Nurses' Knowledge, Attitude, and Practice Regarding Pressure Ulcer Prevention for Hospitalized Patients at Rajshahi Medical College Hospital in Bangladesh

Md. Shariful Islam

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Nursing Science (International Program)

Prince of Songkla University

2010

Thesis Title	Nurses' Knowledge, Attitude, and Practice Regarding Pressure Ulcer Prevention for Hospitalized Patients at Rajshahi Medical College Hospital in Bangladesh
Author	Md. Shariful Islam
Major Program	Nursing Science (International Program)

Major Advisor

……
(Asst. Prof. Dr. Wipa Sae-Sia)

Co-advisor

……...
(Asst. Prof. Dr. Natenapha Khupantavee)

Examining Committee

……...Chairperson
(Asst. Prof. Dr. Wongchan Petpichetchian)

…….
(Asst. Prof. Dr. Wipa Sae-Sia)

…….
(Asst. Prof. Dr. Natenapha Khupantavee)

…….
(Assoc. Prof. MD. Boonsin Tangtrakulwanich)

…….....
(Asst. Prof. Dr. Jom Suwanno)

The Graduate School, Prince of Songkla University, has approved this thesis as partial fulfillment of the requirements for the Master of Nursing Science (International Program).

……
(Assoc. Prof. Dr. Krerkchai Thongnoo)
Dean of Graduate School

Thesis Title	Nurses' Knowledge, Attitude, and Practice Regarding Pressure Ulcer Prevention for Hospitalized Patients at Rajshahi Medical College Hospital in Bangladesh
Author	Md. Shariful Islam
Major Program	Nursing Science (International Program)
Academic Year	2009

ABSTRACT

This is a descriptive correlational study aimed to examine nurses' knowledge, attitude, and practice regarding pressure ulcer prevention in Bangladesh. It also examines the relationships between nurses' knowledge, attitude, and practice with respect to pressure ulcer prevention. The subjects were nurses working at Rajshahi Medical College Hospital in Bangladesh. Ninety one nurses working in pressure ulcer related wards returned the questionnaires (an 84.26% response rate). Data were analyzed by descriptive and Pearson product-moment correlation statistics.

The findings showed that nurses had a very low level of knowledge (M = 57.79%, SD = 9.2%), neutral level of attitudes (M = 78.31%, SD = 6.61%), and a moderate level of practice (M = 77.55%, SD = 11.0%). There was a positive correlation between nurses' attitudes and practice (r = .34, p < .01). However, no significant correlation was found between knowledge and attitude (r = .14, p > .05), and knowledge and practice regarding pressure ulcer prevention (r = .14, p > .05). These findings suggest that nurses need to develop positive attitudes and to increase their knowledge of pressure ulcer prevention in order to improve nursing practice in this area.

ACKNOWLEDGEMENTS

I am very grateful to the Faculty of Nursing, Prince of Songkla University for facilitating my studies and providing resources to me to complete my study. I am also in debt to the Director of the Directorate of Nursing Services under the Ministry of Health and Family Welfare, the Government of the People Republic of Bangladesh who gave me a scholarship to study on the Master in Nursing Science programme. I would like to express my deepest gratitude to my major advisor, Assistant Professor Dr.Wipa Sae-Sia, who has kindly provided me with time, valuable suggestions, guidance, correction, comments, and support. These have greatly contributed to this final thesis paper.

I would also like to extend my warmth appreciation and sincere gratitude to all people who were involved in my completing the research work. Sincere appreciation is also extended to my co-advisor, Assistant Professor Dr. Natenapha Khupantavee, Assistant Professor Dr. Wongchan Petpichetchian, Chairperson of the Program Committee, and the thesis examining committee, for valuable supervision and encouragement.

I extend my gratitude to the other examiners for their precious comments, guidance, valuable time and suggestions. I am grateful to the following experts for their valuable opinions in correcting the instruments: Assistant Professor Dr. Jaruwan Manasurakan, Ms. Uma Jantavisat, nurse clinician and Assistant Professor Dr. Shahedur Rahman Chowdhury, thoracic surgeon. I am deeply gratitude to the Nursing Superintendent and the Director of Shaheed Ziaur Rahman Medical College College Hospital in Bogura for giving me permision to collect data for the pilot study.

Sincere appreciation goes to Assistant Professor Dr. Sopen Chunuan for her statistical guidance. I thank Mohammad Golam Kibria and Assistant Professor Dr. Azaher Ali Molla for their great contribution during the back translation of the instruments. I would also like to thank Professor Dr. Anthony Gethin Hopkin and Mr. Saroj Gyawali for their kindness and excellent assistance in editing my English.

My sincere thanks extend to all nurses who participated in this study and special thanks also go to Director and Nursing Superintendent of Rajshahi Medical College Hospital who permitted and facilitated my collection of the data. I greatly thank and pay my respects to all staff in Faculty of Nursing and my classmates for their constant support when completing my work on this thesis.

Finally, my very special respects are offered to my beloved wife whose patience and loving kindness enabled me to complete this study. Special thanks go to my sweet children who sacrificed their valuable time with me.

Md. Shariful Islam

CONTENTS

	Page
ABSTRACT ……...	iii
ACKNOWLEDGEMENTS ……...	iv
CONTENTS ……...	vi
LIST OF FIGURES ……	ix
LIST OF TABLES …….....	x
CHAPTER	
1. INTRODUCTION ……..	1
Background and Significance of the Problem ……..…….	1
Objectives of the Study ……..	6
Research Questions ……	6
Conceptual Framework of the Study …….…….	6
Hypothesis …….…….	10
Definition of Terms ……	10
Significance of the Study ……	11
Scope of the Study ……..	12
2. LITERATURE REVIEW ……...	13
Concept of Pressure Ulcer Development ……...……	14
Pressure Ulcer Prevention Practice ……...…….	25
Current Nurses' Knowledge, Attitude, and Practice towards Pressure Ulcer Prevention …….……	31

CONTENTS (Continued)

	Page
Nursing Practices in Pressure Ulcer Prevention in Bangladesh …..…...	36
Summary ……...…….....	37
3. RESEARCH METHODOLOGY ……...	39
Design of the Study ……	39
Setting, Population, and Sample of the Study ……...…….	39
Instrumentation ……...	40
Data Collection Procedure ……..	46
Ethical Consideration …….	46
Data Analysis …….	47
4. RESULTS AND DISCUSSION …….	48
Results ……...…….	48
Discussion ……...	59
5. CONCLUSIONS AND RECOMMENDATIONS ……..	68
Summary of the Findings ...……	68
Strength and Limitation ……..……	69
Implications and Recommendations ……..…….	69
REFERENCES ……...	71
APPENDICES ……	82
A. Informed Consent Form ……..……...	83
B. Instruments ……..……...	85
C. Tables …….	97

TABLE (Continued)

	Page
D. Expert of the Content Validity of the Questionnaires ……...	108
E. Back Translators of the Instrument ……	109
VITAE……..	110

LIST OF FIGURES

Figure		Page
1	Conceptual Framework of Nurses' Knowledge, Attitude, and Practice Regarding Pressure Ulcer Prevention	9

LIST OF TABLES

Table		Page
1	Frequency and Percentage of Nurses' Demographic Characteristics (N=91) ……	49
2	Frequency and Percentage of Nurses in Each Category of Knowledge Level (N=91) …….…….	50
3	Mean Percentage, Standard Deviation, and Level of Nurses' Knowledge Regarding Pressure Ulcer Prevention Separated by each Dimension and Total Score (N = 91) ……...……...	51
4	Five Items with Highest and Five Items with Lowest Percentage of Nurses Answered Correctly on the Nurses' Knowledge of Pressure Ulcer Prevention Questionnaire (N = 91) ……..……	52
5	Frequency and Percentage of Nurses in Each Category of Attitude Level of Pressure Ulcer Prevention (N = 91) …….	53
6	Mean Percentage, Standard Deviation, and Level of Nurses' Attitude Regarding Pressure Ulcer Prevention Separated by Each Dimension and Total Score (N=91) ……..……..	54
7	Five Items with Highest and Four Items with Lowest Percentage of Nurses' Responded as "Strongly agree" on the Nurses' Attitude of Pressure Ulcer Prevention Questionnaire (N = 91) ……	55
8	Frequency and Percentage of Nurses in Each Category of Practice level of Pressure Ulcer Prevention (N = 91) ……..…….	56

LIST OF TABLES (Continued)

Table		Page
9	Mean Percentage, Standard Deviation, and Level of Nurses' Practice Regarding Pressure Ulcer Prevention Separated by Each Dimension and Total Score (N = 91) ……..……	57
10	Five Items with Highest and Five Items with Lowest Percentage of Nurses' Responded as "Always Practice" on the Nurses' Practice of Pressure Ulcer Prevention Questionnaire (N = 91) ……	58
11	Pearson Product-Moment Correlation Coefficient Between Nurses' Knowledge, Attitude, and Practice Regarding Pressure Ulcer Prevention (N=91) ……..……..	59
A-1	Mean Percentage, Standard Deviation, Frequency, and Percentage of Correct Answer of Nurses' Knowledge Regarding Pressure Ulcer Prevention Questionnaire (N=91) ……..	97
A-2	Frequency and Percentage of Nurses' Rating on the Attitude Regarding Pressure Ulcer Prevention Questionnaire (N = 91) ……	100
A-3	Frequency and Percentage of Rating on the Questions in the Nurses' Practice of Pressure Ulcer Prevention Questionnaire (N = 91) …….	104
A-4	Mean Percentage, Standard Deviation (SD), and F- Value of Nurses' Knowledge in Different Year of Working Experiences Regarding Pressure Ulcer Prevention (N = 91) ……...……	106
A-5	Mean Percentage, SD, and F-Value of Nurses' Working Experiences on Attitude Regarding Pressure Ulcer Prevention (N = 91) ……...……	106

LIST OF TABLES (Continued)

Table		Page
A-6	Mean Percentage, SD, and F-Value of Nurses' Working Experiences on Practice Regarding Pressure Ulcer Prevention (N = 91) …...……	107
A-7	Correlational Analysis Between Nurses' Service Experiences and Mean Percentage of Knowledge, Attitude, and Practice Score (N = 91) …….	107

CHAPTER 1

INTRODUCTION

Background and Significance of the Problem

A pressure ulcer is an area of localized damage to the skin, muscle and/or underlying tissue, caused by shear, friction, or unrelieved pressure, usually over bony prominences (Nursing Clinical Practice Guideline, 2001). Pressure ulcers are common problems in healthcare system and produce a significant burden on patients, relatives and caregivers (Bours, Halfens, Abu-Saad, & Groll, 2002). According to Brain and Lyder (2004), it was estimated that 60,000 deaths occurred each year in the United States of America (USA) due to pressure ulcer related complications. At least 1.7 million patients developed pressure ulcers every year (Pieper, 2007). Another study estimated that the incidence of pressure ulcer in acute care settings ranged from 2.2% to 66% in the United Kingdom (UK) and from 0% to 65.6% in the USA and Canada respectively (Kaltenthaler, Whitfield, Walters, Akehurst, & Paisley, 2001). According to (National Pressure Ulcer Advisory Panel [NPUAP], 2001), the incidence of pressure ulcer in the USA ranged from 0.4% to 38% in acute care settings, 2.2% to 23.9% in long term care, and 0% to 17% in home care. Recent study conducted in Europe, USA, Canada and Australia provided estimates of pressure ulcer prevalence in hospital ranging from 8.3% to 25.1% (Hulsenboom, Bours, & Halfens, 2007). The incidence of pressure ulcer in Asian countries was considered high ranging from 2.1% to 31.3% in ICU (Suriadi et al., 2007).

In Bangladesh, the incidence and prevalence data regarding pressure ulcers were not available. There were no sufficient records about pressure ulcer in the hospitals of Bangladesh. However, Hoque, Grangeon, and Reed (1999) conducted a study among paralyzed patients in Bangladesh and found that 94 out of 247 patients (38%) developed pressure ulcers. Until recently, there was no known guideline for the prevention of pressure ulcers in Bangladesh. The study of Hoque, Grangeon, and Reed was considered as an important land mark in the pressure ulcer prevention issue.

Pressure ulcer was a significant financial burden to any health care system and had adverse effects on achieving goals of care (Clark & Watts, 1994). Previous studies showed that pressure ulcers created several adverse effects, such as increased risk of infection, delayed wound healing, increased mortality, increased use of hospital resources and patient care costs, increased patients' length of hospital stay, pain and suffering, and lower quality of life (Armstrong, Bortz, & Halter, 2001; NPUAP, 2001). Many patients with recurrent pressure ulcers faced expensive dressing changes and time away from the family (Rintala, Garber, Friedman, & Holmes, 2008). Moore (2005) estimated that the annual treatment cost of pressure ulcers in the UK was $270 to $481.5 million and prevention cost was $270 to $1132.5 million. Pieper (2007) stated that treatment cost of pressure ulcer ranged from US $2.2 to US $3.6 billion per year. Pressure ulcer was the third most expensive morbidity due to prolonged hospitalization, and the need for intensive nursing care for pressure ulcer in the Netherlands (Haalboom, 2000).

There were several factors contributed to pressure ulcer development. These included advanced age, immobility, dehydration, co morbidities, impaired sensory perception, altered tissue perfusion, malnutrition, anemia, organ system failure, and

infection as intrinsic factors and intensity and duration of pressure, friction, shearing, and maceration as extrinsic factors (Fogerty et al., 2008; Sewchuk, Padula, & Osborne, 2006). Nurses' knowledge, attitude, and practice are also viewed as extrinsic factors for pressure ulcer formation.

Poor or inadequate knowledge and practice, and negative attitudes of nurses influenced higher prevalence of pressure ulcers (Ayello & Meaney, 2003). Pressure ulcer occurred as a result of a combination of both intrinsic and extrinsic factors and one important extrinsic factor was from poor management of sick patients (Bliss, 1990). Some reasons for the high incidence of pressure ulcer might be related to nurses' knowledge and practice in terms of risk assessment and prevention methods. Knowledge, attitude, and practice increased nurses' awareness of the problem of pressure ulcer and provided the basis for informed decision making and the framework to develop and maintain competency of delivering high quality of nursing care (Benbow, 1992). Gunningberg, Lindholm, Carlsson, and Sjoden (2001) studied staff nurses' knowledge and practice regarding existing guidelines of pressure ulcer in Sweden and found that majority of the nurses had an inadequate knowledge and practice to implement and document the risk assessment, prevention, and treatment of pressure ulcers in patients with hip fracture.

Pressure ulcer prevention is the responsibility of all health care professionals who are involved in patient care. Knowledge, attitude, and skills are necessary to provide nursing care effectively (Cully, 1998). Halfen and Eggink (1995) tested Dutch nurses' knowledge and practice regarding implementation of the 1985 Dutch National Guidelines and found that nurses had sufficient knowledge on the national

Guidelines, but they did not implement into practice. The researchers reported that attitude was necessary to implement the guideline.

Pressure ulcer prevention is one of the quality indicators to reduce the incidence of pressure ulcer in acute care setting. Development and implementation of pressure ulcer prevention protocol, educating staff, formation of quality improvement team and protocol, a nursing step in assessing risk and nutritional status, providing skin care, and documenting are the quality indicators for combating the pressure ulcer occurrences (Catania et al., 2007).

Pressure ulcer prevention guideline is one of the core components of the national healthcare strategic planning services. Guidelines are the instructions for nurses to provide up-to-date scientific clinical evidence on specific areas to ensure consistent and appropriate clinical practice (Langemo et al., 2008). A guideline is a systematically developed statement for practitioners that help to take decision about appropriate nursing practice for defined areas (Langemo et al.). Previous studies showed that in order to deliver high quality of care, it was essential for nurses to provide evidence-based nursing practice. In this regards, nurses must have knowledge of risk factors and preventive strategies of pressure ulcer development (Panagiotopoulou & Kerr, 2002). Various preventive measures were being used in nursing practice following a set of national guideline. Not only the nurses' knowledge, but also attitude towards pressure ulcer prevention is important. If an individual had a very negative attitude towards a given topic, then it is unlikely that the individual would perform positive or supportive behaviors in relation to that topic (Maylor, 2001). For example, the more pressure ulcer prevention was valued by

nurses, the greater the likelihood of prevention practice being carried out by them (Maylor & Torrance, 1999).

Factors that enhance nurses' knowledge, attitude, and practice regarding pressure ulcer prevention were effective education, willingness to change clinical practice, availability of resources, sufficient equipment supplies, administrative support, and increased multidisciplinary team collaboration (Clarke et al., 2005). One study found that lack of updating in nurses' education decreased the level of knowledge among nurses with many years experience (Pancorbo-Hidalgo, Garcia-Fernandez, Lopez-Medina, & Lopez-Ortega, 2007). It was stated that nurses who were not being trained in pressure ulcer prevention possessed lower level of knowledge and practice as compared to those being trained in pressure ulcer prevention program (Pancorbo-Hidalgo et al.) Other social and organizational factors that affect nurses to incorporate knowledge into practice included: 1) inadequate leadership, 2) lack of education and training program, 3) lack of evidence-base practice guideline, 4) patients over load, 5) shortage of staff, 6) insufficient time and cooperation from other professionals, and 7) lack of equipment and facilities, and inadequate pain management (Moore & Price, 2004).

In Bangladesh, there is very limited information available about pressure ulcer prevention strategies used by the nurses. Currently, there is no evidence on Bangladeshi nurses' knowledge, attitude, and practice regarding pressure ulcer prevention and this study was the first of its kind. Therefore, it was important to explore and investigate the nurses' knowledge, attitude, and practice regarding pressure ulcer prevention for hospitalized patients in Bangladesh.

Objectives of the Study

The objectives of this study were as follows:

1. To assess the level of nurses' knowledge regarding pressure ulcer prevention

2. To evaluate the level of nurses' attitudes regarding pressure ulcer prevention

3. To identify the level of nurses' practice regarding pressure ulcer prevention

4. To investigate the relationships among the level of nurses' knowledge attitude, and practice regarding pressure ulcer prevention.

Research Questions

The research questions of this study were as follows:

1. What is the level of nurses' knowledge regarding pressure ulcer prevention?

2. What is the level of nurses' attitudes regarding pressure ulcer prevention?

3. What is the level of nurses' practice regarding pressure ulcer prevention?

4. Are there any relationships between nurses' knowledge and attitude, attitude and practice, knowledge and practice regarding pressure ulcer prevention?

Conceptual Framework of the Study

The conceptual framework of this study was based on taxonomy of educational objectives developed by Bloom (1956) and modified by Anderson and Krathwohl (2001). In addition, the knowledge - attitude - practice (KAP) model (Launiala, 2009) and the literature reviews of risk factors of pressure ulcer

development were used to guide the relationship between knowledge, attitude, and practice and to develop contents of pressure ulcer prevention. Bloom's Taxonomy of learning objectives was selected to guide this present study because the researcher would like to examine whether nurses had been trained to achieve learning outcomes, which is needed to enhance the prevention of pressure ulcer development. Three domains of learning objective are classified: cognitive, affective, and psychomotor. Knowledge, attitude, and practice represent those three domains respectively.

Cognitive domain has two dimensions: knowledge and cognitive process (Anderson & Krathwohl, 2001). Knowledge refers to factual, conceptual, procedural, and metacognitive thought. Cognitive process refers to the mechanism in which one reaches such different levels of knowledge. Combining these two dimensions, according to Bloom, there are six levels of cognitive domains: remembering, understanding, applying, analyzing, evaluating, and creating. This study focused on the first three levels of the cognitive domain by viewing them as basic knowledge for nursing practice (Anderson & Krathwohl; Bloom, 1956). The first three levels are the lower level of learning and the rests are the higher level of learning. Remembering is described as retrieving, recognizing, and recalling relevant knowledge from long term memory. Understanding is the meaning, translation, and interpretation of instructions and problems. Applying is defined as the carrying out or using a procedure through executing or implementing.

Attitude is an internal or covert feeling and emotion or selective nature of intended behavior which represents the affective domain (Bloom, 1956). Attitude can be defined as human perception and cognitive reaction to a condition or event. It is categorized into five levels including receiving, responding, valuing, organizing, and

internalizing (Krathwohl, Bloom, & Masia, 1964). Attitude can be viewed as one aspect of an affective domain as stated by Bloom. This study focused on the first three levels of the affective domain by viewing them as foundational level of attitude development. Those three levels are: 1) Receiving explains awareness, willingness to hear, and selected attention towards the phenomenon, 2) Responding is meant to attend and react to a particular phenomenon, and 3) Valuing is an internalization of a set of specified values which were expressed by an individual's overt behavior (Bloom).

Practice represents the psychomotor domain. It refers to the physical movement, coordination, and use of motor or neuromuscular activities (Bloom, 1956). Practice is the application of rules and knowledge that leads to action (Bloom). Psychomotor domain categorized into five levels including imitation, manipulation, precision, articulation, and naturalization. This study focused on the first three levels of the psychomotor domain by viewing them as foundational level of practice development. Those three levels are: 1) Imitation covers observing and patterning behavior after someone else, 2) Manipulation is an individual's ability to perform certain actions by following written or verbal instructions, and 3) Precision is an individual's ability to perform a task or activity with expertise and to deliver high quality care without assistance or instructions (Bloom).

The first three levels of each domain was used to cover the contents of 1) factors related to pressure ulcer development, 2) risk assessment, 3) skin care, 4) nutrition to maintain healthy skin, 5) management of mechanical loads, and 6) educational program for patients, family, and staff respectively as listed in Figure 1.

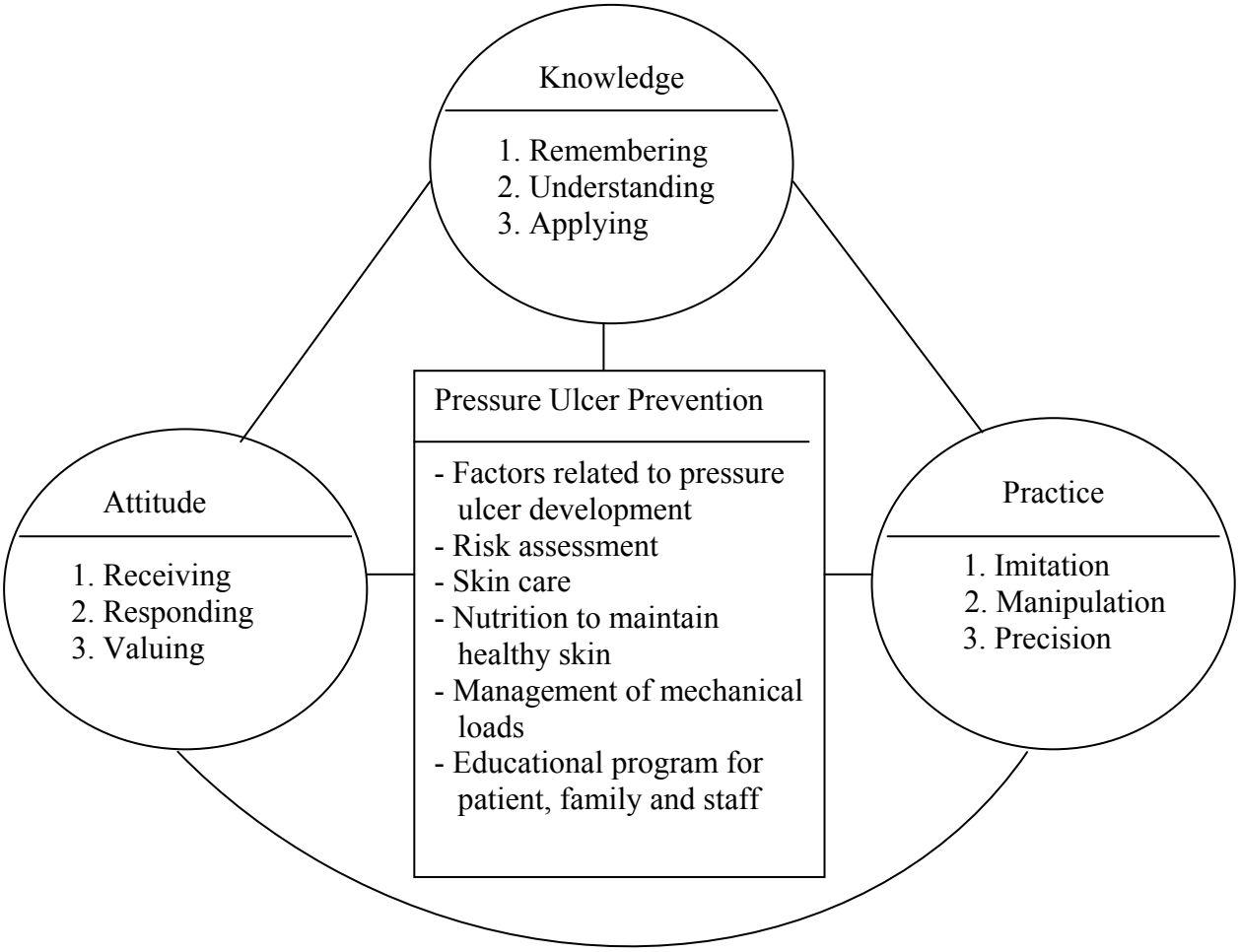

Figure 1

Conceptual Framework of Nurses' Knowledge, Attitude, and Practice Regarding Pressure Ulcer Prevention

According to Bloom (1956), the first level is the prerequisite to the next. It means that one cannot effectively address the higher level if they do not learn the below ones. In addition, in the context of Bangladesh, nurses have been trained to perform task oriented nursing actions, which require at least the first three levels of knowledge, attitude, and practice skills. It is then more reasonable to assess them

whether Bangladeshi nurses possess the first three levels in the learning domains. Therefore, in this study, knowledge, attitude, and practice were the key concepts representing nurses' development of quality of care to prevent pressure ulcer formation. According to the KAP Model (Launiala, 2009), there are interrelations among knowledge, attitude, and practice. Certain knowledge can influence upon individuals ability to perform actions. The attitude affects individual towards practice. Knowledge and attitude bring changes in human behavior. Therefore, integral components of knowledge, attitude, and practice represent the quality of nursing practice.

Hypothesis

There are positive relationships between nurses' knowledge and attitude, attitude and practice, and knowledge and practice regarding pressure ulcer prevention.

Definition of Terms

Nurses' knowledge of pressure ulcer prevention refers to the level of nurses' remembering, understanding, and applying of pressure ulcer prevention in the following contents: factors related to pressure ulcer development, risk assessment, skin care, nutrition to maintain healthy skin, management of mechanical loads, and educational program for patient, family, and staff. Nurses' knowledge was assessed by self-report questionnaire developed by the researcher. The higher scores indicate higher level of knowledge.

Nurses' attitude of pressure ulcer prevention refers to the level of nurses' receiving, responding, and valuing of pressure ulcer prevention in the following areas:

factors related to pressure ulcer development, risk assessment, skin care, nutrition to maintain healthy skin, management of mechanical loads, and educational program for patient, family, and staff. Nurse's attitude was assessed by self-report questionnaire developed by the researcher. The higher scores indicate positive attitude.

Nurses' practice of pressure ulcer prevention refers to the level of nurses' imitation, manipulation, and precision of pressure ulcer prevention in the following areas: factors related to pressure ulcer development, risk assessment, skin care, nutrition to maintain healthy skin, management of mechanical loads and educational program for patient, family, and staff. Nurses' practice was assessed by self-report questionnaire developed by the researcher. The higher scores indicate higher level of practice.

Significance of the Study

The study was expected to describe the nurses' knowledge, attitude, and practice regarding pressure ulcer prevention. The outcomes of this study contribute to nursing education, nursing practice, and future research in Bangladesh. It will provide baseline data for higher authority to plan for an initiation for staff development in order to improve quality of care. The study findings will also provide a unique exploration of level of nurses' knowledge, attitude, and practice regarding pressure ulcer prevention; thereby, contributing to body of knowledge on this subject. In-service training and educational program can be designed for nurses to enhance their knowledge, attitude, and practice.

Scope of the Study

This correlational descriptive study was focused on exploring the nurses' knowledge, attitude, and practice regarding pressure ulcer prevention. In addition, the relationships among nurses' knowledge, attitude, and practice were examined. The subjects involved in this study were all nurses who were working permanently at six selected units of Rajshahi Medical College Hospital, a 500-bed teaching hospital in Bangladesh. This study was conducted from November 2009 to January 2010.

CHAPTER 2

LITERATURE REVIEW

This chapter describes theoretical review and research findings related to nurses' knowledge, attitude, and practice on pressure ulcer prevention. The review is presented as follows:

1. Concept of pressure ulcer development
    1.1 Definition of pressure ulcer
    1.2 Stages of pressure ulcer
    1.3 Pathophysiology and risk factors for pressure ulcer development
    1.4 Risk assessment of pressure ulcer
2. Pressure ulcer prevention practice
    2.1 Skin care
    2.2 Nutrition to maintain healthy skin
    2.3 Management of mechanical loads
    2.4 Educational program for patient, family, and staff
3. Current nurses' knowledge, attitude, and practice towards pressure ulcer prevention
    3.1 Factors contributing to nurses' knowledge, attitude, and practice regarding pressure ulcer prevention
    3.2 Relationships between nurses' knowledge, attitude, and practice regarding pressure ulcer prevention
4. Nursing practices in pressure ulcer prevention in Bangladesh
5. Summary

Concept of Pressure Ulcer Development

Different terminologies are used to refer to pressure ulcer, such as bed sore, decubitus ulcer, and pressure sore. Pressure ulcer is developed when tissue damage occurs due to applying some mechanical forces over bony prominences (Sewchuk, Padula, & Osborne, 2006). Approximately 1.7 million patients developed pressure ulcer every year (Pieper, 2007). More than a million hospitalized patients developed one or more pressure ulcers each year in the USA (Young, Evans, & Davis, 2003). The incidence of pressure ulcer development in spinal cord injury patients and surgical patients ranged from 20% to 31% and 4% to 45%, respectively (NPUAP, 2001). Pressure ulcer causes pain and suffering, risk for infection, delayed wound healing, increased mortality, decreased quality of life of patients, increased hospital length of stay and use of hospital resources as well as increased treatment costs (NPUAP; Rintala et al., 2008).

Definition of pressure ulcer

A pressure ulcer is defined as any lesion caused by unrelieved pressure that result in damage to the underlying tissue. Various organizations defined pressure ulcer in different ways. Currently, pressure ulcer is defined as localized injury to the skin/or underlying tissue usually over bony prominences as a result of pressure or pressure in combination with shear and/or friction (National Pressure Ulcer Advisory Panel [NPUAP], 2007). Fonder et al. (2008) described pressure ulcer as an area of skin breakdown due to unrelieved pressure in one position without shifting weight for a long or short duration of time against the skin which reduces blood supply to that area followed by tissue necrosis and cellular death. According to (European Pressure Ulcer Advisory Panel [EPUAP], 1999), pressure ulcer is defined as an area of localized

damage to the skin and underlying tissue caused by pressure, shear, friction, and/or combination of these. Therefore, pressure ulcer is a type of localized injury or damage to the underlying soft tissue caused by unrelieved pressure, shear, and friction force. Pressure ulcer occurs when the tissue is compressed between a bony prominence and external surface for a prolonged period of time.

Stages of pressure ulcer

Pressure ulcer staging system was developed by the National Pressure Ulcer Advisory Panel (NPUAP) in 1989. This system was previously classified into 4 stages including Stage I, Stage II, Stage III, and Stage IV pressure ulcer. Recently, NPUAP (2007) modified the staging systems of developing pressure ulcer into six types including 1) suspected deep tissue injury, 2) stage I, 3) stage II, 4) stage III, 5) stage IV, and 6) unstageable pressure ulcer. Suspected deep tissue injury is a purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. This type of tissue injury cannot be identified due to Escher.

Stage I pressure ulcer is an intact non-blanchable redness skin which may appear as painful, firm, soft, warmer or cooler as compared to adjacent tissue. It is very difficult to differentiate the blanching from darkly pigmented skin. Stage II pressure ulcer is a partial thickness skin loss which is characterized by a red pink wound bed including ruptured serum filled blister. Stage III pressure ulcer is defined as full-thickness tissue loss without exposing of bone, tendon, or muscle including undermining and tunneling. Stage IV pressure ulcer is described as a full-thickness tissue loss with exposed bone, tendon, or muscle with slough or Escher. Unstageable pressure ulcer can be defined as full-thickness tissue loss covering the base of ulcer

with slough. (yellow, tan, gray, green, or brown) and/or Escher (tan, brown, or black) in the wound bed (Black et al., 2007).

Pathophysiology and risk factors for pressure ulcer development

Pathophysiology of pressure ulcer

Two theories explain pathophysiology of pressure ulcer development including outward theory and inward theory. The outward theory states that muscle tissue dies first from pressure. Pressure ulcer begins from the bone outward. Deep tissue injury near the bone occurs first and it continues until the tissue death reaches the epidermis resulting in skin breakdown (Maklebust & Sieggreen, 2001). The second theory is inward theory. External pressure is transmitted from the epidermis inward towards the bone as well as counter pressure from the bone. Blood vessels, fascia, and the skin are compressed between these two counter pressures (Maklebust & Sieggreen). The skin destruction occurs at the epidermis and proceeds downward to the deeper tissues. Friction and shear are also mechanical forces responsible for pressure ulcer development (Maklebust & Sieggreen). These two phenomena create tissue ischemia and ulcer development.

Risk factors of pressure ulcer development

The most important determinants of pressure ulcers are the intensity and duration of pressure and the tissue tolerance for pressure (Bergstrom, Braden, Laguzza, & Holman, 1987). Greater degree and longer duration of shearing and compressive forces between bony prominence and external surface cause damage to the tissue (Keller, Wille, VanRamshorst, & Van der Werken, 2002). Tissue tolerance is defined as the ability of the skin and underlying structures to tolerate pressure (Australian Wound Management Association [AWMA], 2001). Tissue tolerance for

pressure is influenced by both extrinsic and intrinsic factors. Most studies classified risk factors for pressure ulcer development as an extrinsic and intrinsic factors. Extrinsic factors are related to mobility, activity, skin moisture, friction, and shear. Mobility is the ability to change and maintain or sustain body positions. Activity reflects the ability of an individual to remove all pressure sores from skin area not adapted to weight bearing and enhances circulation and influences metabolism (Bergstrom et al., 1987). Intrinsic factors are malnutrition, advanced age, vasoactive drugs use, low blood pressure, stress, fever, sensory perception, and dehydration which influence pressure ulcer development.

Extrinsic factors. Extrinsic factors are external factors that damage the skin resulting in pressure ulcer formation. Lindholm et al. (2008) studied among the long-term bed-ridden patients to investigate extrinsic factors and found that pressure, shear and friction, and skin moisture were to be listed as extrinsic factors for pressure ulcer formation. Pressure ulcers are caused by three forces of extrinsic factors including pressure, shear, and friction. If external pressure is grater than capillary perfusion pressure, then there is vascular compression resulting in tissue ischemia. Normal capillary filling pressure is approximately 32 mmHg at the arteriolar end and 12 mmHg at the venous end (Pieper, 2007). External pressure greater than 32 mmHg may cause tissue damage by restricting blood flow to the area. Continued pressure on soft tissue causes capillaries to collapse and forms thrombi. Thus, cells die due to impaired oxygenation and nutrients to affected area and accumulation of waste products in the tissue (Chang & Seireg, 1992; Prentice, 2005). A low pressure over bony prominences for a long duration has a detrimental effect towards tissue at a high

pressure for a shorter duration (Baranoski, 2006). Constant pressures of 70 mmHg for greater than two hours cause cellular death (Dinsdale, 1974).

Shear is the result of parallel force to the skin surface which affects blood supply that leads to ischemia, cellular death, and necrosis (Baranoski, 2006). It is affected by the amount of pressure exerted, the coefficient of friction between the support surface materials and body surface contacting each other, and the extent to which the body makes contact with the support surface (Bergstrom, Bennett, & Carlson, 1994). Elevating the head of the bed increases shear and pressure in the sacral and coccygeal areas. Shear is greatest when a caregiver drags a patient along with the surface of the sheet during repositioning or allows the patient to slide down from high fowler's position. Then shearing forces cause triangular shaped sacral ulcer with tunneling or deep sinus track (Maklebst & Sieggreen, 2000).

Friction is the force of two surfaces moving across one another (Maklebust & Sieggreen, 2000). The bed linen may rub away from the support surface when a patient was dragged during lying on the bed causing friction force. When the interface between body and bedding is moist caused by perspiration, incontinence, or wound exudates, the coefficient of friction and shearing rises sharply (Maklebust & Sieggreen). If the head of the bed is high, gravity pulls the skeleton downward, and the friction and shearing forces cause necrosis in the sacral area (Maklebust & Sieggreen). Friction causes skin damage to the epidermal and upper dermal layer in the patients who are restless (Keller et al. 2002). Movement from rough surface weakens the barrier as friction and shearing caused by outer layers of the skin slide with rough or sticky surfaces, pulling and potentially tearing underlying tissues (Bergstrom et al., 1987).

In addition, maceration from incontinence, sweating, or leaking wounds were the possible risk factors for patients admitted in ICU unit (Keller et al., 2002). Exposure to moisture in the form of urine, feces, perspiration, and drainage from fistula or wound for prolonged period causes maceration and rashes thus weakening the natural barrier of the epidermis (Bergstrom et al., 1987).

Intrinsic factors. Intrinsic factors are physiologic factors or disease conditions that affect an individual at risk for pressure ulcer development. Several intrinsic factors including old age, gender, malnutrition, vasoactive medications, sensory perception, and impaired blood circulation were to be found as influencing intrinsic factors for pressure ulcer development (Majumdar, Kothari, & Gupta, 2006; Suriadi et al., 2007). Previous studies showed various types of intrinsic factors for identifying an individual at risk for pressure ulcer development. Some of them are described as specific medications including anesthetics, sedatives and analgesics (Ayello, Baranoski, Lyder, & Cuddigan, 2004; Suriadi et al.). These medications caused vasoconstriction leading to reduced peripheral tissue perfusion (Suriadi et al.). Low serum protein, low hemoglobin, and low hematocrit were found as intrinsic factors, which can affect tissue perfusion (Dyson & Lyder, 2001). Low serum albumin, which is caused by poorly supplied nutrient, leads interstitial edema. The interstitial edema tissues were at risk for tissue breakdown when they were exposed by pressure, shear, and friction (Wells, 1994). According to Majumdar, Kothari, and Gupta (2006), malnutrition was to be found as one of the intrinsic factors for pressure ulcer development.

Advanced age decreased epidermal turnover, decreased surface barrier function, decreased sensory perception, and decreased delayed and immediate

hypersensitivity reaction, loss of subcutaneous fat due to gradual atrophy and greater heterogeneity of blood and lymph vessels of skin (Kanj & Philips, 2001). The age-related impaired functions are risk factors for pressure ulcer development. Aging reflects changes in the skin and its underlying structures that cause less nutrient exchange and less resistance to shear force (Ryan, 2004). The elderly and immobile people with severe acute illness and/or neurological deficits were more prone to develop pressure ulcer (Cullum, Deeks, Sheldon, Song, & Fletcher, 2003). It can be inferred that low blood supply to the skin decrease epithelial layer flatten and thin, subcutaneous fat decrease, and collagen fiber loss elasticity resultant lowered tolerance to hypoxia causes pressure ulcer development to the older person.

Sensory perception is an ability to perceive pain or discomfort or seeking for assistance for changing position (Bergstrom et al., 1987). Impaired sensory perception is the person's inability to feel or perceive or recognize pressure or discomfort. Patients with spinal cord injury, patients with cerebro-vascular disease, and patients with diabetes mellitus are example of patients who have impaired sensory perception. Therefore, those groups of individual are at risk for pressure ulcer development (Auer-Grumbach, 2008).

Impaired blood circulation is another intrinsic risk factor for pressure ulcer development. Systolic blood pressure below 100 mmHg and diastolic pressure below 60 mmHg were related to pressure ulcer formation (Bergstrom, 1997). Hypotension prevents blood flow from the skin to vital organs resulting in skin intolerance for pressure (Pieper, 2007). Pieper showed that paraplegic and geriatric patients had lower blood flow in the ischeal tuberosity during sitting up on an unpadded surface than in normal patients. Smoking was found as factor which can

affect decrease tissue perfusion (Ayello et al., 2004; Dyson & Lyder, 2001). Fever, dehydration, ischemia, hypoxemia, and anemia also were found as factors that impaired tissue perfusion (Majumdar et al., 2006).

Based on above mentioned discussion, it is concluded that immobility, decreased activity, pressure, shear, and friction were found to be important extrinsic factors for pressure ulcer development. In addition, malnutrition, advanced age, impaired sensory function, impaired blood circulation, some medications uses were considered as intrinsic risk factors for pressure ulcer development. Therefore, nurses need to have knowledge of the pathophysiology for pressure ulcer development and its contributing factors in order to perform risk assessment and preventive care. These types of knowledge can enhance the nurses' performance of identifying an individual at risk for pressure ulcer development.

Risk assessment of pressure ulcer

Pressure ulcer risk assessment activities are aimed at reducing the potential risks for developing a pressure ulcer. It improves patients' quality of care. The tool must have high predictive values, be highly sensitive and specific, reliable and easy convenience to use. Risk assessment should be based on assumption that all individuals are at risk for developing pressure ulcer (National Institute for Clinical Excellence [NICE], 2001). The risk assessment tool is more accurate and more reliable than the clinical judgment to identify patients who are at risk for pressure ulcer development (Bergstrom, 1997) in order to perform initiatory preventive intervention. Risk assessment scale is designed for identifying an individual at risk and factors contributing to pressure ulcer formation in order to initiate preventive intervention.

Pressure ulcer risk assessment should be performed periodically depending on patient's condition. For example, risk assessment should be performed at the first day of admission and then every other day in patients admitted in long-term care unit for one week, and then every week unless the patient's condition changed (Bergstrom & Braden, 1992). In acute care setting, risk assessment should be performed upon admission and every 48 hours, or changes in patient's condition (Ayello & Braden, 2002). In neurologic patients, risk assessment should be assessed on admission, weekly for the first 4 weeks, monthly, and quarterly or based on patient's condition (Pieper, 2007).

Risk assessment tools for pressure ulcers were developed more than 40 years ago and used in measuring the risk status of patients. Most of these risk assessment tools have a numerical score to score risk factors. The total scores indicate the patient's status at 'no risk', 'low risk', 'medium risk', 'high risk', or 'very high risk' (Ayello & Braden, 2002). Several risk assessment tools have been developed, such as Norton scale, Braden scale, and Waterlow to identify individuals at risk for developing pressure ulcer and these tools assist health care professionals to gather information systematically and identify individuals at risk (Prentice, 2005).

A good risk assessment tool should meet basic requirements of validity and reliability (AWMA, 2001). Reviewing the reliability and validity of each validated scale should always be the first step in the decision making process to select the tool to be used. Sensitivity is the percentage of individuals who were assessed as being at risk for a pressure ulcer (Baranoski & Ayello, 2003). Specificity is the percentage of individuals who were assessed as being not at risk. Both the EPUAP (1999) and the Agency for Health Care Policy and Research [AHCPR] (1992) encourage the use of a

risk assessment tool. Norton and Braden scale are tools mentioned in the AHCPR guideline as appropriate tool to determine pressure ulcer risk assessment. Braden scale, Waterlow, and Norton scale are briefly described below.

Braden Scale. The Braden scale used for predicting pressure ulcer risk is composed of six subscales intended to measure the clinical determinants of either intense and prolonged pressure (activity, mobility, sensory perception) or tissue tolerance to pressure (nutrition, moisture, friction and shear). Each subscale includes a title, and each subscale and each level has a key concept descriptor and a one-or-two phrase sentence descriptor of qualifying attributes. Five of the subscales are rated from 1 (least favorable) to 4 (most favorable). The friction and shear subscale is rated from 1 to 3. A total of 23 points is possible. The subscales are designed so that each level is indicated as one choice (Bergstrom et al., 1987). Six is the lowest possible score and 23 are the highest. A lower numerical score means the patient is at higher risk for developing pressure ulcer.

The Braden scale is the most commonly used assessment scale worldwide. It was created in 1987 by Bergstrom et al. and suggested the following level of risk based on total Braden scale scores that the scores ranged from 15 to 18 indicates at low risk, score 13 to 14 indicates at moderate risk, score 10 to 12 indicates at high risk, and score 9 or below indicates very high risk. The Braden scale is categorized into 6 subscales which are described as: 1) sensory perception, 2) activity, 3) moisture, 4) mobility, 5) friction and shear, and 6) nutrition. The sensory perception subscale measures the ability to feel and relieve discomfort. The inability to feel or recognize pressure or discomfort increases risk for pressure ulcer development. The moisture subscale measures the degree to which skin is exposed to

moisture. The activity and mobility subscales are derived from separate but related concepts. These reflection show frequency and duration of activity or position change. Mobility is the ability to relieve pressure through movement. Nutrition reflects the usual food intake of the patient and gives a range from very poor to excellent outcome of pressure ulcers. This subscale also accounts for liquids supplement, intravenous, and parenteral nutrition (Bergstrom et al.).

Previous studies showed the sensitivity and specificity of the Braden scale. By using cut off point of 16, sensitivity was 100% in two studies (Bergstrom et al, 1987). Within the same study, specificity ranged from 64% to 90%. The reliability of the Braden scale was also high. One study showed that reliability was increased to .99 when used by the registered nurses than aid nurses (r = .83) and licensed practicum nurses (r = .94) (Bergstrom et al., 1987).

Waterlow Scale. The Waterlow pressure ulcer scale was considered as a comprehensive scale for risk assessment and prevention. The risk assessment includes weight for height, incontinence, skin type, mobility, age, gender, and appetite. With a score >10, the patient is considered at low risk, >15 at high risk, and >20 at very high risk. Independent assessment of the Waterlow tool showed sensitivity of 98-100% percent but specificity was as low as 14% (AWMA, 2001).

The Norton Scale. The Norton scale rates physical condition, mental state, activity, mobility, and incontinence on a scale of 1 to 4. Total score range from 5 to 20 where the lower the score the higher the risk of ulceration. A score of 14 indicates the onset of risk, 15 or 16 score at risk and a score of below 12 indicates high risk for pressure ulcer formation (Norton, 1996). Gunningberg, Lindholm, Carlsson, and Sjoden (1999) showed that Norton scale was possible to identify the

majority of patients at risk for development of pressure ulcer. Using the Norton scale, the sensitivity and specificity for prediction of pressure ulcer formation was 71% and 44%, respectively. It was calculated on the basis of risk assessment performed in the accident and emergency department and on the nature of pressure ulcer at the time of discharge (Gunningberg et al., 1999). In another study, inter-rater reliability using percentage of agreement between Waterlow and Norton scale was tested by four student nurses among the same five patients and found that Norton scale achieved 70 percent inter-rater reliability, while Waterlow scale achieved 60% inter-rater reliability (AWMA, 2001).

Pressure Ulcer Prevention Practice

It is necessary to state that evidence based practice is an important guideline for nurses to use in pressure ulcer prevention care. Skin care is one of the assessment procedures for pressure ulcer prevention practice. This type of care should include skin assessment, management of nutrition to maintain healthy skin, management of mechanical loads, and educational program for patient, family, and nursing staff (AWMA, 2001).

Skin Care

Skin assessment. Skin assessment is an essential and simple step to early recognition of skin damage. It is also an important aspect for both assessment and prevention. Skin should be inspected regularly on the basis of individualized assessment and frequency of inspection should be determined in response to changes in an individual's condition (Nursing Clinical Practice Guideline, 2001). Localized skin should be checked at each repositioning or turn. Skin overlying bony

prominences of the sacral area, the heels, and the greater trochanters should be paid special attention. Skin assessment should be done at least daily for the sign of impaired skin integrity (AWMA, 2001).

Skin hygiene. In order to maintain skin integrity, irritant substances should be minimized. Skin should be kept clean and dry, without excessive dryness. Urine, feces, perspirations, and wound drainage are susceptible to induce skin injury thus leading to skin break down (Nursing Clinical Practice Guideline, 2001). Skin should be cleansed at the time of soiling and washed with mild detergent with warm water followed by applying moisturizer over the skin to minimize irritation and drying (AHCPR, 1992). Skin rubbing and massage over bony prominences must be avoided (AHCPR).

Skin moisture maintenance. Elimination of intrinsic and extrinsic factors results in dryness or maceration of the skin which makes skin poorer to resist trauma. Dry, flaky or scaling skin should be treated with topical moisturizer. Dryness and reduced tissue turgor diminish the tissue resistance to mechanical forces, such as pressure, shear, and friction (Frantz & Gardner, 1994). Irritating substances e. g. urine and feces increase the risk of maceration that provide favorable environment for bacterial growth (Anderson et al., 1994). In order to promote continent regular toileting, the use of incontinence pads, garments or protective pads should be employed. Moisture barrier ointments, creams, and skin barrier films provide skin protection from moisture and chemical irritants (Anderson et al.). Fecal incontinence, leaking wounds, and sweating due to fever and the higher temperatures in ICU are the causative factors for skin moisture (Shanon & Lehman, 1996).

Maintenance of a stable skin temperature. Overheating of the skin has a greater risk of pressure ulcer development and contributes to increased perspiration. Maintenance of a stable skin and body temperature is important in reducing the metabolic and oxygen demands of the body (Grous, Reily, & Gift, 1997).

Nutrition to Maintain Healthy Skin

Malnutrition is one of the cited risk factors for pressure ulcer formation. Hypoproteinemia is one of the critical determinants to alter tissue regeneration, inflammatory reaction, and the immune function that causes edema formation, which impairs the oxygen diffusion and nutrient transportation in ischemic and edematous tissue; thus, resulting in decreased resistance to infection (Harris & Fraser, 2004). Malnutrition affects the skin integrity and supportive structure. In addition, a lack of vitamin and trace elements increase the risk for pressure ulcer development (Cullum & Clark, 1992). A balanced diet should be encouraged to provide adequate calorie requirements for the maintenance of BMI and for tissue repairman. It is important to assess the individual's dietary intake regularly, particularly in an acute care setting, where diet is interrupted to diagnostic tests, treatment, or surgical procedures. Food and fluid intake should be assessed along with other nutritional status. A dietician should be consulted, and oral, enteral or parenteral supplementary nutrition should be considered (Pieper, Surgrue, Weland, Sprague, & Heimann, 1997).

Certain vitamin deficiencies, such as vitamins A, C, and E influenced pressure ulcer formation. Vitamin A deficiency impeded reepithelialization, collagen synthesis, and cellular cohesion, while vitamin C compromised collagen formation and immune system function. Vitamin E deficiency decreases immunity and increases tissue damage (Thomas, 2006). The assessment should include current weight and

height, recent weight loss, eating habits, and recent changes in eating habit and intake (Nursing Clinical Practice Guideline, 2001). High protein energy intake and specific nutrients including arginine, zinc, and antioxidants resulted less pressure ulcer development and better wound healing (Lee, Posthauer, Dorner, Redovian, & Maloney, 2006).

Management of Mechanical Loads

To protect the skin from external forces of pressure, shear and friction requires a prevention plan that includes an appropriate turning schedule, elimination of shear and friction, reduction or elimination of heel pressure, promotion of mobility and activity, and the use of an appropriate support surface (AWMA, 2001).

Positioning and repositioning. The most frequently repositioning of the patient was recommended to prevent capillary occlusion, tissue ischemia, and pressure ulceration for several years. According to Pieper (2007), repositioning schedule should be an hourly to 2 hourly based on the interface pressure reading from healthy subjects. Repositioning reduced the duration of pressure that was critical element for pressure ulcer formation. But frequency of turning position lacked in strength of research evidence (Salcido, 2004). However, Pieper (2007) recommended frequent turning and repositioning schedule at least 2 hours. Duration of pressure, shear, and friction could be minimized by regular repositioning or by using pressure redistributing surfaces (Gunningberg et al., 2001). Head of bed should be maintained at 30 degree lateral and supine position alternatively. This position should be kept one hour after meal or nasogastric tube feeding (Pieper).

Elimination of shear and friction. Immobile and inactive individuals were exposed to the forces of shear and friction due to lifting, turning, and positioning over bony prominences (Young, 1990). Friction was experienced during repositioning and was dragged over the rough surface of the bed linen. To avoid friction, proper lifting and manual handling techniques should be employed. Turning devices, slide sheets and slide boards may be used during lifting and transferring (Young). Skin should be protected with padding or protected dressing of hydrocolloids or transparent films. The force of shear can be reduced by elevating the foot of the bed by 10 to 20 degree. This helps to prevent sliding when sitting or semi-recumbent. The head of the bed should also be maintained at the lowest possible elevation no greater than 30 degree according to individuals' medical condition and comfort (Baranoski, 2006).

Elimination of heel pressure. Reducing heal pressure was one of the important caring aspect aimed at providing total relief of pressure from the heel. Pillows or foam under the full length of the lower leg assist in relieving pressure from heel. Standard heel protectors, such as gel or cushion booties, help to reduce the forces of shear and friction (Guin, Hudson, & Gallo, 1991).

Activity and mobilization. Mobilization and activity alter pressure on weight bearing areas, relieving stressed or damaged tissue and improving circulation. Individuals should be encouraged to maximize activity and mobilization in accordance with their medical condition, ability, and energy level. Health care team can use devices, such as trapeze, cot sides, cane, walker or handrails to assist individual with activity and mobilization (AWMA, 2001).

Educational Program for Patient, Family, and Staff

Educational program for patient, family, and staff, was a component of pressure ulcer prevention practice (Langemo et al., 2008). Education of patient, family, and staff should be based on an individual's needs and requirements. Staff should be educated in pressure ulcer risk assessment and prevention strategies and they should disseminate their knowledge and skills to other associated healthcare professionals. Educational programs should include risk factors for pressure ulcer formation, pathophysiology, application of risk assessment tools, skin assessment, skin care, selection and maintenance of pressure redistributing support surfaces, methods for keeping record of risk assessment and prevention activities, proper positioning to minimize pressure, shear, and friction damage, functions of inter and multidisciplinary team approach in pressure ulcer management, and policy and procedure for transferring the patient from one unit to another (Nursing Clinical Practice Guideline, 2001).

McGouph (1999) reflected that coordinated and structured educational program in addition to continuous quality assurance approach was more beneficial for patients in reducing the incidence and prevalence of pressure ulcer formation than providing no programs. Zulkowski, Ayello, and Wexler (2007) noted that nurses attending on an educational session on skin assessment and implementation of prevention protocols decreased the incidence of stage I and stage II pressure ulcers. However, patient and family should be informed and educated on the cause of pressure ulcer formation, significance of factors related to pressure ulcer, impacts of prevention strategies, sites for greater risk of developing pressure ulcers, skin

inspection and its changes, process of skin care, methods for reducing pressure, and notification of skin damage to healthcare professionals (AHCPR, 1992; Pieper, 2007).

Therefore, it is imperative from aforementioned discussion that skin care, nutrition to maintain healthy skin, management of mechanical loads, and educational programs for patient, family, and staff are basic requirements for pressure ulcer preventive practice for nurses to combat the incidence of pressure ulcer.

Current Nurses' Knowledge, Attitude, and Practice Towards Pressure Ulcer Prevention

Various studies related to nurses' knowledge, attitude, and practice on the prevention of pressure ulcers have shown there are huge gaps. Panagiotopoulous and Kerr (2002) conducted a study among nurses in a general hospital in England to identify the nurses' knowledge and their practice regarding pressure ulcer prevention. It was found that nurses were knowledgeable in areas of risk factors, but they had a lack of knowledge regarding preventive methods of massage and using donuts, which were not recommended. A study was designed by Hays, Wolff, and McHugh (1995) to test the nurses' knowledge regarding pressure ulcer risk factors. It was revealed that most nurses had an inadequate knowledge of reducing pressure and friction. Another previous study showed that nurses' practice regarding strategies and methods for preventing pressure ulcers was inadequate (Pieper et al., 1997). Gunningberg et al. (2001) studied the knowledge and practice regarding of staff nurses in this field in Sweden. A majority of the nurses had insufficient knowledge and practice to implement and document pressure ulcer prevention in patients at risk, such as those with hip fractures.

Factors Contributing to Nurses' Knowledge, Attitude, and Practice Regarding Pressure Ulcer Prevention

Several factors are related to nurses' knowledge, attitude, and practice regarding the prevention of pressure ulcers. They are: 1) education and training background, 2) years of experience, 3) expertise in the area of preventive practice, 4) lack of nursing leadership, 5) inadequate facilities and equipment, 6) shortage of nurses and work over-loads, and 7) individual beliefs (Pancorbo-Hidalgo et al., 2007).

Education and training background. Education is one of the important contributing factors for preventing pressure ulcer development. A previous study found that Spanish nurses with university degrees and specific education obtained high scores both for knowledge and clinical practice in pressure ulcer prevention (Pancorbo-Hidalgo et al., 2007). A quasi-experimental study involving 595 registered nurses and 59 licensed practicum nurses was conducted to examine the knowledge before and after two weeks of educational workshop about pressure ulcers (Sinclair et al., 2004). The pre and post test results showed that registered nurses' scores were significantly higher than those of the licensed practicum nurses. Thus the nurses who are specifically trained have better knowledge of pressure ulcer prevention. Pieper and Mott (1995) stated that the nurses who had recently attended a lecture or read a pressure ulcer related article had higher knowledge than nurses who did not. The researchers reported that nurses' level of knowledge regarding pressure ulcers was higher than that their level of clinical practice. This was due to the lack of awareness and interest of nurses, insufficient time, inadequate leadership, lack of equipment, and an excessive number of patients. High level of knowledge was not always reflected in practice because of other influencing factors.

Years of experience. Nurses' experience of service also is another contributing factor for the prevention of the development of pressure ulcers. A study found that a lower level of knowledge among nurses with many years experience was due to a lack of current educational exposure in relation to pressure ulcer prevention (Mockridge & Anthony, 1999).

Expertise in the area of preventive practice. Nurses' expertise is an influential factor in preventing pressure ulcer development. A study was conducted by Zulkowski et al. (2007) among 460 nurses in rural and urban areas to assess their knowledge of pressure ulcers. It showed that wound care nurses obtained high scores (89%) in this area compared with non-wound care nurses (75%).

Lack of nursing leadership. The inadequate leadership given to nurses can decrease the level of nursing practice in pressure ulcer prevention. A two-year study was designed to evaluate the outcomes of implementing clinical practice guidelines to prevent and treat pressure ulcers in primary, secondary and tertiary health centers in Canada. The resulting data showed that lack of leadership for nurses was identified as a barrier for implementing evidence-based guidelines for preventing pressure ulcer development (Clarke et al., 2005).

Inadequate facilities and equipment. Facilities for dealing with pressure ulcers, such as related learning materials and relevant equipment, are essential elements for nurses to prevent pressure ulcers. Lack of facilities to access literature, lack of opportunities to utilize research findings, and lack of equipment are contributing factors for nurses to implement quality care for pressure ulcer prevention. Previous studies have found a number of barriers for nurses to develop good practice in this field. These include: lack of access to literature; lack of resources and

equipments; lack of hospital policies for utilizing risk assessment tools; an absence of evidence-base guidelines; and inadequate utilization of research findings in clinical areas (Moore & Price, 2004; Panagiotopoulou & Kerr, 2002;).

Shortage of nurses and work over-loads. The low number of nursing staff is one of the factors for providing inappropriate nursing care to prevent pressure ulcer formation. Previous studies show that lack of time and shortages of nursing staff prevented nurses implementing their positive attitudes into good practice (Moore & Price, 2004; Panagiotopoulou & Kerr, 2002). There is a huge shortage of nursing staff in Bangladesh. It was reported that the current ratio of nurses to patients in Bangladesh was 1: 15, as against an international ratio of 1:4 (Arju, 2008).

Individual beliefs. A positive attitude is an important factor for an individual to transform behavior into practice. Previous studies have shown that nurses had negative attitudes regarding pressure ulcer prevention because they believed that pressure ulcer prevention activities have low priority in nursing care (Bus, Halfens, Abu-Saad, & Kok, 2004). Moore and Price (2004) stated that nurses demonstrated a positive attitude towards the awareness of pressure ulcer prevention care. Another study indicated that nurses demonstrated negative attitudes by their preferring their own clinical judgment rather than using a risk assessment scale to assess patients at risk from pressure ulcers (Ulrika & Bjorn-Ove, 2009).

Relationships between Nurses' Knowledge, Attitude, and Practice Regarding Pressure Ulcer Prevention

Many previous studies have found inconsistent findings in terms of the relationship between nurses' knowledge, attitude, and their practice relating to the

prevention of pressure ulcers. Some found a positive correlation between nurses' knowledge and practice (Maylor, 2001; Pancorbo-Hidalgo et al., 2007; Ulrika & Bjorn-Ove, 2009). Maylor found that higher level of orthopedic nurses' knowledge was negatively correlated with the prevalence of pressure ulcers. Therefore, it could be hypothesized that nurses' higher levels of knowledge influence nurses' practice for reducing the prevalence of pressure ulcers. Some previous studies found a negative correlation between knowledge and practice. Halfens and Eggink (1995) studied Dutch nurses' knowledge and practice. The results showed that nurses' knowledge level was significantly higher than that their practice level.

Ulrika and Bjorn (2009) also found that Swedish nurses' knowledge was not related to their practice. The authors considered that there might be other factors related to nurses' levels of practice. These included: lack of pressure relieving equipment, lack of preventive policies; absence of good team work; lack of time; and the conditions of patients. Another study also found that Spanish nurses had higher levels of knowledge than levels of practice (Pancorbo-Hidalgo et al., 2007). Therefore, the level of knowledge is not in accord with the level practice in terms of pressure ulcer prevention.

The relationship between attitudes and practice showed a negative correlation. A survey among 300 staff nurses was conducted to identify their attitude, behavior, and perceived barriers towards pressure ulcer prevention. The findings showed that nurses' positive attitudes were negatively correlated with nurses' practice. This means that a positive attitude is not related to the level of the practice of nurses (Moore & Price, 2004). These authors put forward the idea that other factors,

such as an inadequate number of nurses and heavy working loads, are related to nurses' levels of practice.

It has been shown that nurses' practice was not related to either their knowledge or attitudes. Ulrika and Bjorn-Ove (2009) found that Swedish nurses had better knowledge and positive attitudes, but showed inadequate practice in pressure ulcer prevention. Another study found that inadequate practice was related to inadequate knowledge (Halfens & Eggink, 1995). They found that nurses still massaged over bony prominences, used topical cream, and applied donut rings to reduce pressure. These have not been recommended to prevent pressure ulcers (Pancorbo-Hidalgo et al., 2007).

It is very noticeable from the above discussion that relationships between nurses' knowledge, attitudes, and practices regarding pressure ulcer prevention were uneven. High levels of knowledge and positive attitudes are not always reflected in good practice because there may be other factors related to good practice, such as hospital policy, organizational barriers, and social values and beliefs.

Nursing Practices in Pressure Ulcer Prevention in Bangladesh

The researcher's experience suggests that there is no known study or guidelines regarding pressure ulcer prevention in Bangladesh. Most nurses utilize their clinical experience to prevent pressure ulcers. Nurses have information about skin care, nutrition, mechanical loading, and education from other healthcare professionals, but they do not have up-dated information and basic knowledge regarding care for preventing pressure ulcers. Basically, nurses use talcum powder to prevent the skin from becoming moist. Turning positions are not maintained and

documented every 2 hours. Patients' maceration is not undertaken properly because the skin is not cleansed properly by relatives. This is because nurses do not instruct them how to macerate cleanly. Most nurses encourage the patients to eat a high protein diet. Caregivers are instructed by the nurses to turn the patient's position every 2 hours but without demonstrating the procedure.

Nurses' practices regarding the prevention of pressure ulcer are to massage bony prominences, use air cushions under patients' backs, and apply antiseptic lotions to backs to prevent bacterial invasion. There are no in-service education and training programs for nurses available in Bangladesh on the prevention of pressure ulcers. There is minimal content about pressure ulcer prevention in training programs. Only one institution, which is located near to Dhaka city, which provides neurological care for the spinal cord to injured patients, offers training facilities for nurses in this area. This is a private institution and there is very limited scope and opportunity for nurses to avail themselves of such training programs.

Summary

In summary, three major areas of the literature have been reviewed. These are the concept of pressure ulcer development, pressure ulcer prevention practices, and nurses' current knowledge, attitudes, and practices towards pressure ulcer prevention. A pressure ulcer is localized tissue damage caused by intrinsic and extrinsic factors. There are theories about the outward and inward mechanisms for the development of pressure ulcers. Several risk factors are related to pressure ulcer development, such as pressure, shear, friction, moisture, aging, low arterial pressure, and skin temperature. The pressure ulcer prevention practices reviewed suggest that

there are basic requirements for the practice of pressure ulcer prevention. These include: skin care, good nutrition to maintain healthy skin, the management of mechanical loads, and educational programs for patient, family, and staff.

According to Bloom's taxonomy (1956), human behaviors are derived from the integration of the cognitive, affective, and psychomotor domains. Knowledge, attitudes, and practices could be representative of the cognitive, affective, and psychomotor domains respectively. It has been shown that there was a little link between knowledge, attitudes, and practice. Many studies have shown that most registered nurses had a higher knowledge of practice; however the level of their clinical practice was lower than the level of their knowledge. There may be other factors related to transforming knowledge into practice. These factors include attitudes, the number of staff, working loads, and nursing leadership. In Bangladesh, there have been no studies to determine the knowledge, attitudes, and practices of nurses who work with patients at high risk of developing pressure ulcers. It would be beneficial for the nursing profession if the level of current nurses' knowledge, attitudes, and practices are explored. This information would help to implement effective strategies to improve nursing care in the field of preventing pressure ulcers.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter describes the design of the study, population, setting and sample, instrumentation, data collection procedure, and data analysis.

Design of the Study

The descriptive correlational design was used to explore the nurses' knowledge, attitude, and practice regarding pressure ulcer prevention for hospitalized patients in Bangladesh. In addition, the relationships among nurses' knowledge, attitudes, and practices were examined.

Setting, Population, and Sample of the Study

The study was conducted at Rajshahi Medical College Hospital (RMCH), a 500-bed tertiary level teaching hospital, which is located in Rajshahi Metropolitan city of Bangladesh. Approximately 1,200 patients per day are admitted in this hospital. The study was carried out from November, 2009 to January, 2010. Total number of nurses working in this hospital was 375. The study was conducted in sixteen wards under six selected units including 1) surgical unit, 2) medical unit, 3) orthopedic unit, 4) neuro-surgical unit, 5) neuro-medical unit, and 6) coronary care unit. It is likely that patients who are at high risk for pressure ulcer development have been admitted in these 16 wards. They are 5 medical wards, 5 surgical wards, 1 neuro-medical, 1 neuro-surgical, 2 orthopedics, and 2 coronary care wards.

Sample size was determined by power analysis using the acceptable level of significance at $\alpha < .05$ and power of test at .80 (Polit & Hungler, 1999). The effect size was calculated based on Duimel-Peeters, Hulsenboom, Berger, Snoeckx, and Halfens's (2006) study conducted at Netherlands that examined the relationship between knowledge and practice, attitude and practice, and knowledge and attitude. The correlation of these variables ranged from 0.39 to 0.66. Since the context of Netherlands and Bangladesh was different; therefore, the researcher considered using the small effect size of .30, yielded a sample size of 88. Number of nurses who worked in the mentioned unit was 108. A total number of 108 nurses who met the following inclusion criteria were recruited into this study in order to overcome non-response subjects. Ninety one nurses returned questionnaires with a response rate of 84.26%.

The inclusion criteria:

1. Working as a full time staff nurses at 16 wards under six units
2. Having roles and responsibilities connected with direct patient care
3. Having educational status of at least three years diploma in nursing
4. At least 6 months of working experience on respected units

Instrumentation

The instrument developed by the researcher was divided into 4 sections including 1) Demographic Questionnaire, 2) Nurses' Knowledge Regarding Pressure Ulcer Prevention Questionnaire, 3) Nurses' Attitude Regarding Pressure Ulcer Prevention Questionnaire, and 4) Nurses' Practice Regarding Pressure Ulcer Prevention Questionnaire. The details of each section will be explained as follows:

Section 1: Demographic Questionnaire

This questionnaire consisted of 7 items to assess the subjects' demographic data including age, gender, marital status, basic education, formal training on pressure ulcer, current areas of practice, and length of service (Appendix B).

Section 2: Nurses' Knowledge of Pressure Ulcer Prevention Questionnaire

This questionnaire was designed to assess the level of nurses' knowledge regarding pressure ulcer prevention based on the first three levels of cognitive domain of Bloom's Taxonomy. Those three levels were remembering, understanding, and applying. It was composed of 22-item multiple choice questions which had been modified and developed from the Pressure Ulcer Prevention Guideline (PUPG) (Maylor & Torrance, 1999), and Halfen and Eggink's work (1995) (Appendix B). The subjects were asked to choose correct answer from 3 choices of each question. Knowledge elements included factors related to pressure ulcer development, risk assessment, skin care, nutrition to maintain healthy skin, management of mechanical loads, and educational program for patient, family and staff. Score "1" was given for correct answer and "0" for incorrect answer. The total score ranged from 0-22 and it was then converted into percentage. The higher scores indicated the higher level of knowledge.

McDonald's standard of learning outcome measured criteria was used to categorize nurses' level of knowledge regarding pressure ulcer prevention. This set of criteria was developed in order to measure the actual performance of students' learning in the educational institution. So, in this study, McDonald's composite percent scores were used for measuring accurate learning outcomes of the nurses'

knowledge and their practice regarding pressure ulcer prevention. The level of knowledge was categorized into five groups (McDonald, 2002):

Level of Knowledge/Practice	Composite percent of scores
Very low	< 60%
Low	60% - 69.99%
Moderate	70% - 79.99%
High	80% - 89.99%
Very high	90% - 100%

Section 3: Nurses' Attitude of Pressure Ulcer Prevention Questionnaire

A 25-item structured questionnaire was developed by the researcher based on level of receiving, responding, and valuing of affective domain of Bloom's Taxonomy and modified from Pressure Ulcer Attitude Questionnaire (PUAQ) (Moore & Price, 2004) (Appendix B, section 3). Attitude components included factors related to pressure ulcer development, risk assessment, skin care, nutrition to maintain healthy skin, management of mechanical loads, and educational program for patient, family and staff. The subjects were asked to rate the 5 level of attitude ranged from 1 to 5; 5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, and 1 = strongly disagree. The questionnaire included positive and negative item questions. Items number 1, 3, 6, 8, 10, 13, 18, 20, 22, and 24 were negative questions and the rest of them were positive questions. The scores of negative items were reversed. The possible total score ranged from 25 to 125 and it was then converted into percentage. The higher scores indicated the positive attitude. Total scores of attitudes were categorized into three levels based on mean percentage and standard

deviation: low level below (mean ±1 SD), neutral level (mean ± 1 SD), and positive attitude above (mean ± 1 SD). The scores of each level were as followed:

Level of attitude	Score
Negative	< 71.70%
Neutral	71.70% - 84.92%
Positive	> 84.92%

Total scores of each dimension of attitude were also categorized into three levels based on mean percentage and standard deviation: low level below (mean ± 1 SD), neutral level (mean ± 1 SD), and positive attitude above (mean ± 1 SD). The scores of each level of attitude were as followed:

Level of attitude:

Dimension of factors for pressure ulcer formation	Score
Negative	< 64.34%
Neutral	64.34% – 85.46%
Positive	> 85.46%
Dimension of risk assessment	Score
Negative	< 67.77%
Neutral	67.77% - 85.37%
Positive	> 85.37%
Dimension of skin care	Score
Negative	< 71.22%
Neutral	71.22% - 92.28%
Positive	> 92.28%

Dimension of nutrition to maintain healthy skin	Score
Negative	< 64.84%
Neutral	64.84% - 91.52%
Positive	> 91.52%
Dimension of management of mechanical loads	Score
Negative	< 65.84%
Neutral	65.84% - 95.68%
Positive	> 95.68%
Dimension of educational program for patient, family, and staff	Score
Negative	< 70.31%
Neutral	70.31% - 108.15%
Positive	> 108.15%

Section 4: Nurses' Practice of Pressure Ulcer Prevention Questionnaire

A 22-item structured questionnaire was developed based on level of imitation, manipulation, and precision of psychomotor domain of Bloom's Taxonomy using a 3-point numerical rating scale (Appendix B), ranged from 1 to 3; 3 = always, 2 = sometimes, and 1= never. Each item asked subjects to indicate the frequency of their practice of pressure ulcer prevention. Practice elements included factors related to pressure ulcer development, risk assessment, skin care, nutrition to maintain healthy skin, management of mechanical loads, and educational program for patient, family, and staff. The possible scores ranged from 22-66. These scores were then

converted into a percentage. The higher scores indicated the higher level of practice. The total score was categorized into five groups as indicated in section 2.

Validity and Reliability of the Instrument

The validity of the questionnaires of nurses' knowledge, attitude, and practice regarding pressure ulcer prevention was assessed by a panel of three experts. There were two experts being nurse educator and experienced researcher from Faculty of Nursing, Prince of Songkla University, another was a physician who is expertise in pressure ulcer in Bangladesh. The experts' comments were used to modify each questionnaire for its appropriateness. Internal consistency reliability of the nurses' knowledge, attitude, and practice questionnaires were examined through a pilot study with 20 nurses from Shaheed Ziaur Rahman Medical College Hospital in Bogura, Bangladesh who had similar characteristics to the subjects in this current study. Formula of Kuder-Richardson 20 was used for internal consistency reliability of knowledge questionnaire yielded at .74 and Chronbach's alpha coefficient value of .73 was yielded for attitude questionnaire and .73 was yielded for practice questionnaire.

Translation of the Instrument

All questionnaires were developed by the researcher in English language. The back translation method was conducted by 2 bilingual translators. The first translator translated the English version questionnaires into Bengali language. The second translator was then translated the questionnaire from Bengali version back into English language. Next, the two English versions of the questionnaires were checked

for clarity, discrepancy by the advisory committee who is expertise in pressure ulcer prevention area from Faculty of Nursing, Prince of Songkla University, Thailand.

Data Collection Procedure

Prior to data collection, the proposal was approved by the Institutional Review Board (IRB) of Faculty of Nursing, Prince of Songkla University, Thailand and the Director of Rajshahi Medical College Hospital in Bangladesh. The researcher asked nursing superintendent to assist in selecting nurses who were subjects in this study. Purpose of the study was explained by the researcher to the subjects and was asked for their cooperation. After explaining the purpose of the study, the researcher was then seek for verbal and written informed consent (Appendix A) from the subjects who agreed to participate in this study. The questionnaires were distributed among the total number of 108 nurses working in medical, surgical, neuro-medicine, neuro-surgery, orthopedics, and coronary care units and requested them to return the questionnaires within two days. Ninety one nurses returned questionnaire with a response rate of 84.26%.

Ethical Consideration

Subjects' autonomy and confidentiality was strictly maintained. The researcher communicated with the nursing superintendent to select the eligible subjects to participate and informed the subjects about the objectives and the procedure of this study. Among them 91 subjects signed the written informed consent form. Participation was voluntary and anonymity was guaranteed. Based on returning and completing the questionnaire by 91 nurses was considered as eligible subjects

who signed written informed consent form in this study. Subjects could be withdrawn at any time without any reason. All necessary information collected from the subjects were kept confidential and destroyed after completion of the study.

Data Analysis

All data were processed through computer program. Data were analyzed using descriptive and inferential statistics. Descriptive statistics were used for presenting demographic characteristics. Knowledge, attitude, and practice level were described in terms of frequency, percentage, mean, standard deviation, and range. The Pearson product-moment correlation coefficient (r) was used to examine the relationships among the level of nurses' knowledge, attitude, and practice. Prior performing the Pearson product-moment coefficient statistics, assumptions of normality, and linear relationship of the tested variables were checked. All variables were met the assumptions of normality and linearity.

CHAPTER 4

RESULTS AND DISCUSSION

In this chapter the results of this study are presented under the following headings:

1. Subjects' characteristics
2. Levels of nurses' knowledge, attitude, and practice regarding pressure ulcer prevention
3. Relationships between nurses' knowledge and attitude, attitude and practice, and knowledge and practice regarding pressure ulcer prevention

Results

Subjects' Characteristics

The target group in this study consisted of all nurses working in the sixteen wards of the departments of medicine, surgery, neuro-medicine, neuro-surgery, orthopedics, and coronary care at Rajshahi Medical College Hospital. It is a tertiary level hospital in Bangladesh. Ninety-one out of 108 questionnaires (an 84.26% response rate) were completed and returned by the nurses.

Table 1 shows the demographic characteristics of the nurses. The mean age of the nurses was 40.03 years (SD = 5.75) with a minimum and maximum age of 30 and 54 years. The age range of most nurses was between 30 to 40 years (56%). A majority of them were female (87.9%). All the nurses were married. Most of them (78%) had a Diploma in nursing. The average length of service of the nurses was

12.9 years (SD = 7.95), and this ranged from 1 year to 30 years. However, most of them had not received any formal training on pressure ulcer prevention (98.9%).

Table 1

Frequency and Percentage of Nurses' Demographic Characteristics (N=91)

Demographic Data	n	%
Age (years old) (M = 40.03, SD = 5.75, Min = 30, Max = 54)		
30 – 40	51	56.0
41 – 50	37	40.7
51 – 60	3	3.3
Gender		
Female	80	87.9
Male	11	12.1
Educational status		
Diploma in nursing	71	78.0
Bachelor degree of nursing	20	22.0
Service experience (years) (M =12.9,SD = 7.95, Min =1, Max = 30)		
1 – 10	45	49.5
11 – 20	27	29.6
21 – 30	19	20.9
Formal training of pressure ulcer		
No	90	98.9
Yes	1	1.1

Nurses' Knowledge Regarding Pressure Ulcer Prevention

Overall, the nurses' knowledge regarding pressure ulcer prevention was at a very low level (M = 57.79%, SD = 9.20) with minimum and maximum scores of 27.27% and 86.36%, respectively. Table 2 shows the number and frequency of nurses who were in each category of knowledge level. It was found that 92.3% of nurses possessed very low (70.3%) to low (22%) level of knowledge. Very few nurses (5.5%) had a moderate level of knowledge. Few nurses (2.2%) scored a high level of knowledge and no nurses had a very high level of knowledge regarding pressure ulcer prevention.

Table 2

Frequency and Percentage of Nurses in each Category of Knowledge Level Regarding Pressure Ulcer Prevention (N=91)

Knowledge Level	n	%
Very low (<60%)	64	70.3
Low (60 – 69.99%)	20	22.0
Moderate (70 – 79.99%)	5	5.5
High (80 – 89.99%)	2	2.2
Very high (90 – 100%)	0	0.0

Considering each dimension of knowledge regarding pressure ulcer prevention, four out of the six dimensions were at very low levels. Nurses assessed knowledge on the skin care dimension a little higher but this was still at a low level

(M = 61.75%, SD = 18.2). They possessed higher levels of knowledge on educational program for patients, family, and staff (M = 84.61%, SD = 25.48) (Table 3).

Table 3

Mean Percentage, Standard Deviation, and Level of Nurses' Knowledge Regarding Pressure Ulcer Prevention Separated by each Dimension and Total Score (N=91)

Nurses' Knowledge	M (%)	SD	Level
Factors for pressure ulcer formation	50.27	25.68	Very Low
Risk assessment	50.32	18.94	Very Low
Skin care	61.75	18.29	Low
Nutrition to maintain healthy skin	55.67	25.36	Very Low
Management of mechanical loads	57.87	24.76	Very Low
Educational program for patient family and staff	84.61	25.48	High
Total score	57.79	9.20	Very Low

Table 4 presents the 5 items that highest percentages of nurses answered correctly regarding nurses' knowledge of pressure ulcer prevention. These items were: 1) turning the position every 2 hours to protect skin damage, 2) scheduling turning positions for reducing pressure ulcer formation, 3) recognizing the value of vitamins C & E to maintain healthy skin, 4) elevating the head of bed at $<30^0$ to reduce shearing force, and 5) undertaking head to toe skin assessment for pressure ulcer development. Conversely, there were 5 items that lowest percentages of nurses answered correctly. These were: 1) applying a risk assessment scale for pressure ulcer development, 2) determining low albumin to be the critical determinant for pressure

ulcer development, 3) using a Braden scale for assessing the risk of pressure ulcer development, 4) applying topical cream as a method of skin care, and 5) using serum albumin as a laboratory test for nutritional assessment of pressure ulcer development.

Table 4

Five Items with Highest and Five Items with Lowest Percentage of Nurses Answered Correctly on the Nurses' Knowledge of Pressure Ulcer Prevention Questionnaire (N = 91)

Knowledge of Pressure Ulcer Prevention	n	%
Five items with highest percentage of nurses answered correctly		
1. Turning the position for every 2 hours to protect skin damage	91	100
2. Scheduling turning position for reducing pressure ulcer formation	86	94.5
3. Recognizing the value of vitamins C & E to maintain healthy skin	84	92.3
4. Elevating the head of bed at $<30^0$ to reduce shearing force	78	85.7
5. Undertaking head to toe skin assessment for pressure ulcer development	73	80.2
Five items with lowest percentage of nurses answered correctly	n	%
1. Applying a risk assessment scale for pressure ulcer development	11	12.1
2. determining low albumin to be the critical determinant for pressure ulcer development	21	23.1
3. Using a Braden scale for assessing the risk of pressure ulcer development	24	26.4
4. Applying topical cream as a method of skin care	25	27.5
5. Using serum albumin as a laboratory test for nutritional assessment of pressure ulcer development.	21	23.1

Nurses' Attitudes Regarding Pressure Ulcer Prevention

Table 5 shows the level of nurses' attitude regarding pressure ulcer prevention. Most of the nurses (63.7%) achieved neutral (M = 78.31%, SD = 6.61%) levels of overall attitude towards pressure ulcer prevention. Nearly one-fifth (17.6%) of the nurses showed negative attitudes and approximately one-fifth (18.7%) of the nurses had an overall positive attitudes regarding pressure ulcer prevention.

Table 5

Frequency and Percentage of Nurses in Each Category of Attitude Level of Pressure Ulcer Prevention (N=91)

Nurses' Attitude	n	%
Negative (<71.70%)	16	17.6
Neutral (71.70% - 84.92%)	58	63.7
Positive (>84.92%)	17	18.7
M = 78.31%, SD = 6.61, Min = 64, Max = 90.40	91	100

Assessing each dimension of the attitudes regarding pressure ulcer prevention revealed that all dimensions of the attitudes were at neutral levels (Table 6).

Table 6

Mean Percentage, Standard Deviation, and Level of Nurses' Attitude Regarding Pressure Ulcer Prevention Separated by each Dimension and Total Score (N=91)

Nurses' Attitude	M (%)	SD	Level
Factors for pressure ulcer formation	74.90	10.56	Neutral
Risk assessment	76.57	8.80	Neutral
Skin care	81.75	10.53	Neutral
Nutrition to maintain healthy skin	78.18	13.34	Neutral
Management of mechanical loads	80.76	14.92	Neutral
Educational program for patient family and staff	89.23	18.92	Neutral
Total score	78.31	6.61	Neutral

Table 7 shows the 5 items that the highest percentage of nurses responded to with "strongly agree" regarding nurses' attitude towards pressure ulcer prevention. These were: 1) patients should be cleansed immediately after soiling themselves, 2) attending educational activities on pressure ulcer prevention is important for nurses, 3) a pressure ulcer is an important indicator of the quality of nursing care, 4) standard nursing care should be carried out to prevent pressure ulcers, and 5) patients at risk of pressure ulcers should be turned every 2 hours.

However, it was reported that no nurses scored "strongly agree" to the statement "Patients at risk for developing pressure ulcer should be assessed at the first day of admission". The 4 items that recorded the lowest percentage of nurses responded with "strongly agree" regarding their attitudes to pressure ulcer prevention

were: 1) clinical judgment was not better than any pressure ulcer risk assessment tool, 2) all patients were not at risk for developing pressure ulcers, 3) the incidence of pressure ulcers should be 0% in their wards, and 4) nurses were interested in moving patient from one side to another side of the bed by lifting up him/her out of the bed (Table 7).

Table 7

Five Items with Highest and Four Items with Lowest Percentage of Nurses' Responded as "Strongly agree" on the Nurses' Attitude of Pressure Ulcer Prevention Questionnaire (N = 91)

Attitude of Pressure Ulcer Prevention	n	%
Five items with highest percentage responded as "strongly agree"		
1. Patient should be cleansed immediately after soiling themselves.	63	69.7
2. Attending educational activities on pressure ulcer prevention is important for nurses.	58	63.7
3. A pressure ulcer is an important indicator of the quality of nursing care.	54	59.3
4. Standard nursing care should be carried out to prevent pressure ulcers.	49	53.8
5. Patients at risk of pressure ulcers should be turned every 2 hours.	49	53.8
Four items with lowest percentage responded as "strongly agree"	n	%
1. Clinical judgment was not better than any pressure ulcer risk assessment tool.	9	9.9
2. All patients were not at risk for developing pressure ulcers.	12	13.2
3. The incidence of pressure ulcer should be 0% in their ward.	15	16.5
4. Nurses were interested in moving patient from one side to another side of the bed by lifting up him/her out of the bed.	18	19.8

Nurses' Practice Regarding Pressure Ulcer Prevention

Overall nurses' practice regarding pressure ulcer prevention were at the moderate level (M = 77.55%, SD = 11.00) with minimum and maximum scores of 53.03% and 95.45%, respectively. As Table 8 shows, it was found that 24.2% of the nurses scored at the moderate levels and 42.9% of the nurses had high levels of practice regarding pressure ulcer prevention.

Table 8

Frequency and Percentage of Nurses in Each Category of Practice Level of Pressure Ulcer Prevention (N=91)

Nurses' Practices	n	%
Very low (<60%)	9	9.9
Low (60 – 69.99%)	15	16.5
Moderate (70 – 79.99%)	22	24.2
High (80 – 89.99%)	39	42.9
Very high (90 – 100%)	6	6.6

When considering each dimension, it was found that 5 out of 6 dimensions of practice relating to pressure ulcer prevention were at moderate levels. Only the dimension of skin care was at a high level (Table 9).

Table 9

Mean Percentage, Standard Deviation, and Level of Nurses' Practice Regarding Pressure Ulcer Prevention Separated by Each Dimension and Total Score (N=91)

Nurses' Practices	M (%)	SD	Level
Factors for pressure ulcer formation	77.65	20.06	Moderate
Risk assessment	74.17	15.61	Moderate
Skin care	82.05	13.54	High
Nutrition to maintain healthy skin	77.41	16.68	Moderate
Management of mechanical loads	77.65	12.41	Moderate
Educational program for patient family and staff	75.09	16.17	Moderate
Total score	77.55	11.00	Moderate

Table 10 shows the 5 items that scored the highest percentage of nurses responding with "always practice" regarding nurses' practice for pressure ulcer prevention. These were: 1) turning a patient's position every two hours, 2) giving advice to the patient or caregiver regarding pressure ulcer prevention before discharging the patient from hospital, 3) assessing and providing pain management, 4) paying special attention towards bony prominences during cleansing after soiling, and 5) performing skin assessment through following a standard guide for nursing care available in their wards.

Five items were reported with the lowest percentage of nurses responding as "always practice" regarding nurses' practice of pressure ulcer prevention. These were: 1) attending seminars on pressure ulcer prevention, 2) using a risk assessment scale to assess pressure ulcers, 3) performing laboratory tests for nutritional status followed by

physicians' instructions, 4) documenting all data related to pressure ulcer assessment; and 5) avoiding using donut-shape (ring) cushions at bony prominences (Table 10).

Table 10

Five Items with Highest and Five Items with Lowest Percentage of Nurses' Responded as "Always Practice" on the Nurses' Practice of Pressure Ulcer Prevention Questionnaire (N = 91)

Practice of Pressure Ulcer Prevention	n	%
Five items with highest percentage responded as "always practice".		
1. Turning a patient's position every two hours.	80	87.9
2. Giving advice to the patient or caregiver regarding pressure ulcer prevention before discharging the patient from hospital.	76	83.5
3. Assessing and providing pain management.	63	69.2
4. paying special attention towards bony prominences during cleansing after soiling.	62	68.1
5. performing skin assessment through following a standard guide for nursing care available in their wards.	60	65.9
Five items with lowest percentage responded as "always practice"	n	%
1. Attending seminars on pressure ulcer prevention.	19	20.0
2. Using a risk assessment scale to assess pressure ulcers.	20	22.0
3. Performing laboratory tests for nutritional status followed by physicians' instructions.	28	30.8
4. Documenting all data related to pressure ulcer assessment.	29	31.9
5. Avoiding using donut-shape (ring) cushion at bony prominences.	37	40.7

Relationship Between Nurses' Knowledge and Attitude, Attitude and Practice, and Knowledge and Practice Regarding Pressure Ulcer Prevention

Correlational analysis revealed that there was a moderately positive relationship between nurses' attitude and practice ($r = .34$, $p < .01$). There was a small and non-significant relationship between knowledge and attitude ($r = .14$, $p > .05$), and between knowledge and practice ($r = .14$, $p > .05$) regarding pressure ulcer prevention (Table 11).

Table 11

Pearson Product-Moment Correlation Coefficients Between Nurses' Knowledge, Attitude, and Practice Regarding Pressure Ulcer Prevention (N = 91)

	Knowledge	Attitude	Practice
Knowledge	1.00		
Attitude	.14	1.00	
Practice	.14	.34**	1.00

** $p < .01$

Discussion

The study aimed at exploring the level of nurses' knowledge, attitudes and practice regarding the prevention of pressure ulcers and to examine the relationships among those variables. The findings revealed that nurses had a very low level of knowledge, neutral level of attitudes, and a moderate level of practice regarding pressure ulcer prevention. There was a non-significant relationship between nurses' knowledge and attitude, and between knowledge and practice. However, a moderate

correlation was found between nurses' practice and attitude. The findings are discussed in four parts: 1) level of knowledge; 2) level of attitude; 3) level of practice; and 5) relationships among knowledge, attitude, and practice.

Level of Knowledge

The findings showed that the nurses who participated in this study had a very low level of overall knowledge regarding the prevention of pressure ulcers. There are three possible reasons to explain the very low level of overall knowledge of this group of subjects.

First, their formal education background and training experience may be a factor related to this very low level of knowledge. Most of the nurses (78%) graduated with a diploma followed by a bachelor degree (22%). The content included in both these curriculums was not specifically focused on up-to-date information about pressure ulcer prevention. In addition, the majority of nurses (98.9%) were not trained in the prevention of pressure ulcers' program. Inadequate up-dated information about pressure ulcer prevention was included in both curriculums. The lack of opportunity to be trained about up-dated on pressure ulcer prevention programs might preclude the nurses from remembering, understanding, and applying suitable knowledge regarding pressure ulcer prevention.

Item analysis supports this explanation. This revealed that the items that the lowest percentage of nurses answered correctly were questions that related to up-dated information about pressure ulcer prevention. These included that the risk assessment scale is an appropriate method to assess pressure ulcer risk, or low albumin is a critical determinant of pressure ulcer formation (see Appendix C, Table A-1). The findings of this study are similar to a previous study in which lack of

training in pressure ulcer prevention care in Irish nurses was one barrier to nurses accessing to up-dated information about pressure ulcer prevention (Moore & Price, 2004).

Second, it has been proposed that the greater the working experience the higher the knowledge gained (Pancorbo-Hidalgo et al., 2007). However, the additional analysis did not support this proposition. There were significant differences in nurses' knowledge with different working experiences. It was found that nurses with more years of working experience (21-30 years) had lower levels of knowledge than those with less years of working experience (1-10 years) (see Appendix C, Table A-7). This may be because nurses with more years of working experiences may have had less chance to gain access to up-to-date information about pressure ulcer prevention. It was found that nurses with many years of clinical experience (over 20 years) had lower levels of knowledge regarding pressure ulcer prevention and its associated care due to their not up-dating their knowledge (Mockridge & Anthony, 1999; Pancorbo-Hidalgo et al., 2007).

Third, the lack of learning resources for nurses to up-date their knowledge would be another reason for the very low level of knowledge. In Bangladesh, there is a lack of learning resources for nurses to up-date their knowledge. Nursing journals are not available even at the nursing institutes or hospitals. Only some old nursing journals are available at the Bangladesh Nursing Council. These facts indicate that nurses still have an inadequate knowledge in some areas of pressure ulcer prevention due to their knowledge not being up-to-date either by lack of formal training or reading text books or journals.

Level of Attitude

Results indicated that the majority of nurses showed a neutral level of attitude regarding the prevention of pressure ulcers. The current study also demonstrated that all the dimensions of attitudes were found to be at the neutral level. This finding indicates that nurses neither care nor were indifferent about the prevention of pressure ulcer development. It means that nurses were unaware of pressure ulcer prevention care, or they had no idea about preventing pressure ulcer development. In this present study factors related to this neutral level of attitude may be individual and/or organizational. An individual factor may be the awareness of nurses. Nurses may lack awareness of pressure ulcer prevention since that showed a very low level of knowledge in pressure ulcer prevention. It has been claimed that knowledge is an antecedent to developing awareness (Bloom, 1956). Since the subjects in this current study demonstrated very low levels of knowledge, this would cause a neutral level of attitude of pressure ulcer prevention. This is because subjects do not know about up-dated methods of preventing pressure ulcer development and this may make them less attentive or interested in pressure ulcer prevention.

It is assumed that age would be related to attitude. However, additional analysis did not support this expectation. There was no significant correlation between age and attitude in this current study (Appendix C, Table A-5). Furthermore it could be hypothesized that working experience is not related to an individual's attitude. It is true that in this study the greater the age of nurses, the longer was the working experience of those nurses. Therefore, both age and working experience did not influence the neutral level of attitude in this current study.

In addition, organizational policy, the absence of guidelines, the shortage of nurses, or work overload could affect the neutral attitude shown (Moore & Price, 2004). One study supported that nurses' working experience was related to developing positive attitudes regarding pressure ulcer prevention (Ulrika & Bjorn-Ove, 2009). An examination of these factors on nurses' attitudes towards pressure ulcer prevention is recommended for future study.

Workload and the shortage of nurses may be other factors related to neutral level of attitudes. Based on the researcher's experience, the nurse-patient ratio in government hospitals of Bangladesh is 1:15 (Arju, 2008). Therefore, nurses may pay more attention in caring for patients with the critical or acute conditions that occur mostly in Bangladesh hospitals, compared with the problem of pressure ulcer prevention.

However, nurses still had negative attitudes in some areas of pressure ulcer prevention. Some nurses still "strongly agree" and "agree" that their personal clinical judgment was better than using risk assessment tool to assess pressure ulcer risk. Fifty percent of nurses stated that pressure ulcer prevention cannot be independently provided by nurses, and approximately 20% of the nurse stated that the incidence of pressure ulcers should be greater than 0% in their units. These findings suggest that nurses still pay less attention, and respond less and show less value towards the issue of pressure ulcer prevention. These negative attitudes may be due to their very low level of knowledge. According to Bloom (1956), knowledge is the basis for the cultivating of positive attitudes. Therefore, promoting knowledge of pressure ulcer prevention is needed not only for increasing nurses' level of knowledge, but also for improving their attitudes.

Level of Practice

It was found that the nurses' practice regarding pressure ulcer prevention was at a moderate level. The current study also showed that five out of the six dimensions of practice except skin care were at moderate levels. The level of knowledge was lower than the level of their practice. In this study, nurses' practice was not reflected by their knowledge. This result is not in accord with the concept proposed by the KAP model (Launiala, 2009). A possible reason for explaining this moderate level of practice may be due to certain factors. First, the shortage of nursing staff and the limited working time available for direct patient care in preventing pressure ulcers may be an organizational factor related to the moderate level of practice. In Bangladesh it has been shown that nurses in government hospitals spent only 5.3% of their working time in direct contact with their patents (Hadley & Roques, 2007). The current ratio of nurses to patients in Bangladesh is 1: 15 (Arju, 2008). Another previous study stated that the ratio of nurses to the Bangladesh population was 11 nurses for 100,000 people (Ministry of Health and Family Welfare, 2004). This inadequate nurse to patient ratio may limit the implementation of quality care to prevent pressure ulcers development. A previous study indicated that a majority of nurses reported lack of staff and lack of time as barriers to carry out pressure ulcer prevention care into effective practice (Moore & Price, 2004; Ulrika & Bjorn-Ove, 2009).

Second, education and training, administrative support, and supplies of equipment are particularly essential for nurses to prevent the development of pressure ulcers. In this study hospital, no in-service education or training or adequate supplies of equipments are available for preventing pressure ulcer development. For example,

there is no pressure relieving support surface. One study found that nurses in Bangladesh were not trained and equipped for providing a good standard of nursing care to prevent pressure ulcers. The same authors discussed that it was due to lack of proper education and training, inadequate resources, and an inappropriate supervision and management system (Rahman, Shahidullah, Shahiduzzaman & Rashid, 2002).

Third, the provision of guidelines for practice to prevent pressure ulcers is an important factor for nurses in providing standard nursing care. These were not investigated in this current study. The researcher's experience in Bangladesh suggests that nurses have limited access to up-to-date evidence-based guidelines for practice in pressure ulcer prevention. No organizational policy or guidelines have yet been developed for nurses to prevent pressure ulcers. The researcher assumed that there were other important factors that might contribute to nurses' practice regarding pressure ulcer prevention. These were not explored in this current study. Those factors include values, beliefs, social norms, purpose, awareness, effects of workloads, inadequate facilities, and shortages of staff. Future studies should explore these factors to determine whether they are related to practice or not.

An item analysis of the results showed that only 30% of nurses did not use donut shape cushion at bony prominences or document all information related to pressure ulcer risk. Fifty percent of nurses in this current study did not use a risk assessment scale to assess pressure ulcer. Approximately three-fifths of the nurses used donut shape cushion at bony prominences. These results indicate that nurses lacked current up-dated knowledge and information regarding nursing care activities for pressure ulcer prevention. Extensive education and in-service training, and

evidence-based nursing practice about pressure ulcer prevention are required to develop their competencies and might improve nurses' practices in this field.

Relationships Among Knowledge, Attitude, and Practices

No significant relationship was found between knowledge and attitude regarding pressure ulcer prevention. According to the KAP model, one factor that affects attitudes is a knowledge-base in a specific area. However, the findings of this study do not support the KAP model. This may be because nurses' attitudes were influenced by their concern, purpose, awareness, or traditional values that they learned from nursing teachers or senior nurses. This was when they worked for a long period of time when their knowledge was at very low level. Therefore, knowledge in itself is not related to nurses' development of attitudes. Future research should explore the nurse's awareness, purpose, or traditional values in relation to pressure ulcer prevention. The small sample size of this study could be another factor for the lack of a link between nurses' knowledge and attitude.

According to Bloom (1956), effective education can bring change in human behavior especially regarding positive attitudes. It has been showed that proper education and training can influence nurses' positive attitude regarding pressure ulcer prevention (Moore & price, 2004). According to the KAP model, changes in the knowledge and attitude of individuals can affect practice. In this regard, nurses need further continuing education and training programs regarding pressure ulcer prevention that could influence positive attitude; ultimately, leading to effective nursing practice of pressure ulcer prevention.

There was no significant relationship between knowledge and practice regarding pressure ulcer prevention among the nurses. These findings contrast with

the KAP model in which practice is influenced by knowledge. There could be other factors that affect nursing practice other than knowledge. Previous study showed that the nurses' high level of knowledge regarding pressure ulcer prevention intervention was not reflected in practice (Pancorbo-Hidalgo et al., 2007). Similarly, there was no relationship between Hong Kong nurses' knowledge and practice. Although the majority of these nurses had good knowledge of pressure ulcer prevention their practice was reported to be at a low level (Wilkes, Bostock, Lovitt, & Dennis, 1996). One study revealed that orthopedic nurses had a negative correlation between knowledge and pressure ulcer prevention practice (Maylor, 2001). Other factors might influence practice. Those factors may be shortage of nursing staff, lack of time, insufficient equipment, the absence of guidelines, the lack of in-service training and nursing leadership, the lack of learning resources to access, and patients' conditions.

However, there was a moderate, significant positive correlation between practice and attitude. This relationship was in accord with the KAP model. The KAP model suggests that if attitudes developed, they would reflect on practice. Previous studies found that there was a moderate significant correlation between nurses' practice and attitude regarding the usefulness of massage to prevent the development of pressure ulcers (Duimel-Peeters et al., 2005).

It may be concluded that not only do knowledge and attitude determine practice, other factors are also involved. These factors may be purpose, awareness, personal interest, traditional values, workplace policy, availability of pressure ulcer prevention equipment, policy regarding the use of pressure ulcer prevention guidelines, or the nurse-patient ratio.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

This chapter presents a summary of the study findings, the implications and recommendations for nursing practice, education and administration, and suggestions for future research. A descriptive study was conducted to explore the level of nurses' knowledge, attitude, and practice regarding the prevention of pressure ulcers. In addition, the relationships between nurses' knowledge, attitude, and practice were also examined for hospitalized patients at the Rajshahi Medical College Hospital in Bangladesh. The study was carried out from November, 2009 to January, 2010 at six selected units. The participants were all nurses who worked in those selected units.

Summary of the Study Findings

The level of nurses' knowledge was at very low level regarding pressure ulcer prevention care, the level of nurses' attitude was at a neutral level, and the level of nurses' practice was at a moderate level. Five out of six sub-dimensions of knowledge were identified as being at very low to low levels. These were: 1) factors related to pressure ulcer formation, 2) risk assessment, 3) skin care, 4) nutrition to maintain healthy skin, and 5) management of mechanical loads. All sub-dimensions of attitude were at neutral levels and five out of six sub-dimensions of practice were reported at moderate levels. There was a positive correlation between nurses' attitudes and practice ($r = .34$, $p < .01$) regarding pressure ulcer prevention. In contrast, no correlation existed between nurses knowledge and attitude ($r = .14$, $p > .05$), and

between nurses knowledge and practice (r = .14, $p > .05$) regarding pressure ulcer prevention.

Strength and Limitation

This exploration of the current situation of nurses' knowledge, attitude, and practice for pressure ulcer prevention could provide baseline data for the further improvement of nursing care in this field in Bangladesh. There are some limitations to this study. The main limitation was using a self-report questionnaire to examine nurses' practice. The responses might not reflect actual nursing practices. Another limitation was the generalizability of the findings because this study was conducted in one medical college hospital. The findings may not be generalized to other medical college hospitals or to hospitals at other levels.

Implications and Recommendations

Despite the above limitations, it is recommended that Bangladeshi nurses need up-dated knowledge and information about pressure ulcer prevention in order to improve their practice. Although the attitude level was neutral and the practice level was moderate, the knowledge level was very poor. These findings indicated that attitudes are important factors in relation to practice on pressure ulcer prevention. In this regard, nurses need further continuing education, refresher courses, and training program about pressure ulcer prevention in order to enhance their knowledge, attitude, and practice of care in this field. Following recommendations are put forward to improve nurses' knowledge, attitude, and practice regarding the prevention of pressure ulcers:

1. In-service training and refresher courses about pressure ulcer prevention should be designed for Bangladeshi nurses. This should provide them with up-dated knowledge to understand pressure ulcer prevention which can be translated into practice.

2. Hospital policies and guideline are needed to promote nurses' attitude in relation to pressure ulcer prevention.

3. Further interventions studies should be initiated to examine the level of knowledge, attitude, and practice after nurses participate in in-service training programs.

4. A training program on pressure ulcer prevention should also be conducted for nurse-teachers in order to improve the knowledge they are expected to transmit to students.

5. A replication study is recommended in other settings to promote the generalizability of the findings above.

6. The results of this study should be shared with stake holders such as nurse administrators, nurse teachers, nurse researchers, nurse clinicians, hospital administrators and the public. This should make the problem of pressure ulcers a public concern.

REFERENCES

Agency for Health Care Policy and Research. (1992). *Pressure ulcers in adults: Prediction and prevention* (AHCPR Publication No. 92-0047). Rockville, MD: U.S. Department of Health and Human Services. Retrieved on March 23, 2009, from http://www.ahrq.gov/news/pubcat/c_clin.htm

Andersen, P. H., Butcher, A. P., Saeed, I., Lee, P. C., Davis, J. A., & Maibach, H. I. (1994). Fecal enzymes: In vivo human skin irritation. *Contact Dermatitis, 30*, 152-158.

Anderson, L. W., & Krathwohl, D. R. (Eds.). (2001). *A taxonomy for learning, teaching and assessing: A revision of Bloom's taxonomy of educational objectives: Complete edition.* New York: Longman.

Arju, A. (2008, May 12). The nurse crisis hampers health services. *The Daily New Age*. Retrieved March 5, 2010, from http://www.newsbd.com

Armstrong, D., Bortz, P., & Halter, M. J. (2001). An integrative review of pressure relief in surgical patients. *Association of Preoperative Registered Nurses Journal, 73,* 645-657.

Auer-Grumbach, M. (2008). Hereditary sensory neuropathy type 1. *Orphanet Journal of Rare Disease, 3,* 1-7.

Australian Wound Management Association. (2001). *Clinical practice guidelines for the prediction and prevention of pressure ulcers*. Retrieved on April 8, 2009, from http://www.awma.com.au/publications/publications.php

Ayello, E., & Meaney, G. (2003). Replicating a survey of pressure ulcer content in nursing textbooks. *Journal of Wound Ostomy Continence Nursing, 30*, 266-271.

Ayello, E. A., Baranoski, S., Lyder, C., & Cuddigan, J. (2004). Pressure ulcers. In S. Baranoski, & E. A. Ayello (Eds.), *Wound care essentials: Practice principles* (pp. 240-270). Philadelphia: Lippincott William & Wilkins.

Ayello, E. A., & Braden, B. (2002). How and why to do pressure ulcer risk assessment. *Advanced Skin Wound Care, 15*, 125-131.

Baranoski, S. (2006). Raising awareness of pressure ulcer prevention and treatment. *Advances in Skin and Wound Care, 19*, 398-405.

Baranoski, S., & Ayello, E. A. (2003). *Wound care essentials: Practice principles.* New York: Lippincott.

Benbow, M. (1992). Keeping the pressure off. *Nursing the Elderly, 33*, 17-19.

Bergstrom, N. I. (1997). Strategies for preventing pressure ulcers. *Clinical Geriatric Medicine, 13,* 437-454.

Bergstrom, N., Bennett, M. A., & Carlson C. E. (1994). Treatment of pressure ulcers in adults: Clinical practice guideline. *Agency for Health Care Policy and Research Publication, 15.* 181-188.

Bergstrom, N. I., & Braden, B. (1992). A prospective study of pressure sore risk among institutionalized elderly. *Journal of American Geriatric Society, 40,* 748-758.

Bergstrom, N., Braden, B. J., Laguzza, A., & Holman, V. (1987). The Braden Scale for predicting pressure sores risk. *Nursing Research, 36*, 205-210.

Black, J., Baharestani, M., Cuddigan, J., Dorner, B., Edsberg, L., & Langemo, D. (2007). National Pressure Ulcer Advisory Panel's updating pressure ulcer staging system. *Urologic Nursing, 27*, 144-156.

Bliss, M. (1990). Geriatric medicine. In D. L. Bader (Ed.), *Pressure ulcers: Clinical practice and scientific approach* (1st ed.) (pp. 65-80). London: McMillan.

Bloom, B. S. (1956). *Taxonomy of educational objectives, the classification of educational goals - Handbook I: Cognitive domain.* New York: David McKay.

Bours, G. J. J., Halfens, R. J. G., Abu-Saad, H. H., & Groll, R. T. P. (2002). Prevalence, prevention, and treatment of pressure ulcers: Descriptive study in 89 institutions in the Netherlands. *Research in Nursing and Health, 25*, 99-110.

Brain, H., & Lyder, C. (2004). Protocol for the successful treatment of pressure ulcer. *American Journal of Surgery, 188,* 9-17.

Buss, I. C., Halfens, R. J. G., Abu-Saad, H. H., & Kok, G. (2004). Pressure ulcer prevention in nursing homes: Views and beliefs of enrolled nurses and other health care workers. *Journal of Clinical Nursing, 13,* 668-676.

Catania, K., Huang, C., James, P., Madison, M., Moran, M., & Ohr, M. (2007). PUPPI: Pressure ulcer prevention protocol intervention. *American Journal of Nursing, 107,* 44-52.

Chang, W. L., & Seireg, A. A. (1992). Prediction of pressure ulcer formation on the skin. *Medical Hypothesis, 2*, 141-144.

Clarke, H. F., Bradley, C., Whytock, S., Handfield, S., VanderWal, R., & Groound, S. (2005). Pressure ulcers: Implementation of evidence based nursing practice. *Journal of Advanced Nursing, 49*, 578-590.

Clark, M., & Watts, S. (1994). The incidence of pressure sore within a national health service trust hospital during 1991. *Journal of Advanced Nursing, 20,* 33-36.

Culley, F. (1998). Nursing aspects of pressure ulcer prevention and therapy. *British Journal of Nursing, 7*, 879-886.

Cullum, N., Deeks, J., Sheldon, T., Song, F., & Fletcher, A. W. (2003). Beds, mattresses and cushions for pressure sore prevention and treatment. *Cochrane Library, 49,* 32-42.

Cullum, N., & Clark, M. (1992). Intrinsic factors associated with pressure sores in elderly people. *Journal of Advanced Nursing, 17*, 427-431.

Dinsdale, S. M. (1974). Decubitus ulcers: Role of pressure and friction in causation. *Archives of Medicine and Rehabilitation, 55*, 147-152.

Duimel-Peeters, I. G. P., Hulsenboom, M. A., Berger, M. P. F., Snoeckx, L. H. E. H., & Halfens, R. J. G. (2006). Massage to prevent pressure ulcers: Knowledge, beliefs and practice. *Journal of Clinical Nursing, 15,* 428-435.

Dyson, M., & Lyder, C, (2001). Wound management: Physical modalities. In M. Morison (ed.). *The prevention and treatment of pressure ulcers*. Edinburgh, UK: Mosby.

European Pressure Ulcer Advisory Panel. (1999). Pressure ulcer prevention guidelines. *European Pressure Ulcer Advisory Panel Review, 1*, 7-8.

Fonder, M., A., Lazarus, G. S., Cowan, D. A., Aronson-Cook, B., Kohl, A. R., & Mamelak, A. J. (2008). Treating the chronic wound: A practical approach to the care of non healing wounds and wound care dressings. *Journal of American Academy in Dermatology, 58*, 185-206.

Fogerty, M. D., Abumrad, N. N., Nanney, L., Arbogast, P. G., Poulose, B., & Barbul, A. (2008). Risk factors for pressure ulcer in acute care hospitals. *Wound Repair and Regeneration, 16,* 11-18.

Frantz, R., & Gardner, S. (1994). Clinical concerns: Management of dry skin. *Journal of Gerontological Nursing, 20*, 15-18.

Grous, C., Reilly, N., & Gift, A. (1997). Skin integrity in patients undergoing prolonged operations. *Journal of Wound Ostonomy Care Nursing, 24,* 86-91.

Guin, P., Hudson, A., & Gallo, J. (1991). The efficacy of six heel pressure reducing devices. *Decubitus, 4,* 15-23.

Gunningberg, L., Lindholm, C., Carlsson, M., & Sjoden, P. Q. (1999). Implementation of risk assessment and classification of pressure ulcers as quality indicators for patients with hip fractures. *Journal of Clinical Nursing, 8,* 396-406.

Gunningberg, L., Lindholm, C., Carlsson, M., & Sjoden, P. (2001). Risk, prevention and treatment of pressure ulcer: Nursing staff knowledge and documentation. *Scand Journal of Caring Science, 15*, 257-267.

Hadley, M. B., & Roques, A. (2007). Nursing in Bangladesh: Rhetoric and reality. *Social Science and Medicine, 64,* 1153-1165.

Haalboom, J. R. (2000). The Dutch experience of pressure ulcers: A personal view. *Journal of Wound Care, 9*, 121-122.

Halfen, R. J. G., & Eggink, M. C. (1995). Knowledge, belief and use of nursing methods in preventing pressure sores in Dutch hospitals. *International Journal of Nursing Studies, 32,* 16-26.

Harris, C. L., & Fraser, C. (2004). Malnutrition in the institutionalized elderly: The effects on wound healing. *Ostomy Wound Management, 50,* 54-63.

Hayes, P., Wolff, Z., & McHugh, M. (1995). Effects of teaching plan on a nursing staff's knowledge of pressure ulcer risk assessment and treatment. *Journal of Nursing Staff Development, 10,* 207-213.

Hoque, M. F., Grangeon, C., & Reed, K. (1999). Spinal cord lesions in Bangladesh: An epidemiological study 1994-1995. *Spinal Cord, 37,* 858-861.

Hulsenboom, M. A., Bours, G. J., & Halfens, R. J. (2007). Knowledge of pressure ulcer prevention: A cross-sectional and comparative study among nurses. *Bio-Medical Central Nursing, 6*, 1-11.

Kaltenthaler, E., Whitfield, M. D, Walters. S.J., Akehurst, R.L., & Paisley, S. (2001). UK, USA and Canada: how do their pressure ulcer prevalence and incidence data compare? *Journal of Wound Care 10*, 530–535.

Kanj, L. F., & Philips, T. J. (2001). Skin problems in the elderly. *Wounds, 13*, 93-97.

Keller, B. P. J. A., Wille, J., VanRamshorst, B., & Van der Werken, C. (2002). Pressure ulcer in intensive care patients: A review of risk and prevention. *Intensive Care Medicine, 28*, 1379-1388.

Krathwohl, D. R., Bloom, B. S., & Massia, B. B. (1964). *Taxonomy of* educational *objectives, the classification of educational goals - Handbook II: Affective domain*. New York: David McKay.

Launiala, A. (2009). How much can a KAP survey tell us about people's knowledge, attitudes, and practices? Some observations from medical anthropology research on malaria in pregnancy in Malawi. *Anthropology Matters Journal, 11,* 1-13.

Langemo, D., Cuddigan, J., Baharestani, M., Ratliff, C. R., Posthauer, M. E., Black, J., et al. (2008). Pressure ulcer guidelines: "Minding the gaps" when developing new guidelines. *Advanced in Skin and Wound Care, 21*, 213-217.

Lee, S. K., Posthauer, M. E., Dorner, B., Redovian, V., & Maloney, M. J. (2006). Pressure ulcer healing with a concentrated, fortified, collagen, protein hydrolysate supplement: A randomized controlled trial. *Advanced Skin Wound Care, 19,* 92-96.

Lindholm, C., Sterner, E., Romanelli, M., Pina, E., Torra y Bou, J., Hietanen, H., et al. (2008). Hip fracture and pressure ulcer: The Pan-European pressure ulcer study-intrinsic and extrinsic risk factors. *International Wound Journal, 5,* 315-328.

Maklebust, J., & Sieggreen, M. Y. (2000). *Pressure ulcers: Guidelines for prevention and management.* Pennsylvania: Springhouse.

Maklebust, J., & Sieggreen, M. Y. (2001). *Pressure ulcers: Guidelines for prevention and management.* Pennsylvania: Springhouse.

Majumdar, R., Kothari, S. Y., & Gupta, A. (2006). Challenge in the management of pressure ulcers. *Indian Journal of Physical Medicine and Rehabilitation, 17*, 1-4.

Maylor, M. (2001). Control beliefs of orthopedic nurses in relation to knowledge and prevalence of pressure ulcers. *Journal of Orthopedic Nursing, 5,* 180-185.

Maylor, M., & Torrance, C. (1999). Pressure ulcer survey part 2: Nurses' knowledge. *Journal of Wound Care, 8,* 101-105.

McDonald, M. E. (2002). *Systematic assessment of learning outcome: Developing multiple choice exams.* Sudbury, M A: Jones and Bartlett Publishers.

McGough, A. J. (1999). *A systematic review of the effectiveness of risk assessment scales used in the prevention and management of pressure sores.* Unpublished master's thesis, University of York, York, UK.

Ministry of Health and Family Welfare. (2004). *Poverty reduction strategy paper: Thematic group on health including population planning, nutrition and sanitation*. Dhaka: Government of Bangladesh.

Mockridge, J., & Anthony, D. (1999). Nurses' knowledge about pressure sore treatment and healing. *Nursing Standard, 13*, 68-71.

Moore, Z. (2005). Pressure ulcer grading. *Nursing Standard, 19*, 56-64.

Moore, Z., & Price, P. (2004). Nurses attitude, behavior, and perceived barrier towards pressure ulcer prevention. *Journal of Clinical Nursing, 13,* 942-951.

National Institute for Clinical Excellence. (2001). *Pressure ulcer risk and prevention.* London, UK. Retrieved on January 15, 2009, from http://www.worldwidewounds.com/NICE-pressure-ulcer-review.com.htm

National Pressure Ulcer Advisory Panel. (2007). Reexamining and updated the definition and stages of pressure ulcer. *Society for Urologic Nurses Associates, 27*, 144-150.

National Pressure Ulcer Advisory Panel. (2001). Pressure ulcers in America: Prevalence, incidence, and implications for the future. *Advanced in Skin & Wound Care, 14*, 208-215.

National Pressure Ulcer Advisory Panel. (1989). Pressure ulcers prevalence, cost, and risk assessment: Consensus development conference statement. *Decubitus*, 2, 24-28.

Norton, D. (1996). Calculating the risk: Reflections on the Norton scale. *Advanced Wound Care, 9*, 38-43.

Nursing Clinical Practice Guideline. (2001). *Nursing management of pressure ulcer in adults.* Singapore: Ministry of Health. Retrieved April 10, 2009, from http://www.hpp.moh.gov.sg/HPP/1163085654642.html

Panagiotopoulou, K., & Kerr, S. M. (2002). Pressure area care: An exploration of Greek nurses' knowledge and practice. *Journal of Advanced Nursing, 40*, 285-296.

Pancorbo-Hidalgo, P. L., Garcia-Fernandez, F. P., Lopez-Medina, I. M., & Lopez-Ortega, J. (2007). Pressure ulcer care in Spain: Nurses' knowledge and clinical practice. *Journal of Advanced Nursing, 58*, 327-338.

. Pieper, B. (2007). Mechanical forces: Pressure, shear, and friction. In R. A. Bryan & D. P. Nix (Eds.), *Acute and chronic wounds: Current management concepts* (3rd ed., pp. 205-234). Philadelphia: Mosby Elsevier.

Pieper, B., & Mott, M. (1995). Nurses knowledge of pressure ulcer prevention, staging, and description. *Advanced Wound Care, 8*, 34-48.

Pieper, B., Sugrue, M., Weland, M., Sprague, K., & Heimann, C. (1997). Presence of pressure ulcer prevention methods used among patients considered at risk versus those considered not at risk. *Journal of Wound Ostonomy Care Nursing, 24,* 191-199.

Polit, D. F., & Hungler, B. P. (1999). *Nursing research: Principle and methods*. Philadelphia: Lippincott Williams & Wilkins.

Prentice, J. (2005). Pressure ulcers. In S. Templeton (Ed.), *Wound care nursing: A guide to practice* (1st ed.) (pp. 189-209). Melbourne: Ausmed publication.

Rahman, M. M., Shahidullah, M., Shahiduzzaman, M., & Rashid, H. A. (2002). Quality of health perspectives. *Bangladesh Medical Research Council Bulletin, 28,* 87-96.

Rintala, D. H., Garber, S. L., Friedman, J. d., & Holmes, S. A. (2008). Preventing recurrence pressure ulcers in veterans with spinal cord injury: Impact of a structured education and follow-up intervention. *Archives of Physical Medicine and Rehabilitation, 89*, 1429-1441.

Ryan, T. (2004). The aging of the blood supply and the lymphatic drainage of the skin. *Micron, 35*, 161-171.

Salcido, R. (2004). Patient turning schedule: Why and how often? *Advanced Skin Wound Care, 17*, 156-166.

Sewchuk, D., Padula, C., & Osborne, E. (2006). Prevention and early detection of pressure ulcers in patients undergoing cardiac surgery. *Association of Operating Room Nurses, 84,* 75-96.

Shannon, M. L., & Lehman, C. A. (1996). Protecting the skin of the elderly patient in the intensive care unit. *Critical Care Nursing Clinic in North America, 8,* 17-28.

Sinclair, L., Berwiczonek, H., Thurston, N., Butler, S., Bulloch, G., Ellery, C. et al. (2004). Evaluation of an evidence based education program for pressure ulcer prevention. *Journal of Wound Ostomy Continence Nursing, 31*, 43-50.

Suriadi, Sanada, H., Sugama, J., Kitagawa, A., Thigpen, B., Kinosita, S. et al. (2007). Risk factors in the development of pressure ulcers in an intensive care unit in Pontianak, Indonesia. *International Wound Journal, 4*, 208-215.

Thomas, D. R. (2006). Prevention and treatment of pressure ulcers. *Journal of American Medical Directors Association, 7,* 46-59.

Ulrika, K., & Bjorn-Ove, S. (2009). Knowledge, attitude, and practice among nursing staff concerning pressure ulcer prevention and treatment: A survey in a Swedish healthcare setting. *Scandinavian Journal of Caring Sciences, 23,* 334-341.

Wells, L. (1994). At the front line of care: The importance of nutrition in wound management. *Professional Nursing, 9*, 525-530.

Wilkes, L. M., Bostock, E., Lovitt, L., & Dennis, G. (1996). Nurses' knowledge of pressure ulcer management in elderly people. *British Journal of Nursing, 5,* 858-865.

Young, Z. F., Evans, A., & Davis, J. (2003). Nosocomial pressure ulcer prevention: A successful project. *Journal of Nursing Administration, 33*, 380-383.

Young, J. (1990). Everyday aids and appliances: Aids to prevent pressure sores. *Bio-Medical Journal, 300*, 1002-1004.

Zulkowski, K., Ayello, E. A., & Wexler, S. (2007). Certification and education: Do they affect pressure ulcer knowledge in nursing? *Advanced Skin Wound Care, 20,* 34-38.

APPENDICES

APPENDIX A

INFORMED CONSENT FORM

Dear Madam,

I am Md.Shariful Islam, working as a senior staff nurse at Rajshahi Medical College Hospital. I am now studying Master of Nursing Science under Prince of Songkla University, Thailand. As per course requirements I am going to conduct a research on nurses' knowledge, attitude, and practice regarding pressure ulcer prevention at Rajshahi Medical College Hospital in Bangladesh. I would like to ask you some questions about pressure ulcer prevention.

The intention of this study is to examine the nurses' knowledge, attitude, and practice regarding pressure ulcer prevention. The findings of the study will contribute to help nurses improve quality of nursing practice on pressure ulcer prevention and provide necessary information which inspire further intervention.

Your participation in this study is completely voluntary. Whether you participate in this study or not depends on your sole decision. In this regard, your decision will be respected and it will make no difference in your work environment. You have the right to stop or withdraw from the study at any time without any reason. If you agree to participate in the study, you will then be asked to complete the self-reported questionnaire including demographic data, knowledge, attitude and practice in relation to pressure ulcer prevention. This will take approximately 30 minutes. All the information you provide will be kept in strictly confidential. Your anonymity will be guaranteed and your identity will not be reflected in any part of the document. The raw data will be permanently discarded once data analysis is finished and a report is

published. If you have any question regarding this study, please feel free to contact me. My address is Md. Shariful Islam, Master of Nursing Science (International program), Faculty of Nursing, Prince of Songkla University, Thailand. During data collection, you can communicate to me at Mobile Phone no 01731253480 (Bangladesh) and e-mail number shariful71@yahoo.com.

Thank you

On the above mentioned information, I (Ms……..)

agree to participate in this study.

…… ……

Participants' Signature Date

…… ……

Researcher's signature Date

APPENDIX B

INSTRUMENTS

Subject No.…….. Date/Time : ……

Ward/Unit : …….....

Introduction: This instrument is divided into 4 sections. Section 1 is related to your personal data. Section 2 is your knowledge about pressure ulcer prevention. Section 3 is your attitudes related to pressure ulcer prevention. Section 4 is your practices regarding pressure ulcer prevention.

Section 1*: *Demographic Data

Instruction: Please fill in the blank space or tick mark (√) on your answer in the bracket as indicated.

1. Age …….years old

2. Gender

( ) Female ( ) Male

3. Marital Status

( ) Single ( ) Married

( ) Divorced ( ) Widowed

4. The level of education

( ) Diploma in Nursing ( ) Bachelor of Nursing

( ) Master of Nursing

5. Have you received any formal training on pressure ulcer prevention since you qualified as a nurse?

( ) Yes ( ) No

If yes, please specify: Year…… Place……Duration…….

6. How long have you been employed as a permanent staff nurse in your hospital?

I have been employed as a permanent staff nurse for……years

7. What area of practice do you work in?

( ) Medical ( ) Surgical

( ) Orthopedic ( ) Neuro-surgery

( ) Neuro-medicine ( ) CCU

***Section 2. Nurses' Knowledge of Pressure Ulcer Prevention Questi*onnaire**

Instruction: Please read each statement carefully and select the correct answer by tick mark (√) on a, b, or c

1. What is the contributing factor for pressure ulcer formation?

    a) Intracranial pressure

    b) Chronic wound

    c) High loading pressure (x)

2. Which of the following factor is the most important factor for pressure ulcer formation in an 80-year old man with fracture hip and bedridden?

    a) Malnutrition

    b) Urinary incontinence

    c) Immobility (x)

3. What is the favorable environment for bacterial growth in the form of maceration for a young man having head injury with unconsciousness?

    a) Dehydration

    b) Anemia

    c) Feces (x)

4. Which factor is the critical determinant for pressure ulcer formation?

    a) Low albumin (x)

    b) High hematocrit

    c) High sodium level

5. What assessment procedure do you select for a patient with spinal cord injury who is at high risk for pressure ulcer development?

a) Abdominal assessment

b) Respiratory assessment

c) Head to toe skin assessment (x)

6. Which one is the risk assessment scale for pressure ulcer development?

a) Richter scale

b) Braden scale (x)

c) Glasgow coma scale

7. Which answer is an appropriate method for assessing an individual who is at risk for pressure ulcer development?

a) Assess with risk assessment scale (x)

b) Assess with clinical judgment

c) Assess by physician's order

8. Which of the following is correct answer for the sign of stage II pressure ulcer?

a) Intact skin without break in skin integrity

b) Partial skin loss with blister & abrasion (x)

c) Full thickness skin loss with tissue necrosis

9. Which one is the first sign for pressure ulcer development?

a) Open sore

b) Non-blanchable redness, or blue-gray discoloration on the skin (x)

c) Blister and bruish in the skin

10. Which answer is an appropriate method for skin care?

a) Massage at bony prominence

b) Apply topical cream (x)

c) Apply talcum powder

11. Which nursing care is significant activity for protecting skin damage?

a) Sit up 2 hours

b) Turn position for every 2 hours (x)

c) Elevate head of bed greater than 30^0

12. What nursing care activity is appropriate for preventing maceration for a 78-year old man having a stroke with hemiplegic?

a) Continence pad

b) Cleansing soil and using skin barrier cream or lotion (x)

c) Wound dressing

13. Which nursing care is a correct practice for maintaining skin integrity?

a) Lift up the patient without dragging (x)

b) Use donut cushion

c) Use sheep skin pad

14. What do you do to prevent heel ulcer?

a) Raise the foot-end of a bed

b) Use cotton pad

c) Use pillow under the patient's leg (x)

15. What kind of vitamin is important to maintain healthy skin?

a) Vitamin B & D

b) Vitamin C & E (x)

c) Vitamin K

16. Which nutrient needs to be offered to a 85-year old bedridden patient who has BMI < 18.5

a) High fat

b) High protein and high calorie (x)

c) Fruits & vegetables with fibers

17. Which answer is an appropriate lab test for nutritional assessment of pressure ulcer patient?

a) Platelet count

b) Serum electrolyte

c) Serum albumin (x)

18. What is an appropriate nursing care for managing mechanical load?

a) Turn position (x)

b) Cleanse soil

c) Place the air cushion under bony prominence

19. What is an appropriate activity to reduce friction for an 80-year old man having fracture hip with skeletal traction?

a) Elevate head of bed greater than 30^0

b) Lift patient without dragging (x)

c) Massage at bony prominence

20. Which nursing care is the activity for reducing shearing force?

a) Elevate the head of bed < 30^0 (x)

b) Elevate the head of bed at 60^0

c) Elevate the head of bed at 90^0

21. What educational information is necessary for reducing pressure ulcer formation?

a) Procedure of sitting up

b) Method to lift the end of a bed

c) Schedule of turning position (x)

22. Which answer is the best educational activity that enhances competency of staff nurses in preventing pressure ulcer?

a) In-service training on pressure ulcer prevention (x)

b) Set up pressure ulcer prevention protocol

c) Conducting seminar

Section 3: Nurses Attitude of Pressure Ulcer Prevention Questionnaire

Instruction: Please read each statement carefully and tick '√' the box that most closely reflects your answer to the following questions. If you accidently tick the incorrect box please put an 'X' through the box and then tick the correct box.

-If you are strongly agree with that particular statement, please tick "√" in the box of "strongly agree".

-If you are agree with that particular statement, please tick "√" in the box of "agree".

-If you are neither agree nor disagree with that particular statement, please tick "√" in the box of "neither agree nor disagree".

-If you are disagree with that particular statement, please tick "√" in the box of "disagree".

-If you are strongly disagree with that particular statement, please tick "√" in the box of "strongly disagree".

Strongly agree means you are strongly agree with the statement. 'Agree' means you are agree with the statement. 'Neither agree nor disagree' means you are neither agree nor disagree with the statement. 'Disagree' means you are not agree with the statement. 'Strongly disagree' means you are strongly not agree with the statement.

5 = Strongly agree, 4 = Agree, 3 = Neither agree nor disagree, 2 = Disagree, 1 = Strongly disagree.

	Statement	Nurses' Rating				
		5	4	3	2	1
1	All patients are at risk for developing pressure ulcer.					
2	Most risk factors of pressure ulcer can be avoided.					
3	Prevention of risk factors for pressure ulcer is time consuming for me to carry out.					

Statement		Nurses' Rating				
		5	4	3	2	1
4	The incidence of pressure ulcer should be 0% in my ward.					
5	In my opinion, nurses can independently provide nursing care to prevent pressure ulcer.					
6	I am less interested in pressure ulcer prevention than other aspects of nursing care.					
7	I am aware of an appropriate assessment procedure for pressure ulcer formation.					
8	My clinical judgment is better than any pressure ulcer risk assessment tool available to me.					
9	Patient who is at risk for pressure ulcer development should be assessed at the first day of admission.					
10	Pressure ulcer risk assessment should not be regularly carried out on all patients during their stay in hospital.					
11	All data about pressure ulcer should be documented at the time of assessment and reassessment.					
12	Pressure ulcer should be an important indicator for quality of nursing care.					
13	Patient's relative should not be advised to assess patient's skin during bathing a patient.					
14	Patient who is at risk for pressure ulcer development should be cared by using standard nursing care to prevent pressure ulcer.					
15	I realize to provide nursing care to protect skin breakdown.					
16	Patient should be cleansed immediately after soiled.					

	Statement	Nurses' Rating				
		5	4	3	2	1
17	I realize to apply skin lotion to patient who is at risk for pressure ulcer formation.					
18	Patient should be massaged at the bony prominences after turning position.					
19	I am aware to monitor nutritional status of my patient.					
20	I think that nutritional status of a patient is not a problem for pressure ulcer development.					
21	I intend to assess the amount of food that patient intakes every meal.					
22	Patient should be received small amount of fluid intake.					
23	I am aware to turn my patient who is at risk for pressure ulcer every 2 hours.					
24	I am less interested to move patient from one side to another side of the bed by lifting up him/her out of the bed.					
25	I value that joining educational activities on pressure ulcer prevention is important for my practice.					

Section 4: Nurses Practice of Pressure Ulcer Prevention Questionnaire

Instruction: Please read each statement carefully and tick '√' the box that most closely reflects your answer to the following questions. If you accidentally tick the incorrect box please put an 'X' through the box and then ticks the correct box.

-If you do not practice at all in accordance with the statement, please tick "√" in the box of "never".

-If you practice very often in accordance with the statement, please tick "√" in the box of "sometimes".

-If you practice every time in accordance with the statement, please tick "√" in the box of "always".

Never means you do not practice at all in accordance with statement. Sometimes mean you practice very often in accordance with the statement. Always means you practice every time in accordance with the statement.

No	**Nurses' practice regarding pressure ulcer prevention**	Always	Sometime	Never
1	I observe how other nurses assess risk factors of pressure ulcer development.			
2	I identify common contributing factors for pressure ulcer development by periodical assessment of patient's skin.			
3	I do skin assessment that guided by a standard nursing care available in my ward or in my hospital.			
4	I use risk assessment scale to assess pressure ulcer.			
5	I document all data related to pressure ulcer assessment.			
6	I assess and provide management of pain in the patients who experience pain from any causes.			
7	I perform skin care as a routine work of my unit.			
8	I place the pillow under the patient's leg to prevent heel ulcer.			

No	Nurses' practice regarding pressure ulcer prevention	Always	Sometime	Never
9	I use or advice caregiver to use creams or oils on patients' skin in order to protect from urine, stool or wound drainage.			
10	I pay more attention to pressure points during cleansing the soil or maceration.			
11	I perform lab test for assessing nutritional status followed by physicians' instruction.			
12	I provide vitamin and food for patients who are malnourish.			
13	I monitor a protein and calories diet in patient who is bedridden.			
14	I avoid dragging the patients during repositioning.			
15	I always use a special mattress to prevent pressure loadings, such as foam, air.			
16	I avoid massage over patient's bony prominences to prevent pressure ulcer formation.			
17	I avoid using donut-shape (ring) cushion at bony prominences to prevent pressure ulcer formation.			
18	I turn a patient position every two hour.			
19	I put pillow under patients' legs from mid-calf to ankle in order to keep heels off the bed.			
20	I use air-bed for patient who is at high risk for pressure ulcer formation followed by physicians' prescription.			
21.	I always attend seminars for pressure ulcer prevention.			
22.	I give advice to the patient or caregiver regarding pressure ulcer preventive care before discharge the patient from a hospital.			

APPENDIX C

Table A-1

Mean Percentage, Standard Deviation, Frequency, and Percentage of Correct Answer of Nurses' Knowledge Regarding Pressure Ulcer Prevention Questionnaire (N=91)

Nurses' Knowledge regarding pressure ulcer	Correct answer			
	M (%)	SD	n	(%)
Factors related to pressure ulcer development	50.27	25.68	6	6.6
1. High loading pressure is the contributing factor for pressure ulcer formation.	.40	.49	36	39.6
2. Immobility is the most important factor for pressure ulcer formation in an 80-year old man with fracture hip and bedridden.	.67	.47	61	67.0
3. Feces is the favorable environment for bacterial growth in the form of maceration for a young man having head injury with unconsciousness.	.71	.45	65	71.4
4. Low albumin is the critical determinant for pressure ulcer formation.	.23	.42	21	23.0
Risk assessment	50.32	18.94	1	1.1
5. Head to toe skin assessment is an assessment procedure for a patient with spinal cord injury who is at high risk for pressure ulcer development.	.80	.40	73	80.2
6. Braden scale is the risk assessment scale for pressure ulcer development.	.26	.44	24	26.4
7. Risk assessment scale is an appropriate method for assessing an individual who is at risk for pressure ulcer development.	.12	.32	11	12.1
8. Partial skin loss with blister & abrasion is correct answer for the sign of stage II pressure ulcer.	.64	.48	58	63.7

Nurses' Knowledge regarding pressure ulcer	Correct answer			
	M (%)	SD	n	(%)
9. Pale, red, or blue-gray discoloration on the skin is the first sign for pressure ulcer development.	.69	.46	63	69.2
Skin care	61.75	18.29	4	4.4
10. Topical cream is an appropriate method for skin care.	.27	.44	25	27.5
11. Turn position for every 2 hours is significant activity for protecting skin damage.	1.0	.00	91	100
12. Cleansing soil and using skin barrier cream or lotion activity is appropriate for preventing maceration for a 78-year old man having a stroke with hemiplegic.	.70	.45	64	70.3
13. Lift up the patient without dragging is a correct practice for maintaining skin integrity.	.41	.49	37	40.7
14. Use pillow under the patient's leg to prevent heel ulcer.	.70	.45	64	70.3
Nutrition to maintain healthy skin	55.67	25.36	14	15.4
15. Vitamin C & E is important to maintain healthy Skin.	.92	.26	84	92.3
16. High protein and high calorie needs to be offered to a 85-year old bedridden patient who has BMI < 18.5.	.43	.49	39	42.9
17. Serum albumin is an appropriate lab test for nutritional assessment of pressure ulcer patient.	.32	.46	29	31.9
Management of mechanical loads	57.87	24.26	14	15.4
18. Turn position is an appropriate nursing care for managing mechanical load.	.49	.50	45	49.5

Nurses' Knowledge regarding pressure ulcer	Correct answer			
	M (%)	SD	n	(%)
19. Lift patient without dragging is an appropriate activity to reduce friction for an 80-year old man having fracture hip with skeletal traction.	.38	.48	35	38.5
20. Elevate the head of bed < 30^0 is the activity for reducing shearing force.	.86	.35	78	85.7
Educational activity for patients, family and staff	84.61	25.48	65	71.4
21. Schedule of turning position is necessary educational information for reducing pressure ulcer formation.	.95	.22	86	94.5
22. In-service training on pressure ulcer prevention is the best educational activity that enhances competency of staff nurses in preventing pressure ulcer.	.75	.43	68	74.7

Table A-2

Frequency and Percentage of Nurses' Rating on the Attitude Regarding Pressure Ulcer Prevention Questionnaire (N = 91)

Nurses' attitude of pressure ulcer prevention	Rating of nurses' attitude									
	5		4		3		2		1	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
1. All patients are at risk for developing pressure ulcer.	10	11.0	15	16.5	9	9.9	45	49.5	12	13.2
2. Most risk factors of pressure ulcer can be avoided.	29	31.9	40	44.0	4	4.4	14	15.4	4	4.4
3. Prevention of risk factors for pressure ulcer is not time consuming.	4	4.4	6	6.6	2	2.2	35	38.5	44	48.4
4. The incidence of pressure ulcer should be 0% .	15	16.5	25	27.5	6	6.6	35	38.5	10	11.0
5. Nurses can independently provide nursing care to prevent pressure ulcer.	34	37.4	45	49.5	4	4.4	4	4.4	4	4.4
6. I am less interested in preventing pressure ulcer than other aspect of nursing care.	2	2.2	9	9.9	4	4.4	52	57.1	24	26.4

Nurses' attitude of pressure ulcer prevention	Rating of nurses' attitude									
	5		4		3		2		1	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
7. I am aware of an appropriate assessment procedure for pressure ulcer formation.	25	27.5	36	39.6	2	2.2	11	12.1	17	18.7
8. My clinical judgment is better than any pressure ulcer risk assessment tool available to me.	16	17.6	42	46.2	5	5.5	19	20.9	9	9.9
9. Patient who is at risk for pressure ulcer development should be assessed at the first day of admission.	41	45.1	44	48.1	-	-	1	1.1	5	5.5
10. Pressure ulcer risk assessment should be regularly carried out on all patients during their stay in hospital.	14	15.4	15	16.5	4	4.4	35	38.5	23	25.3
11. All data about pressure ulcer should be documented at the time of assessment and reassessment.	36	39.6	50	54.9	3	3.3	1	1.1	1	1.1
12. Pressure ulcer should be an important indicator for quality of nursing care.	54	59.3	34	37.4	1	1.1	1	1.1	1	1.1

Nurses' attitude of pressure ulcer prevention	Rating of nurses' attitude									
	5		4		3		2		1	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
13. Patient's relative should not be advised to assess patient's skin during bathing patient.	1	1.1	5	5.5	2	2.2	46	50.5	37	40.7
14. Patient at risk for pressure ulcer development should be cared by using standard nursing care to prevent pressure ulcer.	49	53.8	41	45.1	-		-		1	1.1
15. I realize to provide nursing care to protect skin breakdown.	28	30.8	60	65.9	1	1.1	1	1.1	1	1.1
16. Patient should be cleansed immediately after soiled.	63	69.2	26	28.6	-	-	-	-	2	2.2
17. I realize to apply skin lotion to patient who is at risk for pressure ulcer formation.	24	26.4	40	44.0	12	13.2	10	11.0	5	5.5
18. Patient should be massaged at the bony prominences after turning position.	8	8.8	21	23.1	5	5.5	48	52.7	9	9.9
19. I am aware to monitor nutritional status of my patient.	32	35.2	41	45.1	3	3.3	9	9.9	6	6.6

Nurses' attitude of pressure ulcer prevention	Rating of nurses' attitude									
	5		4		3		2		1	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
20. I think that nutritional status of a patient who has albumin < 2.5 g% is not a problem.	6	6.6	7	7.7	2	2.2	50	54.9	26	28.6
21. I intend to assess the amount of food that patient intakes every meal.	28	30.8	41	45.1	9	9.9	9	9.9	4	4.4
22. Patient should be received small amount of fluid intake.	5	5.5	8	8.8	3	3.3	48	52.7	27	29.7
23. I am aware to turn my patient who is at risk for pressure ulcer every 2 hour.	49	53.8	36	39.6	2	2.2	3	3.3	1	1.1
24. I am less interested to move patient from one side to another side of the bed by lifting up from bed.	6	6.6	12	13.2	7	7.7	48	52.7	18	19.8
25. I value that joining educational activities on pressure ulcer prevention is important for my practice.	58	63.7	26	28.6	2	2.2	1	1.1	4	4.4

Note: Rating scale of nurses' attitude: 5 = strongly agree, 4 = Agree, 3 = neither agree nor disagree, 2 = Disagree, 1 = strongly disagree.

Table A-3

Frequency and Percentage of Rating on the Questions in the Nurses' Practice of Pressure Ulcer Prevention Questionnaire (N = 91)

Nurses' Practice of Pressure Ulcer Prevention	Rating of nurses' practice					
	Always		Sometimes		Never	
	n	(%)	n	(%)	n	(%)
1. I observe how other nurses assess risk factors of pressure ulcer development.	37	40.7	43	47.3	13	14.3
2. I identify common contributing factors for pressure ulcer development by periodical assessment of patient's skin.	47	51.6	31	34.1	11	12.1
3. I do skin assessment guided by a standard nursing care available in my hospital.	60	65.9	26	28.6	5	5.5
4. I use risk assessment scale to assess pressure ulcer.	20	22.0	25	27.5	46	50.5
5. I document all data related to pressure ulcer assessment.	29	31.9	31	34.1	31	34.1
6. I assess and provide management of pain in the patients who experience pain from any causes.	63	69.2	20	22.0	8	8.8
7. I perform skin care as a routine work of my unit.	48	52.7	29	31.9	14	15.4
8. I place the pillow under the patient's leg to prevent heel ulcer.	44	48.4	44	48.4	3	3.3
9. I use or advice caregiver to use creams or oils on patients' skin in order to protect from urine, stool or wound drainage.	50	54.9	25	27.5	16	17.6
10. I pay more attention to pressure points during cleansing the soil or maceration.	62	68.1	26	28.6	3	3.3

Nurses' Practice of Pressure Ulcer Prevention	Rating of nurses' practice					
	Always		Sometimes		Never	
	n	(%)	n	(%)	n	(%)
11. I perform lab test for assessing nutritional status followed by physicians' instruction.	28	30.8	30	33.0	33	36.3
12. I provide vitamin and food for patients who are malnourish.	49	53.8	36	39.6	6	6.6
13. I monitor a protein and calories diet in patient who is bedridden.	56	61.5	29	31.9	6	6.6
14. I avoid dragging the patients during repositioning.	50	54.9	14	15.4	27	29.7
15. I always use a special mattress to prevent pressure loadings, such as foam, air.	40	44.0	24	26.4	27	29.7
16. I avoid massage over patient's bony prominences to prevent pressure ulcer formation.	50	54.9	11	12.1	30	33.0
17. I avoid using donut-shape cushion at bony prominences to prevent pressure ulcer formation	37	40.7	24	26.4	30	33.0
18. I turn a patient position every two hours.	80	87.9	9	9.9	2	2.2
19. I put pillow under patients' legs from mid-calf to ankle in order to keep heels off the bed.	49	53.8	29	31.9	13	14.3
20. I use air-bed for patient who is at high risk for pressure ulcer formation followed by physicians' prescription.	57	62.6	10	11.0	24	26.4
21. I always attend seminars for pressure ulcer prevention.	19	20.0	23	25.3	49	53.8
22. I give advice to the patient or caregiver regarding pressure ulcer preventive care before discharge the patient from a hospital.	76	83.5	15	16.5	-	-

Table A – 4

Mean Percentage, Standard Deviation (SD), and F- Value of Nurses' Knowledge in Different Year of Working Experiences Regarding Pressure Ulcer Prevention (N = 91)

Working Experience	Mean	SD	F	p - value
1 – 10 years	12.93	1.99	4.14	.01
11 – 20 years	13.14	1.79		
21 – 30 years	11.57	2.09		

Table A – 5

Mean Percentage, SD, and F-Value of Nurses' Working Experiences on Attitude Regarding Pressure Ulcer Prevention (N = 91)

Working Experience	Mean	SD	F	p - value
1 – 10 years	97.84	8.62	.056	.94
11 – 20 years	97.59	8.43		
21 – 30 years	98.42	7.57		

Table A – 6

Mean Percentage, SD, and F-Value of Nurses' Working Experiences on Practice Regarding Pressure Ulcer Prevention (N = 91)

Working Experience	Mean	SD	F	p - value
1 – 10 years	52.08	6.92	1.28	.28
11 – 20 years	49.33	7.78		
21 – 30 years	51.68	7.16		

Table A – 7

Correlational Analysis between Nurses' Service Experiences and Mean Percentage of Knowledge, Attitude, and Practice Score (N = 91)

	Knowledge	Attitude	Practice	Service experience
Knowledge	1			
Attitude		1		
Practice			1	
Working experience	-.22*	.02	-.06	1

*p < .05

APPENDIX D

EXPERT OF THE CONTENT VALIDITY OF THE QUESTIONNAIRE

1. Assistant Professor Dr. Shahedur Rahaman Chowdhury, MBBS, MS

   Department of Thoracic Surgery

   National Institute of Diseases of the Chest and Hospital, Mohakhali, Dhaka, Bangladesh

2. Assistant Professor Dr. Jaruwan Manasurakarn, RN, PhD.

   Department of Medical Nursing, Faculty of Nursing,

   Prince of Songkla University, Hat Yai, Songkla, Thailand

3. Miss. Uma Jantawises, RN, MSN

   Medical ward

   Songklanagarind Hospital

   Prince of Songkla University, Hat Yai, Songkla, Thailand

APPENDIX E

BACK TRANSLATORS OF THE INSTRUMENT

For Bengali Version of the original instruments

1. Assistant Professor Dr. Azaher Ali Molla, MD, MPH, MSC

   Institute of Health Economics

   University of Dhaka, Bangladesh

For English Version of the Bengali Version

2. Muhammad Golam Kibria

   Teacher Trainer

   English Language Teaching Improvement Project (ELTIP)

   Satellite Resource Center (SRC), Teacher Training College, Rajshahi, Bangladesh

For Discrepancy and Clarity of two Versions Questionnaires

3. Assistant Professor Dr. Wipa Sae-Sia, RN, PhD.

   Department of Surgical Nursing

   Faculty of Nursing, Prince of Songkla University

   Hat Yai, Songkhla, Thailand

VITAE

Name Md. Shariful Islam

Student ID 5110420074

Education Attainment:

Degree	Name of Institution	Year of Graduation
Master of Nursing Science	Prince of Songkla University	2010
Certificate of Critical Care Nursing	Prince of Songkla University	2007
Bachelor of Nursing Science	University of Dhaka	2004
Diploma in Orthopedic Nursing	Nursing Institute, Rajshahi	1993
Diploma in General Nursing	Nursing Institute, Rajshahi	1991

Scholarship Awards During Enrollment:

2008 - 2010 Master Degree Scholarship funded by the Directorate of Nursing Services, Ministry of Health & Family Welfare, the Government of People Republic of Bangladesh.

Work-Position and Address:

Senior Staff Nurse at Rajshahi Medical College Hospital, Bangladesh

E-mail shariful71@yahoo.com