledge and age

| Age category | | Total | Prevention | Staging | Wounds |
|---|---|---|---|---|---|
| 21-30 | Mean | 34.5 | 11.2 | 14.1 | 9.3 |
| | Std. Deviation | 9.6 | 3.1 | 3.9 | 3.8 |
| 31-40 | Mean | 37.8 | 12.5 | 15.2 | 10.2 |
| | Std. Deviation | 7.9 | 2.8 | 3.7 | 3.3 |
| 41 and above | Mean | 42.6 | 13.7 | 16.6 | 12.3 |
| | Std. Deviation | 7.7 | 2.4 | 3.2 | 3.7 |

A normality test was undertaken (Table 6-13) and, as age was not normally distributed, a Kruskal-Wallis test was undertaken (Table 6-14).

Table 6-13 Normality test for level of knowledge and age

| Category of knowledge on PrUs | Age Category | Kolmogorov-Smirnov[a] | | |
|---|---|---|---|---|
| | | Statistic | df | Sig. |
| Knowledge on Prevention | 21-30 | .110 | 226 | .001* |
| | 31-40 | .141 | 143 | .001* |
| | 41 and above | .143 | 35 | .069 |
| Knowledge on Staging | 21-30 | .080 | 226 | .001* |
| | 30-40 | .113 | 143 | .001* |
| | 41& above | .206 | 35 | .001* |
| Knowledge on Wounds | 21-30 | .079 | 226 | .002* |
| | 31-40 | .089 | 143 | .007* |
| | 41 and above | .086 | 35 | .200 |
| Total score of knowledge on Prevention, Staging and Wounds | 21-30 | .077 | 226 | .003* |
| | 31-40 | .095 | 143 | .003* |
| | 41 and above | .132 | 35 | .128 |

(*$P$<0.001 is highly significant)

The results of the Kruskal-Wallis test demonstrate a significant difference between the age groups in terms of the nurses' levels of knowledge (i.e. in the total score and the sub-scales) (all $P$=0.001) (Table 6-14).

Table 6-14 Kruskal-Wallis results for level of knowledge and age

| Category of knowledge on PrUs in relation to age | Significance ($p$) |
|---|---|
| Knowledge on Prevention | .001* |
| Knowledge on Staging | .001* |
| Knowledge on Wounds | .001* |
| Total score of knowledge on Prevention, Staging and Wounds | .001* |

(*$P$<0.001 is highly significant in difference between the overall total of knowledge and subscales and age

A post hoc analysis was performed using the Mann-Whitney test to identify where the significant differences were. Due to multiple comparisons, a Bonferonni correction was applied whereby the *p* value was adjusted to *p*=0.0167 for each test (0.05/3).The results showed that level of knowledge increased with increased age. This can be seen when comparing the different categories. The overall general trend is increase in knowledge level with increasing age (Table 6-15).

Table 6-15 Post hoc tests for the nurses' level of knowledge and age

| Category of knowledge on PrUs | Age Category | Mann-Whitney *P* value |
|---|---|---|
| Knowledge on Prevention | 21-30—31-40 | .001* |
| | 21-30—41 and above | .001* |
| | 31-40—41 and above | .082 |
| Knowledge on Staging | 21-30—31-40 | .021 |
| | 21-30—41 and above | .001* |
| | 31-40—41 and above | .012 |
| Knowledge on Wounds | 21-30—31-40 | .080 |
| | 21-30—41 and above | .001* |
| | 31-40—41 and above | .005* |
| Total score of knowledge on Prevention, Staging and Wounds | 21-30—31-40 | .002* |
| | 21-30—41 and above | .001* |
| | 31-40—41 and above | .012 |

(**P*<0.001 is highly significant between the age categories and knowledge

### 6.5.2 Differences between the Nurses' Level of Knowledge and Years of Experience

Table 6-16 presents the mean and the standard deviation for the nurses' level of knowledge and years of experience. Years of experience consisted of three categories: less than one year and four years, between five years and ten years, and ten years and above. In all the sub-scales and total score, level of knowledge increases with increase in years of experience.

Table 6-16 Mean and standard deviation of level of knowledge and years of experience

| Years of experience | | Total | Prevention | Staging | Wounds |
|---|---|---|---|---|---|
| <1year- 4 years | Mean | 29.1 | 9.9 | 11.3 | 7. 9 |
| | Std. Deviation | 8.9 | 2.9 | 3.4 | 4.2 |
| 5 years- <10 years | Mean | 35.6 | 11.6 | 14.4 | 9.6 |
| | Std. Deviation | 9.6 | 3.1 | 4.1 | 3.7 |
| 10 years and above | Mean | 39.7 | 12.9 | 15.9 | 10.8 |
| | Std. Deviation | 7.6 | 2.8 | 3.5 | 3.3 |

The normality test for years of experience showed a variation in the *p* value, suggesting that some data were normally distributed and others were not (Table 6-17). Due to this variation, non-parametric tests were performed.

Table 6-17 Normality test for level of knowledge and years of experience

| Category of knowledge on PrUs | Years in Practice | Kolmogorov-Smirnov[a] | | |
|---|---|---|---|---|
| | | Statistic | df | Sig. |
| Knowledge on Prevention | <1 year- 4 years | .207 | 28 | .003* |
| | 5 years- <10 years | .116 | 261 | .001* |
| | 10 years and above | .096 | 177 | .001* |
| Knowledge on Staging | <1 year- 4 years | .126 | 28 | .200 |
| | 5 years- <10 years | .097 | 261 | .001* |
| | 10 years and above | .112 | 177 | .001* |
| Knowledge on Wounds | <1 year- 4 years | .122 | 28 | .200 |
| | 5 years- <10 years | .077 | 261 | .001* |
| | 10 years and above | .088 | 177 | .002* |
| Total score of knowledge on Prevention, Staging and Wounds | <1 year- 4 years | .076 | 28 | .200 |
| | 5 years- <10 years | .114 | 261 | .001* |
| | 10 years and above | .070 | 177 | .034 |

(**P*<0.001 is highly significant)

The Kruskal-Wallis test results showed a significant difference between the nurses' level of knowledge on PrUs and their years of experience (all *P*=0.001) (Table 6-18).

Table 6-18 Kruskal-Wallis results on level of knowledge and years of experience

| Category of knowledge on PrUs in relation to years of experience | Significance (*p*) |
|---|---|
| Knowledge on Prevention | .001* |
| Knowledge on Staging | .001* |
| Knowledge on Wounds | .001* |
| Total score of knowledge on Prevention, Staging and Wounds | .001* |

(**P*<0.001 is highly significant in difference between years of experience and knowledge)

Post hoc, Mann-Whitney tests were implemented, with the Bonferroni correction being applied as described above (p=0.0167). The results showed that level of knowledge increases with the number of years' of experience (i.e., the greater the number of years of experience, the greater the level of knowledge) (Table 6-19).

Table 6-19 Post hoc tests for the nurses' level of knowledge and years of experience

| Category of knowledge on PrUs | Years of experience | Mann-Whitney *P* value |
|---|---|---|
| Knowledge on Prevention | <1year-4 years--5 years- <10 years | .014 |
| | <1year-4 years--10 years and above | .001* |
| | 5 years- <10 years--10 years and above | .001* |
| Knowledge on Staging | <1year-4 years--5 years- <10 years | .001* |
| | <1year-4 years--10 years and above | .001* |
| | 5 years- <10 years--10 years and above | .001* |
| Knowledge on Wounds | <1year-4 years--5 years- <10 years | .042 |
| | <1year-4 years--10 years and above | .001* |
| | 5 years- <10 years--10 years and above | .003* |
| Total score of knowledge on Prevention, Staging and Wounds | <1year-4 years--5 years- <10 years | .001* |
| | <1year-4 years--10 years and above | .001* |
| | 5 years- <10 years--10 years and above | .001* |

(**P*<0.001 is highly significant in terms of difference between knowledge and years of experience)

### 6.5.3 Differences in the nurses' level of knowledge across hospital sites

Table 6-20 presents the mean and the standard deviation in the nurses' level of knowledge across hospital sites. In all the sub-scales and total score, level of knowledge was higher in hospital G compared to the remaining hospitals.

Table 6-20 Mean and standard deviation of level of knowledge across hospital sites

| Hospital | | Total | Prevention | Staging | Wounds |
|---|---|---|---|---|---|
| A | Mean | 30.4 | 10.1 | 12.1 | 8.2 |
| | Std. Deviation | 10.9 | 3.1 | 4.5 | 4.4 |
| B | Mean | 35.3 | 11.4 | 14.3 | 9.6 |
| | Std. Deviation | 8.8 | 2.4 | 4.3 | 3.8 |
| C | Mean | 36.6 | 11.8 | 14.9 | 9.9 |
| | Std. Deviation | 7.9 | 2.5 | 3.9 | 3.5 |
| D | Mean | 36.2 | 11.8 | 15.0 | 9.4 |
| | Std. Deviation | 8.8 | 2.9 | 3.9 | 3.6 |
| E | Mean | 37.2 | 3.4 | 3.9 | 3.5 |
| | Std. Deviation | 9.9 | 12.3 | 14.8 | 10.3 |
| F | Mean | 36.9 | 12.4 | 14.6 | 10.2 |
| | Std. Deviation | 9.2 | 3.0 | 3.8 | 3.8 |
| G | Mean | 39.0 | 12.7 | 15.9 | 10.4 |
| | Std. Deviation | 8.5 | 3.3 | 3.7 | 3.5 |

Normality tests were performed to assess the distribution of the level of knowledge scores, including the subscales and the hospitals nurses were working in. The results showed that the data, in general, were not normally distributed and so the non-parametric Kruskal-Wallis test was used (Table 6-21).

Table 6-21 Normality testing level of knowledge across hospital sites

| Category of knowledge on PrUs | Working Hospital | Kolmogorov-Smirnov[a] | | |
|---|---|---|---|---|
| | | Statistic | df | Sig. |
| Knowledge on Prevention | A | .126 | 33 | .200 |
| | B | .168 | 36 | .012 |
| | C | .130 | 76 | .003* |
| | D | .125 | 30 | .200 |
| | E | .107 | 94 | .010 |
| | F | .200 | 88 | .001* |
| | G | .135 | 117 | .001* |
| Knowledge on Staging | A | .192 | 33 | .003* |
| | B | .118 | 36 | .200 |
| | C | .095 | 76 | .089 |
| | D | .075 | 30 | .200 |
| | E | .079 | 94 | .187 |
| | F | .138 | 88 | .001* |
| | G | .110 | 117 | .001* |
| Knowledge on Wounds | A | .219 | 33 | .001* |
| | B | .071 | 36 | .200 |
| | C | .070 | 76 | .200 |
| | D | .185 | 30 | .010 |
| | E | .096 | 94 | .034 |
| | F | .093 | 88 | .056 |
| | G | .090 | 117 | .021 |
| Total score of knowledge on Prevention, Staging and Wounds | A | .135 | 33 | .136 |
| | B | .092 | 36 | .200 |
| | C | .134 | 76 | .002* |
| | D | .100 | 30 | .200 |
| | E | .078 | 94 | .200 |
| | F | .137 | 88 | .001* |
| | G | .122 | 117 | .001* |

(*$P$<0.001 is highly significant)

The Kruskal-Wallis result shows a significant difference between the overall level of knowledge, including its sub-categories, and the hospital in which the nurses worked, except in the subscale of knowledge on wounds (*P*=0.099) (Table 6-22).

Table 6-22 Kruskal-Wallis results on level of knowledge across hospital sites

| Category of knowledge on PrUs in relation to the working hospital | Significance (*p*) |
|---|---|
| Knowledge on Prevention | 0.001* |
| Knowledge on Staging | 0.001* |
| Knowledge on Wounds | 0.099 |
| Total score of knowledge on Prevention, Staging and Wounds | 0.001* |

(**P*<0.001 is highly significant in difference between knowledge and the hospital nurses working in)

A post hoc analysis was performed using the Mann-Whitney test. Bonferroni correction was applied due to the multiple comparisons and the *p*-value was adjusted for each test as 0.007 (0.05/7). The results showed that knowledge levels were higher in Hospital G compared to the remaining hospitals (Table 6-23).

Table 6-23 Post hoc tests for nurses' level of knwoledge across hospital sites

| Category of knowledge on PrUs | Working Hospital | Mann-Whitney *P* value |
|---|---|---|
| Knowledge on Prevention | A—B | .629 |
| | A—D | .312 |
| | A—C | .137 |
| | A—F | .007* |
| | A—E | .008* |
| | A—G | .001* |
| | B—D | .997 |
| | B—C | .995 |
| | B—F | .661 |
| | B—E | .687 |
| | B—G | .248 |
| | D—C | 1.000 |
| | D—F | .984 |
| | D—E | .980 |
| | D—G | .781 |
| | C—F | .885 |

| | | |
|---|---|---|
| | C—E | .904 |
| | C—G | .367 |
| | F—E | 1.000 |
| | F—G | .983 |
| | E—G | .971 |
| Knowledge on Staging | A—B | .197 |
| | A—D | .048 |
| | A—C | .011 |
| | A—F | .031 |
| | A—E | .011 |
| | A—G | .001* |
| | B—D | .993 |
| | B—C | .993 |
| | B—F | 1.000 |
| | B—E | .997 |
| | B—G | .746 |
| | D—C | 1.000 |
| | D—F | .998 |
| | D—E | 1.000 |
| | D—G | .896 |
| | C—F | .998 |
| | C—E | 1.000 |
| | C—G | .504 |
| | F—E | 1.000 |
| | F—G | .142 |
| | E—G | .331 |
| Knowledge on Wounds | A—B | .710 |
| | A—D | .855 |
| | A—C | .249 |
| | A—F | .123 |
| | A—E | .091 |
| | A—G | .048 |
| | B—D | 1.000 |
| | B—C | .999 |
| | B—F | .984 |
| | B—E | .970 |
| | B—G | .924 |

| | | |
|---|---|---|
| | D—C | .992 |
| | D—F | .957 |
| | D—E | .932 |
| | D—G | .864 |
| | C—F | 1.000 |
| | C—E | .999 |
| | C—G | .990 |
| | F—E | 1.000 |
| | F—G | 1.000 |
| | E—G | 1.000 |
| Total score of knowledge on Prevention, Staging and Wounds | A—B | .282 |
| | A—D | .149 |
| | A—C | .019 |
| | A—F | .008* |
| | A—E | .004* |
| | A—G | .001* |
| | B—D | 1.000 |
| | B—C | .991 |
| | B—F | .967 |
| | B—E | .935 |
| | B—G | .321 |
| | D—C | 1.000 |
| | D—F | 1.000 |
| | D—E | .999 |
| | D—G | .738 |
| | C—F | 1.000 |
| | C—E | 1.000 |
| | C—G | .548 |
| | F—E | 1.000 |
| | F—G | .672 |
| | E—G | .773 |

(*$P$<0.001 is highly significant in terms of difference between knowledge and the hospital in which nurses were working)

### 6.5.4 Differences between the nurses' level of knowledge and gender

Table 6-24 presents the mean and the standard deviation and the nurses' level of knowledge and gender. In all the sub-scales and total score, there was no difference in knowledge between males and females.

Table 6-24 Mean and standard deviation of level of knowledge and gender

| Gender | | Total | Prevention | Staging | Wounds |
|---|---|---|---|---|---|
| Male | Mean | 35.7 | 11.6 | 14.4 | 9.9 |
| | Std. Deviation | 9.9 | 3.1 | 4.2 | 3.7 |
| Female | Mean | 37.0 | 12.2 | 14.9 | 9.9 |
| | Std. Deviation | 9.1 | 3.1 | 3.9 | 3.7 |

Normality tests were performed and, as the data were found not to be normally distributed, Mann-Whitney test was used (Table 6-25).

Table 6-25 Normality testing for level of knowledge and gender

| Category of knowledge on PrUs | Gender | Kolmogorov-Smirnov[a] | | |
|---|---|---|---|---|
| | | Statistic | df | Sig. |
| Knowledge on Prevention | Male | .103 | 78 | .041 |
| | Female | .121 | 387 | .001* |
| Knowledge on Staging | Male | .118 | 78 | .009* |
| | Female | .093 | 387 | .001* |
| Knowledge on Wounds | Male | .149 | 78 | .001* |
| | Female | .061 | 387 | .001* |
| Total score of knowledge on Prevention, Staging and Wounds | Male | .078 | 78 | .200 |
| | Female | .096 | 387 | .001* |

(*$P$<0.001 is highly significant)

The results of the Mann-Whitney test showed that there was no significant difference between the nurses' level of knowledge in relation to gender, in the total score of knowledge and the three subscales (Table 6-26).

Table 6-26 Mann-Whitney results on level of knowledge and gender

| Category of knowledge on PrUs in relation to gender | Significance (*p*) |
|---|---|
| Knowledge on Prevention | .091 |
| Knowledge on Staging | .440 |
| Knowledge on Wounds | .778 |
| Total score of knowledge on Prevention, Staging and Wounds | .297 |

### 6.5.5 Differences between the nurses' level of knowledge and reading the EPUAP/NPUAP guidelines

Table 6-27 presents the mean and the standard deviation and the nurses' level of knowledge and reading the EPUAP/NPUAP guidelines. In all sub-scales and total score, there was no difference in the level of knowledge between nurses who had read the EPUAP/NPUAP guidelines and those who had not.

Table 6-27 Mean and standard deviation of level of knowledge and the EPUAP/NPUAP guidelines

| Read the EPUAP/NPUAP guidelines? | | Total | Prevention | Staging | Wounds |
|---|---|---|---|---|---|
| Yes | Mean | 35.9 | 11.4 | 14.4 | 10.0 |
| | Std. Deviation | 9.9 | 3.2 | 3.9 | 3.9 |
| No | Mean | 36.83 | 12.2 | 14.8 | 9.9 |
| | Std. Deviation | 9.0 | 3.0 | 3.9 | 3.6 |

Normality tests were conducted between whether nurses had read the EPUAP/NPUAP guidelines and their level of knowledge; the results showed that the data were not normally distributed (Table 6-28) and the Mann-Whitney test was therefore used for subsequent analysis.

Table 6-28 Normality testing of level of knowledge and reading the EPUAP/NPUAP guidelines

| Category of knowledge on PrUs | Read the EPUAP/NPUAP guidelines? | Kolmogorov-Smirnov[a] | | |
|---|---|---|---|---|
| | | Statistic | df | Sig. |
| Knowledge on Prevention | Yes | .133 | 93 | .001* |
| | No | .106 | 357 | .001* |
| Knowledge on Staging | Yes | .119 | 93 | .003* |
| | No | .088 | 357 | .001* |
| Knowledge on Wounds | Yes | .094 | 93 | .044 |
| | No | .072 | 357 | .001* |
| Total score of knowledge on Prevention, Staging and Wounds | Yes | .114 | 93 | .004* |
| | No | .082 | 357 | .001* |

(*$P$<0.001 is highly significant)

The results of the Mann-Whitney test showed that there was no significant difference between the nurses' level of knowledge and whether they had read the EPUAP/NPUAP guidelines (Table 6-29).

Table 6- 29 Mann-Whitney results on level of knowledge and reading of the EPUAP/NPUAP guidelines

| Category of knowledge on PrUs in relation to reading the NPUAP/EPUAP guidelines | Significance ($p$) |
|---|---|
| Knowledge on Prevention | .061 |
| Knowledge on Staging | .296 |
| Knowledge on Wounds | .557 |
| Total score of knowledge on Prevention, Staging and Wounds | .383 |

## 6.6 Nurses' knowledge on policies followed in Oman

This section consists of the response to the three questions in relation to the nurses' knowledge of policy in Oman (Table 6-30). Nurses were asked whether they were familiar with the available policy or not, their rating on their knowledge and skills, and how often they manage wounds. More than half of the respondents stated that they were 'familiar with wound management policy and procedures in Oman' (60.5%), while 14.9% 'didn't know' and 24.6% responded as 'not sure'.

Only half of the respondents rated their knowledge and practical skills in relation to wound assessment as "good practical skill but lacking knowledge" (50.1%), 19.6% rated themselves as a "highly skilled practitioner", 22.3% rated themselves as having a "good knowledge base but lacking practical skills", and 8% rated themselves as having "poor knowledge and practical skills".

Finally, 56.8% of respondents stated that they were managing wounds "daily", 23.3% were managing wounds "2-3 times a week", 13.7% were managing wounds "monthly", and only 6.2% were managing wounds "2-3 times a year".

Table 6-30 Familiarity with the policy on wound management in Oman

| Questions | Category | n | % |
|---|---|---|---|
| 1. Are you familiar with wound management policy and procedures in Oman? N=456 | Yes | 276 | 60.5 |
| | No | 68 | 14.9 |
| | Not sure | 112 | 24.6 |
| 2. How do you rate your knowledge and practical skills on wound assessment? N= 449 | Highly skilled practitioner | 88 | 19.6 |
| | Good knowledge base but lacking practical skills | 100 | 22.3 |
| | Good practical skills but lacking knowledge | 225 | 50.1 |
| | Poor knowledge and practical skills | 36 | 8.0 |
| 3. How often do you manage wounds? N=454 | Daily | 258 | 56.8 |
| | 2-3 times a week | 106 | 23.3 |
| | Monthly | 62 | 13.7 |
| | 2-3 times a year | 28 | 6.2 |

## 6.7 Nurses' knowledge on resources available in Oman for preventing and treating PrUs

Table 6-31 presents the preventive measures available for PrUs (i.e., pressure relieving devices) in the wards and units where the nurses were working. Air mattresses were the most common (66.5%) preventative measure in use and the ripple mattress was the second most common (55.9%).

Table 6-31 Prevention measures available for PrUs in the wards/units

| Prevention measure | n | % |
|---|---|---|
| Air mattress | 318 | 66.5 |
| Ripple mattress | 267 | 55.9 |
| Heel elevation devices | 121 | 25.3 |
| Sheepskin | 79 | 16.5 |
| Repositioning every two hours and lotion application | 20 | 4.2 |
| Gloves with water | 9 | 1.9 |
| Pillows to position patient | 8 | 1.7 |
| Oil | 5 | 1.0 |
| Others (not specified) | 4 | 0.8 |
| Nothing from the above | 3 | 0.6 |
| Fleecy boot | 2 | 0.4 |
| Head ring | 2 | 0.4 |
| Massage | 2 | 0.4 |
| Paraffin liquid | 1 | 0.2 |
| Cushions | 1 | 0.2 |

Table 6-32 presents the number of respondents using preventive measures in each hospital.

Table 6-32 Total numbers of preventive measures according to each hospital

| Prevention measure / Hospital =n (%) | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| Ripple mattress | 6 (17.7) | 14 (38.9) | 18 (23.7) | 6 (20) | 53 (55.2) | 71 (79.8) | 99 (84.6) |
| Air mattress | 28 (82.4) | 31 (86.1) | 58 (76.3) | 27 (90) | 69 (71.9) | 38 (42.7) | 67 (57.3) |
| Sheepskin | | | 5 (6.6) | | 3 (3.1) | 35 (39.3) | 36 (30.8) |
| Heel elevation devices | 4 (11.8) | 15 (41.7) | 10 (13.2) | | 19 (19.8) | 26 (29.2) | 47 (40.2) |
| Gloves with water | | 2 (5.6) | | | 1 (1) | 2 (2.3) | 4 (3.4) |
| Head ring | | 1 (2.8) | | | | | 1 (0.9) |
| Nothing from the above | | | 2 (2.6) | | 1 (1) | | |
| Others (not specified) | | | 2 (2.6) | | 1 (1) | | 1 (0.9) |
| Repositioning every two hours and lotion application | | | 2 (2.6) | | 5 (5.2) | 3 (3.4) | 10 (8.6) |
| Cushions | | | 1 (1.3) | | | | |
| Paraffin liquid | | | 1 (1.3) | | | | |
| Pillows to position patient | | | 1 (1.3) | 1 (3.3) | 6 (6.3) | | |
| Fleecy boot | | | | | | 2 (2.3) | |
| Oil | | | | | | | 5 (4.3) |
| Massage | | | | | | | 2 (1.7) |

*Blank space indicate that preventive measure is not used

Table 6-33 sets out the topical treatments used for treating PrUs. Normal saline 0.9% (89.7%) was the most commonly used solution followed by Povidone-iodine solutions (67.6%). In addition, hydrogen peroxide 3% (66.1%) and Silvercel (54.2%) were commonly used. Other treatments that were available but not used commonly include Nu-gel (Hydrogen with Alginate) (33.1%), Hydrogel (25.3%), Calcium Alginate (23.6%) and Promogran (19%). Some respondents (n=3) added Betadine solutions as a treatment and this was combined with the responses for Povidone-iodine solutions, as they are effectively the same (Table 6-33).

Table 6-33 Treatments used for PrUs in the wards/units

| Treatment used | n | % |
|---|---|---|
| *Normal saline 0.9% | 429 | 89.7 |
| Povidone-iodine solutions | 323 | 67.6 |
| Hydrogen peroxide 3% | 316 | 66.1 |
| Silvercel | 259 | 54.2 |
| Nu-gel (Hydrogen with Alginate) | 158 | 33.1 |
| Hydrogel | 121 | 25.3 |
| Calcium Alginate | 113 | 23.6 |
| Promogran | 91 | 19 |
| Paraffin gauze | 15 | 3.1 |
| Duoderm | 15 | 3.1 |
| Vac dressing | 12 | 2.5 |
| Honey | 2 | 0.4 |
| Hydro-colloid | 2 | 0.4 |
| Flamazine ointment | 2 | 0.4 |
| Tegaderm | 1 | 0.2 |
| Mobi cream | 1 | 0.2 |
| Actisorb | 1 | 0.2 |

* Cleansing solution, not a treatment

Table 6-34 The number of respondents reporting they used the treatments (regardless of place of work). These numbers were calculated using the number of respondents from each institution.

Table 6-34 Total numbers of treatments according to its availability and use in each hospital

| **Treatment used** | **Hospital** | | | | | | |
|---|---|---|---|---|---|---|---|
| ***N** | A (34) | B (36) | C (76) | D (30) | E (96) | F (89) | G (117) |
| Silvercel | 26 (76.5) | 12 (33.3) | 28 (36.8) | 7 (23.3) | 15 (15.6) | 65 (73.0) | 106 (90.6) |
| Calcium alginate | 13 (38.2) | 3 (8.3) | 6 (7.9) | 1 (3.3) | 3 (3.1) | 47 (52.8) | 40 (34.2) |
| Povidone-iodine solutions | 24 (70.6) | 32 (88. 9) | 39 (47.4) | 21 (70) | 63 (65.6) | 65 (73) | 79 (67.5) |
| Normal saline 0.9% | 29 (85.3) | 32 (88.9) | 67 (88.2) | 30 (100) | 88 (91.7) | 73 (82) | 110 (94) |
| Hydrogen peroxide 3% | 29 (85.3) | 29 (80.6) | 48 (63.2) | 22 (73.3) | 75 (78.1) | 53 (59.6) | 60 (51.3) |
| Hydrogel | 18 (52.9) | 9 (25) | 12 (15.8) | 5 (16.7) | 7 (7.3) | 16 (18) | 54 (46.2) |
| Nu-gel (Hydrogen with Alginate) | 11 (32.4) | 4 (11.1) | 11 14.5) | | 8 (8.3) | 21 (23.6) | 103 (88) |
| Promogran | 4 (11.8) | 8 (22.2) | 4 (5.3) | 1 (3.3) | 2 (2.1) | 8 (9) | 64 (54.7) |
| Paraffin gauze | | | 2 (2.6) | 1 (3.3) | 8 (8.3) | | 4 (3.4) |
| Duoderm | | | 5 (6.6) | 1 (3.3) | 1 (1) | 5 (5.6) | 3 (2.6) |
| Tegaderm | | | 1 (1.3) | | | | |
| Hydro-colloid | | | | | 2 (2.1) | | |
| Flamazine ointment | | | | | 2 (2.1) | | |
| Vac dressing | | | | | | 1 (1.1) | 11 (9.4) |
| Honey | | | | | | 1 (1.1) | 1 (0.9) |
| Mobi cream | | | | | | 1 (1.1) | |
| Actisorb | | | | | | | 1 (0.9) |

*Blank space indicate that treatment is not available and not used
** N= Number of respondents from each hospital

## 6.8 Summary

In summary, this chapter presents the results of the phase I study. The nurses' level of knowledge on PrUs was assessed and was found to be relatively low in the total score as well in the sub-scales. A relationship between the nurses' knowledge level and characteristics was identified, showing that the nurses' level of knowledge increases with increasing age and years of experience. Also, there were variations in knowledge levels across the hospitals, where Hospital G was shown to have a relatively high level of knowledge and Hospital A had a low level of knowledge. The nurses' knowledge on training, policy and resources was also assessed. The results suggest that nurses require additional training on PrU prevention and management as they lack the knowledge necessary to provide adequate care. Not all nurses were familiar with, or had ever read, the available policy. The available resources, both in terms of preventive measures and topical treatments, were reported as being very limited.

# Chapter Seven: Quantitative Discussion

## 7.1 Introduction:

The following objectives were addressed in phase I:

1. To assess the Omani nurses' level of knowledge about PrU prevention and management
2. To assess nurses' knowledge regarding the policies in use for PrU management
3. To identify nurses' knowledge regarding training for PrUs prevention and management
4. To assess nurses' knowledge about the resources available for prevention and management of PrUs
5. To identify the relationship between nurses' demographic characteristics (e.g., age and years of experience) and knowledge of PrU prevention and management

## 7.2 Response rate:

In order to address the objectives of phase I of the study, a questionnaire was developed and distributed to nurses' in seven hospitals (chapter 5, section 5.7). A fairly high response rate was achieved (76.4%); 489 questionnaires were returned and 478 were analysed out of the total study sample (section 6.2 in Chapter 6). This response rate concurs with other recent studies in the literature. For example, a study was conducted in the Netherlands and Germany to examine nurses' knowledge and use of preventive measures in the management of PrUs in nursing homes (chapter 2, section 2.13) (Meesterberends et al. 2013). A questionnaire was sent to nurses and nursing assistants. The total number of questionnaires sent was 600 in the Netherlands and 578 in Germany. The returned numbers were 454 in the Netherlands and 283 in Germany, with a response rate of 75.7% and 48.4% respectively (Meesterberends et al. 2013).

In another study, 386 questionnaires were sent to nurses working in three hospitals to explore their knowledge of PrU risk factors and preventive modalities (chapter 2, section 2.13) (Tubaishat & Aljezawi 2014). The returned number of questionnaires was 263. Of these, 59 of which were either blank or incomplete. Eventually, 204 were analysed with a response rate of 52.9%. Similarly, a study was undertaken in Sweden to describe and compare the knowledge of registered nurses, assistant nurses and student nurses with regard to the prevention of PrUs (chapter 2, section 2.13) (Gunningberg et al. 2013). Of the 577 participants invited to complete the questionnaire, 418 were completed and three were excluded due to missing data, resulting in a sample of 415 with a response rate of 72%. The response rate of the above mentioned three studies is in line with the response rate of this study and all have a fairly high response rate.

## 7.3 Knowledge on PrUs

The main aim of phase I of this study was to explore the nurses' level of knowledge in relation to PrUs, their knowledge on the policy of wound management and PrUs, and their knowledge of the resources available for the prevention and management of PrUs in Oman. The findings showed that nurses had a relatively low level of knowledge regarding PrU prevention and management. The findings from the PZ-PUKT test indicated that only half of the questions (51%) were correctly answered by the nurses in the total score; the score was slightly higher in the prevention (54.6%) and staging (56.7%) sub-scales but lower in the wounds sub-scale (41.4%). A previous study using the same tool for measuring nurses' knowledge of PrUs (i.e., PZ-PUKT) reported the following mean correct responses: total score 80%, prevention 77%, staging 86% and wounds 77% (Pieper & Zulkowski 2014).

A possible reason for the higher scores in the 2014 study may be due to the fact that nurses were regularly attending the New Jersey Hospital Association (NJHA) PrU conferences. Additionally, since testing of the tool was conducted over two years (i.e.,

2012 and 2013), nurses may have completed the questionnaire twice which may have positively affected their responses (Pieper & Zulkowski 2014). Also, the testing was undertaken by the authors of the PZ-PUKT tool and thus was potentially open to bias.

The reason for the low level of knowledge revealed in the current study may be due to the nurses' basic nursing teaching programme in Oman. As a member of the curriculum development in Oman, the PI was aware that no objectives are included in the nursing curriculum in Oman in relation to PrU prevention and management, meaning that nurses have no basic knowledge about PrUs; nor have they undertaken the training required to provide such care. Basic knowledge of PrUs is important and is considered a foundation for the practical skills that nurses gain later either from experience or from further training. The same principle is emphasised by Bloom when he states that basic knowledge is the foundation for gaining more knowledge and building-up new skills (Bloom 1956). Another possible reason for the low level of knowledge is the low level of training on PrUs in hospitals, especially for new nurses. One final reason relates to policy in Oman; the most recent policy on the management of PrUs in Oman was published in 2000 and has not been updated (more details in section 3.8). In addition, there are no specific guidelines for the prevention and management of PrUs in Oman.

Various studies have previously been undertaken to examine nurses' knowledge of PrU prevention and management (details are given in section 2.13). The results of the study that was conducted in the Netherlands and Germany (Meesterberends et al. 2013) revealed that the knowledge of useful preventive measures is good with an average of 71.3% (the Netherlands) and 66.3% (Germany) of correctly answered questions which show only 5% significant difference between the two countries. In addition, the knowledge of respondents on non-useful preventive measures was not good known in both countries (19.2% in the Netherlands and 24.6% in Germany) while the results on the use of PrU preventive measures showed average results of 68.1% (the Netherlands) and

63.1% (Germany). Furthermore, the results showed non-useful PrU preventive measures like sheepskin and massage are still used as reported by respondents in both countries (34.6% in the Netherlands and 32.3% in Germany). The same tool was used in both countries. The results of the above study were slightly higher in two sections: the knowledge of useful preventive measures and on the use of PrU preventive measures compared to the results of the current study.

Another study was conducted in Australia which aimed to assess nurses' knowledge of PrU management (Lawrence et al. 2015). They used a modified version of the PUKT tool which consisted of 47 items. A sample of 827 completed the questionnaire. The results showed a mean percentage score of 70% overall with scores in the three categories as follows: 77.1% in prevention, 80.8% in staging and 85.1% in wound assessment. This study had higher results compared to the current study under all the sub-categories (section 6.4.3).

The results of the study by Gunningberg et al. discussed earlier in this section, showed that the mean overall knowledge score was 58.9% with a wide variation in the results of the self-reported behaviour to PrUs in clinical practice. The overall conclusion of the study was that there was a knowledge deficit in PrU prevention among the nurses. The result of this study had similar results compared to the current study (i.e. mean score of 51% of the overall knowledge) (Gunningberg et al. 2013).

Another study that used the Pieper PUKT was undertaken in Iran to assess orthopaedic nurses' knowledge of PrUs (Iranmanesh et al. 2013). From the sample of 68 nurses, 57 nurses participated giving a response rate of 84%. The results showed that 70% of 41 items were correctly answered. Furthermore, 65% of the questions in the PrU classification/onset section were correctly answered, followed by 72% of questions concerning wound characteristics, and 74% of questions under the prevention section

(Iranmanesh et al. 2013). This study has high results compared to the current study. The authors didn't suggest or explain the reasons for their high results.

The PZ-PUKT tool has been developed and examined by two authors, Dr Barbara Pieper and Dr Karen Zulkowski (details in section 5.8). The authors revised the previous tool (i.e., the PUKT tool), which had been used for 20 years, and developed a PZ-PUKT tool, which they tested. There were variations in the opinions of different authors regarding the cutoff score that should be used for passing the PZ-PUKT test based on the results of studies that they has undertaken (Pieper & Zulkowski 2014). In 1995, Pieper and Mott stated that the passing score should be 90% as they considered the content of the test to be the basis for practice, while Ilesanmi et al (2012) maintained that the cutoff score should be as follows: 80% or greater is high knowledge, 59% to 79% is moderate knowledge, and less than 59% is low knowledge. Based on these two arguments, the results of this study suggest that, in the case of Omani nurses, the level of knowledge is relatively low.

## 7.4 Knowledge on policy

The nurses were asked about three areas in relation to policy: their familiarity with wound management policy, their rating of their own knowledge and practical skills in connection with wound assessment, and how often they manage wounds. More than half of the nurses stated that they were familiar with the available policy on wounds (60.5%), while half (50%) considered themselves to have "good practical skills but lacks knowledge" and more than half (56.8%) stated that they were managing PrUs on a daily basis. These findings should be considered carefully by the policymakers in Oman in relation to PrUs and wound management in general. In addition, although managing PrUs on a daily basis, many reported that they lacked knowledge on PrUs. It is possible that this lack of knowledge may adversely affect patient care and outcomes although this has not been investigated within the study. Furthermore, as stated above, the available policy

is about wound management in general and it is out-dated and has not been revised since 2000; it should be revised and updated and should include information/guidance about prevention and management of PrUs. The fact that not all nurses were aware of the policy suggests that the channels of communication that are used to disseminate this information require improvement.

## 7.5 Training on PrUs

Training was explored, in relation to wound management generally and PrUs specifically. In the current study, the proportion of participants possessing certification in any clinical speciality was just 14.7% which is low compared to the participants in the two studies by Pieper and Zulkowski which were conducted to assess the validity of the questionnaire (test time 1= 61% and test time 2= 48%) (more details in section 5.8) . Scores were also much lower (2.4%) in relation to participants being certified as wound specialists (31% and 21% respectively). Only 32.5% of the respondents had attended a lecture on PrUs within the last year. Also, the proportion of participants who had read an article or book about PrUs was 47.4% compared to the Pieper and Zulkowski study of 97% and 92%, those who used the internet to seek PrU information was 45.9% compared to 78% and 75%, and those who read the NPUAP/EPUAP guidelines was 20.7% compared to 52% and 50%. All of these knowledge update methods seem to be low compared to the results of a recent Pieper and Zulkowski study (2014).

From the studies that were discussed earlier in section 2.13, there were some similarities and differences between the qualifications of the nurses who participated in these studies and nurses who participated in the current study. For example, the majority of the studies included nurses with Diploma degree (El Enein & Zaghloul 2011, Tubaishat & Aljezawi 2014, Lawrence et al. 2015, Uba et al. 2015, Nuru et al. 2015) which is similar to the qualifications of the majority of the participants in the current study. While the remaining studies included participants with the BSN degree and higher qualifications (Saleh et al.,

2013, Iranmanesh et al., 2013, Beeckman et al., 2011, Nuru et al. 2015). Also, the participants in the studies conducted by El Enein & Zaghloul 2011, Saleh et al., 2013, Strand & Lindgren 2010 were selected from wards/units similar to the ones from which participants of the current study.

Other studies demonstrated the importance of training and continued progressional development (Claudia et al. 2010). Also, from their study, Saleh et al., (2013), found a relationship between knowledge and education in regard to the implementation of prevention strategies while Nuru et al (2015) found that nurses with higher educational level and had attended formal training and had more knowledge (more details in section 2.13).

## 7.6 Availability and use of resources

Resources were divided into preventive measures (i.e., pressure relieving devices) and treatment (i.e., topical treatment). The findings showed that many types of preventive measures were available, with the most commonly used being the ripple mattress and air mattress. Ripple mattresses were not used in all the hospitals as it had been replaced with the air mattress in some hospitals during the last few years. It is not used very frequently. Air mattress is one of the high tech-devices that are used to relieve pressure (Palfreyman & Stone 2015). Different systematic reviews that discussed the feasibility of using the air mattresses and other types of mattresses in prevention and management of PrUs all concluded there were no specific support devices that are best for prevention and treatment of PrU and have recommended a need to conduct more trials to determine the most effective support device (McInnes et al. 2012, Chou et al. 2013, Marchione et al. 2015, McInnes et al. 2013, Colin et al. 2012). It is positive that air mattresses are used in Oman but these are not available in all the hospitals.

The type of topical treatment used for PrUs are selected based on the PrU stage. The Occlusive dressing was developed to maintain a moist wound environment and the word

occlusive indicates the rate of transmission of water vapour from the wound to the external atmosphere (Thomas & Compton 2014). These dressing are divided into broad categories of polymer foams, polymer films, hydrogels, hydrocolloids, alginates, and bio-membranes (Thomas & Compton 2014). The results showed most of these treatments are used in Oman. For example, alginates are used in the form of Nu-gel; hydrocolloids are available in the form of DuoDerm (Table 6-28 in chapter 6). Also, hydrogels, SILVERCEL, honey and Promogran are available. The types of the available topical treatments in Oman is comparable to the types of topical treatments that are recommended by the National Pressure Ulcer Advisory Panel, the European Pressure Ulcer Advisory Panel and the Pan Pacific Pressure Injury Alliance (NPUAP/EPUAP/PPPIA) (NPUAP/EPUAP 2009). Unfortunately, these topical treatments are available in some hospitals and not all. This is very important point, as it may affect the care provided to patients with PrUs in Oman. A recent systematic review (Tricco et al. 2015) concluded that hydrocolloid dressings were more effective in treating PrU than other types of dressing.

On the other hand, there are some topical treatments used, in Oman and other countries, which are not recommended for the treatment of PrU and considered harmful to the skin like hydrogen peroxide which is declared to be highly toxic to the tissue even with low concentrations and should not be used as the preferred antiseptic solution" (NPUAP/EPUAP 2009). Also, Povidone-Iodine dressing is not effective in treating chronic wounds (NPUAP/EPUAP 2009). One study was undertaken to compare the healing of chronic wounds with honey versus Povidone-Iodine dressing in adult patients for 6 weeks, where patients had to attend wound care clinic in Surgical Out Patient Departments in India. The results show that 42 patients completed the follow-up. Two patients developed adverse reactions to Povidone-Iodine and were not included in the outcome results. Of patients in the honey group, 31.82% achieved complete healing at the end of the 6 weeks while none of the patients had a complete healing in the Povidone-

Iodine group at the end of the same period (Gulati et al. 2012). These two topical treatments (i.e. hydrogen peroxide and Povidone-Iodine) are no longer recommended. For this reason, the list of the used topical treatments in Oman should be revised and more guidance should be given to nurses and physicians on the recommended, evidence-based topical treatment to be used.

## 7.7 Relationship between nurses' characteristics and their knowledge of PrUs

The results of the study demonstrate that level of knowledge increases with advancing age and years of experience which suggests that, the greater the nurses' age and years of experience, the greater their level of knowledge in relation to PrUs. Nuru et al (2015) had a similar results where they found that nurses with more experience had more knowledge while studied by Smith & Waugh (2009) and Saleh et al (2013) demonstrated no relationship between knowledge scores and the age of nurses and their years of experience (more details in section 2.13).

In addition, there were significant variations in levels of knowledge between different hospitals. Nurses in Hospital G had the highest level of knowledge overall compared to the remaining hospitals, while Hospital A had the lowest level. The reason for this may be that Hospital G is one of the regional referral hospitals in Oman and the staffs undertake frequent training compared to other hospitals in the country.

There was no significant difference between male and female in terms of level of knowledge. This might be due to the very small number of male nurses which reflects the gender ration in the profession. Similarly, there was no statistically significant difference in knowledge between those who had and those who had not read the EPUAP/NPUAP guidelines groups although it was expected that there would be. The reason for this may be the small number of nurses who stated they had read the guidelines.

In the demographic section, nurses were asked to select their job category, one nurse had selected MD. MD means Medical Doctor. People with an MD from different nationalities come to Oman to work but their MD qualification is not recognised and so they often retrain as nurses for the sake of finding a new job.

## 7.8 Limitations

This study has a number of limitations. Firstly, the PZ-PUKT tool was implemented in the study while it was still being tested by its authors. Few problems were identified pertaining to the questionnaire construction. The questions were not sorted correctly under each category. For example, there were questions under the staging category which were not related to staging and the same for the wounds category which also consisted of questions about dressings and not wounds only. In addition, some questions were worded in a way that may have led the nurses to select the incorrect answer (examples in Table 6.6 in chapter 6). Also, there were some errors in the scoring system identified by the PI and the authors were contacted. Specifically the categorisation of the questions that was provided by the questionnaire developers was not always correct. Some questions were not classified correctly under the right category that leads to miss match between the results and its implications on knowledge. Furthermore, there was a delay in the analysis process as a result of this error as the data had to be recoded when the authors of the tool corrected their error.

Another limitation concerns the fact that the hospitals included in the study were scattered throughout the country, making it difficult for the PI to visit each site on more than one occasion during the study. The final limitation relates to there is being no definitive cutoff scores for passing of test, as it had not been set by the authors yet. However, regardless of these issues, the results highlight a low level of knowledge.

## 7.9 Rationale for undertaking Phase II study (qualitative study)

Phase I results demonstrated that there is poor knowledge but the factors affecting the knowledge and training were not known. Therefore, to obtain more in-depth understanding of nurses' knowledge in relation to PrUs, their attitudes towards the care of PrUs, and their views and beliefs in relation to PrU prevention and management in Oman, Phase II was planned.

# Chapter Eight: Qualitative Methods

## 8.1 Introduction

This chapter describes the study design for phase II of the study (qualitative study). It includes the process in which ethical approval and research development approval (Phase II) was obtained and how the interview guide was developed for the purpose of the study. The study sites and the access, ethical considerations, sample size of the study, pilot study, data collection process, data preparation process, and data analysis are also described. The main purpose of the Phase II (qualitative) study was to explore nurses' views, attitudes and beliefs regarding PrU prevention and management in Oman. The specific aims were:

1. To explore nurses' attitudes towards PrU prevention and management.
2. To ascertain nurses' views regarding the existing policies, resources and training related to PrU management.

## 8.2 Study Design

In-depth semi-structured interviews were conducted. An interview guide was developed to explore the nurses' knowledge on PrUs, their attitudes towards its prevention and management, their knowledge on the available training, polices and resources available on wound management and PrUs, and their views on PrU prevention and management (Appendix 4). The plan was to interview up to 20 nurses. Data saturation was reached after interviewing 16 nurses.

## 8.3 Ethics and Research Development Approval (Phase II)

Ethical approval was received from the Ethics Committee at the MOH in Oman, and from the College of Medicine, Veterinary and Life Sciences Ethics Committee at the University of Glasgow when approval for phase I was obtained (Chapter 5).

## 8.4 Data Collection Tool (Construction of the Interview)

A semi-structured interview was conducted using the interview guide developed for the purpose of the study (Appendix 4). The interview questions explored nurses' views and opinions on the following five areas: knowledge of PrUs, attitudes towards the prevention and management of PrUs, training on wound care, policies in use in relation to wound management and PrU, and the resources available for PrU prevention and management. Probes were used to elicit more in-depth information during the interview. When a participant touched on potential issue that was relevant to the research topic which needed to be expanded, the researcher asked a question (probes) to obtain more information or clarification.

## 8.5 Study Site and Access

Interviews were conducted at the same hospitals in which phase I of the study was undertaken. Participants were selected from the sample of nurses who had completed the phase I questionnaire and had agreed to participate in the interview by completing the slip at the back of the questionnaire (as explained in section 8.7). Access to the hospitals included in the study was obtained simultaneously to the request in relation to phase I of the study, where it was explained that the study would be conducted over two phases (Chapter 5).

## 8.6 Ethical Considerations (Consent and Confidentiality)

Each nurse, who agreed to be interviewed, signed a consent form at the time of the interview. Prior to signing the consent, participants were asked if they had any questions about the study. They each then confirmed that they had read the information sheet distributed to them before completing the questionnaire. Participants were informed that the interviews would be recorded for transcribing.

The supervisors and transcriber were permitted to listen to the interviews only following the removal of all possible means of identification. This was carried out by the researcher. Transcription was carried out by the researcher and a transcriber from the MOH in Oman. The consent forms were stored in sealed envelopes in a secured cabinet in the researcher's office at the University of Glasgow. The recorded interviews and the transcripts were transferred to a secure electronic folder on the researcher's computer at the University of Glasgow, which itself is secured with a password. Each interview was allocated a code in order to maintain confidentiality. These codes were used later during the transcription process and data analysis. The participants were informed that any data, including direct quotes used from the transcripts, would be anonymized.

## 8.7 Access to Participants Sample

The sample for the qualitative component was chosen to ensure that it included the views and experiences of male and female nurses, more experienced and less experienced nurses, Omani and expatriates, and those with a range of qualifications.Interview participants were identified from the sample used in phase I (quantitative study) of the study. They self-selected to participate in the interview. An invitation page (Appendix 3) was attached at the end of the questionnaire, explaining phase II of the study and inviting any nurse who wished to participate in the interview to complete the form with their

contact details and hand it to the RA, who would be collecting the forms and sending them to the researcher. The interested nurses completed the invitation page and handed it back to the RA, who placed them in sealed envelopes. These were then sent to the researcher with the questionnaires. Forty nine nurses (10%) out of 489 of questionnaire respondents agreed to participate voluntarily in the interview.The sample represented all the hospitals that were included in the phase I of the study. Two participants from five hospitals and three participants from the remaining two hospitals (n=16) were interviewed. The participants included were male and female, junior and senior nurses, of different ages and holding different levels of qualification (Chapter 2, Table 9-1).

## 8.8 Pre-test / Pilot study

Generally, it is recommended that a semi-structured interview be piloted in advance as it consists of open-ended questions (Dörnyei 2007). The interview guide was pre-tested and revised three times prior to commencing the interviews. It was first tested during the initial preparation of both phases of the study with a nursing colleague. Based on the findings, the guide was revised and more questions were added. The second testing was undertaken with the help of one participant during Phase I. The guide was further revised based on the findings and questions were expanded as needed. The final revision was undertaken, based on the results from Phase I; more questions were added based on the findings and areas that needed to be explored in more depth. This testing enabled the identification of potential problems of the interview guide and changes were made to alleviate these. These changes included the addition of an introduction at the beginning of the interview guide to help the participant feel more comfortable prior to the commencement of the interview. Also, additional probes were added under each main question as appropriate.

Then, in the response to findings from the first two interviews, the interview schedule was adapted to include these questions:

- In your opinion, how do you rate the care provided for patient with PUs on scale from 1-5 (1 is poor care and 5 is excellent care)? Why? What makes you rate like this?
- Could you please rate your confidence level on scale from 1-5 (1 is less confident and 5 is very confident)? Why?
- In your opinion, how could you rate the training opportunities available in your hospital on scale from 1-5 (1 is less available and 5 is highly available)? Why?
- Could you please rate the policy available on scale from 1-5 (1 is not useful and 5 is very useful)? Why?
- In terms of resources, Could please rate the resources (i.e., preventive measures and the topical treatment) available in terms of its effectiveness and availability on scale from 1-5 (1 less available not useful and 5 is highly available and very useful)? Why?
- Overall, what is your opinion about the practice of pressure ulcer management in Oman?

## 8.9 Data Collection Process

Before arranging the interviews, participants who completed and returned the invitation were contacted by the RA at each hospital in order to ascertain whether they were still willing to participate in the interview. The RAs subsequently arranged with the researcher the date and time for conducting each interview after checking the nurse's availability. The RA in each hospital was responsible for arranging a room where the interview could be carried out. The consent form was signed by the participants prior to commencing the interview (Appendix 5). Once again, the aims of the study were explained to the participants and what was expected from them. They were asked if they had any questions before starting the interview.

Interview times ranged between 25 and 35 minutes in length. Each interview was recorded using a digital recorder and a smart telephone as a back-up recorder. A spare battery was available for the digital recorder and a telephone charger for the telephone. English was the spoken language during all the interviews. All the interviews went

smoothly. Few nurses asked for clarification for questions asked by the researcher. Participants responded to all questions asked by the researcher and a good rapport was maintained between them.

## 8.10 Trustworthiness and /rigor

It is the responsibility of the researcher to report the trustworthiness of the study undertaken. Trustworthiness should be maintained in both types of the research, quantitative and qualitative. In quantitative research, the validity and reliability are addressed through examining the data to assess both the objectivity and credibility of the research (Anderson 2010). Validity is linked to morality and truth of research data and the validity of research findings refers to the extent to which the findings demonstrate precisely the phenomena that they aimed to represent (Anderson 2010). On the other hand, reliability means the reproducibility and stability of the data (Anderson 2010).

Trustworthiness in a qualitative study can be addressed following four criteria suggested by Lincoln and Guba (1985): credibility, dependability, confirmability and transferability (Polit & Beck 2010). These criteria were developed to strengthen the integrity of research where the researcher should focus on long term engagement, have persistent observation, and apply triangulation, peer debriefing, negative case analysis and member-checking (Lincoln 1995).

Credibility refers to "confidence in the truth of the data and interpretations of them" (Polit & Beck 2010). It is the responsibility of the researcher to establish the truth of the findings so people can have confidence in them (Polit & Beck 2010).

Dependability is the second criterion that Lincoln and Guba considered in their framework. It refers to the "stability of data" (Polit & Beck 2010). In other words, the findings of the study would be the same if the study was replicated (i.e., undertaken with similar or the same participants in a similar or the same context).

The third criterion is confirmability that refers to the potential of congruence between two or more independent people about the data's accuracy, relevance, or meaning" (Polit & Beck 2010). It is concerned with ensuring that the data demonstrate the information provided by the participants and that the interpretations are not influenced by the researchers own perception's or bias (Polit & Beck 2010).

The last criterion is transferability which denotes "the level to which qualitative findings can be transferred to other settings or groups" (Polit & Beck 2010). This requires the researcher to include sufficient descriptive data in the research report to help consumers evaluate the applicability of the data to other contexts (Polit & Beck 2010).

In this study, the researcher used Lincoln & Guba's (1985) criteria to help ensure the rigor of the study. Robson's (2011) thematic analysis steps were followed as well. An explanation of the application of these four concepts is given below in section8.12.1.Rigour was ensured through three steps. First one was peer debriefing was initially done with an expert in qualitative methodology. She briefly checked the steps followed for data analysis and agreed on it. The second step was methodological triangulation where two methods were used to collect data. A survey was used in the Phase 1 study (using a questionnaire) followed by interviews in the Phase II study (semi-structured interview). The third step "An audit trail" (i.e. dependability) is a transparent description of the research steps taken from the start of the research to the development and reporting of the research findings (Lincoln & Guba 1985) which was employed throughout the study.

## 8.11 Data Preparation

Sixteen transcripts were analysed. Textual data, i.e. audio-recorded face to face interviews were fully transcribed verbatim. Prior to transcription, all audio-recorded interviews were listened to before being transcribed. This was done as soon as possible

after finishing each interview whilst the interview was 'fresh' in the mind of the researcher and to identify potential questions for the next interview. Following transcription, all transcripts were checked for errors and amended where appropriate.

During preparation for analysis, an *a priori* coding framework based on the KAP model (chapter 4) was pre-set. Data were analyzed following Robson's thematic approach, both deductively using the pre-identified themes (KAP framework themes) and inductively.

## 8. 12 Data Analysis

Data analysis involves two stages: preliminary data analysis and post data collection analysis (Grbich 2007). The preliminary data analysis is considered an on-going process where the researcher starts to engage with data to gain a deeper understanding of the topic while in the post data collection analysis, the researcher tends to reduce the data and develop major analytical themes based on identified issues from the preliminary analysis and then begins thematic analysis (Grbich 2007).

## 8. 12.1 Thematic Analysis

Robson (2011) identified five phases (steps) to thematic coding analysis: self-familiarization with data, generation of initial codes, identification of themes, construction of thematic networks, and finally integration and interpretation of data (Table 8-1).

Table 8-1 Illustration of the process followed for thematic analysis

| | |
|---|---|
| 1. Self-familiarization | - Listening to each interview immediately after the interview<br>- Transcribing and revising each transcript<br>- Reading and re-reading each transcript<br>- Writing initial ideas<br>- Researcher continue checking data through-out the analysis process |
| 2. Generation of initial codes | - Generation of initial codes (free coding)<br>- Using flip chart for coding |
| 3. Identification of themes | - Codes grouped under themes |
| 4. Construction of thematic networks | - Organizing themes using the a *priori* framework<br>- Used a table to sort the themes and sub-themes |
| 5. Data integration and interpretation | - Data interpretation and integration<br>- Explanation and Clarification of data<br>- Researcher's opinion added |

*Adapted from Robson (2011)*

Self-familiarization was done by the researcher and involved listening to each interview immediately after the interview, followed by transcribing and revising each transcript while listening again to the audio-recording of each interview, reading and re-reading each transcript, and writing up the initial ideas which consisted of a general description for each set of data in the transcript. For example, 'PrU development' was given for the data that concerning whether patients develop PrU at home or in the hospital in the transcript, this was changed later to more specific code.

Step two involved the generation of initial codes (i.e. free coding was used), whereby data was analysedboth deductively (using the KAP framework themes) and inductively by identifying the emerging themes. Initially, a flip chart was used to note down all the

important ideas. In the flip chart, all the information was written under headings. For example, under the heading attitudes all the pertaining responses were listed that included positive and negative attitudes and their ratings. The *a priori* codes were applied as appropriate. Coding was ratified by the second supervisor who checked a selection of transcripts and comparison were made.

In step three (i.e. identification of themes), codes were grouped and themes identified. Similarities between the codes were collated under the relevant themes. For example, all the responses relating to 'attitudes' were grouped under one heading.

Step four (i.e. construction of thematic networks) presents a picture of the analysed data. The data was organized by themes according to the *a priori* framework using a table that was prepared to sort the KAP themes, KAP sub-themes, and division of the categories (Table 9-2 in chapter 9). All data were revised again and re-assigned where necessary. Finally, data were integrated and interpreted as a whole and explained for more clarification. Study objectives were checked and compared with the data.

# Chapter Nine: Qualitative Findings

## 9.1 Introduction

This chapter presents the findings of the qualitative phase of the study. It includes the demographics of the participants presented first. The identified themes and a definition for each theme; in addition, it includes exemplars (i.e. quotes) from participants' interviews, the emerging themes (i.e., perception of the role), participants' overall opinion on practices surrounding the management of PrUs in Oman, the recommendations of participants', and a summary.

## 9.2 Participants' Demographic Data

Participants included were male (n=5) and female (n=11), and were Omani (n=10) and other nationalities (n=6). The age range of the participants was 23 to 50 years, and their years of experience ranged from1to 28 years. All held a Diploma in Nursing (n=15) apart from one who held a Bachelor Degree in Nursing (Table 9-1).

Table 9-1 Demographic data of the participants by age

| Age range | Female | Male | Omani | Expatriate | Qualification | Years of experience |
|---|---|---|---|---|---|---|
| 23-30 (n=7) | 5 | 2 | 6 | 1 | Diploma in Nursing (6)<br><br>Bachelor Degree (1) | 1 to 7 years |
| 31-40 (n=7) | 4 | 3 | 4 | 3 | Diploma in Nursing | 10 to 18 years |
| 41-50 (n=2) | 2 | 0 | 0 | 2 | Diploma in Nursing | 26 to 28 years |

## 9.3 Findings

Three main themes and three sub-themes were pre-set which were knowledge, attitudes, and practice as the main themes (framework themes) and training, policy and resources (sub-themes). From the interviews, the same themes were identified in addition to perception of role theme. The theme "perception of role" (i.e. emerging) was divided further into two themes: the nurse's role versus the wound management role and the physician's role versus the nurse's role (Table 9-2). The themes and sub-themes are shown in Table 9.2 with the categories encompassed within these.

Table 9-2 KAP pre-identified themes and sub-themes

| KAP themes | KAP sub-themes | Division of the categories |
|---|---|---|
| 9.3.1. Knowledge | | - PrU definition, causes and complications<br>- Guidelines for PrU (NPUAP/EPUAP guidelines)<br>- Assessment Tools for PrU<br>- Rating of care provided for patients with PrUs |
| 9.3.2. Attitude | | - Attitudes towards PrU care (preference of wound care, reasons for refraining from PrU care)<br>- Nurses' rating of confidence level, and reasons for it<br>- Whether patient developed the PrU in the hospital or at home |
| 9.3.3. Practice: | | This encompasses three inter-related sub-categories: training, policy and resources |
| | 9.3.3.1: Policy | - Availability of wound management policy and its accessibility<br>- Rating of the policy<br>- Assessment and care: frequency of PrU care, types of patients with PrUs<br>- Use of preventive measures<br>- Role of "patient and family education" |
| | 9.3.3.2: Training | - Training programmes attended<br>- Availability of training courses for wound management<br>- Methods of updating knowledge<br>- Nurses' rating of training opportunities |
| | 9.3.3.3: Resources | - Rating of the availability and effectiveness of preventive measures<br>- Topical treatments, their availability and effectiveness<br>- Rating of topical treatments |

Each of the themes and sub-themes are discussed below.

### 9.3.1 Knowledge

Under the knowledge theme, several categories were encompassed. These were: definition of the PrU, its causes, its complications and the guidelines that are used for the identification of PrUs.

- Defining PrUs, the Causes and the Complications:

*Defining PrUs:*

The majority of nurses were unable to define PrUs while some appeared to understand the meaning but were unable to define it fully. Most described a PrU as a skin problem that can affect skin integrity and others related it mostly to being "an old age". Examples illustrated below:

> *"PrU means there is a break in the skin integrity" and "there is a problem with skin lacerations" (B-1)*
>
> *"PrU means a break in the skin of the body" (Su-3, Page 2)*
>
> *"PrU is a skin ulcer" (SQH-2)*

Those nurses who were unable to define PrUs did recognize it as a major problem that patients tend to suffer from.

*Knowledge of Causes and Complications of PrUs:*

The majority of nurses stated that PrUs were caused by being "bedridden". Some were able to identify additional causes stating that they are caused by "mobility problems and not-changing position frequently".

> *"Caused usually if the patient is immobilised or cannot move or position oneself every two hours" (Su-1)*
>
> *"It occurs when patients cannot mobilise from bed" (SQH-2)*

Some nurses were unable to identify the specific causes of a PrU and attributed it to the patient's medical problem.

> *"Medical problems usually, like patients who have a severe head injury, CVA, patients who are post-op also and who are under spinal anesthesia" (Su-1)*

Most nurses were able to identify the complications of PrUs. Some stated that patients had developed "septicaemia" while others termed it an "infection" and were not able to recognize any other potential complications.

- Guidelines for PrUs (NPUAP/EPUAP Guidelines):

Only a few nurses had read the guidelines (NPUAP/EPUAP) by themselves. As these guidelines were not available to read in their hospitals, the majority of nurses had no knowledge of the NPUAP/EPUAP guidelines.

- Assessment Tools for PrU:

The nurses were asked about the availability of assessment tools. The majority of them stated that they had a "wound assessment tool for PrUs" and a "general chart" which included a description and treatment for all wounds. A small number of nurses said they had no tools or guidelines.

> *"Unfortunately we don't have any tool and nobody is following the pressure ulcers of the patients we have" (Ib-1).*

It was reported that although a chart was available in the ward, it was not referred to or used, and instead PrUs were managed according to the physician's orders and their own experience.

> *"Actually there is a chart but we don't practice it" (Su-1).*

One nurse (K-1) reported using the Braden scale, which is a recognized risk assessment tool for PrU assessment immediately after each patient was admitted to their unit.

- Nurses' Opinions of the Care Provided for Patients with PrUs:

The nurses were asked to verbally rate the care provided to patients with PrUs on a scale from 1 (poor care) to 5 (excellent care). Table 9-3 presents the different ratings and explains the rating with exemplars of the quotes obtained from the participants' interviews to illustrate the variations in their opinions. Two nurses rated the care provided as 2, stating that no one cares about PrUs in their hospital and that they lack the knowledge and resources required to provide care. The majority of nurses rated the care provided as 3, stating that increasing workload, inadequate equipment and receiving no help from family members during care prevented them from providing effective care to patients. Four nurses rated the care provided as 4; they were unsure of how to proceed when faced with a complicated PrU. Only one nurse rated the care provided as 5.This was attributed to the fact that everybody worked as a team and knew what to do. One nurse did not rate the care provided as the researcher forgot to ask.

Table 9-3 Rating of nurses' opinions on PrU care provided on a scale of 1 to 5

| Ratings of nurses' opinions | Number of nurses providing the rating | Exemplars from participant interviews |
|---|---|---|
| 2 | 2 | - "Because, as I told you, nobody likes pressure ulcers. We have nothing documented regarding pressure ulcers: no chart, no guidelines, nothing, no follower, and no statistics regarding pressure ulcers. No people are specialised in pressure ulcers. We even lost a patient due to a pressure ulcer: it started with a pressure ulcer, then they developed septicaemia and then passed on, but nobody is concerned about the cause" (Ib-2) |
| 3 | 8 | - "We are repositioning every two hours. Sometimes the staff are busy and they inform the relatives that, after two hours, they must turn the |

| | | |
|---|---|---|
| | | position of the patient, but they are not doing this" (So-3)<br><br>- "We don't have enough equipment; we don't have enough members of staff to care for these patients" (SQH-1)<br><br>- "In fact we have few staff and can for example only sometimes change the position of the patient and so this patient will develop a bedsore. Not all staff actually are focussed on patients with bedsores" (Su-2)<br><br>- "Generally some staff care and some staff don't, so 50/50" (Su-1) |
| 4 | 4 | - "The reason for this rating is because nurses should have dedication and knowledge; these are all things that I think they need. Also continuous training, and somebody senior who knows about pressure ulcers should be there" (SQH-3) |
| 5 | 1 | - "Everybody is working as a health team and doing their work properly and sincerely" (K-1) |

### 9.3.2 Attitude

According to Cacioppo et al. (1981), "the term attitude should be used to refer to a general and enduring positive or negative feeling about a person, object, or issue". Pelto & Pelto (1997) stated that although people consider attitude as "positive or negative", the terms "casual or indifferent attitude" should be used as well for example towards disease prevention because of "lack of knowledge".

Discussions were held with the nurses during the interview in order to determine their attitudes regarding PrU care and their feelings towards providing care to patients with this problem. Their preferences in terms of wound management were also explored including the reasons that made them refrain from or dislike providing care to PrU wounds and they were asked to rate their confidence level while proving care to PrU wounds. Probes were used to elicit fruitful information about perceived confidence.

Nurses' Attitudes towards the Care of PrUs:

Two types of attitudes were identified when nurses were asked about their preference for type of wounds they like to care for. These attitudes were positive and negative. For positive attitudes, some nurses stated that they consider wound improvement to be rewarding and they feel satisfied while taking care of PrU wounds.

> *"I feel happy when I know that I'm going to change this wound for the better" (B-1)*

A negative attitude was identified in nurses who stated that they:

> *"disliked dealing with PrU wounds as they are complicated and take a long time to heal" (Su-1).*

*Preferences of wound management:*

Three different preferences emerged in terms of wound management: nurses who prefer managing surgical wounds, nurses who prefer to manage PrU wounds, and nurses who had no preference of one over another and are happy to manage both types of wound. Nurses who stated that they prefer to manage surgical wounds stated that this was because: they are "easy to care for", they are "clean wounds", and they "heal fast and are less complicated". The exemplars below illustrate the variations in responses.

> *"Because a surgical wound is a healing wound. They heal easily and are outside. Bedsores are usually on the back and this area is difficult to care for because it is covered all the time as the patient will be lying down. Surgical wounds are almost always in front of the patient, so we can care for them easily, dress them easily and observe them easily" (So-1)*

> *"I actually prefer surgical wounds because pressure ulcers are very difficult to care for with our resources; we have only limited things, so how can I manage pressure sores using only manual things like positioning" (Ib-2)*

Nurses who said that they like to take care of PrU wounds stated that it gave them a sense of satisfaction seeing the wound improve:

> *"I like caring for pressure ulcers, because doing something that means a patient's wound will heal better means, in our minds, that we can feel some satisfaction in knowing that the patient will recover" (K-1)*

Finally, nurses who said that they like to take care of both surgical and PrU wounds stated that both are wounds and need the same care and attention.

> *"As nurses, we are ready to take care of both wounds. Pressure wounds need more care and more concentration. ……., we still apply the same importance to surgical wounds but we are more keen to deal with pressure sores" (Ib-1)*

> *"Both are the same for me because I see both cases" (K-2)*

*Reasons to Refrain from/Dislike PrU Care:*

The majority of nurses stated that there was nothing that made them refrain from or dislike PrU care. A few said that they refrain from caring for PrUs because of the *"bad smell"* and the *"bad look"* of these wounds, especially when they are *"very deep and the bones can be seen"*; also, they stated that they do not know how to manage large wounds.

> *"No – as nurses it is our role and we have to provide care. It is our responsibility" (Ib-2)*

> *"Maybe the look of the pressure ulcer; when it reaches stages four, it involves the bone and the muscle, and that foul necrotic smell around the wound. This makes you feel like not going to the patients and caring for them. You do not feel comfortable with the overload of work on you" (Ib-2)*

- Ratings of Nurses' Confidence Levels in Providing PrU Care:

The confidence level of nurses providing PrU care was examined by asking them to rate it verbally on a scale from 1 to 5 (1 being less confident and 5 being very confident). The

responses varied among the interviewed nurses. One nurse rated her confidence as 2, five nurses rated it as 3. Half of nurses (n=8) rated it as 4, and two nurses rated it as 5. Those who rated their confidence as low stated the reasons for this as being a lack of training, a lack of knowledge, and inadequate equipment to provide PrU care. On the other hand, the nurses who rated themselves as having a high level of confidence attributed it to their experience working with patients with PrUs. Table 9-4 illustrates the nurses' rating of confidence levels with exemplars illustrating why they had rated their confidence as they did.

Table 9-4 Rating of nurses' confidence level on a scale of 1 to 5

| Ratings of Nurses' confidence level | Number of nurses providing the rating | Exemplars from participants' interviews |
|---|---|---|
| 2 | 1 | - "I don't have the specialty to deal with these patients and sometimes actually we get some staff to care for bedsore patients, especially pressure ulcers" (Su-2) |
| 3 | 5 | - "It depends on the actual nature of the wound I suppose; if it is at stage 1 or 2, I am fully confident" (SQH-1)<br>- "If I attend a one month course or training I will give a higher rating more than 3, 4 or even 5" (N-1)<br>- "Because I face so many problems with patients; they will shout and they will cry because it is painful" (SQH-2) |
| 4 | 8 | - "Actually, to be frank, we still need to update our knowledge" (Ib-1)<br>- "From experience and study, and sometimes from workshops also. I have attended workshops also for wound assessment for a long time and from experience" (So-2, Page 9)<br>- "From my experience I can tell you. I am not perfect, but I can give myself 4" (K-2)<br>- "Because we are dealing with this and we are managing this, but still we need some special protocols or guidelines to follow which maybe will improve our care" (So-1) |
| 5 | 2 | "Because of my years of experience with the consultants and I know how to improve the wound healing. Also from other information; I am attending and the workshops, I can give this rating…." (SQH-3) |

- Whether Patients Development of PrUs in the Hospital or at Home:

When nurses were asked whether patients develops PrUs in hospital or at home, the majority answered that they can develop PrUs in both places. A few said that they develop at home only, and one said that patients develop them in hospital whilst they are admitted and when they are transferred from other hospitals.

> *"It also happens in hospital, sometimes due to the workload of the nurses" (Ib-1)*
>
> *"Actually most of them come from home like this" (N-2)*
>
> *"Sometimes they develop in patients with chronic problems....., so many times a patient will come here with pressure ulcers" (K-1)*

The explanations above suggested that there were variations in the nurses answer regarding where patients had developed PrUs.

## 9.3.3 Practice

The three *a priori* practice themes were policy, resources, and training. These are all considered necessary for the delivery of good care and maintaining good practice.

### *9.3.3.1 Policy*

During the interviews, participants were asked if there was a policy available in the hospital that was used to guide wound care generally and PrUs specifically.

- Availability and accessibility of a Wound Management Policy:

The majority of nurses stated that a policy is available in their hospital but it needs updating. Some said that it does not include everything about PrU wounds and others stated that it includes nothing about PrU wounds. One nurse said that she had not read it but it had been presented by a colleague in their unit while another said that a policy had been previously available but that it had been misplaced.

*"Wound management policy is there. I think it has to be updated and revised. Not all the things are there" (SQH-3)*

Some nurses did not know if there was any policy available on wounds and had not heard of its existence or encountered during their practice:

*"I didn't see it" (Su-1).*

They also emphasised the need to have a policy on wound care and PrUs specifically.

*"Policy needs update in general and also add everything about pressure ulcer" (So-2)*

- Nurses' Rating of the Policy:

Nurses gave their rating on the available policy on a scale from 1 to 5, 1 being less useful and 5 being more useful for PrU care and wounds generally. Most of the participants considered the policy outdated and in need of updating in relation to wounds generally and PrUs specifically. Not all nurses rated the policy because not all had seen it. Four nurses rated the policy as 3 and another four nurses rated it as 4. Table 9-5 illustrates the ratings and provides illustrative exemplars from the interviews.

Table 9-5 Nurses' ratings of the policy on a scale of 1 to 5

| Ratings of nurses' on the policy | Number of nurses providing the rating | Exemplars from participants' interviews |
|---|---|---|
| 3 | 4 | - "It does not include everything" (K-2)<br>- "But it should actually be updated" (So-2) |
| 4 | 4 | "We have to think about the new updates, and we have to update this policy" (SQH-3)<br>- "Still needs to be updated" (Ib-1) |

- PrU assessment and frequency of managing patients:

The assessment performed on patients with PrUs varied in each hospital. In one hospital, nurses stated they used the Braden scale to assess all patients who were at risk of developing PrUs during their period of admission. Based on the assessment score, preventive devices and other nursing measures are commenced.

> *"Braden scale is the assessment tool that we write soon after the admission of the patient" (K-1)*

In another hospital, nurses stated that, when patients are admitted to the elderly patients' ward (for patients aged over 60 years), an assessment is carried out and repositioning is undertaken every two hours if the patient is considered at risk. No specific tool was mentioned as being used and these nurses specified that this process was followed only for "elderly patients" who were considered being at risk. In the remaining hospitals, all the nurses stated that an "assessment tool" is used. However, they could not specify which one.

> *"It is a must that we examine old age patients above 60 on admission for a pressure ulcer assessment" (N-1)*

The frequency with which nurses encountered patients with PrUs varied widely as illustrated in their responses to being asked about this such as "frequently", "very often", "once every month or two months", "2-3 patients daily", "every 4-5 days" and "weekly".

- The Use of Preventive Measures:

Almost all nurses stated that preventive measures were used for patients who had medical problems that affected their mobility status, including pelvic fracture, cerebrovascular disease (CVA), diabetes and spinal injury. They also stated that patients who were malnourished, bedridden or attain a high score on Braden scale (this scale was only used in one hospital) were started on preventive measures, including preventive devices such as

air mattress and positioning. These measures included repositioning every two hours, air mattress (which is not always available), and provision of good nutrition but was not considered adequate.

> *"We reposition two hourly. We have air mattresses but the number is not enough" (So-3)*

- Role of the Patient and Family Education:

When nurses were asked about the role of patient and family education in reducing the incidence of PrUs, and they stated it is highly effective if given effectively and comprehensively. However, it is not always given to patients and their families.

> *"Health education is very important and we have to give to them" (Su-1)*

> *"I have faced many patients who have been bedridden for 13 or 14 years at home and, because the family takes care of them nicely, they come to the hospital without bedsores. Other patients arrive as bedridden for two or three years and have already develop bad bedsores. So, if the family is educated and knows about pressure ulcers and its complications, then they will take greater care of the patient" (Ib-2)*

There was variation in nurses' views about family education and the time they had available to do this. One nurse suggested considering the educational level of the family when providing health education using simple terminology that can be easily understood. Another said that nurses are usually very busy and do not have the time to educate patients, while other nurses suggested that somebody else should be free to teach patients as the nurses have no time for this.

> *"They should be given time; they will have queries and they need a lot of explanation because their basic knowledge level is down. They should actually be given special time but staff*

*cannot meet these needs. So, somebody else should sit and explain the condition to them" (SQH-1)*

There was also reluctance by some family members to contribute to care or learn more about how to prevent this. There was a view that some patient's family members were uncooperative and do not follow the instructions provided leaving the nurses to provide care to patient. They refuse to help nurses during care, stating that it is the nurse's job.

*"We are facing so many problems. They say that this is work for staff and we will not help you; we are here only to visit the patient, that's all" (B-2)*

Although some relatives refuse to participate in patient care, the nurses insisted that they help to provide care so that they can learn to care for the patient once they are discharged home.

*"Sometimes the relatives don't want to do it. They tell staff members to ask their colleagues to help them but we insist on the relatives helping staff. When the patient is discharged, they will then know how to position the patient and how to check the patient's back for bedsores or anything else" (So-3)*

It was reported that during the period of admission, families are given a protocol for patient care but it is not always followed as some of these patients were readmitted for the same problem. Nurses emphasized that taking care of the patient is not the sole responsibility of the nurses and hospital; rather, it is a shared responsibility between them (i.e., the family and the whole community) and the healthcare staff.

*"So the main reason for developing pressure ulcer is that family is not aware of it and not taking care of the patient. It is not only the responsibility of the hospital; it needs also the awareness of the family and society" (K-2)*

There was a belief that health education should be planned and delivered by a multi-disciplinary team, which includes nurses, physicians, dieticians, and physiotherapists. The

aim of the team is to deliver comprehensive teaching that both patients and families can benefit from and be based on patient's needs.

> *"Doctor, nurse who is taking care, dietician and physiotherapist all have to give health education" (SQH-3)*

> *"It's not only the nurses, but is also the medical team and even the doctors" (Ib-1)*

It was stated that most nurses focus on providing education on the medication which patients should take after discharge and informing them about their next appointment or follow-up either in the hospital or in their nearest health centre. It was believed that this was ineffective practice and that health education was more than that; and it should involve all aspects of a patient's care, including PrU prevention and management. Moreover, nurses had not witnessed anyone providing such health education.

> *"In my experience, I have never seen anybody explaining about bedsore prevention at home" (So-1)*

#### *9.3.3.2 Training*

For the purpose of this study, training was defined as all forms of training that nurses have received on wounds and PrU care including courses, conferences and workshops.

- Training Programmes Attended:

The nurses were asked if they had received training or had attended any workshops on wound care generally, or PrUs specifically. They responded that they had not attended any workshops or training sessions on wound management or PrUs at all. A few (n=5) had attended workshops on wound care and foot care, and some (n=5) had attended workshops on PrU care only. Most of the nurses said that they had no training in recent years and that all their training had been undertaken more than three years ago, either at their hospitals or nationally (i.e. at the level of the whole country).

*"I attended one wound management workshop, maybe five or six years back" (SQH-1)",*

- Availability of Training Courses on Wound Management:

The majority of nurses were not aware of the availability of training courses on wound management in general, or of the availability of specialised training courses on wound management specifically where nurses can become specialised as wound management nurse. Wound management nurse have the same responsibility as tissue viability nurse. These nurses gained their knowledge on wound management in general from the workshops they attended and their own learning and experience working with wounds.

- Methods of Updating Knowledge:

Some nurses tended to use the internet to update their knowledge whenever they had specific questions or needed to update their knowledge. The Google search engine was used to find the information needed. Besides the internet, books and journals were referenced to. In some cases, the in-charge nurse and senior nurses were asked to help them find the information they needed, while others asked the physicians.

*"For me, my way is the internet only. Sometimes I try to ask our shift in-charge but if she is busy I cannot disturb her. I just read from the internet and I also have our Medical/Surgical book" (SQH-2)*

*"We have a library here and we can access it. We have our experienced doctors who can lead. The internet is available and sometimes I ask specialty people" (So-1)*

- Nurses' Ratings of Training Opportunities:

The available training opportunities were rated on a scale of 1 to 5 (1 being less available and 5 being highly available). Nurses awarded different ratings, as illustrated in Table 9-6, but two did not give a rating as they were not asked to rate. One nurse gave a rating of 0

as she claimed that there were no training opportunities available; another nurse gave a rating of 1, three nurses gave a rating of 2 and nine nurses gave ratings of 3.

The available training opportunities were perceived by most nurses as inadequate to meet the needs and that very limited numbers of nurses are attending training. Training opportunities are limited and when it is available it is in workshop format. All agreed that previously these workshops were offered more frequently within their hospitals but this has reduced over the last three to five years. Also, the nurses mentioned that training is undertaken away from their hospital sites, making it difficult for them to attend.

Table 9-6 Nurses' rating of training opportunities on a scale from scale 1 to 5

| Nurses' ratings of training opportunities | Number of nurses providing the rating | Exemplars from participants' interviews |
|---|---|---|
| 0 | 1 | - "There are no opportunities for staff, even if they are interested in going" (Ib-2) |
| 1 | 1 | -"Because there is nothing" (So-1) |
| 2 | 3 | - "Not provided for all staff to attend, offered to a limited number of staff and here in this hospital, sometimes available to just one or two staff members from each department" (Su-2)<br>-"Not enough training" (Su-1) |
| 3 | 9 | -"Because since two years they started to take staff for training, they are taking only two staff from every ward which is not enough for all to attend" (So-3,Page 13)<br>-"We have only one staff for wound care who are well trained" (N-2) |

#### *9.3.3.3 Resources*

Resources were defined as both preventive measures and topical treatments. Measures used for the prevention of PrU development are divided into pressure relieving devices such as air mattresses and nursing actions such as positioning and skin care. Topical

treatments include all the treatments that are applied to PrU wounds and the different materials used for dressing.

- Rating of the Availability and Effectiveness of Measures in Preventing PrUs:

It was reported that preventive measures were used for patients with mobility problems caused by fracture for example, or medical problems that affect mobility such as CVA or being a diabetic patient with an amputated leg. Nurses verbally rated the effectiveness and availability of preventive measures on a scale from 1 to 5 (1 being less available and not useful and 5 being highly available and very useful). As illustrated in Table 9-7, some nurses (n=4) rated the availability of resources as 3, while most nurses (n=9) rated it as 4, and one nurse rated as 5. Not all the nurses rated the preventive measures as they were not asked. Table 9-6 illustrates nurses' ratings with exemplars from the interviews.

Table 9-7 Nurses' ratings of the availability and effectiveness of preventive measures on a scale of 1 to 5

| Nurses' ratings of availability and effectiveness of preventive measures | Number of nurses providing the rating | Exemplars from participants' interviews |
|---|---|---|
| 3 | 4 | - "Because some staff take care of the patients but staff are sometimes busy and sometimes they ignore a patient – not ignore but take little care of that patient" (So-2)<br>- "Because sometimes the preventive measures are effective and sometimes it is not effective and not helping either wound healing or prevention" (Su-2) |
| 4 | 9 | - "Because we have air mattresses and our staff take care of the patients two hourly, depending on the type of wound and the type of patient also" (So-1)<br>- "For preventive measures, I can give four out of five. We have methods of preventing pressure ulcers like positioning, cushions, an air mattress" (Ib-2) |
| 5 | 1 | - "Regarding the air mattress, I will rate this as 5 as it is very helpful, it's totally helpful" (Ib-1) |

- Views on the topical Treatment availability and effectiveness:

A few types of the topical treatments were used for PrUs. It was stated that hydrogen peroxide and Betadine are still used for PrUs, although most acknowledged that these are not effective, especially hydrogen peroxide. According to some nurses, Betadine is used for infected wounds which are not showing signs of improvement. For the majority of nurses, some of these treatments are new (for example, Nu-gel and hydrocolloids) and they all agreed these new treatments are highly effective and aid in fast healing of PrUs, especially in the first stages. Unfortunately, these topical treatments are not always available in all of the hospitals.

> *"I think there is a new treatment for pressure ulcer but it is not available here in our wards. When I attend diabetic foot care, so many treatments are available but we don't have them here" (So-3)*

> *"Cleaning done by saline if the wound is not infected, if infected saline and betadine, and then using paraffin gauze and a simple dressing for ventilation. This is good for the wound and, if it is infected, we use another solution, which is hydrogen peroxide" (B-2)*

It was mentioned that, for a period of time, vinegar was applied to PrUs. This practice has now ceased as there is no scientific base for its use.

> *"I remember that previously we used vinegar sometimes on pressure ulcers but nowadays we do not use vinegar" (N-1)*

Nurses had been informed during workshops and training sessions on wounds, not to use hydrogen peroxide because it was ineffective and can cause problems with the wound. However, it was still used in the seven participating hospitals and was prescribed by physician.

*"They are telling me that we should not use hydrogen peroxide and that nobody is now using it, but we are still using it" (B-1)*

Training on the use of topical treatments has been recently implemented in some hospitals; because they believe it will maximise the effectiveness of these treatment used for PrUs and minimise waste.

*"Yes, if there are any new things coming to manage bedsores, we need to be trained" (So-1)*

- Rating of the Availability and Effectiveness of Topical Treatments:

The nurses were asked to rate the topical treatments used for PrUs verbally in relation to their availability and effectiveness, on a scale from 1 to 5 (1 being less available and not useful and 5 being highly available and very useful). Not all nurses rated the topical treatments as not being asked. As illustrated in Table 9-7, one nurse rated the availability and the effectiveness of the topical treatment as 0 stating topical treatment was not available specifically for PrU treatment, one nurse rated it as 2, some nurses (n=4) rated it as 3, while another nurses (n=4) rated it as 4, and finally some (n=3) rated it as 5. Table 9-8 illustrates the nurses' ratings, with exemplars from their interviews.

Table 9-8 Nurses' ratings on availability and effectiveness of topical treatments on a scale of 1 to 5

| Nurses' ratings of availability and effectiveness of topical treatments | Number of nurses providing the rating | Exemplars from participants' interviews |
|---|---|---|
| 0 | 1 | - "Topical treatment is zero out of 5 because it is not available" (Ib-2) |
| 2 | 1 | - "To be frank, we don't have topical treatments; we routinely only have one or two at the most, so there's not much available" (Ib-1) |
| 3 | 4 | -" Because before we were doing only dressing for that patient but now sometimes we are applying Nu-gel but not |

| | | |
|---|---|---|
| | | daily. I mean no need to do dressing daily, every two days or three days and it is more comfortable for the patient " (Ib-1)<br>- "The available topical treatment is effective for some patients but sometimes not" (SQH-2) |
| 4 | 4 | - "The available types of topical treatment are acceptable. I don't know of any updated or new materials that can be used because, since we came, we have been using normal saline, betadine and hydrogen peroxide for the care of wounds, even bedsores and all types of wound, so I feel it is effective" (So-1) |
| 5 | 3 | - "Yes the topical treatment is effective. Definitely it is acting" (K-1)<br>- "I would rate this at 5 because almost all of the topical treatments for wound management are available and I would say they are effective" (Su-1) |

- Nurses opinion about the availability of resources:

In general, nurses stated that resources, both preventive measures and topical treatments, are not always available in all the hospitals and at the time needed (more examples are listed in Table 9.7 and Table 9.8).

> *"Sometimes resources are not available, patient has to wait for equipment to arrive like mattresses and some treatments. Sometimes patient's PrU improved before all the needed resources arrive" (Su-2)*

## 9.4 Emerging Themes

This section includes the emerging themes that are not included in *a priori* themes, and were identified from the data during the analysis. This theme is the perception of role which is further divided into: nurses' role versus wound management role and physician's role versus nurse's role.

### 9.4.1 Perception of Role

- Nurses' Role versus Wound Management Role:

The perception of nurses was that the wound management nurse has the full responsibility of providing care for patients with PrUs. However, the wound management nurse is available in some hospitals only. As illustrated by other nurses the PrU assessment and care was the responsibility of wound management nurse and that all PrU care was provided by her/him:

> *"This is done by the wound management nurse; she comes to observe the patient and she decide the wound degree" (Su-2)".*

- Physician's Role versus Nurse's Role:

The majority of the nurses tended to ask the nurse in-charge, senior nurses or physicians about the PrU stage and the type of topical treatment to apply. Some said that the physician should identify the PrU stage and decide the type of topical treatment to be applied. It was stated that, nurses cannot do this because they lack the knowledge and training required for decision making in relation to PrUs management, while other nurses stated that physicians have greater knowledge of PrUs so it is their responsibility to decide.

> *"I ask my senior staff nurse; if she/he does not know, I go to the doctor and ask for his decision; we ask the surgeon" (B-1)*
> *"I know about the pressure stage but sometimes I have to ask the doctors; sometimes doctors see the slough and tell us to not to remove it, when it should be removed" (B-1)*
>
> *"If it is an infected bed sore, the surgeon will take care of it. Also, with the help of the staff, debridement and special dressings we can follow the doctor when we have seen once or twice how they manage the patient and then follow their procedure" (B-2)*

Most nurses said that some patients listened to physicians and tended to believe them more. Patients tend to think that physicians know more than nurses.

> *"But they listen more to the doctor than to the nurses, depending on the patient" (SQH-2).*

## 9.5 Nurses' Overall Opinion on the Practice of PrU Management in Oman

When asked their opinion on the overall practice of PrU management in Oman nurses expressed different views, as illustrated in their use of the following terms: *"good care"*, *"improved and advanced care compared to before"*, *"fair care"* and *"excellent care"*.

> *"I think overall there is good practice. The staff think careful about bed sores and changing the patient's position every two hours especially if patient cannot mobilize" (SQH-2)*

It was stated that nurses do their best to provide care for patients based on their knowledge and experience, and the available resources:

> *"Nurses are working following their experience; with no guidelines and no wound management department is following them" (So-1).*

However it was felt that physicians should pay more attention to PrUs as they do not all consider them to be a serious problem.

All nurses voiced a need for better resources, covering both preventive measures and topical treatments. It was pointed out that some hospitals have no resources at all, which makes PrU care very difficult; nurses are struggling to provide the care required with these limited resources.

> *"It is difficult to provide care without resources. There are no topical treatments and no preventive measures that should*

*be used for patients before they develop pressure ulcer." (Ib-1)*

Additionally, the nurses stated that there are now fewer nurses covering an increased workload. Some wards admit many patients with mobility problems who need frequent positioning, but this is very difficult to do when there are an insufficient number of nurses available in each shift. Low numbers of nurses can affect the quality of care provided.

*"Shortage of staff doesn't allow nurses to provide good care to patients with pressure ulcer or those who are at risk" (SQH-1)*

There was a need to train all nurses on wound management, including PrU care. They emphasised its importance in terms of enabling the nurses to deliver safe, high quality care to patients which, in turn, can save resources and shorten a patient's period of admission.

*"Need more training and knowledge update on pressure ulcer and more knowledge the use of mattresses and diet patient should take" (K-1)*

Also, in some hospitals, there is at least one wound management nurse who follows patients with wounds, including PrUs, and is able to guide nurses in the continuation of the care. Nurses found this very useful and they want additional nurses to be trained in all hospitals so that patients can receive this care.

*"Care regarding pressure ulcers is going on. It is improving year by year and actually at our hospital we are lucky to have a staff member who has undertaken training. He is instructing the staff better than the doctors do. He is giving good instruction and is following the patients and explains to the nurse who cares for patient what should be done" (N-2)*

## 9.6 Recommendations of Nurses:

Recommendations for future were provided by nurses that were grouped under the main themes, i.e., knowledge, attitudes, and practice (framework themes), and sub-themes of policy changes, training and resources and discussed below.

With regard to policy, it was recommended that new guidelines and tools be used for PrU care and that nurses should be trained on how to use these. It was also suggested that community nurses should have a role in educating the community about PrUs prevention and that the whole community should be made aware of this problem. Health education was viewed as a team responsibility which involved nurses, physicians, physiotherapists, social worker, community nurse and the family. The majority emphasised that health education should be developed and delivered effectively to family.

> *"The role of the community nurse is to visit and teach families with bed ridden patient at home and expand their role to include the entire community. There should have a team to be responsible for community education as well" (B-2)*

Additional recommendation were that a social worker be available in each hospital and should follow all patients discharged with PrUs to assess the patient's housing situation and all requirements should made available to the family or other ministries such as Social Affairs.

> *"Nowadays social workers are needed to be involved especially for patients with pressure ulcers as they need special mattress which should be arranged by them" (K-2)*

Furthermore, they requested that statistics on PrUs be documented and maintained, and added to the annual report of MOH.

*"Need for a statistician to maintain the numbers of PrU cases in each hospital, a person to follow the nurses' training and focus on, and investigate patients who die because of PrUs. This should all be done at the level of the Ministry of Health" (Ib-2)*

It was recommended to increase training on PrUs in terms of knowledge and practice. It was agreed that all nurses should be have an equal chance to be trained on wound management, including PrUs. The training should include courses plus workshops and conferences that should be conducted every year to update nurses' knowledge about the advances in wound care generally and PrUs specifically. Also it was recommended that more nurses be trained to become wound management nurses, who can take the responsibility of guiding and teaching other nurses in their hospitals. At the same time, they would encourage other nurses to update their knowledge and emphasise the importance of keeping up to date with advances related to PrUs. A designated individual should be assigned to follow up the progress of nurses in terms of training and act as a resource person for them.

*"Nurses in our hospital were working with their experience only. There are no specific guidelines or training courses. There is no wound care department or even a trained nurse who can guide other nurses" (So-1)*
*"There are fewer chances to go for conferences or workshops on wound care including PrU" (N-2)*

*"I feel nurses need more training on PrU prevention and management. Also, there should be a person who follow the nurses training and identify their needs" (Ib-2)*

The need for more resources, including those relating to both the preventive measures and the topical treatments that are so important for the prevention and management of PrUs was highlighted. Similarly it was emphasised that resources should be made

available in all hospitals (examples of nurses responses were added in section 9.3.3.3 and 9.5).

## 9. 8 Summary

Sixteen interviews were carried out with participants who care for patients with PrUs. Different views and opinions about PrU prevention and management were expressed. The findings suggested that some had basic knowledge and experience which enabled them to provide care to PrU wounds, while others lacked both. The policy on wound management and PrU was not known by most of the participants. Training was another issue that affected PrU care as nurses were not getting frequent training or updates. Neither was there any encouragement for self-directed updating. There was also a lack of resources, which included both the equipment and devices used for the prevention of PrUs and the topical treatments used for management. The need for wound management nurse was also highlighted and considered important part of training. The majority of nurses stated shortage of staff and increased workload as reasons for inability to provide effective care to patients with PrUs.

# Chapter Ten: Qualitative Discussion

## 10.1 Introduction

This qualitative study aimed to explore nurses' views, attitudes, and beliefs regarding the prevention and management of PrU in Oman. The specific aims were:

1. To explore nurses' attitudes towards PrU prevention and management.
2. To ascertain nurses' views regarding the existing policies, resources and training related to PrU management.

In order to address the objectives of phase II, interviews were conducted with a sample of nurses that participated in Phase I (section 5.7). These nurses self-selected to participate in the interviews.

A thematic approach was adopted using a framework with the pre-determined themes and sub-themes (section 4.2). The findings were discussed under the following pre-determined themes: nurses' knowledge on PrUs, nurses' attitudes towards PrU care, and nurses' practice regarding PrU prevention and management. Practice was further divided into three sub-themes: 'nurses' knowledge about the policy on wounds and PrU management'; nurses training on PrU management; and resources available for PrU prevention and management. Perception of the role (an emergent theme) which encompassed nurse's role versus wound management nurse role and the physician role versus nurses' role are also discussed. Nurses' overall opinion on PrU management in Oman and their recommendations are presented.

## 10.2 Nurses' Level of Knowledge

In the Phase I study, a questionnaire was used to explore the nurses level of knowledge in regard to PrUs and the results showed a low level of knowledge (chapter 6) while in Phase II, knowledge was assessed briefly at the beginning of the interview. That

information was used to judge whether these nurses had sufficient knowledge on PrUs and this result showed that knowledge varied among nurses (more details in chapter 9, section 9.3.1). There are a number of possible explanations for this. There was insufficient teaching and training specifically on PrU prevention and management in the nursing teaching programme in Oman. Nursing students in Oman are only exposed to PrUs when they go to the clinical area. There are no objectives in the nursing curriculum about PrUs. So, students may not be getting sufficient teaching and training in this area. According to Bloom et al (1956), although basic knowledge is considered to be a low level of knowledge it is considered necessary for subsequent learning in order to progress to a higher level with contextualization of further knowledge. In Oman, nurses do not have the basic knowledge in regard to PrUs to consider different patients who are at risk for developing PrU (As discussed earlier in chapter 7, section 7.3). The findings of this study suggest that there is a perception among nurses that PrUs only develop in patients as they get old while Coleman et al (2013) concluded in their systematic review that the risk factors for the development of PrUs are immobility/inactivity; inadequate tissue perfusion; and skin status (more details in chapter 2 section 2.8).

The results of the cross sectional study by Demarré et al. (2011) showed that nurses and nursing assistants' knowledge about PrUs was insufficient. It also demonstrated a significant correlation between the nurses and nursing assistants attitudes towards PrUs and the application of prevention compliant with clinical guidelines (chapter 2, section 2.13 has more details).

Athlin et al (2009) also undertook semi-structured interviews with nurses, but in Sweden, with the aim of exploring hospital and community nurses' understanding of factors affecting prevention and care of PrUs. The findings were categorised under three categories (1. the patient, 2. health care personnel, and 3. structure of health care) and the study concluded that nurses understood prevention of PrUs but rarely incorporated

prevention practices in their care. They also highlighted that PrU care was performed by LPNs not RNs (more detail provided in chapter 2, section 2.13).

The results of the above discussed studies used different methodology: survey in Demarré et al (2011) study versus interviews in Athlin et al (2009) study, however their results are similar to the findings of the present study in which nurses had insufficient knowledge about PrU and the prevention strategies and that nurses focus more on treatment rather than prevention while providing care.

Moreover, the findings confirm Blooms' view that emphasised the need for basic knowledge before a person thereafter should learn to perform the subsequent tasks. Basic learning is very important and from that can build more complex facts/concepts that the individual acquires with more experience in their field of work.

## 10.3 Nurses Attitudes

The nurses' attitudes were explored in Phase II study. Nurses were asked about their preferences of wound care in general and from their responses two types of attitudes were identified (details in chapter 9, section 9.3.2). Positive and negative attitudes towards PrUs were identified. Nurses with positive attitudes related this to having a good knowledge of PrU and experience of working with patients who had a PrU. A cross-sectional study, conducted in Sweden by Källman & Suserud (2009), that aimed to explore Registered Nurses' (RNs) and Nursing Assistants' (NAs) attitudes regarding PrU prevention, their knowledge on PrU prevention and treatment, practice of risk assessment and documentation associated with PrUs, and to identify perceived possibilities and barriers in PrU prevention and treatment (details about this study in chapter 2, section 2.13). The results of this study illustrated that all participants had good knowledge on prevention and management of PrU and demonstrated positive attitudes towards it (Källman & Suserud 2009). The findings of this study suggest that the knowledge seems

to influence the attitude. It can be argued that the person with more knowledge has a more positive attitude to PrUs although this needs further research.

On the other hand, in the present study, nurses identified as having a negative attitude toward PrUs care stated that they had insufficient knowledge on PrU prevention and management and this prevent them from always making the right decision about the type of wound care that they should provide.

Moore & Price (2004), demonstrated that nurses had a positive attitudes towards prevention of PrUs which is similar results that was identified by Källman & Suserud (2009); Strand & Lindgren (2010); Demarré et al (2011) and Uba et al (2015). Interestingly in three of these studies (i.e., Strand & Lindgren, 2010,Demarré et al., 2011 and Uba et al., 2015) the level of the nurses knowledge was poor while in comparison Källman & Suserud (2009) showed nurses had a good level of knowledge (details of these study are in chapter 2, section 2.13). In addition, Moore & Price (2004) showed that nurses consider the preventive measures as important but they don't apply which is similar to Källman & Suserud (2009). Moreover, Waugh (2014) concluded from his systematic review, that there is a lack of understanding of nurses attitudes towards the PrU prevention (details section 2.13, chapter 2). On the other hand, Beeckman et al. (2011) concluded that knowledge of nurses about PrU prevention in Belgian hospitals was inadequate while their attitudes towards its prevention were significantly correlated with the application of adequate prevention (details of this study in chapter 2, section 2.13). The results of these studies are similar to the results of the present study (i.e., Phase II study) in which the nurses had insufficient knowledge about the preventive measures but positive attitudes towards its implementation.

Nurses in the present study were found to have different preferences in relation to the types of wounds that they managed (as demonstrated in the exemplars from the interviews in Section 9.3.2 under the heading "Preferences of wound management"). For

example, nurses working in surgical wards expressed their preference to care for surgical wounds rather than PrUs and those in medical wards stated having no preference in providing care for surgical or PrU wounds as both needs care. It might be that, their preferences were related to their area of work and exposure to certain types of wounds over others. The preferences of wound care was not between the nurses working in surgical wards and nurses working in medical wards, it was about their preferences in relation to the types of wounds they like to care for (details in chapter 5, section 5.5).

The nurses' confidence level was linked to their level of knowledge, the training, and exposure to PrU. Those nurses who rated themselves as having a high level of confidence related it to having good knowledge on PrUs and experience of working with patients with PrUs. On the other hand, nurses who rated themselves as having a low level of confidence attributed this to a lack of knowledge and less training on PrUs (Chapter 9, Table 9-4). Unfortunately, there is no literature to support this finding. So for future research, the relationship between knowledge and confidence needs to be explored.

There was variation in the nurses' opinion on whether patients had developed the PrU at home or during the hospital admission. While some nurses stated that patients developed PrUs at home, others said that patients can develop them in hospital because the preventive measures such as positioning and using pressure relieving devices are not used frequently. Those who said patients may develop a PrU in the hospital stated that no assessment is carried out during admission, so it is not possible to know where the PrU developed, as many of these patients will have mobility problems and are unable to move by themselves which is known to be a factor in PrU development. This suggests a reactive attitude where nurses did not take action at the right time. In other words, the action of the nurses, to implement preventive measures, was not initiated during admission using relevant assessment scores. This places the patient at risk, especially if they were already under the risk of development of PrU. Nurses should be encouraged to

be proactive and to be more confident based on their knowledge level and seek help whenever they are not sure what measures to take, for the sake of patient safety. A previous qualitative study by Samuriwo (2010) also found that nurses who had placed a high value on prevention of PrUs were more proactive in preventing them compared to their colleagues (more details in chapter 2, section 2.13).

The results of the present study showed that PrU risk assessment is not done routinely in all the hospitals and so patients are at increased risk. The International Expert Wound Care Advisory Panel stated in their consensus paper regarding the legal issues pertaining to PrUs that health care clinicians are responsible for performing PrU assessment and implementing the care once the patient is admitted to their health institution. If staff fail to do so they risk legal action (Ayello et al. 2009). Unfortunately, having a legal case against nurses may leave them at risk of losing their professional license. Although it is unlikely that staff have been sued specifically over PrUs, there is a professional and legal framework to which healthcare practitioners must adhere.

## 10.4 Nurses' Practice

Practice was explored under three sub-themes: policy, training, and resources. High quality care for patients with PrUs was achieved if policy, training and resources were current, appropriate and adequate.

### 10.4.1 Policy

The current available MOH policy on wound management was first introduced in 2000 and has not been updated since then. The nurses, who had read this policy, did not find it helpful as it does not include anything about PrUs specifically. Most of the nurses did not know about its existence when they were asked about it.

It is very important that nurses have access to an up-to-date policy to guide their practice, both prevention and management of PrUs. For prevention, the policy should include

assessment guidelines that enable nurses to assess the patient during admission, and thereafter, regardless of the patients' age especially if they have a mobility problem. Based on the assessment findings, interventions should be commenced when appropriate in order to reduce the risk for PrU development and prevent further deterioration of existing PrUs. According to the recommendation of NICE Clinical guideline No. 179 (2014), any patient who has a mobility problem is at risk of PrU development and should have a thorough assessment to help the clinicians to plan effective care.

In the present study nurses considered patient and family education to have a major role in reducing the development of PrU and felt that part of the nurses' role was in assisting the family to provide care for patients who already developed them. In Oman, health education is part of the responsibility of registered nurse and it is mentioned in their job description. The NICE guideline (2014) recommended that nurses should provide health education for the patient and the family regarding PrU prevention and management which includes information about its development as well as strategies to prevent it. However, most nurses stated they are not always able to teach patients and family about PrU prevention and management strategies because of insufficient staff number and increased workload. Although, there are certain times it is inappropriate for nurses to give health education for example, when the patient is critically ill.

Aghakhani et al. (2012) conducted a cross sectional survey to explore nurses' attitudes to patient education. A questionnaire was distributed to 240 nurses who were affiliated to Educational Hospitals and the barriers to patient education were evaluated (Aghakhani et al. 2012). The findings showed that the education in these hospitals was not good and nurses believed that patient education was not their responsibility. Also, the available facilities were not sufficient and shortness of time was the main reason for the lack of patient education (Aghakhani et al. 2012). The findings of this study are similar to the

findings of the current study as the nurses believe that health education is not their duty and it should be provided by a person who should be assigned only for this purpose.

Good communication is the key for providing patient education. Nurses should acquire good communication skills that allow them to communicate effectively with each individual patient. Good communication skills are mainly based on the nurses' education level and the background experience (Kourkouta & Papathanasiou 2014).

Nurses said some relatives were not helping them provide care to the patient and as they assumed that nurses were responsible for patient care. However, other relatives were very cooperative and assisted the nurses' to provide care to the patient. Helping family members and other relatives is an important aspect in the family relationships in Oman. It is a part of the culture and Islamic religion as well. Each person will grow-up understanding that it is his/her responsibly to take care of their parents when they become old, take care of younger siblings, take care of the whole family and be ready to support them during any crisis. These crises include the sickness of any member where all family members should be beside the sick person and help him/her. Once the patient is discharged, they will continue the care at home. There is no literature that covered the specific role of the family members. For this reason, the family is involved in the patient's care during hospitalization in order to prepare them to be able to provide the same care once the patient is discharged home.

In the United Kingdom, the practice is a little different where ill patients are asked if their family should be informed about their health condition, unless the patient cannot indicate their agreement to share information, then family members are kept involved and appropriately informed, but staff are mindful of any potentially sensitive issues and the duty of confidentiality (NICE 2012). In addition, it is the nurse's responsibility to highlight certain confidentiality issues regarding the patients care according to the

confidentiality aspects that are followed in each health care institution, either in Oman or UK.

### 10.4.2 Training

Training opportunities are very limited in relation to wound management generally and PrUs specifically. In this study, not all nurses' were aware of what training is available. There are a few training workshops conducted each year in the capital area, however, only a limited number of nurses can attend from each hospital as the aim of these workshops is to have nurses represented from all areas of Oman. Furthermore those who attend the training are not disseminating their learning to others in the ward or clinical area. Nurses were not getting further training in the hospital on PrU and the opportunity for them to attend PrU management in-service education was limited. Moreover, the in-charge nurse decided who should attend training, and which training courses should be attended, based on the workload and the available spaces rather than nurses interest in the subject. Selection was based on the need of each area, and not on the learning needs of the individual nurse. Continuous professional education is very important as it keeps nurses updated with relevant and current issues in nursing practice (Cleary et al. 2011). Nurses should be knowledgeable on the latest advances in PrU management and the nursing field that will enable them to provide good care for their patients.

The available training workshops and conferences only provide theoretical instructions about PrUs without skills training, which the majority of nurses felt they needed. There are many short courses and conferences that have been developed to update the practitioners on wound management and very few on PrUs. Studies have demonstrated that after educational interventions, confidence and knowledge diminish gradually over time while applying educational theory to practice through implementing adult centred learning techniques (i.e. problem-based learning, reflective learning and learning by example) are very suitable and suit the teaching of healthcare professionals in the clinical

environment (Flanagan 2008). In addition, this indicate that besides having the main courses and training, nurses needs also refresher courses to maintain their knowledge.

In USA, a new course was started in the last few years that aimed to train wound management nurses however few hospitals have a trained nurse who works as wound management nurse but the majority currently do not. Clinical certification is increasingly one of the requirements in nursing practice and it is linked to patient satisfaction, staffing, retention rates, and improvement in patient outcome (Corbett 2012). For example, wound certified nurses are more experienced in assessing the accurate stage of PrU than non-certified nurses' (Corbett 2012). Certification in the nursing profession has become highly recognised and appreciated by nurses.

The nurses who participated in this study were not aware of the NPUAP/EPUAP guidelines for identifying the different stages of PrUs on which appropriate management can be applied. These guidelines have been available since 2009 and were revised again in 2014 (NPUAP, EPUAP & PPPIA 2014). Having clear guidelines for providing care is very effective as it guides nursing practice toward the most appropriate care (NICE 2014a). The findings of this study suggest that the nurses' lack of knowledge on PrU, and lack of awareness of relevant guidelines and that the care being delivered by nurses is based on their clinical experience rather than on evidence based clinical guidelines (Section 9.5).

Some nurses were updating their knowledge of PrUs only when they experienced a patient with a PU and identified a gap in their own knowledge, this self –directed learning appeared to be dependent on the nurses' level of experience in managing PrUs. However experience alone is not enough to provide safe and effective nursing care to critically ill patients (Witt 2011). Continuing education is important for professional nurses.

A qualitative study was conducted in Netherlands which explored nurses' and their mangers' perceptions of the differences in continuing professional development between younger and older nurses (Pool et al. 2013). The findings suggested that participants perceive differences in continuing professional development between younger and older nurses (Pool et al. 2013) while younger nurses have less focus on their development as they still have an open paths for career compared to older nurses who have more focus on their own professional development. This difference should be considered when developing strategies for continuing professional development. Interestingly, the scope of professional development whether is it is limited to "keep up to date" or more broadly "expansion of knowledge and skills" appears to relate more to nurses' attitudes towards work than to their age (Pool et al. 2013). The relationship between age and attitude in relation to learning was not an issue highlighted in the present study.

### 10.4.3 Resources

In this study, resources available for the prevention and management of PrUs were defined as topical treatment and pressure relieving devices which were not available in all hospitals. Even when available, nurses reported that there were in scare supply. Regarding pressure relieving devices, these were not available at all in some hospitals and were few in number in other hospitals. Only two types of mattress, the ripple mattress and air mattress, were available but again not in all the hospitals. The ripple mattress is less commonly used compared to the air mattress (section 7.6). Moreover, different systematic reviews (McInnes et al. 2012, Colin et al. 2012) undertaken to assess the effectiveness of support devices in the prevention and treatment of PrUs, have concluded that it was not possible to recommend any specific support devices for prevention and treatment of PUs and that further trials should be conducted (section 2.11.1.1).

With regard to topical treatments, most nurses were not aware of the new topical treatments e.g. Nu-gel that were available in some of these hospitals. This might be

related to the fact that the nurses' in-charges in these hospitals were not aware of the availability of these treatments either. A recent systematic review by Tricco et al. concluded that hydrocolloid dressings were more effective compared to other types of dressing (Tricco et al. 2015).

Nurses reported that they were using some topical treatments which evidence demonstrates are not effective in managing PrUs (section 7.6) and that are therefore not recommended for use any more for treating wounds including PrU wounds. These topical treatments include Povidone-Iodine and Hydrogen Peroxide. Interestingly, some nurses reported using vinegar previously for treating infected PrUs wounds. Again this is no scientific base for its use in treating any type of wounds. These findings were supported by a study that was conducted by Gulati et al. concluded that honey was more effective than Povidone-Iodine in achieving complete healing, reducing pain and wound surface area, and increasing comfort in subjects with chronic wounds including PrUs (Gulati et al. 2012) (details in section 2.11.2.1). This is the first study that has explored the nurses' perception about the effectiveness of the topical treatments that are used for PrU care.

## 10.5 Perception of Role

### 10.5.1. Nurses role versus wound management role:

In some hospitals, the "wound management nurse" role was assigned to nurses who were trained to take care of wounds including PrUs. These nurses perform similar duties to that performed by the tissue viability nurse (TVN). The TVN is expected to focus on the prevention of skin breakdown and its underlying tissue to facilitate wound healing specially in complicated wounds, where the normal process of healing was prevented (Ousey et al. 2014). In the UK, the current role of the TVN is complex and consists of range of skills. Unfortunately, there is no accepted national role description on the

knowledge and skills framework that can be used to benchmark services internationally (Ousey et al. 2014).

Some nurses said that they do not provide care for PrU as it is the responsibility of the wound management nurse while it should be a shared responsibility between them. It was found that the wound management nurse undertakes different roles. They follow-up patients admitted to the different wards and units inside the hospital, teach nurses about wound care, and follow patients in the outpatient clinics. Having a job description would help them to work more effectively in their role.

Ousey et al (2015) conducted a mixed methods study to explore the role, and identify the responsibility of the TVN in the UK. There were 261 respondents who completed a questionnaire and seven participated in a subsequent semi-structured interview (Ousey et al. 2015). The results identified there was no national job title for the role and the available titles are not fully understood by patients (Ousey et al. 2015). The result is similar to the situation in Oman were the role of the wound management nurse is not fully understood by nurses, physicians or patients.

There are two papers (Ousey et al. 2014, Ousey et al. 2015) that looked at the TVN and conducted studies in its regard which was led by the same group of researchers.

### 10.5.2. Physician role versus nurse role:

The majority of nurses in Oman consider physicians to be more knowledgeable about health issues than them. In fact, both physicians and nurses are knowledgeable in their own field and should work together for the benefit of the patient. As previously discussed (section 10.2) in the current study nurses stated, most physicians (based on the nurse's statement), and nurses still think PrUs only occur in bedridden and old patients while in fact, all adult patients who have mobility problem are at risk of developing a PrU (NICE 2014a). This misunderstanding and lack of knowledge about PrUs from both physicians

and nurses may have undesirable consequences for the patient. Both nurses and physicians should have more knowledge on PrU and should work together to prevent PrU development and care for patients who already have them. The nurses rely on physicians to manage PrU and give instructions for care because they do not have the necessary knowledge and skills to provide care by themselves. In contrast, in the UK the TVNs work independently without orders from the physicians.

In the USA, the Institute for Clinical Improvement Systems (ICIS) produce specific guidelines for PrU prevention and treatment that was last updated in 2010. This guideline is followed by all healthcare members including advanced practice nurses, nurses, physicians, occupational therapists, dieticians, physical therapists and other clinicians (ICSI 2012). This guideline indicates that the care of PrU is not only the responsibility of nurses; it is the responsibility of the health team who take care of the patient.

## 10.6 Limitations

The study had several limitations. The first limitation pertains to the location of the sites where the study was undertaken. The hospitals were scattered around the country and it was difficult for the researcher to travel easily between these hospitals. For that reason, interviews were planned ahead of time between the RA in each site and the PI. The nurses were interviewed based on their availability on the day when the PI visited the hospital, if nurses were not available on that day they were not part of the study, even if they had agreed to take part. This may be considered a good point as there was no chance to select nurses so no selection bias occurred. The second limitation was the language barrier. The interview was undertaken in English and during the interview some nurses were not able to understand the questions. Questions were repeated to make sure that they understood. The third limitation is related to the analysis. It was not possible to follow all the steps of checking rigor of the study like member checking, due to the geographical location of both the participants and the PI. In fact, the PI was able to conduct different

steps for rigor (Chapter 8, Section 8.11.1). The last limitation was no wound management nurse was interviewed in this study. The reason for that was that wound management nurses are not assigned in the wards/units where the study was undertaken. Interviewing them would have given more information regarding the actual practice of PrUs management in Oman.

## 10.7 Summary

In conclusion, the findings of this study showed that nurses had insufficient knowledge that was identified briefly from the interview. Also, nurses received insufficient teaching about PrU when they studied nursing in Oman and they received fewer opportunities for on job training during their career (section 9.3.3.2). In terms of attitudes, both positive and negative attitudes were identified from the interviews. These attitudes were affected by the nurses' knowledge on PrU. In relation to practice, nurses stated the available policy does not help in managing PrU as it is a general policy on wound management and no specific guidelines in this policy relate to PrU prevention and management. For resources, nurses said the available resources were very limited which prevented them from providing the expected care. In addition, nurses identified they needed more training which includes both theoretical and practical training. Also, the role of the nurses and physicians in relation to PrU prevention and management should be clearer and each should be able to perform their defined role and assist each other effectively. Finally, the wound management nurse was given most responsibilities for taking care of PrU patients while it should be a shared responsibility.

# Chapter Eleven: Final Discussion and Conclusion

## 11.1 Introduction

This research aimed to explore the Omani nurses' level of knowledge and views about PrU prevention and management. The aims of this study (below) were achieved over two phases of the study. Phase I aims were:

1. To assess the Omani nurses' level of knowledge about PrU prevention and management
2. To assess nurses' knowledge regarding the policies in use for PrU management
3. To identify nurses' knowledge regarding training for PrUs prevention and management
4. To assess nurses' knowledge about the resources available for prevention and management of PrUs
5. To identify the relationship between nurses' demographic characteristics (e.g., age and years of experience) and knowledge of PrU prevention and management

While Phase II aims were:

1. To explore nurses' attitudes towards PrU prevention and management.
2. To ascertain nurses' views regarding the existing policies, resources and training related to PrU management.

This chapter brings the thesis to a conclusion by recapping the research process undertaken and answers the research aims. Here, the important and significant findings of the research are summarised and implications of the findings for practice, policy and education are presented.

## 11.2 Achieving the research aims and objectives

The main aim of the study was to explore nurses' level of knowledge and views about PrU care and practices in order to describe the management of PrUs in Oman and guide

the strategic planning for adopting new prevention and management strategies. The main aims of the quantitative study (Phase I) and qualitative study (Phase II) were achieved (details in section 11.1). Both studies explored nurses' knowledge on PrUs, the available training and resources while Phase II study had explored nurses' attitudes and their views in regard to the PrUs.

A descriptive explanatory sequential mixed-method design has been used and that each data collection method built on the results from other (details in chapter 4, section 4.5) with the purpose to enrich the areas of inquiry and enhance the evidence base through triangulation of both Phases. Phase II (qualitative) was used to explore the findings of Phase I (quantitative) and explain the results in more depth. These methods were used to complement each other in order to increase the credibility of the findings and attain the research aims. Besides that, there were some limitations pertaining to each method which were discussed in chapter 7, section 7.8 and chapter 10, section 10.6.

The results of Phase I demonstrated that nurses had low level of knowledge on PrUs prevention and management, fewer training opportunities and fewer resources. The findings of Phase II were similar to those of Phase 1 and so provided further support. Also, Phase I demonstrated that nurses level of knowledge in relation to PrUs increases with advancing age and years of experience which was further supported from the findings of Phase II where the nurses stated they work with PrUs depending on their experience (chapter 9, section 9.5). In addition, Phase II study concluded that some nurses had a negative attitude towards the management of PrUs. In conclusion, most of the results that were identified from the quantitative study (Phase I) were supported and confirmed with findings from qualitative study (Phase II).

Moreover, the qualitative study (as discussed in chapter 9, section 9.3.3.1 and chapter 10, section 10.4.1) also explored staff attitudes towards the role of relatives in the care of PrUs, which had not been reported in the previous literature. The findings suggested that

nurses expected that relatives would participate in the care of their relatives PrU when they are admitted and thereafter discharge at home.

### 11.2.1 Knowledge on PrUs

The results of Phase I demonstrated that the nurses' level of knowledge on PrUs in Oman was relatively low compared to previous, similar studies (Chapter 6). This low level of knowledge was confirmed in the Phase II study (Chapter 9). One reason for low level of knowledge was related to the basic teaching that nurses had received while they were studying nursing in Oman (as discussed earlier in chapter 7, section 7.3). Objectives relating to the assessment and management of PrUs were not part of the curriculum of the nursing diploma programme in Oman; either from a theoretical or practical perspective. Student nurses were only exposed to PrUs in the clinical area. Similarly, the importance of PrUs was not emphasized in the hospitals as a major problem that should be considered carefully. The findings also suggested that level of knowledge affected the nurses' attitudes towards the PrU prevention and management practices (Phase II results), with low level of knowledge associated with a more negative attitude towards PrUs prevention and management.

### 11.2.2 Knowledge on policy

The results of Phase I demonstrated that not all nurses were familiar with the available policy on wound management; half of the nurses lacked the knowledge and skills on PrUs although more than half of them were managing PrUs on a daily basis. The reason behind this finding (i.e., nurses familiarity with the available policy on wound management) was explored in the Phase II study. The findings of Phase II showed that the available policy was outdated (i.e. last updated in 2000) and does not include any guidelines specifically for PrU prevention and management. Taken together, the findings of the two phases highlight the need for up-to-date policy and new guidelines on PrU

prevention and management in Oman with a clear, strategic plan for dissemination of these guidelines to the clinical areas. The new guidelines should emphasise the importance of patient and family education which should be planned effectively by the healthcare team (details of this findings in chapter 9, section 9.6). Another issue which was raised by nurses was to increase the awareness of the family and community in general about the importance of PrU prevention and management strategies through the media and to expand the role of the community nurse and the health educators (details of this findings in chapter 9, section 9.6). All of these findings should be added in the updated policy on wounds and PrUs.

### 11.2.3 Knowledge on the available training

Phase I results revealed that nurses were not attending lectures on PrUs very often, a small proportion of nurses had read a book or article on PrUs, and less than half of them used the internet. Furthermore few had read the EPUAP/ NPUAP guidelines. This suggests that nurses were not self-directed to learn and this is supported in Phase II when nurses reported they were not updating their knowledge and skills on PrUs regularly, but only in a reactive way if they had a specific patient with a PrU. The findings also indicated that there was limited opportunities for all nurses to attend on the job training regarding PrU prevention and management, there was no active continuous training at the hospitals level (except in one regional referral hospital), and that not all nurses were aware of the available training for the wound management nurse role.

Both Phases of the study highlight a need for PrU training to be part of the Continuous Professional Development (CPD) of nurses, and for all nurses to have equal opportunity to attend/receive education/training in this area.

### 11.2.4 Knowledge on the available resources

Preventive measures and topical treatments were investigated in both phases of the study. The results of Phase I showed that the air mattress was the most commonly used preventive measure but the available number of mattresses was not sufficient and varied between hospitals, this was similarly reported in Phase II. The evidence from the systematic review by Colin et al (2012) showed that the low-air-loss bed is more efficient than a mixed pulsating air mattress in the prevention of heel PrUs while an air-fluidized bed improves the healing of PrU. This latter point was also reported in the systematic review of Tricco et al (2015) (details of both studies in chapter 2, section 2.11.1.1). However, this study did not explore specifically the type of the air mattress that was used in the hospitals in Oman, which makes the comparison very limited.

Similarly, topical treatments were available in most of the hospitals but with some variation. Examples of the available topical treatments were Nu-gel, hydrocolloids, hydrogels, SILVERCEL, honey and Promogran (details in chapter 6, Table 6-33 and Table 6-34).The Phase II findings supported the results from Phase I were nurses stated using some of these topical treatments like Nu-gel, hydrocolloids and honey. In the systematic review, Tricco et al (2015)found that hydrocolloid dressings were more effective in the treatment of PrUs (details in chapter 2, section 2.11.2.1).In addition, in the present study there were examples of topical treatments, not recommended for use any more, but still being used such as the hydrogen peroxide and Betadine (details in chapter 6, Table 6-33 and Table 6-34). This further emphasises the need for appropriate education/training.

## 11.3 Nurses' demographic characteristics and knowledge

The results of phase I demonstrated that the level of nurses' knowledge increased with advancing age and years of experience. In the Phase II study, nurses' stated having more

experience had helped them to manage PrUs effectively and confidently. In addition, Phase I results showed that there was a significant variation in the level of knowledge between nurses from different hospitals (details in chapter 6, section 6.5.3). There was no significant difference between female and male nurses in relation to level of their knowledge and those nurses who had read the NPUAP/EPUAP guidelines, however as the number of male nurses who participated was relatively low, the results may not be generalised.

## 11.4 Nurses' attitudes towards PrUs management

Nurses' attitude towards the care of PrU was explored in Phase II study. Positive attitude appeared to be associated with more knowledge and experience in working with patients with PrU, while a negative attitude related to lack of knowledge on PrU and its management. Also, nurses had different preferences towards the types of wounds that they prefer to manage which, in this study, appeared to be linked to the area where they worked and their exposure to PrU knowledge, skills and wounds. Therefore, it is important to maintain regular training sessions and refresher courses on PrUs for nurses. It may also be helpful to rotate nurses between wards and units like surgical and medical wards in order to have the opportunities to work with patients with different types of wounds (i.e., surgical and PrUs wounds).

## 11.5 What did this study add to the field of the knowledge?

There are several findings of this study that add new aspects to the existing knowledge in terms of the overall management of PrUs in Oman. Although there have been a few qualitative studies that have explored nurses' knowledge, attitudes and practice on PrU, this is the first mixed method study undertaken in Oman to explore the nurses' level of knowledge, attitudes and views on prevention and management of PrUs. The findings

showed that: the nurses' level of knowledge was relatively low compared to other studies, the available policy was not up-to-date, the training opportunities were not sufficient, and the available resources were limited (both pressure relieving devices and topical treatment) and not available in all hospitals to prevent and manage PrUs. This is the first study to use the PZ-PUKT tool out with the research group which developed and tested the tool(Pieper & Zulkowski 2014). However, there is a need for further validation for the PZ-PUKT as it was only validated by the authors.

The qualitative study has added to the literature as there was no recent study that was undertaken to explore the nurses' views and knowledge in relation to PrU. Moreover, no study has examined the relationship between the nurses' level of knowledge and age which also adds to the literature.

## 11.6 Recommendations

The findings of this study highlighted a need for certain recommendations that should be addressed by the relevant authorities in Oman.

***Recommendations for MOH:***

- Update the available policy on wound management and incorporate new guidelines for PrU prevention and management.
- Disseminate the policy to all the hospitals in the country and make sure that all nurses get access to it.
- Increase the training opportunities for all nurses at a regional level and national level and provide an equal opportunity for everyone to attend. The training should include objectives on expanding the nurses' knowledge and skills on PrU management.
- In each hospital the Staff Development Unit (SDU) department should implement periodic training on PrUs and assign specific people who should follow-up the

nurses and assist in identifying their learning and training needs with the help of the nurse in-charge of each ward/unit

- The training can vary from short video sessions to workshops that can be implemented over a day or more, depending on the nurses' learning needs (Phillips et al., 2012).

- Develop an online learning package that can be accessed by all nurses in the country and keep regularly updated. This would allow all the nurses to have an equal opportunity to have a continuous update on PrUs with minimal cost.
- Provide evidence based resources required for the prevention and management of PrUs to all the hospitals and train nurses on their use.
- Develop a statistical data base for maintaining and recording all cases of PrU (including its stage, its location, and its prognosis) that will assist for future planning regarding its prevention and management.

- Nurses' learning needs can be identified through staff appraisal, which should be used as a tool to help plan the future learning of staff (NHS 2009). In Oman, staff appraisal is carried-out twice yearly for all staff.

***Recommendations for Nursing Education:***

- Objectives relating to the theoretical knowledge of PrUs should be incorporated into the Omani nursing curriculum and in addition provide training on wound care and management generally, and specifically in relation to PrUs should be provided.
- Nursing students should be taught the importance of evidence-based guidelines and how these can be utilised to deliver effective patient care.

***Recommendations for future research:***

- Patients views on the quality of PrU management should be explored

- The clinical and cost effectiveness of interventions for PrU management should be determined
- The available assessment tools used for PrU assessment should be validated
- The nurses' implementation of PrU assessment during admission should be assessed

## 11. 7 Conclusion

In conclusion, this mixed methods study has demonstrated that Omani nurses had a low level of knowledge on PrU prevention and management, with age and years of experience being related to increased knowledge. The study also highlighted the inequality in terms of access to evidence based methods to prevent and treat PrUs across Oman. The lack of knowledge and resources together with an outdated wound management policy which is not readily accessed by nurses may adversely affect patient care. To this effect recommendations have been made to improve pre and post registration training in this area, update current policy and available resources with the ultimate aim of improving patient care by reducing the incidence of PrU development and more effective treatment of PrUs in Oman.

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# Appendices

Appendix 1  The Questionnaire

Appendix 2  Participants Information Sheet

Appendix 3  Invitation sheet to participate in the Phase II study

Appendix 4  Interview Guide

Appendix 5  Interviewee consent form

Appendix 6  Oral Presentation

Appendix 7  E-Poster Presentation

# Appendix 1: The Questionnaire

**Instructions**

Dear Participant:

Please read the following instructions carefully before you start answering the questionnaire. This questionnaire should take about 15-20 minutes to complete. Please answer all the questions and leave the completed form in the box located in the room.

| |
|---|
| The findings of this study will be used to improve patients' pressure ulcers care and training of nurses. |

- This is not a "Test"
- All the information will be anonymous:
    1. Data will be used by the researcher only
    2. All data is anonymized, i.e., no one is identifiable from the responses
    3. For this reason, please feel free to answer as honestly as possible
- Please don't discuss the questions with your colleagues or refer to any literature when responding to the questionnaire. Your input is highly valued based on your knowledge level now
- Please don't discuss the questionnaire after you finish with your colleagues who have not filled in the questionnaire yet.
- After filling the questionnaire, please put it in the collection box (ask the person who handed the questionnaire to you about the box)
- If you are willing to participate in the next part of the study, which is the interview, please use the details on the last page to contact the researcher (you can take the page with you)

***Thank you for taking the time to fill-in this questionnaire***

***I appreciate you help***

H. Code: (For Office use only) _____

Q. Code: (For Office use only) _____

**DIRECTIONS: Please answer each of the following questions about your background by checking the appropriate box (es).**

1. **Where do you primarily work?**

☐Hospital ☐ Long term Care ☐Home Care ☐Private Practice ☐Other (specify) _____

2. **Age:** _____

3. **Gender:** ☐Male ☐Female

4. **Job Category**:

☐MD/DO (Medical Doctor/Doctor of Osteopathy) ☐RN (Registered Nurse)

☐LPN (Licensed Practice Nurse) ☐CAN (Certified Nurse Aid)

☐Administrator ☐Other (specify) _____

5. **Number of years in practice**:

☐< 1 year ☐1 year - 5 years ☐> 5 years - <10 years

☐10years - <15 years ☐15 years - < 20 years ☐ 20 years or more

6. **Highest degree held:**

☐Diploma ☐Associate ☐Baccalaureate ☐ Master ☐Doctorate ☐MD

7. **Certification(s) in any clinical specialty:** ☐Yes ☐No

Certification type: _____

**Certified as** Wound Specialist: ☐Yes ☐No

Certifying Organization_____

Nurse Practitioner or Physician Assistant (NP/PA): ☐Yes ☐No

8. **When was the last time you listened to a lecture on pressure ulcers? (Check one)**

☐One year or less ☐Greater than 1 year but less than 2 years

☐2-3 years ☐ 4 years or greater ☐Never

9. **When was the last time you read an article or book about pressure ulcers (Check one)**

☐One year or less ☐ Greater than 1 year but less than 2 years

☐2-3 years ☐ 4 years or greater ☐Never

10. **Have you sought out information about pressure ulcers on the web?**

☐Yes ☐ No

11**. Have you read the NPUAP/EPUAP International Pressure Ulcer Prevention and Treatment Guidelines?**

☐Yes ☐No

**Pressure Ulcer Knowledge (Pieper-Zulkowski Pressure Ulcer Test OR PUKT):**

| Please answer each of the following by circling your answer. Be truthful if you don't know don't guess. | | | |
|---|---|---|---|
| 1. Slough is yellow or creamy necrotic /devitalized tissue on a wound bed. | TRUE | FALSE | DON'T KNOW |
| 2. Pressure ulcers are sterile wounds. | TRUE | FALSE | DON'T KNOW |
| 3. Foam dressings increase wound pain. | TRUE | FALSE | DON'T KNOW |
| 4. Hot water and soap may dry the skin and increase the risk for pressure ulcers. | TRUE | FALSE | DON'T KNOW |
| 5. Chair bound persons should be fitted for a chair cushion. | TRUE | FALSE | DON'T KNOW |
| 6. A Stage III pressure ulcer is a partial thickness skin loss involving the epidermis and/or dermis. | TRUE | FALSE | DON'T KNOW |
| 7. Hydrogel dressings should not be used on granulating pressure ulcers. | TRUE | FALSE | DON'T KNOW |
| 8. Persons confined to bed should be repositioned dependent on individual and support surface factors. | TRUE | FALSE | DON'T KNOW |
| 9. A pressure ulcer scar will break down faster than unwounded skin. | TRUE | FALSE | DON'T KNOW |
| 10. Pressure ulcers progress in a linear fashion from Stage I to IV. | TRUE | FALSE | DON'T KNOW |
| 11. Eschar is healthy tissue. | TRUE | FALSE | DON'T KNOW |
| 12. Skin that doesn't blanch when pressed is a stage I pressure ulcer. | TRUE | FALSE | DON'T KNOW |

| | | | |
|---|---|---|---|
| 13. The goal of palliative care is wound healing | TRUE | FALSE | DON'T KNOW |
| 14. Stage II pressure ulcers are a full thickness skin loss. | TRUE | FALSE | DON'T KNOW |
| 15. Dragging the patient up in bed increases friction. | TRUE | FALSE | DON'T KNOW |
| 16. Small shifts in positioning may need to be used for patients who cannot tolerate major shifts in body positioning. | TRUE | FALSE | DON'T KNOW |
| 17. Honey dressings can sting when initially placed in a wound. | TRUE | FALSE | DON'T KNOW |
| 18. An incontinent patient should have a toileting care plan. | TRUE | FALSE | DON'T KNOW |
| 19. A pressure redistribution surface manages tissue load and the climate against the skin. | TRUE | FALSE | DON'T KNOW |
| 20. Stage II pressure ulcer may have slough. | TRUE | FALSE | DON'T KNOW |
| 21. Even if necrotic tissue is present if the bone can be seen or palpated the ulcer is a stage IV. | TRUE | FALSE | DON'T KNOW |
| 22. When possible, high-protein oral nutritional supplements should be used in addition to usual diet for high risk patients. | TRUE | FALSE | DON'T KNOW |
| 23. The home care setting has unique considerations for support surface selection. | TRUE | FALSE | DON'T KNOW |
| 24. An Unstageable pressure ulcer will be classified as a Stage II when necrotic tissue is removed. | TRUE | FALSE | DON'T KNOW |
| **25. Donut devices/ring cushions help to prevent pressure ulcers.** | **TRUE** | **FALSE** | **DON'T KNOW** |
| 26. A pressure redistribution surface should be used for all high risk patients. | TRUE | FALSE | DON'T KNOW |
| 27. Foam dressing may be used on areas at risk for shear injury. | TRUE | FALSE | DON'T KNOW |
| 28. Persons at risk for pressure ulcers should be nutritionally assessed (i.e., weight, nutrition intake, blood work). | TRUE | FALSE | DON'T KNOW |
| 29. Biofilms may develop in any type of wound. | TRUE | FALSE | DON'T KNOW |
| 30. Critical care patients may need slow, gradual turning because of being hemodynamically unstable. | TRUE | FALSE | DON'T KNOW |

| | | | |
|---|---|---|---|
| 31. Blanching refers to whiteness when pressure is applied to a reddened area. | TRUE | FALSE | DON'T KNOW |
| 32. A blister on the heel is nothing to worry about. | TRUE | FALSE | DON'T KNOW |
| 33. Staff education alone may reduce the incidence of pressure ulcers. | TRUE | FALSE | DON'T KNOW |
| 34. Early changes associated with pressure ulcer development may be missed in persons with darker skin tones. | TRUE | FALSE | DON'T KNOW |
| 35. A footstool/footrest should not be used for an immobile patient whose feet do not reach the floor | TRUE | FALSE | DON'T KNOW |
| 36. Suspected deep tissue injury (DTI) may be difficult to detect in individuals with dark skin tones. | TRUE | FALSE | DON'T KNOW |
| 37. Bone, tendon, or muscle may be exposed in a Stage III pressure ulcer | TRUE | FALSE | DON'T KNOW |
| 38. Eschar is good for wound healing. | TRUE | FALSE | DON'T KNOW |
| 39. It may be difficult to distinguish between moisture associated skin damage and a pressure ulcer. | TRUE | FALSE | DON'T KNOW |
| 40. Wounds that become chronic are frequently stalled in the inflammatory phase of healing. | TRUE | FALSE | DON'T KNOW |
| 41. Dry, adherent eschar on the heels should not be removed. | TRUE | FALSE | DON'T KNOW |
| 42. Suspected deep tissue injury is a localized area of purple or maroon discolored intact skin or a blood-filled blister. | TRUE | FALSE | DON'T KNOW |
| 43. Massage of bony prominences is essential for quality skin care. | TRUE | FALSE | DON'T KNOW |
| 44. Poor posture in a W/C may be the cause of a pressure ulcer. | TRUE | FALSE | DON'T KNOW |
| 45. For persons who have incontinence, skin cleaning should occur at the time of soiling and routine intervals. | TRUE | FALSE | DON'T KNOW |
| 46. Patients with spinal cord injuries should be taught weight shifts. | TRUE | FALSE | DON'T KNOW |
| 47. In large and deep pressure ulcers, the number of dressings used needs to be counted and documented to ensure all dressings are removed at the next dressing change. | TRUE | FALSE | DON'T KNOW |
| 48. All patients can be turned onto a reddened body area if the pressure was removed from that area for 1 hour. | TRUE | FALSE | DON'T |

| | | | |
|---|---|---|---|
| | | | KNOW |
| 49. Pressure ulcers can occur around the ears in a person using oxygen. | TRUE | FALSE | DON'T KNOW |
| 50. Persons who can be taught should shift their weight every 30 minutes while sitting in a chair. | TRUE | FALSE | DON'T KNOW |
| 51. Stage I pressure ulcers are intact skin with non-blanchable erythema over a bony prominence. | TRUE | FALSE | DON'T KNOW |
| 52. A full thickness tissue loss when the base is totally blocked by slough cannot be staged. | TRUE | FALSE | DON'T KNOW |
| 53. Selection of a support surface should only consider the person's level of pressure ulcer risk. | TRUE | FALSE | DON'T KNOW |
| 54. Shear injury is not a concern with lateral-rotation bed features. | TRUE | FALSE | DON'T KNOW |
| 55. It is not necessary to have the patient with a spinal cord injury evaluated for seating. (F)W | TRUE | FALSE | DON'T KNOW |
| 56. The head of the bed should be elevated more than 45-degrees. | TRUE | FALSE | DON'T KNOW |
| 57. Catheter tubing should be positioned under the leg. | TRUE | FALSE | DON'T KNOW |
| 58. Pressure ulcers may be avoided in bariatric patients with properly sized equipment. | TRUE | FALSE | DON'T KNOW |
| 59. A dressing should keep the wound bed moist, but the surrounding skin dry. | TRUE | FALSE | DON'T KNOW |
| 60. Hydrocolloid and film dressings must be carefully removed from fragile skin. | TRUE | FALSE | DON'T KNOW |
| 61. Nurses should avoid turning a patient onto a reddened area. | TRUE | FALSE | DON'T KNOW |
| 62. Skin tears are classified as stage II pressure ulcers. | TRUE | FALSE | DON'T KNOW |
| 63. A Stage III pressure ulcer may appear sallow if located on the ear or malleolus/ankle. | TRUE | FALSE | DON'T KNOW |
| 64. Hydrocolloid dressings should not be used with a filler dressing. | TRUE | FALSE | DON'T KNOW |
| 65. Pressure ulcers are a lifelong concern for a spinal cord injured patient. | TRUE | FALSE | DON'T KNOW |
| 66. Pressure ulcers can be cleansed with water that is suitable for drinking. | TRUE | FALSE | DON'T KNOW |

| | | | |
|---|---|---|---|
| 67. Hydrocolloid dressings should be assessed for potential of rolling in an area and causing more pressure. | TRUE | FALSE | DON'T KNOW |
| 68. Suspected deep tissue injury does not evolve to another ulcer stage | TRUE | FALSE | DON'T KNOW |
| 69. Film dressings absorb a lot of drainage. | TRUE | FALSE | DON'T KNOW |
| 70. Non-sting skin prep should be used around a wound to protect surrounding tissue from moisture. | TRUE | FALSE | DON'T KNOW |
| 71. A Stage IV pressure ulcer never has undermining. | TRUE | FALSE | DON'T KNOW |
| 72. Bacteria can develop permanent immunity to both silver and honey dressings. | TRUE | FALSE | DON'T KNOW |

**Policies**

**1. Are you familiar with wound management policy and procedures in Oman?**

☐ Yes

☐ No

☐ Not sure

**2. How do you rate your knowledge and practical skills on wound assessment?**

☐ Highly skilled practitioner

☐ Good knowledge base but lacks practical skills

☐ Good practical skills but lacks knowledge

☐ Poor knowledge and practical skill.

**3. How often do you manage wounds?**

☐ Daily

☐ 2-3 times a week

☐ Monthly

☐ 2-3 times a year

---

**Resources**

**1. Which of the following prevention measures of pressure ulcers is available in your ward?** **(***(You may √ **more than one** box if applicable)*

☐ Ripple mattress

☐ Air mattress

☐ Sheepskin

☐ Heel elevation Devices

☐ Others (Please specify)

_____

**2. Which of the following treatment is used for pressure ulcers in your ward?**

**(***(You may √ **more than one** box if applicable)*

☐ Silvercel

☐ Calcium alginate

☐ Povidone-idoine solutions

☐ Normal saline 0.9%

☐ Hydrogen peroxide 3%

☐ Hydrogel

☐ Nu-gel (Hydrogen with Alginate)

☐ Promogran

☐ Others (Please specify)

_____

# Appendix 2: Participants Information Sheet

**Participant Information Sheet**

**Study Title**:

Exploring nurses views and knowledge in relation to pressure ulcers management in Oman: A mixed method of quantitative and qualitative study

***'You are being invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.***

***Thank you for reading this.'***

**The purpose of the study**:

This aim of the study is to explore the nurses' views and their level of knowledge of prevention and management of pressure ulcers in Oman. The reason for conducting this study is to improve our understanding of the reasons why patients develop pressure ulcers either during their admission or when they are at home. In this study, nurses will be chosen from the following areas: ICU, CCU, Surgical ward, Medical ward, and Orthopaedic ward because patients who are admitted here are at risk of developing pressure ulcers.

**Reasons for choosing the candidate: (Why have I been chosen?)**

The reason for choosing you is that you are working in the areas that were specified in the inclusion criteria of this study which are the ICU, CCU, Medical, Surgical, and Orthopaedic wards.

**Do I have to take part?**

*'It is up to you to decide whether or not to take part. If you decided to take part you will be given this information sheet to keep.*

Filling the questionnaire considered consent for the study.

**What will happen to me if I take part?**

If you happy to take part in the study you will be asked to complete a questionnaire. It should take around 15 minutes to complete. The questionnaire will be distributed to you in your place of work.

On the back of the questionnaire is an invitation to take part in the second part of the study which involves interviews with staff nurses. If you are willing to take part in an interview, please contact me using the details given. The interview will be held in your workplace and at the time which is convenient to you and your supervisor. You will be asked to sign a consent form and the interview will take 30 to 45 minutes. The interview will be tape recorded and transcribed.

**What are the possible disadvantages and risks of taking part?**

There will be no disadvantages or risks in taking part in this study.

**What are the possible benefits of taking part?**

'You may not receive a direct benefit from taking part in this study. The information that is collected during this study will give us a better standing of the current situation of pressure ulcers management in Oman.'

**Will my taking part in this study be kept confidential?**

'All the information, which is collected, about you during the course of the research will be kept strictly confidential. You will be identified by an ID number and any information about you will have your name and address removed so that you cannot be recognised from it. Direct quotes from the interview may be used but it will be anonymized and no one will know you.'

**What will happen to the results of the research study?**

The research study will be finalized 2 years from now. Once it is approved the researcher will send a copy to your supervisors were you can read and see the results.

**Who is organising and funding the research?**

The research is being organised by the researcher as a part of her PhD. The funding of this research is included in the researcher study funding.

**Who has reviewed the study?**

The research project has been revised by the Research Committee in MOH in Oman and by the Faculty of Medicine Ethics Committee in the University of Glasgow.

**Contact for further information:**

You can through the following contact details:

Amal Al Shidi

Phone No.: +968 99454317

E-mail address: Amal.AlShidi12@gmail.com

If you have any queries about the study or were not happy about the study and the way it was conducted please feel free to contact:

Dr. Muliira Joshua

Assistant Dean- Clinical Training & Community Services

College of Nursing, Sultan Qaboos University

E-mail address: jkmuliira@gmail.com

Phone No.: +968 93284347

# Appendix 3: Invitation sheet to participate in the Phase II study

***Thank you for your precious time that you have spent in filling this questionnaire.***

The next part of the research involves semi-structured interviews with up to 20 nurses. The interview will take 30 to 45 minutes only. The researcher will meet you during your working time after taking the permission from your supervisor.

If you are interested in taking part in these interviews, please fill the last paper in give it to the Research Assistant in your hospital and you will be contacted later by the researcher.

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Amal Al Shidi

Tutor

Sohar Nursing Institute

Sultanate of Oman

**Currently**:

A PhD student in University of Glasgow, Scotland, United Kingdom

**Please take-off this page. Complete your information and hand it over the Research Assistant in your hospital. Thank you for your co-operation.**

Full Name: _____

Hospital: _____

Ward/unit: _____

Years of experience in the ward/unit: _____

Degree: _____

Graduation year: _____

# Appendix 4: Interview Guide

## Interview Questions

***Introduction*: (Mention the Date and the Time)**

Hi my name is Amal. I'm going to have an interview with you regarding your views

# Appendix 6: Oral Presentation

## 15.50 – 16.45 **Concurrent session 3** – Monday 20 April 2015

3.5.2 Abstract number 258

1:20pm

### Satisfaction and perception with pain management among Palliative Patients with Breakthrough Pain

*Author(s): Subramanian,Pi ,Kuala Lumpur ,Msia; an SB ,Kuala Lumpur ,Msia;Supermanian, S Nottingham, United Kingdom ;Boey CM,Kuala umpur Msia*

*Presenter(s): Dr, Pathmawathi Subramanian, Doctorate In Health Science, University Malaya, Malaysia*

**Abstract**

**Background:** Breakthrough pain contributes significantly to much suffering cancer patients. The xperience of intense pain may interfere with, and ffect, daily life functioning and has major consequences on patients' well-being if it is not well anaged since the area of breakthrough pain has ot been fully understood.

**ims**: The study aims to explore the experiences of reakthrough pain among palliative patients.

**Method:** A qualitative study was conducted based n a series of open-ended interviews among wenty one palliative patients suffering from pain t an urban tertiary hospital in Malaysia.

**esults:** There were five themes generated from he interview data: (1) pain viewed as an unbearble experience causing misery in the lives of atients, (2) deterioration of bodily function and o hope of recovery, (3) receiving inadequate pain ontrol for break through pain, (4) insensitivity of ealth care providers towards patients' pain experince, and (5) pain coping experiences of patients.

**iscussion:** The findings revealed that pain still emains as major issue among palliative patients espite the use of pain control medication. Alterative method such as the non-pharmacological pproaches and psycho social support should e introduced to the patients. Proper guidance nd information should be given to health care roviders to improve the quality of patient care.

**onclusion:** Health care providers should adopt a ensitive approach in caring for patients' to meet heir needs in order to provide adequate pain relief or breakthrough pain.

Theme: Questionnaires

3.6.1 Abstract number 76

3:50pm

### Nurses' knowledge of pressure ulcers and their management in Oman

*Author(s): Amal Al Shidi, Scotland; United Kingdom*

*Presenter(s): Amal Al Shidi, Master in Nursing, PhD Nursing student, Amal Said Salim Al Shidi, PhD Nursing Student, Nursing & Health Care School, School of Medicine, College of Medical, Veterinary and Life Sciences, University of Glasgow, Glasgow*

**Abstract**

**Background:** Pressure ulcers (PrUs) have a significant impact on health system expenditure and quality of life (Coleman et al. 2014). In Oman, no studies have been conducted to investigate nurses' knowledge on prevention and management of PrUs.

**Aim**: To describe the knowledge about PrUs prevention and management among nurses in Oman.

**Ethical Approval**: Ethical approval obtained in September 2013 from the Research and Ethical Review & Approval Committee, Ministry of Health, Oman.

**Method**: A descriptive survey was conducted. Cluster sampling was used to select participants (Parahoo 2006). A questionnaire was developed. The first two sections of the questionnaire were: demographic data and the Pieper-Zulkowski Pressure Ulcer knowledge test (PZ-PUKT) (Pieper & Zulkowski 2014). The PZ-PUKT is divided into three sub-sections: prevention, staging, and wounds description. Section three and four covered policy and resources available for prevention and management of PrUs in Oman. Data were collected in October 2013. Questionnaires (n=640) were distributed to nurses working in seven hospitals.

**Results:** A total of 478 (76.4%) questionnaires were analysed. The overall mean percent scores for correctly answered questions was 51% and for the sub-sections: 53.5%, prevention; 47.7%, staging, 51.2% wounds description. Half of the nurses (50.1%, n = 225) responded they had 'Good practical skills' but lacked knowledge, over half (56.8%, n=258) were managing wounds daily, 60.5% (n=276) were familiar with the hospital wound management policy, and only 20.7% (n=94) had read the National/European Pressure Ulcer

3.6.2 Abstract number 95

4:20pm

### Do nurse led foot checks result in improved reported foot self-care behaviour in haemodialysis patients with diabetes?

*Author(s): Sarah Brand, United Kingdom, Nadina Lincoln, United Kingdom, Alison Musgrove, United Kingdom*

*Presenter(s): Sarah Brand, BA (Hons), Diploma in Nursing, MSc, MA Research Methods, Nottingham University Hospitals Trust, United Kingdom*

**Abstract**

**Background:** Diabetic patients requiring haemodialysis are at particularly high risk of foot ulcers (Game, 2012). Despite this, patients rarely have their feet checked for foot problems whilst attending for dialysis (Schomig et al., 2000).

**Aim:** Conducted as a service evaluation, the aim was to evaluate the effect of education for dialysis nurses on the need to examine patient's feet whilst on dialysis. Outcomes were frequency of foot examination by health care professionals and reported foot self-care behaviour of diabetic haemodialysis patients as measured by the Nottingham Assessment of Functional Footcare (NAFF).

**Methods:** A non-randomised stepped wedge design was used. Data were recorded from all diabetic patients on dialysis willing to participate attending four dialysis units at baseline (June 2013) and at two monthly intervals (final assessment February 2014). Education was delivered sequentially in each dialysis unit.

**Results:** 95 patients agreed to participate. There were no significant differences between the four dialysis units at baseline in frequency of foot examination (chi-squared p⟶0.05) or in foot self-care behaviour (NAFF p=0.57). Comparison of scores between initial and final assessment showed a significant improvement in foot care behaviour (p⟵0.001) and a significant increase in foot examination by nurses (p⟵0.001).

**Discussion:** Analysis of all assessments showed improvements in foot self-care behaviour were unrelated to implementation of the educational intervention as behaviour improved at all units between baseline and second assessment despite the intervention only having been implemented at a single unit.

**Conclusion:** It would appear that raising awareness of foot self-care behaviour by administration of the

## Satisfaction and perception with pain management among Palliative Patients with Breakthrough Pain

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**Background:** Breakthrough pain contributes significantly to much suffering cancer patients. The experience of intense pain may interfere with, and affect, daily life functioning and has major consequences on patients' well-being if it is not well managed since the area of breakthrough pain has not been fully understood.

**Aims:** The study aims to explore the experiences of breakthrough pain among palliative patients.

**Method:** A qualitative study was conducted based on a series of open-ended interviews among twenty one palliative patients suffering from pain at an urban tertiary hospital in Malaysia.

**Results:** There were five themes generated from the interview data: (1) pain viewed as an unbearable experience causing misery in the lives of patients, (2) deterioration of bodily function and no hope of recovery, (3) receiving inadequate pain control for break through pain, (4) insensitivity of health care providers towards patients' pain experience, and (5) pain coping experiences of patients.

**Discussion:** The findings revealed that pain still remains as major issue among palliative patients despite the use of pain control medication. Alternative method such as the non-pharmacological approaches and psycho social support should be introduced to the patients. Proper guidance and information should be given to health care providers to improve the quality of patient care.

**Conclusion:** Health care providers should adopt a sensitive approach in caring for patients' to meet their needs in order to provide adequate pain relief for breakthrough pain.

3:50pm

## Nurses' knowledge of pressure ulcers and their management in Oman

***Author(s):*** *Amal Al Shidi, Scotland; United Kingdom*

***Presenter(s):*** *Amal Al Shidi, Master in Nursing, PhD Nursing student, Amal Said Salim Al Shidi, PhD Nursing Student, Nursing & Health Care School, School of Medicine, College of Medical, Veterinary and Life Sciences, University of Glasgow, Glasgow*

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**Discussion:** For each question on average, only 51% had the correct answer, suggesting a low level of knowledge on PrUs. These results highlight concerns about the nurses' knowledge on PrUs prevention and management.

**Conclusion:** Nurses in Oman require more training to effectively prevent and manage PrUs. The MOH should revise the available wound management policy to include guidelines for PrUs prevention and management and staff training requirement.

## Do nurse led foot checks result in improved reported foot self-care behaviour in haemodialysis patients with diabetes?

***Author(s):*** *Sarah Brand, United Kingdom, Nadina Lincoln, United Kingdom, Alison Musgrove, United Kingdom*

***Presenter(s):*** *Sarah Brand, BA (Hons), Diploma in Nursing, MSc, MA Research Methods, Nottingham University Hospitals Trust, United Kingdom*

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**Results:** 95 patients agreed to participate. There were no significant differences between the four dialysis units at baseline in frequency of foot examination (chi-squared $p \rightarrow 0.05$) or in foot self-care behaviour (NAFF p=0.57). Comparison of scores between initial and final assessment showed a significant improvement in foot care behaviour ($p \leftarrow 0.001$) and a significant increase in foot examination by nurses ($p \leftarrow 0.001$).

**Discussion:** Analysis of all assessments showed improvements in foot self-care behaviour were unrelated to implementation of the educational intervention as behaviour improved at all units between baseline and second assessment despite the intervention only having been implemented at a single unit.

**Conclusion:** It would appear that raising awareness of foot self-care behaviour by administration of the NAFF was the stimulus for improved behaviour. Use of the stepped wedge design enabled closer analysis of the relationships between intervention implementation and outcomes.

# Appendix 7: E-Poster Presentation

**[EP057] EXPLORING NURSES KNOWLEDGE AND VIEWS IN RELATION TO PRESSURE ULCER (PRU) MANAGEMENT IN OMAN**

Amal Al Shidi[1], Glasgow, United Kingdom , Dr Lorna Paul[2], Glasgow, United Kingdom , Dr Elizabeth Tolmie[2], Glasgow, United Kingdom

[1]*School of Medicine; Nursing and Health Care School*
[2]*University of Glasgow; Nursing and Health Care School*

Thursday, May 14, 2015

E-poster session: Education

**Aim:** To explore nurses' views, attitudes and beliefs regarding PrU prevention and management in Oman.

**Method (Mixed Method Design):** A descriptive survey was conducted. Cluster sampling was used to select participants from seven hospitals. A questionnaire that included the Pieper-Zulkowski Pressure Ulcer knowledge test (PZ-PUKT) and two more sections developed by the researcher were administered to 1006 nurses. Semi-structured qualitative interviews were conducted with 16 of the questionnaire respondents. Interviews took approximately 30 minutes, were recorded and transcribed verbatim. Qualitative data were analysed using the Knowledge, Attitudes and Practice (KAP) model as the a *priori* framework.

**Results / Discussion:** A total of 478 (76.4%) questionnaires were analysed. The overall mean percent score for correctly answered questions was 51% suggesting a low level of knowledge. Qualitative analysis identified four themes in addition to those encompassed within the a *priori* framework. Findings indicated that some nurses have a positive attitude about PrUs care and feel rewarded when they see wounds improving while others said they could not work with patients independently because they lacked the knowledge and the skills needed to manage PrUs. There was variation in the management of PrUs between hospitals and view that the Ministry of Health (MoH) wound management policy did not include enough information to guide staff.

**Conclusion:** The available MoH wound management policy needs to be updated. The nurses' lack of knowledge and training affects their attitudes towards PrUs management. Nurses are aware of the risk of PrUs and try their best to manage them with the available resources however more training is required.