

**FACTORS AFFECTING SKIN CARE FOR PREMATURE INFANTS
AMONG NURSES IN NEONATAL INTENSIVE CARE UNITS**



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entitled

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FACTORS AFFECTING SKIN CARE FOR PREMATURE INFANTS AMONG NURSES IN NEONATAL INTENSIVE CARE UNITS**NONGLAK SANG-AROON 4436607 RAPN/M****M.N.S. (PEDRIATRIC NURSING)****THESIS ADVISORS: JARIYA WITTAYASOOPORN, D.N.S. (NURSING), KHANNIKA SUWONNAKOTE, Ph D.****ABSTRACT**

Skin problems in premature neonates such as erythema, dryness and breakdown are common problems in neonatal intensive care units in Thailand. Nurses must provide special care for these infants. This descriptive research aimed to identify factors that can predict good skin care for premature infants among nurses in neonatal intensive care units. Orem's theory was used as the conceptual framework for this study. The sample was composed of 145 professional nurses who had provided neonatal care in neonatal intensive care units in Thai government hospitals in the North of Thailand. Simple random sampling for hospital samples was used. Data was collected by mail in four questionnaires: the demographic data form, the Rosenberg self-esteem questionnaire, the facilitating factors to skin care practices questionnaire, and skin care for premature infants questionnaire. One hundred and thirty four (92.41%) completed questionnaires were returned. Data was analyzed by using the SPSS/FW program. The statistics used for data analysis included descriptive statistics, Pearson's Product Moment Correlation and Stepwise Multiple Regression.

The results showed that the professional nurses provide appropriate skin care for premature infants. Work experience, facilities for skin care, continuing nursing education, and self-esteem had statistically significant positive relationships with good skin care for premature infants. The factors significantly influencing skin care for premature infants were work experience, facilities for skin care, and self-esteem. These predictors accounted for 11.3% of the variance in skin care practices.

The results of the study suggest that premature neonates in neonatal intensive care units should be monitored for skin problems. Administrators of neonatal intensive care units must give support to nurses in providing their premature neonatal skin care, either in administration or resources as well as stimulation and encouragement to care for the skin of premature infants, and nurses who work with these infants should receive training and develop guidelines for premature neonatal skin care.

KEY WORDS: PREMATURE INFANTS/ SKIN CARE/ NURSES/ NEONATAL INTENSIVE CARE UNIT**107 P. ISBN 974-04-4011-8**

ปัจจัยที่มีอิทธิพลต่อการดูแลผิวหนังทารกเกิดก่อนกำหนดของพยาบาลในหออภิบาลทารกแรกเกิด
(FACTORS AFFECTING SKIN CARE FOR PREMATURE INFANTS AMONG
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บทคัดย่อ

ปัญหาที่เกิดขึ้นกับผิวหนังทารกเกิดก่อนกำหนด ได้แก่ ผื่น ผิวหนังแห้งเป็นขุย และผิวหนังถูกทำลาย เป็นปัญหาทั่วไปที่พบได้บ่อยๆในหออภิบาลทารกแรกเกิดในประเทศไทย พยาบาลจึงควรเอาใจใส่ในทารกเหล่านี้อย่างใกล้ชิด การศึกษาครั้งนี้เป็นการวิจัยเชิงพรรณนา มีวัตถุประสงค์เพื่อ ศึกษาอำนาจการทำนายการดูแลผิวหนังทารกเกิดก่อนกำหนดของพยาบาลในหออภิบาลทารกแรกเกิดจากปัจจัยที่ได้คัดเลือกมาศึกษา โดยใช้กรอบทฤษฎีของโอเริ่มมาเป็นกรอบแนวคิดในการศึกษา กลุ่มตัวอย่างประกอบด้วยพยาบาลวิชาชีพที่ให้การดูแลทารกแรกเกิดในหออภิบาลทารกแรกเกิดในโรงพยาบาลของรัฐบาลในเขตภาคเหนือของประเทศไทย จำนวน 145 คน โรงพยาบาลกลุ่มตัวอย่างได้มาจากการสุ่มตัวอย่างอย่างง่าย เก็บข้อมูลโดยการส่งแบบสอบถามทางไปรษณีย์ โดยใช้แบบสอบถาม 4 ชุด ประกอบด้วย แบบสอบถามข้อมูลพื้นฐาน แบบสอบถามความรู้สึที่มีคุณค่าในตนเอง แบบสอบถามสิ่งสนับสนุนในการดูแลผิวหนังทารกเกิดก่อนกำหนด และแบบสอบถามการดูแลผิวหนังทารกเกิดก่อนกำหนด ได้รับแบบสอบถามตอบกลับที่สมบูรณ์ 134 คน (92.41%) นำมาวิเคราะห์ข้อมูลด้วยโปรแกรม SPSS/FW โดยใช้สถิติเชิงพรรณนา สถิติสหสัมพันธ์ของเพียร์สัน และสถิติวิเคราะห์การถดถอยพหุคูณแบบขั้นตอน

ผลการศึกษาพบว่า พยาบาลมีการดูแลผิวหนังทารกเกิดก่อนกำหนดเหมาะสม พบว่าประสพการณ์การทำงาน สิ่งสนับสนุนในการดูแลผิวหนังทารกเกิดก่อนกำหนด การศึกษาต่อเนื่องทางการพยาบาล และความรู้สึที่มีคุณค่าในตนเอง มีความสัมพันธ์กับการดูแลผิวหนังทารกเกิดก่อนกำหนดอย่างมีนัยสำคัญทางสถิติ จากการวิเคราะห์การถดถอยพหุคูณแบบขั้นตอนพบว่า ปัจจัยที่สามารถทำนายการดูแลผิวหนังทารกเกิดก่อนกำหนดอย่างมีนัยสำคัญทางสถิติ คือ ประสพการณ์การทำงาน สิ่งสนับสนุนในการดูแลผิวหนังทารกเกิดก่อนกำหนด และความรู้สึที่มีคุณค่าในตนเอง โดยสามารถร่วมกันทำนายการดูแลผิวหนังทารกเกิดก่อนกำหนดของพยาบาลในหออภิบาลทารกแรกเกิดได้ร้อยละ 11.3

ผลการวิจัยครั้งนี้มีข้อเสนอแนะว่า ทารกเกิดก่อนกำหนดในหออภิบาลทารกแรกเกิดควรมีการเฝ้าติดตามปัญหาที่เกิดขึ้นกับผิวหนัง ผู้บริหารที่มีดูแลหออภิบาลทารกแรกเกิด ควรสนับสนุนพยาบาลในการดูแลผิวหนังทารกเกิดก่อนกำหนด โดยการบริหารและจัดสรรแหล่งประโยชน์ ที่จะช่วยกระตุ้นและเป็นการกำลังใจพยาบาลในการดูแลผิวหนังทารกเกิดก่อนกำหนด และพยาบาลเองควรได้เข้ารับการอบรมในเรื่องการดูแลผิวหนังทารก และ ร่วมมือกันพัฒนา แนวปฏิบัติในการดูแลผิวหนังทารกเกิดก่อนกำหนดต่อไป

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CHAPTER I

INTRODUCTION

Background and Rationale

The skin is the largest organ system in the human body. In newborn infants, the skin is especially large when compared to total body mass. This is particularly true in very low birth weight infants (<1,500 grams). The skin serves many valuable functions which include protecting the internal organs, facilitating thermoregulation, protecting against invasion by exogenous substances, releasing fluids and electrolytes, and it also serves as a receptor for tactile sensory input from the environment such as touch, temperature, pain, and pressure (The National Association of Neonatal Nurses, 1997: 1). In mature neonates, the problems of skin barrier function are fewer than in preterm infants who experience problems such as fluid and electrolyte imbalance, poor temperature control from high insensible water loss, and increased risk of bacterial and fungal sepsis which are important causes of mortality and morbidity in premature infants (Munson, et al., 1999: 25). Percutaneous absorption of toxic agents easily causes the skin to be damaged by trauma. The use of dry incubators or radiant warmers accentuates difficulties caused by high water loss. The skin is also exposed to a variety of potentially toxic agents, such as antiseptics, and to the trauma of adhesive tape, probes, and electrodes (Harpin & Rutter, 1983: 419). The skin of the premature infants with extremely low birth weight (<750 grams) is transparent, enabling full view of veins, bones, organ edges, and pulsation. It is ruddy and shiny and appears quite fragile. The dermal-epidermal junction, although structurally complete, is not strong (Smith, et al., 1988, cited in Maguire, 1999: 222-223).

Premature infants of less than 32 weeks' gestation have an increased risk of infection, increased transepidermal water loss (TEWL), temperature regulation problems, skin breakdown, and systemic uptake of potentially harmful substances. The transition at birth from an aqueous environment results in accelerated maturation of the preterm infant's skin through the information of a functional outer epidermal layer

(Stratum corneum) that is not completely developed until the second week of life. Therefore, preterm skin care in the first week of life during this maturation is vitally important (Baker, et al., 1999: 426). Approximately one fourth of very low birth weight infants weighing less than 1.5 Kg in the United States who survive beyond the third day of life have at least one episode of sepsis. In developing countries, the prevalence of sepsis in premature infants is estimated at 30% to 60% and the mortality rate is 40% to 70%. Septicemia is the most prevalent cause of death, accounting for as much as 50% of neonatal mortality in premature infants. Globally, an estimated 350,000 of neonates die each year because of septicemia and meningitis, and approximately half of these deaths occur in the first week of life, when the epidermal barrier function is most highly compromised (Darmstadt & Dinulos, 2000: 759).

Lund and colleagues (2001: 30) reviewed the studies about neonatal skin care, particularly for hospitalized newborns with varying degrees of underdeveloped skin structures and functions, which are of great interest to neonatal nurses. In the neonatal intensive care unit (NICU), newborns are often connected to monitoring devices, life support equipment, intravenous lines, and other instrumentation, using adhesives that cause trauma to the epidermis. Nursing care practice, such as removal of tape used to secure endotracheal tubes and intravenous catheters, disrupts the integrity of the skin, resulting in severe burn-like abrasions (Lund, et al., 1997: 910; Parravicini, et al., 1996: 730-734). In addition, damaged skin is a portal of entry for bacteria and fungus which results in local or systemic infections. Solutions that are applied topically as skin disinfectants can be absorbed, resulting in toxicity and other side effects such as blistering and skin sloughing (Lund, et al., 1999: 249). Potential sensitivity from chemical exposure such as bathing with soap can be irritating and potentially drying to the infant's skin (Morelli & Weston, 1987: 634-637; Gfatter, et al., 1997). In recent study, routine use of isopropyl alcohol for umbilical cord care has been shown to actually lengthen the period of time of cord separation (Dore, et al., 1998: 621-627). Exposure to antimicrobial ointments can sensitize the skin to allergic reactions later in life, and exposure to other chemicals may predispose to later contact irritant sensitization (Mark, et al., 1995 cited in Lund, 2001: 31). Some studies found topical ointment therapy reportedly lowers TEWL, decreases dermatitis, decreases bacterial colonization of axillary skin, and results in fewer

positive blood and cerebrospinal bacterial cultures (Lane & Drost, 1993: 660-66; Nopper, et al., 1996: 415-419). Semipermeable dressings reportedly increase skin integrity, improve barrier function without increasing bacterial or fungal colonization, and decrease TEWL (Mancini, et al., 1994:306-314; Donohue, et al., 1996: 20-26; Vernon, et al., 1990 cited in Baker, et al., 1999: 426)

The importance of premature neonatal skin care is exemplified by survey results suggesting that nearly 80% of newborns develop a skin problem (ie., “rash”) during the first month of life. But little information is available on which a rational approach to skin care in neonates may be based, and few instructions or recommendations for neonatal or premature neonatal skin care are available in the literature (Darmstadt, & Dinulos, 2000: 759). A study in 215 NICUs in the United States by Maguire (1999: 227) found that an average of 21% of extremely low birth weight infants suffered severe skin breakdown during the first week. While some infants had no skin problems, other experienced very serious problems. Nurses rated the staff’s average concern about skin care at 79%, and the medical staff’s average concern at 67%. A survey of skin care practices for premature low birth weight infants in 104 hospitals with at least 20 Level III NICU beds in the USA by Munson, et al. (1999: 26) found that one quarter of the units had no skin care protocol at all. According to a survey by Siegfried and Shah (1999: 31) of 15 nurseries from 12 hospitals in 4 states in the USA no uniform approach to skin care was found among the nurseries surveyed. In addition, Lund and colleagues studied (2001: 35) testing skin care knowledge of 65 nursery nurses by 25 questions found that the mean score was 76% correct answers (ranging from 56-96%), and this sample of nurses had an average of 18.8 years experience in the nursing profession (ranging from 6-33 years).

The problems of premature neonatal skin care in Thailand were found in most nurseries from all regions in the country. Although there were no precise statistics recorded, these problems in all premature infants were encountered by the researcher in her work. The literature review revealed that there has not been a survey of premature neonatal skin care nursing and no guidelines have been promulgated for premature neonatal skin care. Nurses in neonatal intensive care units generally attend to critical statuses and threats in neonates by providing respiratory care, cardiovascular care, and feeding care, whereas skin care is a sensitive area of practices. Neonatal

intensive care nurses, who must provide close care to these infants, have a major role in maintaining skin integrity, preventing or minimizing risk of skin injury, and treating skin breakdown. Nurses must corrective skin care practices. If nurses take inappropriate steps in skin care for premature infants, they will have bad outcomes, as for instance risks to health and life of premature infants, and the loss time and resources for premature infants' care. Additionally, time spent in hospital may be lengthened. The researcher is accordingly interested in studying skin care for premature infants among nurses in neonatal intensive care units.

Nurses, who had well in nursing practices or nursing actions, must have nursing agency. Nursing agency is understood as a power developed and matured through the science and the art of nursing. This theoretic concept is a formulation of insight about the power of nurses to deliberately interact with persons with legitimate needs for nursing. Nursing agency is analogous to self-care agency. They differ in that nursing agency is developed and exercised for the benefit of others (Orem, 2001: 289). Nursing agency is described as a complex, three-tiered, hierarchical structure with foundational capabilities and dispositions as its base, mediated by power components and leading to capabilities for nursing operations (Gast, et al., 1989: 27). Self-esteem is a part of the human disposition and foundational to nursing agency in Orem's self-care deficit theory of nursing (Anderson & Olnhausen, 1999: 62). Theoretical support for self-esteem related to and influenced on health cares behaviors (Muhlenkamp & Sayles, 1986: 334; Campbell, 1989 cited in Campbell & Weber, 2000: 45; Sriumporn, 2000: abstract; Anderson, 2001: 59; Homnan, 1996: 47). In the past, the study of nurses' self-esteem in neonatal intensive care units was not to be found. One study shows nurses' self-esteem was important for selected primary patients in neonatal intensive care units, aside from infants who have medical problems and need continuing care (Lind & Sterk, 1992: 32-36). This suggests that self-esteem probably influenced nursing action to skin care for premature infants in neonatal intensive care units.

In addition, basic conditioning factors within Orem's theory, were defined as personal conditions or environmental circumstances that affect the values of nurses' powers of nursing agency, that means the basic conditioning factors affect the nursing operations, which is nearly nursing actions or nursing behaviors to caring premature infants. The basic conditioning factors include age, gender, developmental state, health

state, sociocultural orientation, health care system factors, family system factors, patterns of living, environmental factors, and resource availability (Orem, 2001: 167). Nurses' work experience, personal income, continuing nursing education, and facilitating factors to skin care were selected factors in this study.

Work experience is the factor related to developability for the art of nursing and nursing prudence (Orem, 2001: 294). There are the studies which have found a relationship between work experience and nursing practice (Somlak Suwanmalee, B.E. 2539: 56; Naree Sae-aung, B.E. 2543: abstract; Rattananun, 2001: 71). Personal income is a socioeconomic status factor (Moore & Pichler, 2000: 140; Orem, 2001: 167). The studies by Dilaka Tripaiboon (B.E. 2531: 119) and Somlak Suwanmalee (2539: 56) found a relationship between income and nursing practice. Continuing nursing education (CNE) is the pattern of living and sociocultural orientation (Orem, 2001: 167). CNE such as in-service training, panel discussion, learning from documents, journals, or textbooks, and learning activities in the unit were found related to nursing practice (Sunisa Walyapet, B.E. 2533: abstract; Somlak Suwanmalee, B.E. 2539: 56; Narinee Jaruratpitak, B.E. 2543: 56-57). In addition, the facilitating factors to skin care are external environmental conditions that promote surroundings for efficient nursing care (Orem, 2001: 167). The facilitating factors including organization, co-workers, and materials and resources were found to relate to nursing practice (Huang, et al., 2002: 217; Jintana Tungchawalit, B.E. 2541: 90; Nilratana Chanwaiwit, B.E. 2542: 112).

A very few studies of basic conditioning factors in neonatal intensive care nursing was found, but some relationships have been found between the selected factors in this study and nursing care or nursing practices in other field of nursing. The researcher is interested in studying the effect of selected basic conditioning factors including work experience, personal income, continuing nursing education, and facilities for skin care on skin care for premature infants, and in studying the effect of nurse's self-esteem on skin care for premature infants among neonatal intensive care nurses in Thai government hospitals located in the North of Thailand. A better understanding of factors influencing skin care for premature infants has the potential to contribute to nursing practice. The results of this study could be used to develop

guidelines for premature neonatal skin care and help find a way to enhance skin care for premature infants in neonatal intensive care unit nurses.

Theoretical framework

This study used Orem's theory as a framework, supporting by Rosenberg's self-esteem concept and related researches from literature review. In Orem's theory, nursing practice involves knowing and meeting patients' therapeutic self-care demands and regulating the exercise or development of their self-care or dependent-care agency whenever their limitations for action are associated with their own health states or that of their dependents (Orem, 2001: 290).

In this study, the researcher found that premature infants could not have ability to perform self-care. Thus, they were dependent on adults (Tolentino, 1990). Premature neonatal skin care is part of a universal self-care requisite which is one type of therapeutic self-care demand for preventing hazards to human life, human functioning, and human well-being (Orem, 2001: 225). In consideration of the immaturity and under development of premature infants' skin, neonatal intensive care nurses who give close care to these infants must be aware of and alert to the potential hazards, avoiding events that may lead to the development of hazardous situations, removing or protecting their charge from hazards, and controlling hazardous situations to eliminate danger to life (Orem, 2001: 227). Premature infants' skin care includes skin assessment, bathing, the use of emollients, application and removal of adhesives, skin disinfection solutions, control of transepidermal water loss, care of diaper dermatitis, umbilical cord care, prevention of skin breakdown, and treatment and care of skin breakdown (Lund et al., 2001: 42-43).

Nurses, who have had well in nursing practices or actions, must have nursing agency that is analogous to self-care agency. These entities differ in that nursing agency is developed and exercised for the benefit of others and self-care agency is developed and exercised for the sake of one's self (Orem, 2001: 289), Orem believing that humans have power to deliberate about, make decisions about, and deliberately engage in result-producing actions, or refrain from doing so (Orem, 1997: 28). Nurses use knowledge and experience of caring for patients in specific situations and regulating therapeutic self-care demands. They perceive and perform nursing care

from information provided by experience, and sometimes make judgments about situations that they lack positive identification for, and for which more information is needed (Orem, 2001: 442).

Nursing agency and self-care agency are described as forming a complex, three-tiered, hierarchical structure consisting of foundational capabilities and dispositions at base, mediated by power components and leading to capabilities for nursing operations (Gast, et al., 1989: 27). The power components and the capabilities for nursing operations are close to nursing behaviors or nursing practices. Accordingly, the researcher needs to take into account self-esteem, which is a part of human disposition and foundational to nursing agency in Orem's theory of nursing (Anderson & Olnhausen, 1999: 62). It is found that self-esteem is a factor influencing nursing practices especially in neonatal intensive care nursing, because nurses, who have high self-esteem, are eager to act, think creatively, and have the ability to deal with problems immediately (Gammon, 1991 cited in Pawinee Thanabodeethammajaree, B.E. 2540: 20). They have self-acceptance and self-worthiness (Rosenberg, 1989: 30). Thus, they realize the importance of accountability for themselves and others. Furthermore, they make good relationships with other persons and the environment (Coopersmith, 1981: 4-5). Furthermore, neonatal intensive care nurses who have high self-esteem, have the ability to attend to internal and external conditions and factors significant for premature neonatal skin care, make decisions about skin care with reason and skill, have motivation to apply skin care, acquire technical knowledge about skin care from authoritative sources, and order skin care practices with other forms of nursing care in neonatal intensive care units (Backscheider, 1974 cited in Anderson & Olnhausen, 1999: 64; Orem, 2001: 260-262). Therefore, self-esteem is presented as a nursing agency that leads to good practices connected to premature infants' skin care. The study of critical care nursing by Manassanun Nakkerd (B.E. 2542: 60) found that the self-esteem of critical care nurses was at a high level and their knowledge and skill was at a high level.

In addition, basic conditioning factors within Orem's theory were defined as personal conditions or environmental circumstances in a time-place matrix that affect the values of nurses' powers of nursing agency, that means the basic conditioning factors affect the nursing operations, which is mainly nursing care or nursing actions.

Nurses' work experience, personal income, continuing nursing education, and facilities for skin care were selected as basic conditioning factors in this study.

Work experience is the factor related to developability for the art of nursing, nursing prudence and nursing practices (Orem, 2001: 294). In addition, experience in NICU strengthens self-confidence and self-ability in NICUs nurses. A related study was a study of professional nurses at regional and general hospitals in the central region by Rattananun (2001: 71-73) found experience in home health care correlated with job performance of home health care and could predict performance of home health care. In the same way, a study of staff nurses in Prapokklao Regional Hospital, Chantaburi province, by Somlak Suwanmalee (B.E. 2539: 56) found a positive significant correlation between working experience and job competency.

Personal income is also an indicator of socioeconomic status and an essential resource which is determines standard of living (Moore & Pichler, 2000: 140; Orem, 2001: 245). Inadequate income may lead to stress and burnout (Kerr, et al., 1990), while, adequate income promotes self-acceptance and job satisfaction that lead to better nursing practices. There was a related study by Dilaka Tripiboon (B.E. 2531: 116-119) that found significant association between income and performance of quality control circle activities among the nursing personnel of Maharaj Nakorn Chiang Mai Hospital.

Continuing nursing education (CNE) is a part of the living and sociocultural orientation, that increasing complexity in the personal, professional, and social environments in which nursing is practiced makes necessary. The competence in neonatal intensive care nursing and intuitive aspects of care, are increased by CNE (Spence, et al., 1999: 27). Additionally, CNE makes for confidence in nursing practices (Pelletier, et al., 1999: 27). Nurses who have frequent CNE will develop their skills and knowledge of, and attitude to nursing practices (O'Conner, 1979: 354). A related a study by Sunisa Walyapet (B.E. 2533: abstract) that found training in critical care was significantly correlated with job performance among critical care nurses in Bangkok government hospitals.

In addition, the facilities for skin care are external environments that promote surroundings appropriate for efficient nursing care, and help nurses to succeed in their practices (Nickle-Gallagher, 1985: 237; Orem, 2001: 79). They make neonatal

intensive care nurses confident that if they want to perform in their interest, they will perform with success. A related study by Nilrattana Chanwaiwit (B.E. 2542: 112) found a significant relationship between department polices, resources, training for public health nursing, support by the chief of the department and co-workers, and the effectiveness of the home visit activities of public health nursing in the Bangkok Metropolitan area.

A summary of the conceptual framework in this study was presented as follow;

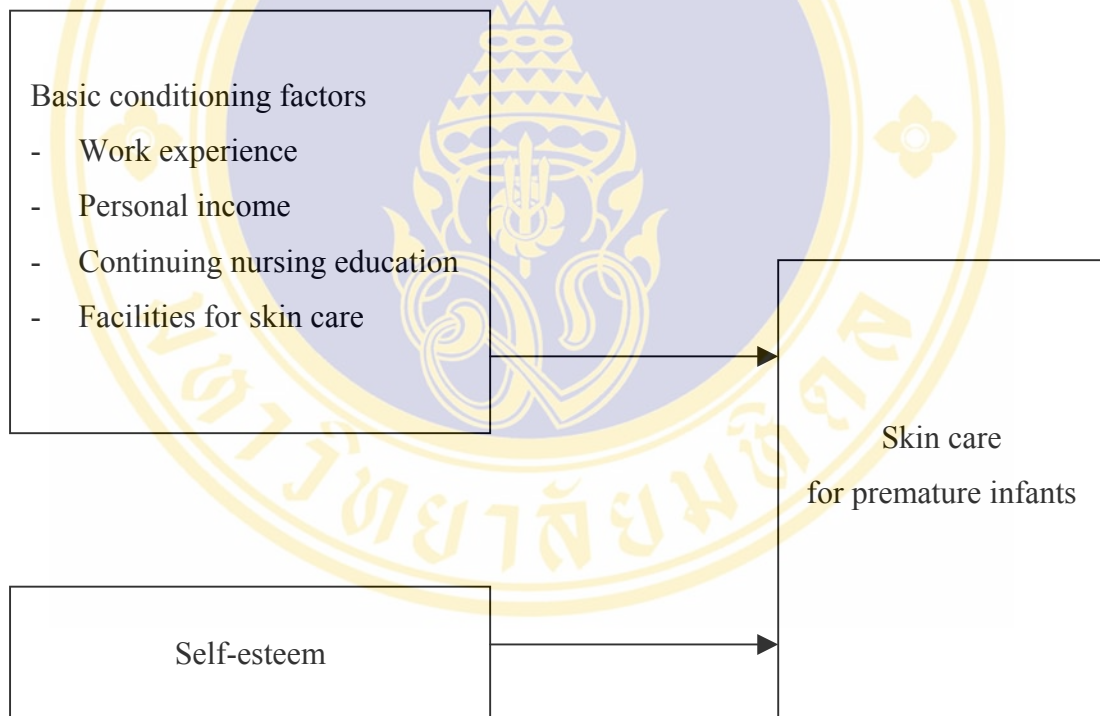


Figure 1 The relationship between studied variables

Research Questions

1. What is the skin care for premature infants among nurses in neonatal intensive care units, and what are their self-esteem and basic conditioning factors including work experience, personal income, continuing nursing education, and facilities for skin care?
2. Can self-esteem and basic conditioning factors including work experience, personal income, continuing nursing education, and facilities for skin care predict skin care for premature infants among nurses in neonatal intensive care units?

Objectives of the study

1. To describe skin care for premature infants, self-esteem and basic conditioning factors including work experience, personal income, continuing nursing education, and facilities for skin care among nurses in neonatal intensive care units.
2. To explore the predictive effects of self-esteem and basic conditioning factors including work experience, personal income, continuing nursing education, and facilities for skin care on skin care for premature infants among nurses in neonatal intensive care units.

Hypothesis

Self-esteem and basic conditioning factors including work experience, personal income, continuing nursing education, and facilities for skin care can predict skin care for premature infants among nurses in neonatal intensive care units.

Scope of the study

The purposes of this study were to study skin care for premature infants, self-esteem and basic conditioning factors including work experience, personal income, continuing nursing education, and facilities for skin care among nurses in neonatal intensive care units, and to explore the predictive effect of self-esteem and basic conditioning factors on skin care for premature infants. The sample was composed of 145 professional nurses who had provided neonatal care in neonatal intensive care units in government hospitals in the North of Thailand .

Expected outcomes and benefits

The researcher expected the results derived from this study could be important for guiding the nurses' manager to pay attention to promoting premature neonatal skin care practices by encouraging nurses to train in skin care practices and seek support resources such as text books for enhancing skin care for premature infants. Nurses should participate and provide and develop further policies or guidelines for effective premature neonatal skin care. For nursing research, this research provides guidelines for studying premature neonatal skin care and utilizing NICU nurses for effective skin care in the future.

Definition of variables

Skin care for premature infants means the perception of NICU nurses in skin care practices for premature infants that they should maintain skin integrity, prevent or minimize the risk of skin injury, treat skin breakdown, and optimize wound healing. Skin care covers skin assessment, bathing, emollients, adhesive application and removal, skin disinfection solutions, control of transepidermal water loss, care of diaper dermatitis, umbilical cord care, prevention of skin breakdown, and treatment and care of skin breakdown, measured by the 100-mm Visual Analog Scale questionnaire, which was developed by the researcher. Higher scores indicate a higher level of skin care for premature infants.

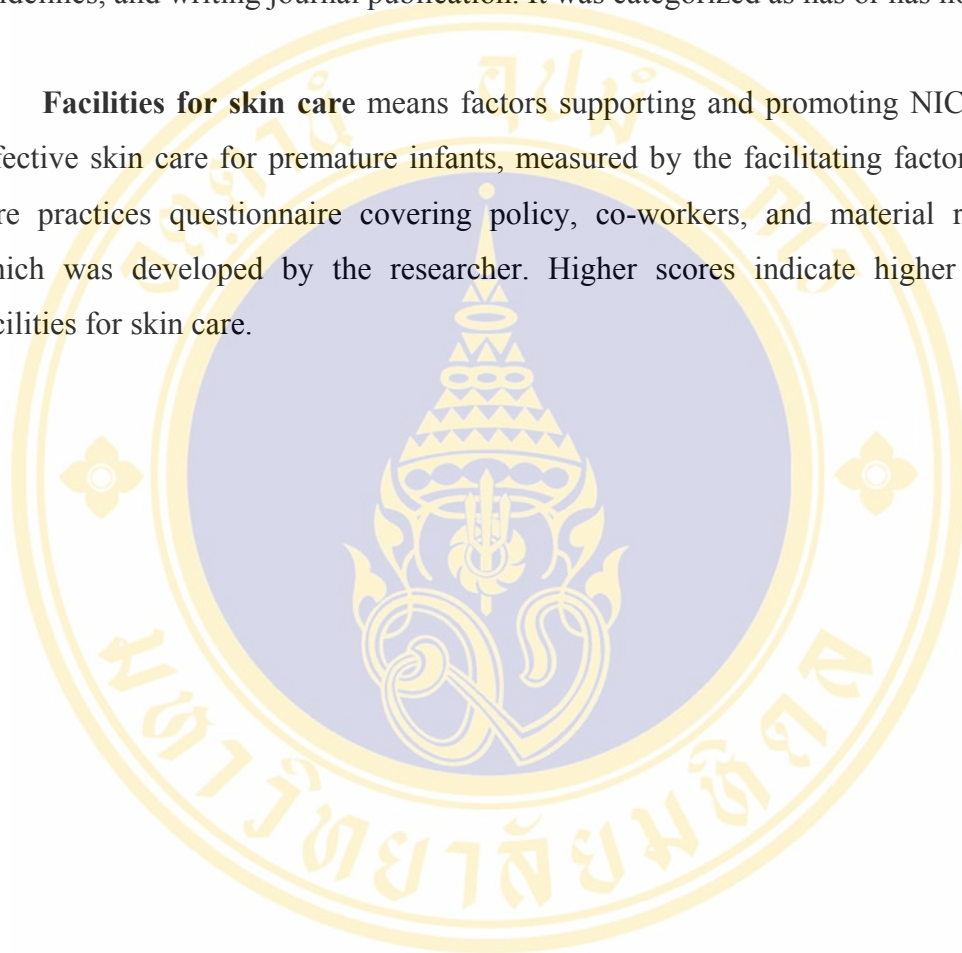
Self-esteem means the score on consideration of NICUs nurses judging themselves to be capable, significant, successful, acceptable, and worthy, measured by the Rosenberg Self-Esteem (RSE) Scale. The questionnaire is a 4-Likert scale. Higher score indicate higher self-esteem.

Work experience means periods since starting work in a neonatal intensive care unit until the study day, measuring in whole numbers of years, over six months calculated as one year.

Personal income means the sum of money received from salary, work shifts, overtime, and other resources, measuring average *baht* per month.

Continuing nursing education means the learning activities of NICUs nurses in premature neonatal skin care during the taking care of infants in neonatal intensive care units within the year 2541-2545 (B.E.), which cover participating refresher courses, reading for new knowledge, participating group, developing clinical practice guidelines, and writing journal publication. It was categorized as has or has not credits.

Facilities for skin care means factors supporting and promoting NICU nurses effective skin care for premature infants, measured by the facilitating factors to skin care practices questionnaire covering policy, co-workers, and material resources, which was developed by the researcher. Higher scores indicate higher level of facilities for skin care.



CHAPTER II

LITERATURE REVIEW

In this study, the researcher reviews literature including:

Skin care for premature infants

Self-esteem in nurses

The concept of nursing agency

The basic conditioning factors in Orem's theory

The relationship between nurses' self-esteem and nursing practices

The relationship between basic conditioning factors and nursing practices

Summary of literature review

Skin care for premature infants

Nursing practice is necessary for nurses to caring patients. In nursing theory of Orem, nursing practice means nurses' responsibility to assist persons to know and meet their own or their dependents' therapeutic self-care demands and to regulate the exercise or development of their self-care or dependent-care agency whenever their limitations for action are associated with their own health states or that of their dependents (Orem, 2001: 517). Nursing practice depends on nurses' attention to person under care, nursing knowledge and skills, and legitimates roles in the occupation of nursing (Orem, 2001: 35).

In the neonatal intensive care unit, premature infants who can't support and self-care for themselves, depend on nursing care by neonatal nurses who have to take direct action to help them meet their therapeutic self-care demands. Skin care is part of a universal self-care requisite which is one type of therapeutic self-care demand. Therefore, skin care for premature infants means direct nursing care to premature infants who depend on nurses for maintaining skin integrity till maturity and development of skin, preventing or minimizing risk of skin injury, treating skin break down, and optimizing wound healing (National Association Neonatal nurses, 1997: 4-

14; Huffines & Logsdon, 1997: 104). Neonatal intensive care nurses must have basic knowledge, including the anatomy and physiology of the skin, physiologic and anatomic differences in premature neonatal skin, and must also update their knowledge, as well as develop skin care practices that increase their efficiency in premature neonatal skin care.

The skin acts as an interface between the internal milieu and the environment and provides many functions essential for human survival, including modulation of transepidermal water fluxes, protection from dehydration and excessive water influx, maintenance of electrolyte homeostasis, thermoregulation and minimization of caloric losses, antimicrobial defense, protection from environmental toxins, protection from trauma, protection from ultraviolet radiation, and tactile sensation (Darmstadt & Dinulos, 2000: 757). The layers of the skin include the epidermis, dermis, and subcutaneous layer. The epidermis functions as a barrier, preventing penetration and absorption of potential toxins and microorganisms and retaining water, heat, and other substances. The basal cell layer, located near the junction of the epidermis and dermis, is present within hair follicles and sweat glands, and replaces the stratum corneum by constantly dividing and growing new keratinocytes. The new keratinocytes mature and form the stratum corneum, or outer barrier of the epidermis which is only 0.05-0.1-mm thick. It is formed of the bricks and lipid between the mortar of a wall. Injury to the epidermis is followed by growth and maturation of additional keratinocytes from the basal layer, hair follicles, and sweat glands. The basal layer is attached to the dermis which is the next layer, by fibrils constructed of protein (Lund, et al., 1999: 242). The dermis is composed of collagen and elastin fibers enclosed in a gel continuum of mucopolysaccharides. It contains nerves, blood vessels, and hair follicles. Sensations of heat, touch, pressure, and pain originate in the dermal layer. The subcutaneous layer is comprised of fatty connective tissue, with fat deposition occurring primarily during the last trimester of pregnancy. This layer provides heat insulation, functions as a calorie reservoir, and thermoregulator. Infants of less than 28 weeks' gestation have very little subcutaneous fat (Lund & Durand, 1998: 317; Weston, et al., 1996 cited in Lund, et al., 1999: 242)

Premature neonatal skin has physiologic and anatomic differences. The stratum corneum, the nonliving layer of the epidermis that is responsible for controlling

evaporative heat loss and transepidermal water loss (TEWL), contains 10-20 layers in adults and term infants. Premature infants have fewer layers of stratum corneum; at less than 30 weeks gestational age they may have only 2-3 layers, and extremely premature infants of less than 24 weeks gestational age may have virtually no stratum corneum (Holbrook, et al., 1998 cited in Lund, et al., 1999: 243). Functions of the stratum corneum, including the protective functions for against toxins and infectious agents such as bacteria, fungi, and viruses, and barrier function, are deficient in premature infants. They have mature function after the first 10 to 14 days of life (Harpin & Rutter, 1983: 419). Other studies report a slower process in preterm less than 27 weeks gestational age, with rate of TEWL nearly double adult levels even at 28 days of life (Sedin, et al., 1985 cited in Lund & Durand, 1998: 321). Recently, research involving daily TEWL and impedance spectroscopy measurements of the thickness of the stratum corneum, found that adult levels of maturation were evident at 30 to 32 weeks postconceptional age regardless of the postnatal age (Kalia, et al., 1998 cited in Lund & Durand, 1998: 321). Thus, the maturation process may take as long as 8 weeks in an infant of 23 weeks gestational age, or 3 weeks in an infant of 28 weeks gestational age. Skin care practices that protect the developing stratum corneum and protect against toxicity and infection may be necessary until maturation is complete (Lund, et al., 1999: 243).

Fibrils connect epidermis to dermis at the dermoepidermal junction of the skin. These are widely spaced and fewer in number in premature infants (Holbrook, 1982 cited in Lund, et al., 1999: 243), but become stronger with advancing gestational and postnatal age. Because of this diminished cohesion, premature infants are at higher risk for injury from adhesive removal and for potential blistering from friction or thermal injury. Certain adhesives may have a stronger bond to the epidermis than that of the epidermis to the dermis, and epidermal stripping may result during adhesive removal (Lund, et al., 1999: 243)

Collagen is deposited in the dermis of the fetus during the last trimester of pregnancy and prevents the accumulation of fluid in this layer. Premature infants exhibit edema because of less collagen and fewer elastic fibers in the dermis. Edema may put them at risk for ischemic injury because of reduced blood flow. To prevent necrosis or injury from edema, routine turning and repositioning, and the use of

surfaces that minimize pressure points in neonates with excessive edema, should be used (Kuller & Lund, 1998: 654; Lund, et al., 1999: 244).

An acid skin surface ($\text{pH} < 5$), seen in children and adults, has protective qualities against some microorganisms (Behrendt & Green, 1971 cited in Lund, et al., 1999: 244). With an increased skin pH, from acidic to neutral, there may be increase in total numbers of bacteria and shift in species. There also may be an increase in TEWL when skin pH rises. Term newborns are born with a relatively alkaline skin surface with a mean pH of 6.34. Within 4 days the pH drops to a mean of 4.95. Bathing and other skin care practices alter skin pH; it may take an hour or longer to regenerate the acid mantle after bathing with an alkaline soap (Lund, et al., 1999: 244). A study of skin pH in 40 premature infants of 24-34 weeks gestational age by Fox, et al (1998: 272-275) found the skin on the 1st day of life was greater than 6.0 and decreased markedly during the 1st week to 5.5, with a gradual decline to 5.0 during the next 3 weeks.

In neonatal intensive care units, which take care of the crisis infants, premature infants at risk for skin trauma and loss of skin integrity because of skin immaturity combine with the need of monitoring and procedure. The skin problems have serious consequences for premature infants in the NICU (Lund & Durand, 1998: 317). Neonatal intensive care nurses have to pay attention to skin care practices in order to decrease skin problems. The researcher reviews skin care practices for prevention and treatment strategies to promote optimal skin integrity for premature infants in the NICU, as follow;

Skin assessment

Skin assessment is the document baseline for reporting abnormal findings to the physician or nurse practitioner. The assessment allows at risk premature infants to benefit from nursing interventions and equipment while decreasing costs of nursing time and equipment charges, decreasing payments, and allowing earlier discharges from hospitalization (Huffines & Logsdon, 1997: 111). The National Association of Neonatal Nurses (1997: 4) suggested skin assessment performance include;

A. Identifying infants at high risk for skin breakdown, the criteria include;

a. Prematurity - careful handling in the immediate post birth period is especially important for the extreme premature infants (< 27 weeks gestation). Much of the damage to these infants' skin occurs in the first hours of resuscitation, stabilization, and procedure-related activities.

- b. Birth weight less than 1000 grams
 - c. Marked edema or anasarca
 - d. Decreased or no spontaneous activity: sedated, paralyzed, neurologically impaired
 - e. Limited positioning options: high-frequency ventilation, postop gastroschisis
 - f. Congenital dermatologic condition: ichthyosis, epidermolysis bullosa
 - g. Essential fatty acid and zinc deficiency
- B. Noting color and normal skin variations: milia, mongolian spots.
- C. Identifying any rashes, areas of breakdown, or abnormal skin variations (vesicles, pustules, etc). Assessing electrode or monitor probe sites (pulse oximeter, skin temperature, etc.). Early identification can facilitate diagnosis and treatment of acquired infections such as herpes.

Bathing

Bathing the newborn has multiple purposes, including potentially reducing microbial colonization such as *Staphylococcus aureus* (Sarkany & Arnold, 1970: 261-267), removal of waste materials (Lund, et al., 1999), and general aesthetics (Als, et al., 1986: 1123-1132).

However, in premature or ill newborn with physiologic instability, early bathing can have deleterious effects. These include absorption of chemicals, contact with irritating substances, hypothermia, the general destabilization of vital signs, and increased crying that increases in oxygen consumption and respiratory distress (Lund, et al., 1999; Henningson, et al., 1981 cited in Darmstadt & Dinulos, 2000: 763). Therefore, antiseptic baths should be avoided. Many hospitals require the initial bath be given with antiseptics such as hexachlorophene, chlorhexidine, and povidine, to minimize the risk of transmission of human immunodeficiency virus, or the hepatitis B virus (Ross & Dickason, 1992 cite in National Association of Neonatal Nurse, 1997: 4; Lund, et al., 1999).

The first bath should be delayed until after temperature and vital signs have been stable for 2-4 hours to avoid hypothermia (Penny – MacGillivray, 1996: 481-487). Excessive vernix may be removed but not necessary for hygienic reasons. One study by Hoath (1997: 338-340) found that vernix may provide antibacterial protection and promote wound healing.

Products used for skin cleansing include soaps created from alkali acting on animal fats or vegetable oils, synthetic detergents derived from alkali interaction with sodium lauryl sulfate, contain antimicrobial properties. All are at least mildly irritating and drying to skin surfaces (Lund, et al., 1999). Baby soap or mild neutral pH soap without additives such as abrasives, deodorants, fragrance, dyes, or preservatives, should be used for bathing (Darmstadt & Dinulos, 2000: 765). The length of contact with soap and the frequency of bathing should be considered. Infrequent bathing and appropriate pH soaps should be used (Gfatter, et al., 1997: 258-262; Gelmetti, 2001: 12-15). Bathing with soaps in term newborns before 1 week and premature infants before 2-3 weeks should be avoided (Lund & Kuller, 1998: 668). Rinsing skin surfaces well after bathing will reduce contact with chemicals that are drying or potential irritants. Rubbing skin surfaces should be avoided to prevent chafing and irritation (Lund, et al., 1999; Darmstadt & Dinulos, 2000: 764).

For extremely premature infants (less than 26 weeks gestational age) sterile water alone is the safest choice during the first 2 months, and the frequency should be only 2-3 times per week (Lund & Kuller, 1998: 668; Seidel & Cohen, 2001: 179). Tub baths may be given for stable full term infants and premature infants after umbilical cord and circumcision sites have healed. Additional thermal support during the bath may be desirable. A portable radiant warmer may be used if available (National Association of Neonatal Nurses 1997: 5). Immersion bathing is soothing to the infant from a developmental perspective (Als, et al., 1986: 1123-1132). It may have positive effects on the skin, such as removal of excess creams, sloughing of cells, and rehydration of skin surfaces (Malloy & McDonald, 1995 cited in Lund, et al., 1999: 245). Bath water temperature should be tested carefully for immersion bathing. The infant may be burned after immersion in hot water tested only by touch (Siegfried, 1998: 439)

Emollients

Hydration of the stratum corneum is essential for an intact skin surface and normal barrier function. This involves preventing dry and scaly skin (Lund, 1999: 908). Moisturizers and emollients or lubricants counteract dry skin and improve lubrication. Emollients hydrate the skin by conserving the water content of the stratum corneum, whereas moisturizers add water to the stratum corneum (Jackson, 1992 cited in Lund, et al., 1999: 246).

Petrolatum is an emollient with excellent hydrating and healing properties. The potential benefits of emolliation therapy include reduced incidence of hypothermia, provision of nutrition through transcutaneous absorption of lipids, enhanced neurologic development and promotion of mother-infant bonding caused by tactile stimulation during application, resolution of dermatitis, decreased and normalization of TEWL, and decreased invasive infections in preterm infants (Lane & Drost, 1993: 417-418; Nopper, et al., 1996: 662-669; Ghadially, Halkier- Sorensen, & Elias, 1992 cited in Lund, et al., 1999: 246; Dramstadt & Dinulos, 2000: 766; Soll & Edward, 2002). For hundreds of years, Indian and Mediterranean populations have routinely applied natural vegetable oils such as sunflower-seed oil to the skin of newborn. Because of their low cost, natural vegetable oils high in linoleic acid and low in oleic may provide a feasible alternative for use in developing countries (Dramstadt & Dinulos, 2000: 766-768).

Some studies indicate petrolatum ointment might increase bacterial or fungal colonization (Lund et al, 1999: 246; Cambell, et al., 2000: 45-53). Although emollients give many positive effects, the dangers of infection should borne in mind. The National Association of Neonatal Nurses (1997:6) recommends avoiding routine lubrication. Creams and emollients can alter skin pH and decrease the protective properties of the acid mantle. Products should be prepared for single patient use for avoiding contamination.

Emollients should be applied in a gentle and uniform manner because frictional forces during application may cause skin injury (Dramstadt & Dinulos, 2000: 767; Hoath & Narendran, 2000: 289-296). Avoiding products with perfumes or dye is prudent since these can be absorbed and are potential contact irritants (Cetta, et al. cited in Lund, et al., 1999; Lane & Drost, 1993: 415-419; Nopper, et al., 1996: 660).

Skin disinfection solution

The use of solutions include isopropyl alcohol and povidone iodine to decontaminate skin before invasive procedures such as venipuncture, circumcision, lumbar puncture, umbilical catheter insertion, and placement of chest tubes, is routine in NICU (Trotter, 1998: 31-38).

Isopropyl alcohol generally evaporates before percutaneous absorption. When applied to premature infants, it can cause local burns or be absorbed with resultant

systemic toxicity (Harpin & Rutter, 1982: 419-425). Adverse systemic effects include dysfunction of the central nervous system, metabolic acidosis, and hypoglycemia (Spray & Siegfried, 2000 cited in Howard, 2001: 219-222). Skin sloughing and blistering was found after the use of isopropyl alcohol pledgets instead of conduct paste under electrocardiographic leads (Schick & Milstein, 1981: 587-588).

Povidone-iodine is another common topical preparation in NICUs. When absorbed in significant amounts, this agent may cause excess iodine, leading to perturbation of production of neonatal thyroid hormone and hypothyroidism, especially in premature infants (Chabrolle & Rossier, 1978: 495-498; Howard, 2001: 220; Jackson & Sutherland, 1981 cited in Lund, 1999: 246; Pyati, et al., 1977: 825-828). Disturbance of thyroid function in infants is associated with intraventricular hemorrhage, growth and motor retardation, and death (Spray & Siegfried, 2000 cited in Howard, 2001: 220). Some authors debate that excess iodine causes hypothyroidism in infants (Brown, 1997: 395-400). However, exposure to povidone-iodine should be strictly limited or avoided where premature infants are concerned (Howard, 2001: 220).

Chlorhexidine is a skin preparation agent with a broad spectrum of activity against gram-negative and gram-positive bacteria and some yeast (Aggett, et al, 1981 cited in Howard, 2001: 220). It is commonly used in hospital wards including NICUs. Systemic absorption was reported in premature infants. However, no toxic effects were seen after absorption (Garland, et al., 1995: 510-516). The safety data is somewhat limited. If chlorhexidine is used with alcohol in the vehicle, the safety should be considered also.

There are many studies about skin disinfection solutions that effectively for decrease microbial colonization in skin preparation (Choudhuri, et al., 1990: 82-85; Maki, et al., 1991: 339-343; Garland et al., 1995: 510-516, 2001: 1431-1437; Malathi, et al., 1999: 312-316). However, antimicrobial solution should be applied over skin areas for approximately 30 seconds for effective skin preparation, and all traces of the solution should be removed with sterile water or normal saline solution as soon as possible after procedure is complete (National Association of Neonatal nurses, 1997: 7).

Umbilical cord care

Exposed necrotic tissue of the umbilical stump is readily colonized and infected by pathogenic bacteria, that lead to systemic infection. Hygienic umbilical cord care can reduce umbilical colonization, infection, neonatal tetanus, and sepsis in developing countries (Garner, et al. cited in Darmstadt & Dinulos, 2000: 762). Cord care options include using isopropyl alcohol, triple dye (brilliant green, gentian violet, and proflavine hemisulfate), povidone-iodine solution, antimicrobial ointment, antimicrobial powder such as 0.33% hexachlorophene powders, or no intervention at all. The use of antimicrobial infection interventions were utilized to control nosocomial outbreaks of staphylococcal and streptococcal infections. However, practice is usually based on nursery tradition (Lund, et al, 1999: 250). The role of antiseptic cord care is less clear. At a minimum, it is recommended that the diaper remain pleated and away from the stump to expedite drying, and application of emollients to the stump should be avoided (Darmstadt & Dinulos, 2000: 763).

The cord should detach from the umbilicus by 2 weeks of age (Arad, Eyal, & Fienmesser, 1981 cited in Lund, et al, 1999: 250). Cord care practices can accelerate or delay the process up to 15 days or more (Wilson, et al., 1985: 292-294; Zupan & Garner, 2001). Drying, infraction, bacterial contamination, and granulocyte influx influence the timing of separation (Razvi, et al., 2001: 493-495). The recent study found shorter times for cord separation when natural drying without special treatment was used (Dore, et al., 1998: 621-627). Thus routine use of alcohol for cord care is not indicated.

No research is available about cord care in situations where an umbilical cord care catheter was placed for blood sampling, blood pressure monitoring, or administration of intravenous fluids. Many nurseries have no routine topical treatment (Lund, et al., 1999: 251).

Care for diaper dermatitis

Diaper dermatitis affects the perineum, groin, thighs, buttocks, and anal region. The degree is affected by skin and medical condition of infant. The moist and macerated skin becomes more permeable and susceptible to injury (Berg, et al., 1986 cited in Lund, et al., 1999: 249; Kuller & Lund, 1998: 675) and more heavily colonized with microorganisms. Because skin pH rises when exposed to urine and changes from acid to alkaline levels, skin is more vulnerable to injury and penetration by microorganisms (Berg, et al., 1986 and Ley, et al., 1977 cited in Lund, et al., 1999:

250). An alkaline pH activates the fecal enzymes protease and lipase, which breakdown protein and fat, building blocks of stratum corneum, and also may activate bile salts that can cause penetration by microorganisms (Beckingham & Berg, 1986 cited in Lund, et al., 1999: 250).

Prevention of diaper dermatitis includes maintaining a dry skin surface with a normal (acidic) skin pH. Superabsorbent gelled diapers keep skin surfaces dry by wicking the moisture away from the skin (Campbell, et al, 1987 and Davis, et al., 1989 cited in Lund, et al., 1999: 250). Frequent diaper changes and buttocks- and perineal area-cleansing with warm water cloths (National Association of Neonatal nurses, 1997: 13) or a mild (nonalkaline) soap if the area is heavily soiled, is indicated (Farrington, 1992: 81-82). Moisturizers such as petrolatum provide protection from wetness and help mildly irritated skin to heal.

After diaper dermatitis has occurred the primary goal of treatment is prevention from reinjury by exposing clean, dry buttocks to air, and applying zinc oxide or skin barriers covering the skin area. Protective barriers coat the injured tissue and protect it from fecal contact even when a diaper is worn. It is not necessary or desirable to completely remove skin barriers with diaper changes because this may disrupt healing tissue (National Association of Neonatal Nurses, 1999: 13; Lund, et al, 1999: 250).

Antibacterial ointments are not recommended because diaper dermatitis is not associated with increased numbers of bacteria but can be associated with candida albicans. An antifungal ointment or cream should be used if candida albicans is involved. It may be necessary to apply a layer of antifungal powder or cream under the zinc oxide-based skin barrier ointment if the dermatitis is both fungal and contact irritant dermatitis. A mild steroid cream is indicated in some infants. In addition, the use of hydrogel cream has the ability to protect skin dermatitis (Kuller & Lund, 1998: 675; Odio, et al., 2000: 238-243).

Extremely severe diaper dermatitis can result from intestinal malabsorption syndromes if there is constant dribbling of stool in infants with spina bifida or bladder exstrophy, or during severe opiate withdrawal. In the case of malabsorption, the stool may have a higher than normal pH because of rapid transit from the small bowel with significant amounts of undigested carbohydrates, fecal enzymes, and bile salts. In

addition, stool frequency is greatly increased. Severe dermatitis can be a symptom of more severe nutritional deficiency and dehydration, and needs thorough medical evaluation. In this case, skin protection from injury should be started. Products such as pectin paste without alcohol are sturdy barriers for infants. They should be applied to skin areas such as thigh, groin, perineum, and anus. The skin should be thoroughly cleansed before a very thick application of the pectin paste. When the infant has a stool, it is not necessary to completely remove the barrier paste. The stool can be wiped away as much as possible before reapplying a thick coating, for rehabilitating and protecting the skin from reinjury (Boiko, 1999: 235-240; Kuller & Lund, 1998: 675; Lund, et al., 1999: 250).

Control of transepidermal water loss (TEWL)

Premature infants who are less than 30 weeks gestational age exhibit water losses as much as 15 times greater than that of full term infants because of their immature stratum corneum. Losses ranging from 40-129 ml/kg/day have been reported (Sedin, et al., 1985 cited in Lund, et al., 1999: 248). Skin factors that predispose infants to water loss include larger surface area in relation to body weight, thinner epidermis, increased water content, increased permeability, and increased blood supply that is closer to the skin surface (Loper, et al., 1992 cited in Kuller & Lund, 1998: 669). Strategies to reduce TEWL and prevent extreme heat and fluid losses in premature infants include the use of double walled incubator, increased ambient humidity, transparent adhesive dressings, and coating the skin with emollients. But no studies have compared one method to another for effectiveness.

A recent study found that TEWL depend on the ambient water vapor pressure (Kjartansson, et al., 1995: 233-238). The National Association of Neonatal Nurses (1997: 11) recommends that supplemental humidity in the first 3-5 days of life is 85%-100 % at 36-37 °C / 97-98 °F. A study by Harpin & Rutter (1985 cited in Lund, et al., 1999: 248) documented a 50% reduction in TEWL in infants placed in incubators with 85-90 % humidity, but recommends reducing the humidity at 7 days of life because of infection risks. Recent innovations in incubator design include servo-controlled humidification using sterile water sources, thus removing the reservoir as a source of bacterial contamination. Monitoring the humidity in the environment surrounding each infant has not been standard NICU practice, but may provide information about the

infant's microclimate for reducing the drying effects of warming devices at excessively high temperatures (Lund, et al, 1999: 248).

The use of plastic wraps or body hoods can prevent evaporative water and heat loss (LeBlanc, 1991 cited in Lund, et al., 1999: 248). TEWL is reduced by as much as 50% by the creation of a transparent adhesive dressing that is a second skin (Bustamante & Steslow, 1989: 165-169; Knauth, et al., 1989: 945-950; Mancini, et al., 1994: 306-314; Vernon, et al., 1990: 357-362). In extremely low birth weight cases, TEWL was significantly reduced immediately within 3 and 6 hours after application of an emollient such as aquaphor ointment (Nopper, et al., 1996: 660-669).

Adhesive application and removal

Adhesives are applied and removed daily in the NICU to secure endotracheal tubes, intravenous devices, monitoring probes, and electrodes. Using the measurement of TEWL to determine 70%- 80% of skin disruption and reduced barrier function, changes are seen in adults after 10 consecutive removals of adhesive tape and after one removal of adhesive tape in premature infants (Harpin & Rutter, 1983: 419-424).

One strategy to reduce trauma from adhesive removal is the use of skin barriers under adhesives to protect the skin (Carlidge & Rutter, 1987 cited in Lund, et al., 1999: 247). Pectin barriers are reported to leave less visible skin trauma when removed (Dollison & Beckstrand, 1995: 35-39; Lund, et al., 1986: 39-44; McLean, et al., 1992: 17-20). However, skin barriers should be applied cautiously in some premature infants who have great vulnerability to skin irritation. Lund's study (1997) found hydrogel adhesive such as EKG electrode did not cause skin trauma and irritation, but the gel fell off before 24 hours. Thus, gel adhesives should be used only in situations in which secure adherence is not critical.

To help prevent skin trauma from adhesive removal, tape use should be minimized when possible by using small pieces, adhesives should be removed carefully with warm water and cotton balls, and tape removal should be delayed until at least 24 hours after application (Lund, et al, 1999: 248). Solvents used to prevent discomfort and skin disruption from adhesive removal present a danger of toxicity. In premature infants with increased skin permeability, this is a serious concern. Epidermal injury, hemorrhage, and necrosis resulting from the use of a solvent have been reported (Ittman & Bozynski, 1993: 467-477). Other substances, such as mineral oil, may be helpful in removing

adhesives, but not if the site must be used again for reapplying adhesives, as when retaping an endotracheal tube (Lund, 1999: 909; Lund, et al, 1999: 247).

The use of adhesive bonding agents such as benzoid and mastisol, especially in premature infants is to be avoided, because bonding agents create a stronger bond between the adhesive and the skin than the bond between the dermis and the epidermis. This increases the likelihood of epidermal stripping (National Association of Neonatal nurses, 1997: 8).

Prevention of skin injury

- **Thermal injury** Radiant warmers and incubators, which are routinely used in the NICU, can cause thermal skin injury if used incorrectly. Skin temperature probes, securely affixed and reading accurately for infants in servo-controlled incubators or radiant warmers, is indicated. The skin probe should be placed in direct contact with the skin, and a pectin-based skin barrier may be placed around or over the temperature probe tip prior to attaching an adhesive probe cover. Probe sites should be changed at least every 4 hours, or more often in infants with documented skin sensitivity. The use of transcutaneous monitors on infants with unkeratinized skin should be avoided. The hot bag should be covered with a blanket prior to use and water temperature should not exceed 41°C/105°F (National Association of Neonatal nurses, 1997: 9-10) or 39-40 °C (Darmstadt & Dinulos, 2000). With heat mattresses, care should be taken to ensure that no leaks are present before applying to the infant, or should be avoided if that is impossible. Phototherapy in premature infants should be monitored to ensure that instruments emit the appropriate wavelength of light and are positioned the proper distance from the skin. Heel warmers, heat mattresses, and photo blankets should be used with caution on infants weighing less than 1,000 gms (Hussain & Sharief, 1996: 945).

- **Friction, pressure sores, and hypoperfusion injury** Friction injuries occur in the NICU when infants are vigorous or agitated and repeatedly rub skin surfaces against bedding surfaces. Emollients, which can reduce friction injury, should be used (Lund, 1999: 912). Risk factors that can add to skin injury potential for infants in the NICU include hypoperfusion of tissues due to hypotension and shock, excessively edematousness, the use of high frequency ventilation, the reception of muscle paralytic agents such as vecuronium or pancuronium, and diagnostic infants with spinal cord

paralysis due to myelomeningocele. Common sites of tissue necrosis are the ear and occiput. Strategies for prevention of injury are recommended, such as the use of soft bedding and the placing of a receiving blanket or cloth diaper over sheepskin beneath infant's head and bony prominences and other areas at risk for pressure necrosis (ears, hips, occiput). Blanket rolls or positioning aids to promote containment and maintain the infant's position should be used. Waterbeds or oscillating air or water mattresses for promoting circulation and decreasing pressure areas is also recommended. Infants should be turned and repositioned as needed. Frequency of turning should be based on the infant's clinical condition and tolerance of handling. Infants with skin breakdown or pressure areas, or immobilized infants, should be turned approximately every 2 hours, as infants with intact skin and poor handling tolerance may be turned every 3-4 hours (National Association of Neonatal nurses, 1997: 6).

- **Intravenous extravasations** The extravasation of intravenous fluids and medications can result in skin injury and deep tissue injury to muscle and nerves in some cases. Therefore, many nurseries limit the glucose concentrations in peripheral lines to 12.5% and the amino acid concentrations to 2%; calcium and potassium concentrations are also more dilute than those used in central lines (Lund, 1999: 912-913). Strategies to identify and treat IV infiltrations quickly include the use of clear tape or transparent dressing to secure peripheral vascular catheters for ready visibility so that infiltrations or discoloration can be detected quickly. Skin barriers may be used as a base layer as long as the site around the catheter tip is visible. Vascular access sites should be assessed hourly and the vascular catheter discontinued immediately when infiltration is suspected. (Kuller & Lund, 1998: 673-674; Wilson, 1992 cited in National Association Neonatal nurses, 1997:10). In some cases, hyaluronidase or phentolamine may be used for preventing tissue necrosis by inserting subcutaneously around the periphery of the site (Zenk & Sills, 1986 cited in Lund, 1999: 914).

Care and treatment of skin breakdown

Skin breakdown in premature infants can range from surface excoriations to partial- or full thickness wounds. The following list describes care and treatment strategies for skin breakdown (National Association of Neonatal Nurses 1997: 11-12; Lund, 1999: 915).

A. Assess and document areas of skin breakdown every shift and identify cause of breakdown whenever possible.

B. Collaborate with physician in establishing treatment plan and consult plastic surgeon, burn specialist, or dermatologist as appropriate. Determine treatment plan for impaired skin integrity.

- Cleanse affected areas with warm sterile water or normal saline solution that is effective in flushing out debris and dead tissue from an infected or dirty wound. The moistening of tissue aids in the healing process.
- Cover areas with skin breakdown with skin barrier or transparent dressing after cleaning areas with warm normal saline solution, and change dressing at the first sign of drying, generally every 3-4 hours in a radiant warmer or every 6-8 hours in an incubator or high humidity environment.
- Skin culture and gram stain should be done. If erythematousness or purulence are present, antibiotics will be administered. Late treatment may be followed by systemic bacterial or fungal disease, especially in premature infants (Rowen, et al., 1996: 682).
- Apply antimicrobial agents such as Bacitracin Polymycin B (Polysporin) for antibacterial effect, Nystatin cream or powder for fungal infection, and Acyclovir ointment for viral lesions, as indicated or as ordered.

C. Beware of alterations in organ system functioning and potential effects on the wound healing process, and maintain physiologic stability, by maintaining the respiratory and cardiovascular systems, monitoring and managing fluid and electrolyte balance, maintaining a neutral thermal environment, and ensuring adequate nutritional intake (Garvin, 1990 cited in National Association of Neonatal nurses, 1997: 14).

Summary The anatomy and physiology of the premature infants' skin is subject to underdevelopment and immaturity, which results in skin breakdown. At present, many researchers are studying skin care practices for premature infants in several fields. Treatment strategies to promote optimal skin integrity, and caution to prevent skin hazards are recommended. Therefore, neonatal intensive care nurses should select effective practices for the skin of premature infants. As the literature review did not discover an effective instrument to measure skin care practices for premature infants, the researcher developed the instrument from a literature review which included

textbooks, documents, researches, and neonatal skin care guidelines of the national association of neonatal nurses (1997) and the association of women's health, obstetric and neonatal nurses (2001).

Self-esteem

The neonatal intensive care unit is the unit for caring and treating critical newborns or infants, so that critical care nurses must have the knowledge and skills for assessing the continuing situations, and determining to performance need to save patients' lives. Among the environment factors that create stress, nurses who can manage situations in critical wards, are usually assisted by one great personality trait, that is self-esteem (Levine, et al, 1988: 392). In addition, nurses have to worked with patients who suffer from physical and psychological problems. Their work is on-going, repetitious, stressful, and involves dangers, both for themselves and their patients. It is necessary for nurses to look at self-values and values of their work, so that they can care for patients with kindness and understanding (Srinuan Viwatkunopakarn, B.E. 2535: 40). Associated with Orem's theory, this theoretical support for self-esteem as a human foundational capability and disposition is one ability of nursing agency, to be related to the motivation to perform effectively at all times (Anderson & Olnhausen, 1999; 62; Anderson, 2001: 59).

Rosenberg (1989: 30) defines self-esteem as positive or negative attitude toward a particular object, namely, the self. Similar to Coopersmith (1967: 4-5) who defines self-esteem as the person's evaluation about self that expresses an attitude of approval or disapproval and indicates the extent to which the individual believes him or herself to be capable, significant, successful, and worthy. According to Coopersmith, self-esteem has four constructs; (a) success, comprised of power, significance, virtue, and competence; (b) values or the importance one places on a situation; (c) aspirations or personal and public goals an individual establishes for self; and (d) defenses or ability to resist devaluation of one's self-esteem. More recently, Branden (1992: 16 cited in Anderson & Olnhausen, 1999: 62) claims that self-esteem is rooted internally and is composed of a sense of personal efficacy (self-efficacy) and a sense of personal worth (self-respect). Additionally, Stanwyck (1983: 11) believes that self-esteem is learned

throughout life, and is self-confidence for determinable ability, self-proudness, and self-attitude, that is influenced by emotion, behavior, and interpersonal relationships.

In summary, it can be said that self-esteem is the person's evaluation of significance or values of self, and self-satisfaction, base on prior learning and experiences. The other definition of self-esteem found in literature review involves the terms self-regard, self-acceptance, self-worth, self-love, self-ideal congruence, self-confidence, self-respect, self-approval, and self-image (Wells & Marwell, 1976 cited in Anderson & Olnhausen, 1999: 62; Thompson, et al cited in Darika Tarnbuasawarn, B.E. 2540: 14; Muhlenkamp & Sayles, 1986).

From the above, we can see that self-esteem is necessary and important for nurses who can give patients care with confidence. They will act bravely, and in the correct way, face many changes and problems, respect themselves, and be proud of their performance. Thus, nurses can carry out nursing care duties with happiness (Srinuan Viwatkunoopakarn, B.E. 2535: 40).

Self-esteem measurement

The measurement of self-esteem is the measurement of the attitude toward the self. It is difficult to measure, but many instruments were constructed, as follow;

1. The Piers-Harris Self-Concept Scale (Well & Marwell, 1976 cite in Mruk, 1999: 101). It has proven itself useful in the clinical setting.
2. The Tennessee Self-Concept scale (Fitts, 1988 cite in Mruk, 1999: 101). It is standard instrument like the Piers-Harris Self-Concept Scale. However, both measures are tests for self-concept rather than self-esteem, so they ignore information about competence and worthiness. More important, these instruments were designed for children and adolescent groups.
3. The Graphic Descriptive of Self-Esteem (Makay & Gaw cited in Puckwilai, 2002: 24). This is an instrument that assesses by marking two points on a line. The first point represents the real self and the second point presents the ideal self. The result is indicated by the distance between the two points. A short distance indicates low self-esteem, and the long distance indicates high self-esteem.
4. The Coopersmith Self-Esteem Inventory: SEI. It employs a self-report questionnaire on self-esteem and has two types, as follows:

4.1. The Coopersmith Self-Esteem Inventory: SEI (1967) is a Therstone questionnaire with 25-item compulsory choice. The subject is asked to respond by indicating whether the statement is like him/her or unlike him/her. It consists of four viewpoints has general, social, occupational, and companion. The weaknesses of the test are transparent, in that virtually any one can manipulate his or her score, and there is no provision for identifying defensive self-esteem.

4.2. The Coopersmith Self-Esteem Inventory: SEI (1984 cited in Puckwilai, 2002: 24-25) which consists of three instruments; School form, School short form, and Adult form. The adult form is used for subjects older than 16 years. It is adapted from the school short form and is a 25-item 6-likert scale.

5. The Multidimensional Self-Esteem Inventory: MSEI (O'Brien & Epstein, 1983, 1988 cite in Mruk, 1999: 102) requires some 116 questions to be answered that are scored and interpreted according to 11 scales. The disadvantages of this instrument are that is more expensive, more time consuming, and requires more interpretation by a professional. The strengths are that it has a high degree of construct validity, related to the competence and worthiness dimensions of self-esteem, and can be used in clinical setting as well as with normal populations.

6. The Rosenberg's Self-Esteem Instrument: RSE (Rosenberg, 1989: 325-327) is a self-report questionnaire on self-esteem. It was originally constructed and developed for use with high school students. The Cronbach's alpha of internal consistency reliability was 0.97. However, it has been used with a variety of groups such as adult, elderly, and nurses' groups. The reliabilities (according to Cronbach's alpha coefficient) ranged from 0.75-0.95; this represents a high internal consistency in the measurement. (Meisenhelder,1986 ; Kemp & Page,1987 ; Mercer, et al,1988 ; 1993 ; Mercer & Ferketich,1988 ; 1994 ; 1995 ; Fothergill, et al.,2000; Edwards, et al.,2000; 2001; Anderson,2001; Mahat & Scoloveno,2001; Wade,2001)

RSE was translated into Thai, modified by other researchers and when used with adult and elderly groups, it was found to have construct validity and internal consistency reliability. Cronbach's alpha coefficient reliability ranged from 0.70-0.91 (Yaowalak Mahasithiwat, B.E. 2529: 72; Saowanee Vichitwatee, B.E. 2534: Samurcharn Arnathep, B.E. 2535; Pongsri Srimoragot, B.E. 2536: 71; Supunnee Sumlek, B.E. 2538: 45).

This instrument comprises 10 items: five are positive-score items and the other five are negative-score items. In this study, the researcher used the translated RSE scale, Thai version by Pongsri Srimoragot (B.E. 2536: 71) and it was content validated by five experts in psychology and was accepted to use for measure self-esteem. It was tested with 20 cervical cancer patients, and the Cronbach's alpha reliability was 0.91. When used with 60 cervical cancer patients, the Cronbach's alpha reliability ranged from 0.87 to 0.90, the proximate primary value. When Darika Thanbuasawan (B.E. 2540: 39) used it with 20 thalassemic patients in early adulthood, the Cronbach's alpha reliability was 0.80. Rugirachai Maungkeaw (B.E. 2534: 34) used it with 30 subjects in the same age group with osteoarthritis of the knee, the Cronbach's alpha reliability was 0.87. Additionally, when Suthinee Pakwilai (B.E. 2545: 45) used it with 20 thalassemia adult patients, one for four times, the Cronbach's alpha reliability ranged from 0.82 to 0.90. This indicates the good internal consistency of the instrument. In this study, the researcher used Rosenberg's Self-Esteem instrument.

The concept of nursing agency

Nursing agency is the complex power of nurses that empowers them to represent themselves as nurses and within the frame of a legitimate interpersonal relationship to act, to know, and to help persons in such a relationship to meet their therapeutic self-care demands and to regulate the development or exercise of their self-care agency or dependent care agency (Orem, 2001: 518). Methods of helping include doing for or acting for another, guiding and directing another, supporting another, teaching, and providing an environment that supports development (Orem, 2001: 348-349). So, nurses will adjust the nursing system and nursing diagnosis, assign, design, act, and regulate nursing to help individuals to meet their therapeutic self-care demands in time and place frames (Somjit Hanucharunkul, B.E.2534 cited in Pattama Vajamun, B.E. 2534: 5).

Nursing agency is analogous to self-care agency. They differ in that nursing agency is developed and exercised for the benefit of others and self-care agency is developed and exercised for the sake one's self. Nurses must be knowledgeable about, and skilled in, investigating and calculating individuals' therapeutic self-care demands, in determining the degrees of development and operability of self-care

agency, and in estimating persons' potential for regulation of the exercise or development of their power of self-care agency (Orem, 1997: 27).

Nursing agency is a complex structure consisting of three types of abilities. They are (Gast, et al, 1989: 27):

1. Capabilities for nursing operations are immediate abilities that are necessary for performance. They are modelled on deliberate action. This type can be measured by nursing practices or nursing actions, because humans who have effective actions must have high levels of agency. Nursing operations have been delineated as having three suboperations;

1.1. Estimative operations – investigating conditions and factors in self and environment that are significant for one's self-care or dependent care.

1.2. Transitional operations – making judgements and decisions about what one can, should, and will do to meet one's or another's self-care requisites.

1.3. Productive operations – performing measures to meet one's or another's self-care requisites.

2. Power components that performing or enabling for nursing operation would be of a nature intermediate between the human functioning and human dispositions. Ten power components include:

2.1. Maintaining attention to and requisite vigilance of the patient as dependent care agent and internal and external conditions and factors significant for nursing care.

2.2. Controlling use of available physical energy that is sufficient for the initiation and continuation of nursing operations.

2.3. Controlling the position of the body and its parts in execution of the movements required for the initiation and completion of nursing operations.

2.4. Reasoning within a nursing care frame of reference.

2.5. Maintaining motivation i.e., goal orientations for nursing care that are in accord with its characteristics and its meaning for life, health, and well being.

2.6. Decision-making about nursing care and operating these decisions.

2.7. Acquiring, retaining, and operationalizing technical knowledge about nursing care.

2.8. Repertoire of cognitive, perceptual, manipulative, communication, and interpersonal skills adapted to the performance of nursing operations.

2.9. Ordering discrete nursing action.

2.10. Performing nursing operations consistently and integrating them with other aspects of the nursing system.

3. Foundation capabilities and dispositions that express physiologically-or psychologically-described capabilities and dispositions that permit or facilitate or hinder persons' performance of nursing operations or the development or adequacy of the power component. These typically consist of self-understanding, self-awareness, self- concept, self-image, self-value, self-acceptance, self-concern, acceptance of body functions, willingness to meet needs of self, and future directedness.

The three types of nursing agency can be hierarchically arranged according to the degree to which they are foundational to one another. The hierarchical structure consists of foundational capabilities and dispositions as its base, mediated by power components and leading to capabilities for nursing operations (Gast, et al., 1989: 27).

Nurses must have nursing agency in premature neonatal skin care to help premature infants to meet their therapeutic self-care demands. Skin care is a part of premature infants' universal self-care requisites for promoting and preventing hazards to human life, human functioning, and human well being, necessary because of the immaturity and undevelopment of their skin. The concept of nursing agency in the levels of capabilities for nursing operations and enabling capabilities for nursing cares, are close nursing practices, or nursing behaviors. Therefore, the researcher studied the self-esteem of NICU nurses, which is one type of nursing agency in the level of foundational capabilities and disposition, and determines the prediction effect of self-esteem on skin care for premature infants.

Basic conditioning factors

The basic conditioning factors in Orem's theory have been described as personal conditions or environmental circumstances that affect nursing agency. That is, nursing operations will be considered with basic conditioning factors including age, gender, developmental state, health state, pattern of living, health care system factors, sociocultural factors, availability of resources, and external environmental factors such

as physical or biological factors of the person's environment. In this study, the factors such as work experience, personal income, continuing nursing education, and facilities for skin care, were chosen.

The relationship between self-esteem and nursing practices

Within Orem's nursing theory, nursing agency is described according to the three-part structure. The foundational capabilities and dispositions facilitate the power components and the nursing operations that comprise the performance of nursing. In a study to compare constructs of self-esteem and dispositions affecting goals, sought in Orem's theory by Anderson and Olnhausen, very similar structures were found, especially self-acceptance and self-value (Branden, 1992, Coopersmith, 1967, Well & Marwell, 1976 cite in Anderson & Olnhausen, 1999: 64). The foundational capabilities and dispositions apply to self-esteem, leading and relating to human behaviors and practices. A study by Wallace, et al. (1984: 263-264) found human being have values of self, and believe in the power of their actions. When they meet stressful events, they try to seek for the truth to solve the problem, and to perform in the ways that they expect.

In addition, many researches relate to Orem's theory. They support the belief in the relationship between self-esteem and health practices or health behaviors. Mosher and Moore (1998: 116-122) found higher self-concept has been related to increased self-care activity in children with cancer. A study of high school students and higher education students by Yarcheaki and Mahon (1989: 88-93) found positive relationship between self-esteem and health practices, as do the results of the study of adult subjects by Muhlenkamp and Sayles (1986: 334-338), and the study of Nepalese adolescent girls by Mahat and Scoloveno (2001: 251). Furthermore, a study of homeless adults by Anderson (2001: 59) found significant correlation between self-esteem and self-care ($r = 0.37$, $p < 0.001$), and self-esteem accounted for 25% of the 54% variance explained in self-care. In Thailand, a study of the elderly by Kamolpun Homnan (B.E. 2539: 47) found positive significant correlation between self-esteem and self-care behavior ($r = 0.223$, $p < 0.01$). A study of menopausal women with diabetes mellitus by Yainontad (2000, 92) found positive significant association between self-esteem and self-care behavior ($r = 0.501$, $p < 0.001$). Additionally, a study of pregnant woman with

pregnancy-induced hypertension by Kitjaidure (2000: 48) revealed significant correlation between self-esteem and self-care behaviors ($r = 0.318$, $p < 0.001$), and self-esteem accounted for 10% of the 18.8% variance explained in self-care.

The study of self-esteem in neonatal intensive care nurses was found very small. But the result data from many studies support Orem's theory that define nursing agency as a self-care agency. The researcher believes that nurses who have higher self-esteem, have higher abilities and nursing practices than those with lower self-esteem (Srinuan Viwatkunoprakarn, B.E. 2535: 40). This concurs with the study by Manussanun Narkkerd (B.E. 2542: 60), which revealed that critical care nurses who have high levels of self-esteem also have high levels of knowledge and skills in nursing practices.

The relationship between basic conditioning factors and nursing practices

Facilities for skin care

Within Orem's theory, the facilitating factors are adjusted to environments that support complete and effective nursing practices, and also develop nursing agency for caring patients. From the literature review it was found that facilities for nursing practices included those coursing from organizations and co-workers.

1. Organizational policy

Policy here means the wide guidelines for the performances that lead to the accomplishment of goals (Thongchai Santiwong, B.E. 2530 cited in Chutima Chatrung, B.E. 2540). In premature neonatal skin care practices, the organization that is responsible for neonatal intensive care unit (NICU) activities should pay attention to the guidelines or policies that facilitate nursing practices. Hospital policies are made to protect the patient and staff nurses in NICUs. NICUs will become a health hazard if guidelines and policies are not followed (Marot, 1996: 10). Thus, nurses will need new policy skills to meet the challenge of ensuring patient care safety and quality health care delivery (Ferguson, 2001: 551). The policies include providing in-service training, producing clinical guidelines, and providing knowledgeable resources that facilitate education for nursing practice developments. This concord with the study by Jintana Tangchawalit (B.E. 2541: 91) that found significant positive correlation

between hospital policies and the nurses' discharge planning in private hospitals of charity foundations in Bangkok metropolis ($r = 0.5741$, $p < 0.0001$).

A study by Sunipa Prachyangpreecha (2001: 78) found that organizational support was significantly related to nursing performance in health promotion and prevention for menopausal women in Bangkok metropolitan administration ($r = 0.34$, $p < 0.0001$) and could explain the 12.1% variances in nursing performance in health promotion and prevention for menopausal women.

Training is the management process to develop human resources to ensure the efficacy of the organization. It develops the knowledgeability of persons in the organization in order to up-to-date and makes suitable their practices (Pensri Prangsuwan, B.E. 2541: 38). This is also true of neonatal nurses who may use knowledge from their learning to structure their practical development in the interests of improving neonatal care. Evidence of achievement is needed to be gathered to demonstrate practical development (Stretton, 1997: 24).

Clinical practice guidelines help professionals stay abreast of the rapidly increasing body of scientific knowledge. They appear to be the promising and effective tools for improving the quality of health care (Grol, 2001: 46). Clinical practice guidelines are usually constructed by an expert panel and incorporate the results of relevant systemic reviews about a topic, as well as other types of research and the consensus views of expert clinician and researcher panel members. The product is evidence-based guidelines with recommendations for policy and practice (Davies, 2002: 559). From a study by Thomas, et al (2002), improved processes of care after guideline implementation were found. According to a study by Wantanee Tiphawornnukul (B.E. 2540: 64-66), policy and guideline practice had statistically significant relation to universal precautions compliance among nurses in hospitals under the Department of Medical Service, Ministry of Health, in Metropolitan Bangkok ($r = 0.57$, $r = 0.48$; $p < 0.001$, respectively) and policy was the factor that influenced universal precautions compliance (Beta = 0.2482).

In neonatal nursing, the training and practical guidelines increase knowledge that is intimately related to a clear understanding of relevant biological theory in neonatal care. This is a fundamental necessity of professional practice that enhances positive outcomes of care (Kanneh & Davies, 2000: 4). Currently, there are few

resources to assist nurses in implementing guidelines for practice (Davies, 2002: 560). Therefore, the organization should facilitate resources for developing practical guidelines. According to a study by Huang et al. (2002: 217), that found nurses who received educational training on universal precautions in Changsha, Hunan province, People's Republic of China improved knowledge, behavior, and practice.

2. Co-workers

Cooperators and assistants among co-workers include administrators, physicians, and subordinates who will support and facilitate and effective practices (Kanter, 1979: 65). The study by Chomchuen Somprasert (B.E. 2541: abstract) found that colleague relationship is the one of the factors affecting the nurse motivation process in their work places. In addition, a study by Jintana Tangchawalit (B.E. 2541: 91) found that multidisciplinary team participation was positively correlated ($r = 0.5691$, $p < 0.0001$) and could predict (Beta = 0.279, $p < 0.001$) the nurses' discharge planning in private hospitals of charity foundations in Bangkok Metropolis with statistical significance.

The study by Nilratana Chanwaiwit (B.E. 2542: 112) found the support of the chief of the department and co-workers was statistically correlated with the effectiveness of the home visit activities ($r = 0.420$, $r = 0.214$, respectively), and support of the chief of the department could predict the effectiveness of the home visit activities with statistical significance (Beta = 0.2121).

In neonatal nursing, journal clubs, encouraging continuing education, standard setting and the development of the lecturer-practitioner role all help the neonatal nurses utilise available theory and research (Young1995: 16).

3. Materials and supplies

Materials and supplies are the majority resource for nursing practice. They comprise objects, articles, structures, and places that facilitate practice (Kanter, 1979: 65). The study by Nilratana Chanwaiwit (B.E. 2542: 112) found resources statistically correlated with the effectiveness of the home visit activities ($r = 0.171$, $p < 0.01$). According to the study of the relationship between selected factors and role perception and role in practice in AIDS counseling by professional nurses at community hospitals in the North-East, Region 7, by Sunalee naosuk (B.E. 2543: 67), the most frequent problems and barriers in AIDS counseling were insufficient medical documents, instruments, and specific advisory offices.

From literature review it was found that facilities for nursing practice, including organizational policy, co-workers, and materials and supplies, were related to nursing practice. Nurses who have high facilities correlate with high practice.

Continuing nursing education (CNE)

Continuing nursing education (CNE) refers to learning after finish primary nursing education from nursing institutions. It is nurse professional learning experiences designed to enrich the nurse's contributions to quality health care and his/her pursuit of professional career goals. CNE is considered to be formal learning, such as attendance at workshops and seminars, academic writing in journals, or participation in graduate education programs, and informal learning comprises such activities as reading a professional journal or text book, listening to presentations, exploring the internet, conferencing with professional teams, or observing other nurses practicing (American Nurse Association, 1994: Kathrein, 1990: 216; McDiarmid, 1998: 267; Pearson & Care, 2002: 174; Kelly, 2002: 192).

CNE appears in the middle of the 20th century when the knowledge base and health services were growing at a rapid rate, along with references to Nightingale, who is reputed to have said, "Let us never consider ourselves as finished nurses.... We must be learning all of our lives". In the past, nurses didn't seek learning because nursing was a field overwhelmingly comprised of women who were an oppressed group (Boughn & Wang, 1994: 112), while the administrators were physicians. Later, nurses have had more confidence in their professional status than in the past. They have developed unity and a demand for professionalism. As role of education has increased, so their self-love and self-esteem may have increased (Stein, 1998: 245).

CNE has been seen as a vehicle for nurses to respond to rapid changes in health care delivery and to raise professional standards of current practice (Waddell, 1998: 52). Gilles and Pettengill (1993: 17) found that given scientific and technological advancements in the health care field, nurses' basic educational preparation for practice becomes obsolete within 10 years. As a result, the role of CNE has grown recently. More than one third of the 50 states in the USA require CNE, which includes programs, scholarships, and independent studies that meet specified criteria for contact hours and relicensure (American Nurse Association, 1994). At present in Thailand,

nurses have seen the important of CNE. The Nursing Council of Thailand has legislated the statute that requires various accrediting agencies to provide nurses with ongoing training in specific areas for relicensure, in the years following 2002. Nurses will engage in CNE activity to collect a credit. Fifty credits have to complete within five years. The curriculums or courses of study were approved by the Nursing Council of Thailand. Documents showing complete CNE credits are required for relicensure (Tassana Boonthong, B.E. 2545: 9).

Kathrein (1990: 216) claimed that CNE is complex. The content of learning is comprehensive and multidimensional, and the process of learning demands the development and use of sophisticated learning skill. A study of factor analysis by O'Connor (1979: 354) found that the reasons nurses participate in continuing education were the desire to be in compliance with authority, improve social relations and social welfare skills, gain professional advancement and professional knowledge, seek relief from routine, and acquire credentials. That means nurses who have the ability to seek knowledge and attend his/her work, are helping improve nursing practices.

The related study by Nittaya Inglinpunt (B.E. 2540: 60) found that there was significant positive correlation between in-service training and perceived job competence of staff nurses in Chainat hospital ($r = 0.3018$, $p < 0.01$) and could predict job competency. A study of critical care nurses in Bangkok government hospitals by Sunisa Wunyapet (B.E. 2533: 56) found the significant positive correlation between training in critical care and job performance. In addition a study of staff nurses in Prapokklao Hospital, Chantaburi province, by Somlak Suwannamalee (B.E. 2539: 56) found significant positive correlation between advanced nursing training and job competency ($r = 0.1638$, $p < 0.05$). A study by Narinee Jarurutpitug (B.E. 2543: 56-57) found seminars could predict health education performance of technical health education officers in regional hospitals and general hospitals with statistical significance. In other countries, a study of the impact of osteoporosis continuing education by Berarducci, et al. (2002: 212) found significantly increased osteoporosis knowledge and attitudes in this cohort of nurses, and Pelletier, et al. (1998: 314-321) claimed that nurses who finish postgraduate have enhanced professional skills in their field.

From the related studies that were reviewed by the researcher, CNE was chosen for this study.

Credits of continuing nursing education in Thailand

Several professional organizations in Thailand are currently active in continuing education, especially in health sciences, one of which is a medical organization which has a center for continuing medical education and nursing organization. Accordingly, Thailand's nursing council has promulgated a statute requiring 50 credits of CNE to be gained within five years for relicensure (Tassana Boonthong, B.E. 2545: 5).

CNE activities were classified in four categories and each category has an accreditation as follows (Rabiab, 2003: 1-6):

1. Participation in lectures, panel discussion, seminars, in-service training, or a refresher course, one credit per hour.
2. Self directed learning such as learning associated with CAI, Internet CNE, or self-assessment & review. These categories have to include at least five items to get 1 credit.
3. Participating in activities developing nursing quality, personal quality, knowledgeability quality, and nursing research quality i.e.,

Index medicus journal publication (10 credits when first named and five credits for other name, in each topic);

Non-index medicus journal publication (five credits when first named and three credits for other name, in each topic);

Scientific presentation (five credits when first named and two credits for other name, in each topic)

Validating nursing instrument (two credits to one topic)

Developing clinical nursing practice guideline (two credits to one topic)

Nursing and health education provider (two credit to one time)

4. Learning in nursing institutes' curriculum (15 credits for trimester curriculums and 12 credits for semester curriculums)

In this study, the criterions for getting CNE credits were followed. In this category, the CNE activities in skin care for premature infants, which provide greater opportunity for neonatal intensive care nurses' learning, were chosen.

Work experiences

Orem claimed that nurses' arts, as well as their propensity to envision, design, and produce nursing assistance for other, develops with practical experience in nursing

(Orem, 2001: 294). The experience in their field leads to learning, understanding, and performing behaviors (Smith, 1968, cited in Somjin Petpunsri, B.E. 2532: 96). In addition to a study of time taken to develop nursing skill from novice to expert, Dreyfrus's model by Benner (1984, cited in Peerapap Kumpang, B.E. 2539: 49) found that nurses who have had more than five years' experience, would have more efficiency of clinical nursing practice than those with one-two years' experience and two- five years' experiences. Expert nurses, who have had more than five years' experience in the original group of patients, must have high skills in clinical practice that are clinically validated by using informational data, high flexibility, and knowing from their performance the results that will follow.

Therefore, high experiences in the work will produce a high level of nursing practices. The related study by Sunisa Wanyapet (B.E. 2533: abstract) found that nurse's experience in the critical care unit had positive significant correlation with nursing practices among intensive care nurses in government hospitals in Bangkok. A study by Rattananun (2000: 71) found that experience in home health care had statistically significant positive relationship with job performance of home health care ($r = 0.214$, $p < 0.01$) by professional nurses at regional and general hospitals in the central region and could predict job performance of home health care with statistical significance. A study by Wantanee Tiphawornnukul (B.E. 2539: 64) found that duration of work had positively significant association with universal precautions compliance ($r = 0.19$, $p < 0.01$) among nurses in hospitals under the Department of Medical Service, Ministry of Public Health in Metropolitan Bangkok and accounted for 0.6 % of the 57.14% variance explained in universal precautions compliance (Beta = 0.0842). A study by Somlak Suwanmalee (B.E. 2539: 56) found that there was a positively significant correlation between working experience and job competency ($r = 0.1786$, $p < 0.05$). Additionally, a study by Naree Saeung (B.E. 2543: abstract) found that work experience had a positively significant correlation with competency of professional nurses in regional hospitals of the Ministry of Public Health ($r = 0.182$, $p < 0.01$). A study by Karntak (1992: 64) found that time in position had positively significant correlation with administrative job performance of the head nurses at community hospitals in the North-East region ($r = 0.3819$, $P < 0.01$).

In addition, a study of factors affecting the practice of nurses towards AIDS patients, considering the patients rights, of one general hospital in Northeastern Thailand by Nipaporn Kamolpreedee (B.E. 2543: 92-94) found a statistical relationship between work experience and nurses' practices, and work experience had significantly influenced nurses' practices (Beta = 0.143), and could be explained with other factor by 0.256% variance.

From the literature review, work experience had a correlation with nurses' practices, therefore work experience was chosen in this study.

Personal income

Nurses' income is a factor that relates with nursing practices and nursing agency (Orem, 2001: 168), but it wasn't described in the operational definitions for the basic conditioning factors. The study of the basic conditioning factors in Orem's theory by Moore and Pichler (2000: 140) defined income in the sociocultural orientation and income is related to operations. The researcher believes that nurses who have concludes high income, would experience decreased stress from economic problems in daily life. They would have self-confidence, empowerment, satisfaction in their work, and efficiency in nursing practices. The related study by Dilaka Tripiboon (B.E. 2531: 119) found that income was significantly associated with the performance of quality control circle activities among the nursing personnel of Maharaj Nakorn Chiang Mai Hospital. A study by Somlak Suwanmalee (B.E. 2539: 56) found that salary and welfare had positively significant correlation with job competency of staff nurses in Prapokklao Hospital, Chantaburi province.

Therefore, personal income that is a factor related to nursing practices was chosen in this study.

Summary of literature review

Anatomical and physiological examination of premature infants' skin discloses facile damage in infants in neonatal intensive care units (NICUs). The skin damage such as erythema, dryness, and breakdown were found in each NICU and had various degrees of severity. Nurses who provide premature neonatal care should pay attention to and interest in these problems and seek the strategies for skin care practices. At the present,

the studies of skin care for premature infants seeking strategies for maintaining skin integrity, preventing or minimizing risk of skin injury, and treating skin breakdown. is increasing. In Thailand, there are still very few studies about premature neonatal skin care, especially skin care that is a part of nursing practices. Neonatal intensive care nurses must give close care to these infants, and perform with appropriate skin care that will lead to good effects on the skin health of premature infants.

At the same time, suitable nursing practices related with several factors. Nursing agency is one factor within Orem's theory that relates to behaviors or practices. Self-esteem is a part of nursing agency that relates to nursing practice. It refers to the fact that nurses who have high self-esteem will have high ability and skills in nursing practices. The studies of self-esteem in neonatal intensive care nurses are very few, but from the past studies of self-esteem, it can be concluded that there is a relationship between self-esteem and health care behaviors.

In addition, the basic conditioning factors that relate to nursing practices include work experience, personal income, continuing nursing education, and facilities for skin care. Work experience was found to be associated with nursing practice at the low to medium level and could predict nursing practice with statistical significance. Personal income was the other factor that was associated with nursing practice at the medium level, but there have been very few studies of the effects of personal income on nurses. Additionally, continuing nursing education (CNE) was found to relate with nursing practice at the medium level with statistical significance. In the past, the studies of continuing nursing education were considered only training, seminar, and panel discussion, but CNE currently presents various learning activities. As facilitating factors, these include organization, co-workers, and materials and resources, that relate to nursing practice at the medium to high level and can predict nursing practice with statistical significance.

Therefore, from the literature review, the researcher focussed on the study of skin care for premature infants and the factors that influence premature infants' skin care among neonatal intensive care nurses. The selected factors in this study were self-esteem, work experience, personal income, continuing nursing education, and facilities for skin care.

CHAPTER III

MATERIALS AND METHODS

This study was a descriptive research aimed to describe skin care for premature infants, self-esteem and basic conditioning factors among nurses in neonatal intensive care units. The predictive effects of self-esteem and basic conditioning factors including work experience, personal income, continuing nursing education, and facilitating factors to skin care on skin care for premature infants were explored.

Populations and sampling

The population in this study was 209 registered nurses who had provided neonatal care among 20 neonatal intensive care units (NICUs) in North Thailand government hospitals.

The sample size was calculated by the formula of Yamane (Yamane, 1973: 272), as follows

$$n = \frac{N}{1 + Ne^2}$$

The level of significance is 0.05

N = size of population

e = the error in the sample, define as 5%

n = sample size

$$\text{Sample size } (n) = \frac{209}{1 + 209 (0.05)(0.05)} = 138 \text{ NICU registered nurses}$$

The cluster sampling was used for participants by simple random sampling technique to evaluating 15 hospitals for this study. Five percent of calculated sample size was provided for loss of participants. Thus, one hundred and forty-five registered nurses who worked in NICUs participated.

Settings

The settings for this study are 15 neonatal intensive care units (NICUs), caring for crisis and high risk newborn, in Thai government hospitals located in the North of Thailand.

Instruments

The instruments used for data collection comprised four items, as follows:

1. The Demographic Data Form. The researcher developed the demographic data form in order to collect years of work experience, personal income per month, and continuing nursing education.

The part of continuing nursing education in this instrument, was developed by the researcher according to the literature review from texts, documents, related researches, and categories of continuing nursing education activity that is promoted by the Nursing Council of Thailand. The five opportune activities in premature neonatal skin care for NICUs nurses learning were selected for the questionnaire. The questionnaire was self-reporting; measurement was made by using credits similar to the credits criteria of the Nursing Council of Thailand (Pensri Rabeab, B.E. 2546), as follows:

Never participated learning activities of continuing nursing education about skin care for premature infants, no credit.

Lecture participation, panel discussion, seminar, in-service training, and refresher courses of skin care for premature infants, one credit per hour.

Reading textbooks, documents, journals, researches or learning associate with CAI, Internet CNE that connected skin care for premature infants, one credit per one topic.

Participating to assess skin problems of premature infants, develop nursing quality, personal quality, knowledgeable quality, one credit per one time.

Developing clinical nursing practice guidelines about skin care for premature infants, two credits per one topic.

Writing for journal publication about skin care for premature infants, five credits when first named and three credits for other name, in each topic.

A higher credit indicated higher continuing nursing education and lower credit indicated lower continuing nursing education in skin care for premature infants.

Validity and Reliability

The part of continuing nursing education in the questionnaire was validated by five experts: a neonatologist, a neonatal nurse instructor, an NICU nurse specialist, and two nurse instructors who are experts in developing nursing instruments. They examined the content validity and language suitability of the questionnaire, the researcher then adjusting for the questionnaire following their advice.

2. Self-Esteem Questionnaire. The researcher used the Rosenberg Self-Esteem (RSE) Scale for measuring NICUs nurses' self-esteem. The RSE scale was constructed and developed by Rosenberg (1965). It was translated into Thai and modified by Pongsri Srimoragot (B.E. 2536: 71). It consisted of 10 items: half are positive-score items (item 1, 2, 4, 6, 7) and the other half are negative-score items (item 3, 5, 8, 9, 10). The scores of negative items were reversed. The questionnaire was a 4-Likert scale from 'never' to 'all the time'. The explanation of the scale was 1 = never, 2 = sometimes, 3 = often, and 4 = all the time. Total possible scores ranged from 10 to 40. A higher score indicated higher self-esteem and lower score indicated lower self-esteem.

Validity and Reliability

The Rosenberg Self-Esteem (RSE) Scale was originally developed for use with high school students. The Cronbach's alpha of internal consistency reliability was 0.97. However, it has been used with a variety of groups such as adult, elderly, and nurses groups. The reliabilities (according to Cronbach's alpha coefficient) ranged from 0.75-0.95; this represents good internal consistency in the measurement. (Meisenhelder,1986 ; Kemp & Page,1987 ; Mercer, et al,1988 ; 1993 ; Mercer & Ferketich,1988 ; 1994 ; 1995 ; Anderson,2001; Edwards, et al.,2000; 2001; Fothergill, et al.,2000; Mahat & Scoloveno,2001; Wade,2001)

The translated RSE scale, Thai version by Pongsri Srimoragot (B.E. 2536: 71) was content validated by five experts in psychology and tested with 20 cervical cancer patients, with Cronbach's alpha reliability at 0.91. When used with 60 cervical cancer patients, with Cronbach's alpha reliability showing ranges from 0.87 to 0.90, that proximate primary value. Darika Tanbuasawan, (B.E. 2540: 39) used the RSE scale with 20 thalassemic patients in adulthood, with Cronbach's alpha reliability at 0.80. Suthinee

Pakwilai (B.E. 2545: 45) used it with 20 patients who had mastectomy and received chemotherapy, one for four times, with Cronbach's alpha reliability showing ranges from 0.82 to 0.90. This again displays the good internal consistency of the instrument.

In this study, the researcher tested the self-esteem questionnaire with 30 registered nurses who have characteristics similar to the study population, with Cronbach's alpha reliability coefficient at 0.82. Next, it was used on the total samples of 145 case, calculated at 0.84.

3. The facilitating factors to skin care practices questionnaire

This questionnaire was developed by the researcher according to the literature review from texts, documents, and related researches. It was a dichotomous questionnaire, which consists of eight items, covering organizational policies, co-workers, and material resources. Each item included 10 premature neonatal skin care practices: skin assessment, bathing, emollients, adhesive application and removal, skin disinfection solutions, control of transepidermal water loss, care of diaper dermatitis, umbilical cord care, prevention of skin breakdown, and treatment and care of skin breakdown. For score criteria, the dichotomous scale was 0 (lacking) and 1 (possessing). Total possible scores ranged from 0-80. Higher scores refer to higher levels of facilitating factors to skin care. Lower scores refer to lower levels of facilities for skin care.

Validity and Reliability

For validity, the questionnaire was validated by five experts: a neonatologist, a neonatal nurse instructor, an NICU nurse specialist, and two nurse instructors who are experts in developing nursing instruments. They examined the content validity and language suitability of the questionnaire, and then the researcher adjusted the questionnaire from their advice.

For reliability, the researcher applied the questionnaire to 30 nurses who had similar characteristics to the sample groups, and the Cronbach's alpha reliability coefficient was calculated. The lowest acceptable alpha value considered was 0.70 (Polit & Hungler, 1997: 297). Cronbach's alpha was 0.92. These results of reliability indicated a satisfactory level of internal consistency of the reliability coefficient. Then, it was used on the total samples of 145 case, calculated at 0.95.

4. Skin care for premature infants questionnaire

The questionnaire was developed by the researcher according to 1) the literature review from texts, documents, related researches, and neonatal skin care guidelines from the National Association of Neonatal Nurses (1997) and clinical practice guidelines: neonatal skin care advice from the Association of Women's Health, Obstetric and Neonatal Nurses 2) advice of neonatal nurses specialists 3) the researcher's experience. The Skin care for premature infants questionnaire included items on skin assessment, bathing, emollients, adhesive application and removal, skin disinfection solutions, control of transepidermal water loss, care of diaper dermatitis, umbilical cord care, prevention of skin breakdown, and treatment and care of skin breakdown. It consisted of 38 items: 35 items were positive-score items and three items were negative-score items (11, 12, and 31). The scores of negative items were reversed.

The questionnaire was a 100-mm Visual Analog Scale. The scale used 0 (never) to 100 (all the time), and indicated the level of premature neonatal skin care practices. The ruler for design work was used for accuracy in measurement. For score criteria, one mm represented one score. The positive-score items were measured from left to right, and negative-score items from right to left. Total possible scores of 38 items ranged from 0-3800. The researcher presented the total scores by percentages of overall scores (0-100). Higher scores refer to higher levels of skin care practices for premature infants. Lower scores refer to lower levels of skin care practices for premature infants.

Validity and Reliability

For validity, the questionnaire was validated by five experts: a neonatologist, a neonatal nurse instructor, an NICU nurse specialist, and two nurse instructors who were experts in developing nursing instruments. They examined the content validity and language suitability of the questionnaire, the researcher then adjusting the questionnaire from their advice.

For reliability, the researcher applied the questionnaire to 30 nurses who had similar characteristics to the sample groups, and Cronbach's alpha reliability was calculated. The lowest acceptable alpha value considered was 0.70 (Polit & Hungler, 1997: 297). Cronbach's alpha was 0.68. These results of reliability indicated unsatisfactory levels of internal consistency of the reliability coefficient. The

researcher reviewed this questionnaire and simplified its language before study. It was used later on the total samples of 145 cases, calculated at 0.71.

Protection of Human Rights

This study was conducted with the intention of protecting human rights. A letter informed participants on the purposes and methods of the study, the advantages following publication of the results, and promised subjects anonymity, since the collected data would be secret. There would be no negative effect to hospital and routine nursing practices, and the data presentations in general and would be used only for research. Nurses could reject to participating and nurses participating had the right to withdraw at any time without prejudice to them. This covering letter giving assurances was sent with each set of questionnaires to each subject.

Data Collection

1. Letters for collaboration to collect the data were obtained from the Faculty of Graduate Studies, Mahidol University.
2. The research proposal, instruments and letters for collaboration to collect the data were sent to the Dean of the university hospital, the Director of Thai Government Hospitals located in the North of Thailand, and the Institution Review Board (IRB) of each hospital or research committees at participating agencies. Approval and permission to collect data were obtained.
3. Letters for permission to collect the data were sent to the head of NICUs nurses for the list of nurses who worked in the neonatal intensive care units.
4. Telephone advice from nurse administrators in each hospital was used for strategy on sending research instruments.
5. The instruments used for data collection, composed of the demographic data form, self-esteem questionnaire, facilitating factors to skin care practices questionnaire, and skin care for premature infants questionnaire, were sent to the study subjects. Stamped envelopes were sent along with the instruments to allow the respondents to record their responses and return them to the researcher within two weeks.
6. Telephone calls to head NICUs nurses was used to follow up the arrival of instruments to the subjects.

7. The instruments, which should be returned after two weeks, were checked for completion.

8. The returned questionnaires that were not completed, were sent to the subjects again to fill in missing answers.

9. Follow-up letters were sent to the subjects and the instruments were sent again along the letters two weeks after the deadline.

10. The data was analyzed by the computer program of Statistical Package for Social Service (SPSS) for Windows.

Data analysis

The Statistical Package for Social Science for Windows Program (SPSS/ FW) was used to analyze the data as follows:

1. Work experience and personal incomes were analyzed using frequency, percentage, range, mean, and standard deviation.

2. The credits of continuing nursing education were analyzed using range, mean, and standard deviation. From the Kolmogorov-Smirnov test, it was not a normal distribution that violates in the assumption of multiple regression. CNE was transformed data by the researcher to a dummy variable so that 0 meant NICU nurses who had no credits for CNE, and 1 meant nurses who had credits of CNE, before performing multiple regression.

3. The scores of self-esteem, facilities for skin care, and skin care for premature infants, were analyzed using range, mean, and standard deviation.

4. The relationship among basic conditioning factors including work experience, personal incomes, continuing nursing education, facilities for skin care, self-esteem, and skin care for premature infants, was analyzed, using Pearson's product moment correlation coefficient.

5. Stepwise multiple regression was performed in order to test the predictive effects of basic conditioning factors including work experience, personal incomes, continuing nursing education, facilities for skin care, and self-esteem on skin care for premature infants.

CHAPTER IV

RESULTS

The purpose of this study was to examine the influence of self-esteem and basic conditioning factors including work experience, personal income, continuing nursing education, and facilitating factors to skin care practices on skin care for premature infants among nurses in neonatal intensive care units. The sample was 145 registered nurses who had provided neonatal care among 15 neonatal intensive care units (NICUs) in North of Thai government hospitals. One hundred and thirty four (92.41%) completed questionnaires were returned. In this chapter, the findings of this study is presented in tables with descriptions in the following research objectives sequence:

Part 1 Skin care for premature infants, self-esteem and basic conditioning factors including work experience, personal income, continuing nursing education, and facilities for skin care among nurses in neonatal intensive care units.

Part 2 The predictive effects of self-esteem and basic conditioning factors including work experience, personal income, continuing nursing education, and facilities for skin care on skin care for premature infants among nurses in neonatal intensive care units.

Part 1 Skin care for premature infants, self-esteem and basic conditioning factors including work experience, personal income, continuing nursing education, and facilities for skin care among nurses in neonatal intensive care units.

Skin care for premature infants

The percentages of the score of skin care for premature infants ranged from 60.82 to 92.68, that was on the mean of 81.07 (S.D. = 5.73). Thus, the mean score was well over the mid-point of 50. The participants had rather high level of skin care for premature infants.

The score on each item was considered, The highest score was on the item, “You used antiseptics on premature infants’ skin before invasive procedures” (mean = 98.50, S.D.= 8.06), “You kept the umbilical cord clean and dry” (mean = 98.33, S.D. = 4.50) followed by the item, “You washed your hands before and after contacting premature infants” (mean = 97.34, S.D.= 5.80), respectively (table 1).

Table 1: Range, mean, and standard deviation (S.D.) of five highest items of skin care for premature infants’ score among nurses in neonatal intensive care units (n = 134).

Skin care for premature infants	Possible range	Actual range	Mean	S.D.
1. You used antiseptics on premature infants’ skin before invasive procedures.	0-100	12-100	98.50	8.06
2. You kept umbilical cord clean and dry.	0-100	77-100	98.33	4.50
3. You wash your hands before and after contacting premature infants.	0-100	72-100	97.34	5.80
4. You monitored and carefully managed the fluid and electrolyte balance ordered by physicians for premature infants with operative wound (s) or skin breakdown.	0-100	69-100	97.12	6.34
5. When you found the area that retained a tube drain stained with heavy excreta, you removed it immediately.	0-100	68-100	96.68	7.35

Whereas, the lowest score was on the item, “You wrapped preterms’ body, arms, legs, and head with transparent plastic wraps during the first week of their life, especially premature infants who had had less than 32 weeks gestational ages or were at risk from hypothermia” (mean = 36.14, S.D. = 38.88) followed by the negative item, “You baths premature infants on a daily basis when they had suitable clinical conditions” (mean = 41.07, S.D.= 42.66), “You used skin barriers such as Tegaderm or Opsite beneath adhesives tapes or plasters in premature infants’ skin” (mean = 42.33, S.D.= 39.05), respectively (table 2).

Table 2: Range, mean, and standard deviation (S.D.) of five lowest items of skin care for premature infants’ score among nurses in neonatal intensive care units (n = 134).

Skin care for premature infants	Possible range	Actual range	Mean	S.D.
1. You wrapped preterms’ body, arms, legs, and head with transparent plastic wraps during the first week of their life, especially premature infants who had had less than 32 weeks gestational ages or were at risk from hypothermia	0-100	0-100	36.14	39.05
2. You bathed premature infants on a daily basis when they had suitable clinical condition.	0-100	0-100	41.07	42.66
3. You used skin barrier such as Tegaderm or Opsite beneath adhesive tapes or plasters in premature infants.	0-100	0-100	42.33	39.05
4. You put premature infants who had edema or limited positioning on an airbed or waterbed.	0-100	0-100	46.77	36.78
5. In premature infants who had dry skin, you used ointment or baby lotion for rubbing their skin.	0-100	0-100	54.69	39.39

Self-esteem

The sum of self-esteem scores of the samples ranged from 27 to 40 (mean = 34.16, S.D. = 2.91). Thus, it can be seen that the mean was very well over the mid-point and close to the full score of 40. Therefore, the subjects had high self-esteem .

Basic conditioning factors

work experience

The results of this study showed that the majority of participants had number of years of experience > 5 years. There were 54 NICU nurses (40.3%) (Table 3). Work experience among nurses in neonatal intensive care units ranged from 1 to 26 years. The average years of work experience was shown, with the mean of 6.68 (S.D.= 5.91) (table 4).

Personal income

The results of this study showed that the majority of participants had income >10,000-20,000 *Baht* / month (77 NICU nurses, 57.46%) (Table 3). The personal income of the participants ranged from 5,130 to 40,000 *baht*/month, with the mean of 13,867.84 (S.D.= 5,239.55) (Table 4).

Table 3: Frequency and percentage of work experience and personal income among nurses in neonatal intensive care unit (n= 134)

n = 134		
	n	%
Work experience		
1- 2 years	40	29.85
> 2 - 5 years	40	29.85
> 5 -10 years	23	17.16
>10-20 years	29	21.64
>20 years	2	1.50
Personal income (<i>Baht</i> / month)		
5,000-10,000	49	36.57
>10,000-20,000	77	57.46
>20,000-30,000	7	5.22
>30,000-40,000	1	0.75

Table 4: Min-max, mean, standard deviation (S.D.), and skewness of work experience and personal income among nurses in neonatal intensive care units (n = 134)

	min-max	Mean	S.D.	Skewness
Work experience (years)	1-26	6.68	5.91	1.180
Personal income (<i>Baht</i> / month)	5,130-40,000	13,867.40	5,239.55	1.317

Continuing nursing education

The results of this study showed that 41 participants (30.6%) had no credit of CNE and 93 participants (69.4%) had credit of CNE (Table 5). From the raw data, continuing nursing education (CNE) of the participants ranged from 0 to 117 credits, with the mean of 7.13 (S.D. = 15.38). The mean of credits of participating for assessment of skin problems of premature infants, and developing nursing quality, personal quality, and knowledgeable quality, was higher than for other aspects (mean = 2.87, S.D. = 6.32). The developing clinical nursing practice guidelines had very low credit (mean = 0.007, S.D. = 0.45). However, writing on premature infants skin care for journal publication had no credits among nurses in neonatal intensive care unit (mean = 0, S.D. = 0) (see appendix D).

Table 5: Frequency and percentage of continuing nursing education among nurses in neonatal intensive care unit (n= 134)

Continuing nursing education (CNE)	Frequency	Percentage
Had no credit of CNE	41	30.6
Had credit of CNE	93	69.4
Total	134	100.00

Facilities for skin care

The sample had the scores of facilities for skin care ranging from 5 to 80, with the mean of 49.40 (S.D.= 17.87). It referred to rather low level of facilities for skin care. Considered from each item, it was found that the item “ More than half of the personnel in your organization performed skin care for premature infants with attention and exactingness” had higher scores than any other (mean = 8.37, S.D. = 2.25). The item “you received advice or transmission in skin care practices for premature infants from the personnel in your organization” was the next higher item (mean = 7.70, S.D. = 2.94). In addition, it was found the lower scores included the item, “Your organization had training, panel discussions or seminars about skin care practices for premature infants” (mean = 3.90, S.D.= 3.66). The other low score item was, “The physicians who participated in premature neonatal treatment and care in NICU, gave advice or consulted about skin care for premature infants” (mean = 4.75, S.D.= 3.82) (Table 6).

Table 6: Range, mean, and standard deviation (S.D.) of facilitating factors to skin care practices score among nurses in neonatal intensive care units (n = 134).

Content	Possible Range	Actual Range	Mean	S.D.
1. More than half of the personnel in your organization performed skin care for premature infants with attention and exactingness.	0-10	0-10	8.37	2.25
2. You received advice or transmission in skin care practices for premature infants from the personnel in your organization.	0-10	0-10	7.70	3.13
3. Your organization had sufficient budgets for providing necessary materials for premature infants' skin care.	0-10	0-10	6.69	2.94
4. Your head nurse gave you advice about skin care for premature infants.	0-10	0-10	6.55	3.73
5. Your organization had textbooks, documents, and other resources such as internet or computer assistant instructors about skin care for premature infants for your self-learning.	0-10	0-10	6.13	3.57
6. Your organization had guidelines or handbooks or standard practices for premature infants' skin care.	0-10	0-10	5.30	3.48
7. The physicians who participated in premature neonatal treatment and care in NICU, gave an advice or consultation about skin care for premature infants.	0-10	0-10	4.75	3.82
8. Your organization had training panel discussions or seminars about skin care practices for premature infants.	0-10	0-10	3.90	3.66
Total	0-80	5-80	49.40	17.87

Part 2 The predictive effects of self-esteem and basic conditioning factors including work experience, personal income, continuing nursing education, and facilities for skin care on skin care for premature infants among nurses in neonatal intensive care units.

In response to the objective, “to explore the predictive effects of self-esteem and basic conditioning factors including work experience, personal income, continuing nursing education (CNE), and facilities for skin care on skin care for premature infants among nurses in neonatal intensive care units”, stepwise multiple regression analysis was conducted.

Assumptions of regression analysis were tested, as followed;

1. Test for normality of dependent and independent variables by the Kolmogorov-Smirnov test, it was found that skin care for premature infants, self-esteem, and facilities for skin care were a normal distribution, but work experience and personal income were not a normal distribution. Hence, the researcher transformed data of work experience and personal income by a log transformation (Tabachnick & Fidell, 1996: 85).

2. Test for multicollinearity to verify correlations among independent variables, it was found that five pairs of independent variables were correlated. These correlations were mild to moderate (ranged from $-.004$ to $.666$) (See table 7), and high correlation that was greater than 0.85 was not met (Munro, 2001: 271).

3. The Durbin-Watson value was 1.77 that could not verify autocorrelation.

4. Linearity was presented by considering scatter plot between regression and residual. It showed the mean of residual all line on the same straight line (See appendix A).

5. Residual analysis was tested for justifying assumptions of regression, as follow (Verran & Ferketich, 1987 cited in Munro, 2001: 273; Wiyada Tanwattanakul, B.E. 2546: 97); Residual scatter plot was considered. It was found that plots in graphs had steady scatter in a narrow space ($+3$ SD) (Weisberg, 1980: 120), thus suggesting constant variance (Homocedasticity). Considering normal probability plot, it was found to be rather linear; accordingly the standardized residual had a normal distribution (See appendix A). In addition, mean residual was nearly zero, and mean of standard residual was zero.

Table 7 : Correlation matrix of study variables (n = 134)

Variables	1	2	3	4	5	6
1. Work experience	1.00					
2. Personal income	.666*	1.00				
3. Continuing nursing education	.091	.157*	1.00			
4. Facilities for skin care	-.004	.049	.193*	1.00		
5. Self-esteem	.195*	.240*	-.057	-.078	1.00	
6. Skin care for premature infants	.210*	.098	.157*	.194*	.197*	1.00

*P < .05

As for correlations between independent and dependent variables, there were found that work experience, continuing nursing education, facilities for skin care, and self-esteem had positively significant correlations at low level with skin care for premature infants ($r = .210, .157, .194, .194$, respectively; $p < .05$). But personal income was not significantly related to skin care for premature infants ($r = .098, p > .05$) (Table 7).

When stepwise multiple regression was performed. The results indicated that three in five predicting factors could predict skin care for premature infants (work experience, facilities for skin care, and self-esteem). They could significantly explain the variation of skin care for premature infants for 11.3 % ($p < .05$) (Overall $F_{3,130} = 5.514, p < .05$). Facilities for skin care was the significantly strongest predictor of skin care for premature infants (Beta = .209, $p < .05$) followed by self-esteem (Beta = .179, $p < .05$) and work experience (Beta = .177, $p < .05$) (Table 8).

The raw score of equation for predicting value of skin care for premature infants, could be written, as follows;

Skin care for premature infants = $64.152 + .007$ (Facilities for skin care) + $.351$ (Self-esteem) + 2.482 (Work experience)

Table 9 : Stepwise multiple regression analysis of the study variables on skin care for premature infants of neonatal intensive care units' nurses (n = 134)

Variables	R ²	R ² change	B	SEB	Beta	t
1. Work experience	.044	.044	2.482	1.184	.177	2.097*
2. Facilities for skin care	.082	.038	.007	.027	.209	2.520*
3. Self-esteem	.113	.031	.351	.166	.179	2.116*

*P < .05

Constant (a) = 64.152, t = 10.98*

R² = .113, R² adj = .092, Overall F = 5.514*, SE EST = 5.456

CHAPTER V

DISCUSSION

This study focussed on the factors that influence skin care for premature infants among nurses in neonatal intensive care units. In this chapter the findings will be discussed according to the objectives and hypotheses.

The results of this study showed that the overall skin care for premature infants was at a rather high level. The percentages of sum scores of skin care for premature infants ranged from 60.82 to 92.68 (mean = 81.10, S.D. = 5.81). Considering overall scores, they were found to be of relatively wide range (min-max = 2,311-3,522). Probably because skin care practices, in many cases, have been developed through trial and error and are passed on informally within the unit, NICU nurses have devised numerous methods to keep the premature infant's skin intact, protected, and minimally damaged. These methods, however, are often not shared or communicated between nurseries, nor have they been evaluated for efficacy (Munson et al, 1999: 25).

Considering scores on items (See appendix B), it was found the majority average scores were more than 80 (25 from 38 items). The highest score was on the item (see table 1), "You used antiseptics on premature infants' skin before invasive procedures" (mean = 98.50, S.D.= 8.06), which proved the importance of skin preparation before puncture was recognized. The use of antiseptics on neonatal skin before catheter insertion rests on the assumption that the elimination of local populations of pathogenic bacteria before the invasive procedure helps to minimize the risk for introducing bacteremia and causing sepsis (Darmstadt & Dinulos, 2000:761). The other high score was on the item, "You kept umbilical cord clean and dry" (mean = 98.33, S.D. = 4.50), which revealed that umbilical cord care was given closest attention in almost NICUs because the necrotic tissue of the umbilical cord is an excellent medium for bacteria growth. Bacteria colonizing necrotic tissue are in close proximity to the umbilical vessels, with a close access to the bloodstream (Gonzalez et al., 1998: 275). The third high score was on the item, "You washed your hands before

and after contacting premature infants” (mean = 97.34, S.D.= 5.80). It emphasized that handwashing is seen as the simplest and most cost-effective way to prevent skin colonization and interrupt nosocomial transmission (Larson, 1999: 1287). Considered from this result, the majority high score items were skin care practices that were connected with infectious control. It probably indicated that NICU nurses paid more attention to fundamental care and hygiene of premature neonatal skin than other in-depth skin care practices.

On the other hand, the lowest score was on the item (see table 2), “You wrapped preterms’ body, arms, legs, and head with transparent plastic wraps during the first week of their life, especially premature infants who had had less than 32 weeks gestational ages or were at risk from hypothermia” (mean = 36.14, S.D. = 38.88). The use of plastic wraps was reported to reduce insensible water loss and answer warmer power demand (Siegfried, 1998:443). However, it is not popular among NICUs in Thailand because this country has hot and wet weather. The use of plastic wraps may be lead to incidence of infection in this environment that is optimal for contamination with pathogenic microbes (Leblanc, 1991: 403). Additionally, it is not convenient during nursing care and procedures i.e., venous puncture, lumbar puncture, or adhesive skin, because of the need to remove it periodically, and it leads potentially to overheating (Darmstadt & Dinulos, 2000: 773). There are limited data on the safety and efficacy of this practice. The other low score was on the negative item, “You baths premature infants on a daily basis when they had suitable clinical condition” (mean = 41.07, S.D.= 42.66). Preterm infants in many NICUs are routinely bathed on a daily or every-other-day schedule (Munsen et al., 1999: 27). The same is true of such infants in NICUs in Thailand. Thailand is a hot country and Thai people believe that bathing is the way to wash off sweat and dirt, and clean the body. This is the case despite lack of evidence of the efficacy of such frequent bathing of premature infants in reducing infection risk (Peters, 1996: 71). Therefore, decrease in routine bathing of preterm infants in NICUs may have a substantial positive effect in reducing the amount of physiologic and behavioral stress experienced by preterm infants, may lead to cost savings from improved patient outcome, and decreased nursing time (Franck & Quinn, 2000: 588). The third low score was on the item, “You used skin barriers such as Tegaderm or Opsite beneath adhesives tapes or plasters in premature infants’ skin”

(mean = 42.33, S.D.= 39.05), which revealed that skin barriers are not favoured products in NICUs in Thailand because they are expensive and nurses lack experience in using these products. In the other word, recent study or research of the use of skin barriers in Thailand is limited.

However, there were many items that had the minimal score at zero, that meant some NICUs nurses never practice them (item 1, 2, 3, 5, 7, 8, 9, 10, 11, 12, 13, 14, 18, 19, 20, 21, 22, 25, 27, 28, 29, 30, 31) (See appendix B). It was described that neonatal intensive care nurses used practices based on trail and error, hospital traditions, and myths while caring for neonatal skin. Their interventions, that are often initiated as part of routine care, are diverse and not based on research (Maguire1999: 223). In addition, there are few researchers who study premature neonatal skin care. It was reported that few instructions or recommendations for neonatal skin care are available (Darmstadt & Dinulos, 2000: 759). In Thailand, documents in the Thai language about premature neonatal skin care practices are not available, and even documents covering skin care areas are not numerous. Therefore, nurses experience difficulty in seeking current knowledge of skin care for premature infants and developing their practices. Additionally, NICUs in this study have unlimited beds for patients. These may be among the reasons that the work in NICUs is accompanied by troubles, delicacies, and various practices that are obstacles for NICU nurses in their attention to and practice of skin care for premature infants.

Considering the predictive effects of some factors on skin care for premature infants among nurses in neonatal intensive care units, stepwise multiple regression was used to analysis the data of this study. It was found the factors which are able to predict skin care for premature infants among nurses in neonatal intensive care units (NICUs) with statistical significance are work experience, facilities for skin care, and self-esteem (Table 8), which partly supports the hypothesis and can be explained as follows:

Basic conditioning factors described within Orem's theory are that certain distinguishing characteristics of persons affected or conditioned the values of the personal agency (Orem, 2001: 167). Work experience is one of the basic conditioning factors that the first variable predicted skin care for premature infants with statistical significance (Beta = 0.177) and accounted for 4.4 % of the 11.3 % variance explained in

skin care for premature infants. Though this study, it was found that among the sample groups of nurses in neonatal intensive care units (NICUs), work experience ranged from 1 to 26 years. The average work experience was on the mean of 6.68 (S.D.= 5.91). In addition, 54 NICU nurses (40.3%) of participants had work experience in NICU more than five years. It was claimed that nurses in NICUs were expert nurses, following Dreyfrus's model by Benner (1984, cited in Peerapap Kumpang, B.E. 2539: 49), who explained that nurses who have had more than five years' experience in an original group of patients were expert nurses.

The results showed that NICU nurses who had more experience in caring for premature infants would have more correct behavior in caring for premature infants' skin than NICU nurses who had less experience. It follows Orem (2001: 294), who indicated that the development in individual nurses is associated with the kinds of life experiences they have had, including nursing experiences. Nursing prudence also demands that nurses continue to advance themselves in the nursing sciences and prudence is based on practical experience in nursing. Therefore, the long duration of caring for sick infants could increase experience and develop skill and prudence of NICU nurses in taking care of premature infants and also increase their perception in premature neonatal skin care potential. That allowed NICU nurses to provide better quality of skin care behavior for premature infants.

This was similar to the findings of Nipatsiripol, Y. (1997: 56) reported that work experience had significantly positive correlation with nursing practice of registration nurses in intensive care units in government hospitals in Bangkok. Similarly, Puntongpun, N. (1999: abstract), which explained that experience had significantly predicted job performance of staff nurses in intensive care units in governmental hospitals in metropolitan Bangkok. A study by Nipaporn Kamolpreedee (B.E. 2543: 92-94) found a statistical relationship between work experience and nurses' practices, and work experience had significantly influenced nurses' practices towards AIDS patients, considering the patients rights, of one general hospital in Northeastern Thailand (Beta = 0.143).

Facilities for skin care was the other basic conditioning factor that influenced skin care for premature infants (Beta = 0.209) and accounted for 3.8 % of the 11.3 %

variance explained in skin care for premature infants. The sample had sum scores ranging from 5 to 80, with the mean of 49.40 (S.D.= 17.87). It indicated that facilities for skin care were not high. This is probably explained by the fact that skin care has many categories, including skin assessment, bathing, emollients, adhesive application and removal, skin disinfection solutions, control of transepidermal water loss, care of diaper dermatitis, umbilical cord care, prevention of skin breakdown, and treatment and care of skin breakdown.

Considered from each item (See table 6), it was found that the item “ More than half of the personnel in your organization performed skin care for premature infants with attention and exactingness” had higher scores than any other (mean = 8.37, S.D. = 2.25). The item “you received advice or transmission in skin care practices for premature infants from the personnel in your organization” was the next higher item (mean = 7.70, S.D. = 2.94). It meant that personnel in the organization was the major factor to facilitating skin care practices. Barrett (1995: 9-13) found through his research that neonatal nurses were eager to improve their skills by extending their role, and that consultant staff were keen to support this. In addition, it was found the lower scores included the item, “Your organization had training, panel discussions or seminars about skin care practices for premature infants” (mean = 3.90, S.D.= 3.66). This meant the occasions to develop or improve skin care strategies by training or seminar were few. In fact, neonatal nurses may use learning contacts to structure their practice development in the interests of improving neonatal care (Stretton, 1997: 24). The other low score item was, “The physicians who participated in premature neonatal treatment and care in NICU, gave advice or consulted about skin care for premature infants” (mean = 4.75, S.D.= 3.82). This showed that physicians and nurses in NICU had minimal contact with each other. If given the opportunity and infused with the will, nurses in NICU can allay fears by providing information, guidance, treatment, and support. Their efforts can help patients believe in the significance, indeed the dignity, of their own existence (McHugh, 1999: 8 cited in Haller, 2001: 137).

The results show that if NICU nurses receive factor facilitation at a low level, their skin care of premature infants is at a low level. In contrast, if nurses receive factor facilitation at a high level, their skin care of premature infants is at a high level. Facilitating factors include the organization, co-workers, and materials, that

continuously develop knowledge about nursing and contribute to the operational function of the production of nursing (Orem, 2001: 456-459). This is consistent with the findings of the study of Loprasert, K. (1997: abstract) who found facilitating factors including policy, administration, working conditions, the organizational communication climate, and downward communication could predict the job performance of the staff nurses in the Police General Hospital. Similarly, Radawiriyakul, W. (1994: 60) found the organizational support for nursing practice could predict nursing practice for the elderly of professional nurses in provincial hospitals under the Ministry of Public Health in Northeast Thailand.

In addition, self-esteem could predict skin care for premature infants ($\text{Beta} = 0.179$) and accounted for 3.1 % of the 11.3 % variance explained in skin care for premature infants. It indicated that NICU nurses with high self-esteem could take better skin care for premature infants than those with low self-esteem. The sum of self-esteem scores of the samples ranged from 27 to 40 (mean = 34.16, S.D. = 2.91). Thus, it can be seen that the mean was very well over the mid-point and close to the full score of 40, which revealed that the sample had rather high self-esteem.

This result might be taken to indicate that self-esteem is one of talents that makes great nurses (Abdenour, 1999: 44). Self-esteem represented the samples' feeling that they are persons of worth; they respect themselves for what they are (Rosenberg, 1965: 31). Nurses who work in critical care units are advanced in nursing and using equipment, and also are positively accepted by patients, parents, and colleagues. The resolution of critical situations strengthens their confidence and enhances self-esteem (Levine, et al., 1988: 392 cited in Manussanun Narkkerd, B.E. 2542; 67, Kuokkanen & Leino, 2001: 279-280). Additionally, nursing is a career that countless people admire; thus, their situations provide them with a feeling of positive value and self-esteem in themselves (Abdenour, 1999: 44). Considering these results (see appendix C), it was found that the majority of the subjects had the mean score more than three on each items. This shows the neonatal intensive care units' nurses were proud of themselves, had self-acceptance and perceived self-value. The item, "I wish I could have more respect for myself", on the other hand, had a rather low score (mean = 2.58, S.D. = 0.91). This meant that the character of this item had to be interpreted in two steps. It was

difficult for the subjects to analyze and think critically in answering this intricate question; on the other hand, it might be true, as Thai nurses are respected by society less than other careers in the health service i.e., physicians, dentists, pharmacists, and medical technicians. This may be the reason why the score in this item was rather low.

The result was in congruence with Rosenberg, who indicated that self-esteem is influenced by socially significant attitudes and behavior (Rosenberg, 1965: 15). This is similar to Orem (2001: 260) who indicated that the foundational capabilities and disposition, which are very similar to constructs that have applied to self-esteem (Anderson & Olnhausen, 1999: 63), affect knowing, reasoning, and making right judgments and decisions in situations, and includes the learned skills that affect communication, as well as investigative and production types of operations. Although there has been little study of the influence of self-esteem on nursing practices, there is consistency with the studies that use Orem's theory framework, because of the analogousness of nursing agency and self-care agency that both have three-tiered, hierarchical structures. The study illustrative of this result, is the study of homeless adults by Anderson (2001: 59), which found self-esteem could predict self-care, and accounted for 25% of the 54% variance explained in self-care. A study on diabetic pregnant women of Tanaporn Wongjanthorn (B.E. 2542: 61) showed that self-esteem could predict health-promoting behaviors in diabetic pregnant women. A study of menopausal women with diabetes mellitus by Yainontad, K. (2000, 92) found self-esteem could predict self-care behavior. Additionally, a study of pregnant woman with pregnancy-induced hypertension by Kitjaidure, A. (2000: 48), revealed self-esteem could predict self-care behaviors, and accounted for 10 % of the 18.8 % variance explained in self-care.

Other basic conditioning factors that do not predict skin care for premature infants are continuing nursing education and personal income. This could be explained as follows:

Continuing nursing education (CNE) correlates with skin care for premature infants ($r = .157$, $p < .05$), but could not predict skin care for premature infants. From data collection, CNE of the participants ranged from 0 to 117 credits, with the mean of 7.13 (S.D. = 15.38). Forty-one participants (30.6%) had no credit for CNE. CNE refers to those professional learning experiences designed to enrich the nurses' contribution

to quality health care and their pursuit of professional career goals (Stein, 1998: 245). Considering CNE in aspect (see appendix D), it was found the mean of credits of participating for assessment of skin problems of premature infants, and developing nursing quality, personal quality, and knowledgeable quality, was higher than for other aspects (mean = 2.87, S.D. = 6.32). This aspect is easily recalled because NICU nurses confront and attack problems of premature skin and then would discuss the events. Thus, the credit for lecture participation, panel discussion, seminar, in-service training, or refresher courses was less than the first aspect. This can be explained by the fact that skin care for premature infants is not a major article in these activities. NICU nurses would overlook the content that is a part of these articles. However, the other aspects had the same low credit, especially writing about premature infants' skin care for journal publication, which had no credits. The reason might be that skin care for premature infants is a new current matter among nurses in NICUs.

From this result, it might be explained that CNE correlated with skin care for premature infants but could not predict skin care for premature infants because of the limitations of the collected data. CNE in Thailand is a recent subject of study and the system of accumulation credits for relicensure was underdeveloped in the past. Therefore, the credit or the data that was received from this study would not be accurate. Also the subjects might have difficulty to recognizing CNE activities. The majority of subjects could not specify the year of their CNE activities. However, it was not incongruent with the concepts of Orem (2001: 468), who defined professional forms of education as leading after experience in nursing practice situations to the expert level of clinical nursing practice and to specialization of practice. Additionally, continuing education is also designed to keep professional nurses abreast of changes in the health service needs of populations served and relevant environmental and social conditions associated with needs for practice changes.

This finding is in congruency with similarly to the study of Radawiriyakul, W. (1994: abstract) who reports that training for the elderly had a statistical significant relationship with the nursing practice for the elderly, but was unable to predict the nursing practice for the elderly of professional nurses in provincial hospitals under the Ministry of Public Health in the Northeast. Likewise, Puntongpun, N. (1999: 89) indicated that training in critical care nursing which is one of the CNE was significant

relationship with job performance, had no influence on job performance of staff nurses in intensive care units in government hospitals in metropolitan Bangkok.

In addition, personal income was found to have no influence on skin care for premature infants. The personal income of the participants ranged from 5,130 to 40,000 baht/month, with the mean of 13,867.84 (S.D.= 5,239.55). It could be considered that personal income was chiefly increased from work experience in NICUs. According to Orem's belief, basic conditioning factors can be interactive among themselves (Orem, 2001: 168).

From the result, it might be explained that personal income and work experience have a rather high level of correlation ($r = .666$, $p < 0.05$) and no statistical correlation with skin care for premature infants ($r = .098$, $p > 0.05$). Although, personal income had a positive relationship with work experience, in fact, personal income of nurses is not only received from NICU work. Part of their income would come from part-time, private, and odd jobs. Consequently, nurses busy in other work would have diminished discretion in nursing practices especially, skin care, which is the most sensitive of practices. The results of the study did not related to Orem's concept (Orem, 2001: 246; Moore & Pichler, 2000: 140), which includes income as a definition of sociocultural orientation that provides social support and affects the abilities to engage in nursing care. Similarly, Pensri Prangsuwan (B.E. 2541: 107) indicated that income had no correlation and could not be a co-predictor of job performance of professional nurses in Southern community hospitals in Thailand.

In summary, in this study, the predicting factors included work experience, facilitating factors, and self-esteem could explained 11.3 % of the variance of skin care for premature infants. In the remaining 88.7 %, this could be because there are other influencing factors which the researcher did not incorporate in the study such as age, marital status, the experience of having had a child, the work burden, work satisfaction, the number of nurses in each shift, etc.

Limitations of the study

Some limitations of the current study were identified, as follows:

1. The setting in which this study was conducted did not feature identical NICUs where the available number of beds were the same, so that the results of this study may be influenced by other factors, such as work burden, number of infants in each shift, etc.
2. Data from some variables did not have a normal distribution, such as work experience and continuing nursing education, therefore the result might be weak.
3. The score for the continuing nursing education (CNE) was not accurate because of the underdeveloped CNE system in Thailand. The participants found it difficult to remember relevant data detail, so CNE questionnaire should be developed for study again in the future.
4. Skin care for premature infants in this study was presented by quantity of care but not refer to quality of premature infants' skin care among NICUs nurses.
5. The Cronbach's alpha reliability of the skin care for premature infants questionnaire had rather low. The visual analog scale for measuring skin care for premature infants had limitation and inappropriate to measuring behaviors.

CHAPTER VI

CONCLUSION

Summary of the study

This study was descriptive research to study some selected factors that influenced skin care for premature infants among nurses in neonatal intensive care units (NICUs), based on Orem's theory. The aims of this study were to study skin care for premature infants, self-esteem and basic conditioning factors such as work experience, personal income, continuing nursing education (CNE), and facilities for skin care and to study self-esteem and basic conditioning factors influencing skin care for premature infants.

The subjects were 145 registered nurses who had provided neonatal care among 15 neonatal intensive care units (NICUs) in North of Thai government hospitals. Data were collected by mail. One hundred and thirty four (92.41%) completed questionnaires were returned.

The instruments were a demographic data form, a self-esteem questionnaire, the facilitating factors to skin care practices questionnaire, and a skin care for premature infants questionnaire. The Statistical Package for Social Science for Windows Program (SPSS/ FW) version 10.0 was used to analyze the data for range, mean, standard deviation, Pearson's product moment correlation coefficient, and stepwise multiple regression.

The results were summarized as follows:

1. As for the basic conditioning factors, the average years of work experience among nurses in neonatal intensive care units with the median of five, the mode of one, and the mean of 6.68 (S.D.= 5.91). The average personal income in baht/month was on the mean of 13,867.84 (S.D.= 5,239.55). The overall credit of continuing nursing education (CNE) was on the average level with the mean of 7.13 (S.D. = 15.38). Finally, the overall score of facilitating factors to skin care was on the mean of

49.40 (S.D. = 17.87) that referred to a rather low level of facilities for skin care. The overall score of self-esteem of nurses in neonatal intensive care units was on the mean of 34.16 (S.D. = 2.91); thus, it can be seen that the mean was very well over the mid-point and close to the full score of 40, that referred to high self esteem.

2. Skin care for premature infants among nurses in neonatal intensive care units referred to a rather high level of skin care for premature infants ($X = 81.07$, S.D. = 5.73). The majority high score items were skin care practices that were associated with infection control, more than in-depth skin care practices. Many items had a minimal score at zero, meaning that some participants never practiced. They used practices based on hospital traditions or tales, to care for premature neonatal skin, because in Thailand, there are few documents in the Thai language about premature neonatal skin care or even covering skin care areas. Therefore, skin care for premature infants is an area in which NICU nurses should increase their practice and seek further knowledge for premature infants' skin care.

3. Factors that influenced skin care for premature infants were work experience, facilities for skin care, and self-esteem ($\text{Beta} = .177$, $\text{Beta} = .209$, $\text{Beta} = .179$, $p < .05$, respectively). Continuing nursing education (CNE) had low correlated with skin care for premature infants ($r = .157$, $p < .05$), but it could not predict skin care. Personal income was the only factor that did not correlate and predicted skin care for premature infants.

Predicting factors included work experience, facilitating factors to skin care, and self-esteem could explain the variance of skin care for premature infants for 11.3 %.

Implications and Recommendations for nursing practice

1. Nurses who work in neonatal intensive care units (NICUs) or special care units should attribute greater importance to skin care practices than they have in the past. They should also participate, communicate and consult to co-workers such as physicians, head nurses, or the other nurses in their NICU or among nurseries, to gain and exchange knowledge and strategies about how to care for the skin of premature infants with greater efficacy. In addition, they should participate in continuing education about skin care for premature infants, by reading recent research, searching the internet, providing time for in-service training and participating in seminars and

panel discussions. Furthermore, they should enhance and develop guidelines for premature neonatal skin care and evaluate for efficacy.

2. From this study, it was found that the majority high score items were skin care practices that applied to infection control, more than in-depth skin care practices. Nurses should increase attention to strategies to keep premature infants' skin intact and protected, and minimize injury.

3. NICU nurses who had more experience in caring for premature infants should share experience about skin care practices and their efficacy with others. At the same time, they should help and be aware of nurses who had less experience of premature neonatal skin care.

4. Nurses managers or nurses administrators in the organizations should pay attention to promoting premature neonatal skin care practices by encouraging nurses to train in skin care practices and seek support resources such as text books or journals for enhancing skin care for premature infants among NICU nurses. In addition, they should promote and encourage NICU nurses to their work and find the way to provide knowledge for enhancing their self-esteem.

5. The organizations should provide materials and supplies i.e. electrode gel, Tegaderm, servo-mode equipments, plastic wrap etc. for enhancing the effectiveness of premature neonatal skin care.

Implications and Recommendations for further research

1. A quasi-study or an experimental study to explore the strategies for premature neonatal skin care in each category such as bathing, control of transepidermal water loss, adhesive application and removal, etc. should be done.

2. Participatory action research should be done in neonatal intensive care units or special care units to test outcomes and efficacy of developing guidelines about premature neonatal skin care.

3. The different nursing practices for premature neonatal skin care among nurses in NICUs should be further studied in detail, to reach agreement with others on the issues and to achieve better understanding, leading to more effective nursing care and practices.

4. Other factors which influence skin care for premature infants should be further studied by taking into account the ages, marital status, the experience of having had a child, work burden, work satisfaction, the number of nurses in each shift, etc. of NICU nurses.

5. The same study should be done in neonatal intensive care units in the other regions of Thailand.

6. The instrument that collects CNE data should be developed in further study to gather accurate data.



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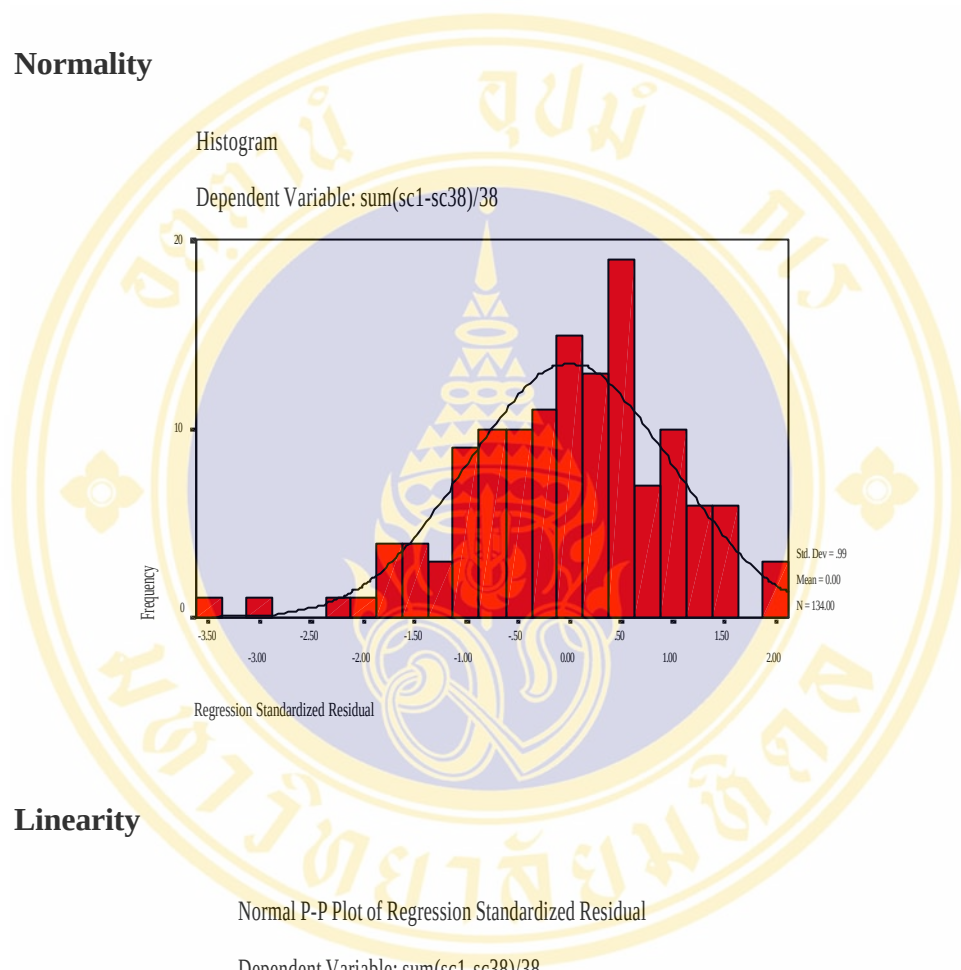
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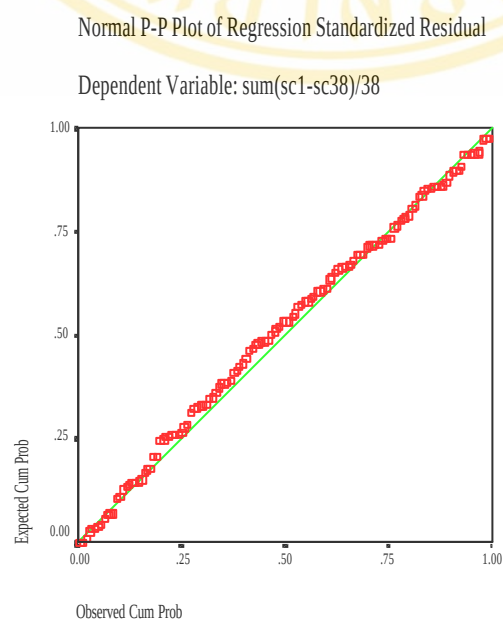
APPENDIX A

Test of Residual

1. Normality



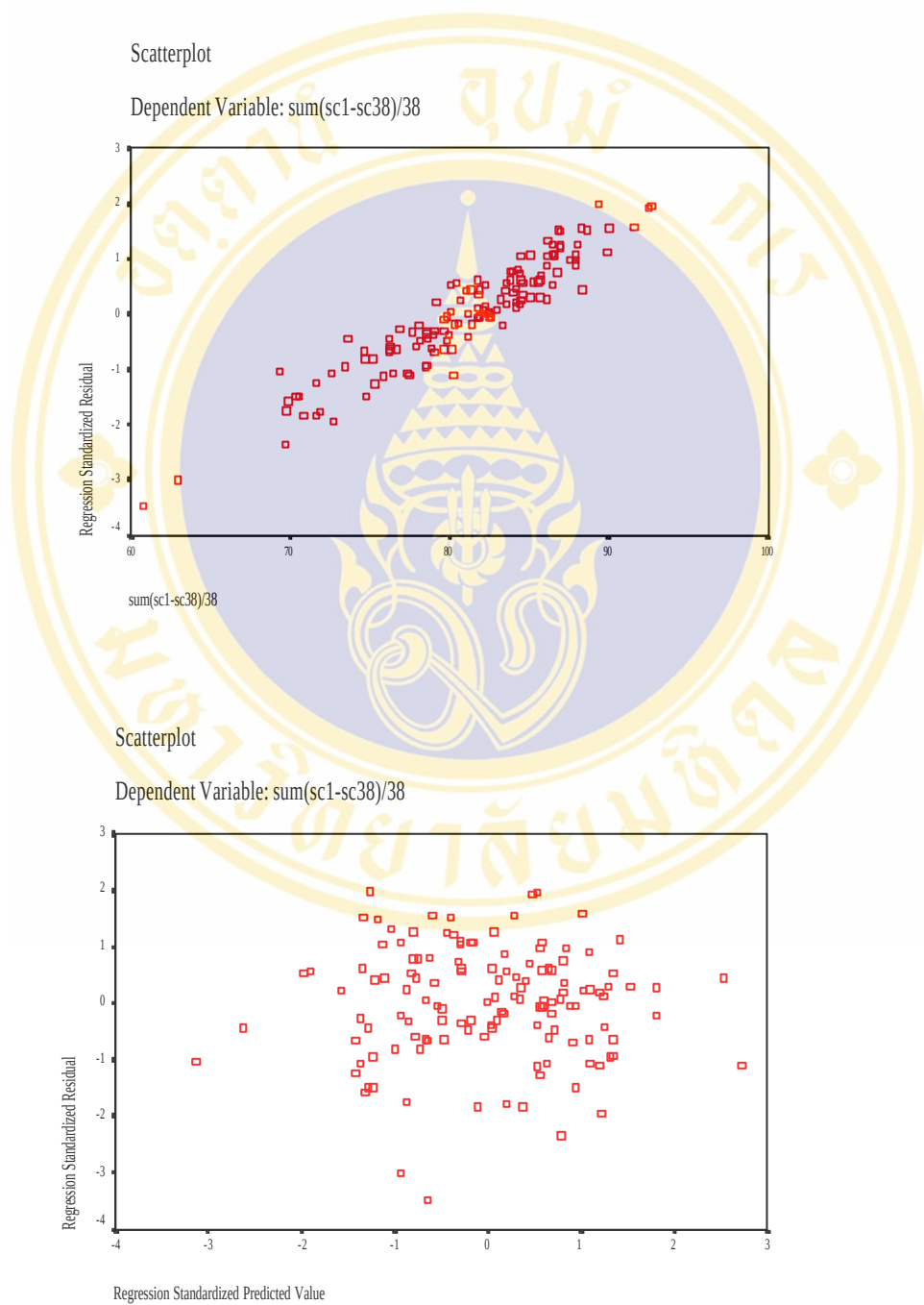
2. Linearity



APPENDIX A

Test of Residual (Continued)

3. Homoscedasticity



APPENDIX B

Skin Care for Premature Infants Score

	Possible range	Actual range	Mean	S.D.
1. You assessed skin of premature infants who less than 32 weeks gestational age.	0-100	0-100	85.93	19.34
2. You assessed skin of premature infants who have birth weight less than 1,500 grams.	0-100	0-100	88.98	19.12
3. You assessed skin of premature infants who have limited positioning options.	0-100	0-100	85.20	21.52
4. You assessed skin of premature infants in an area that on endotracheal tube and oropharyngeal tube.	0-100	26-100	90.90	13.84
5. You assessed skin of premature infants in an area that on umbilical catheters.	0-100	0-100	93.00	14.93
6. You assessed skin of premature infants in an area that on monitors such as electrode or skin probe.	0-100	49-100	94.66	9.18
7. In premature infants who have operative wound, you assessed operative wound and around areas.	0-100	0-100	91.52	21.26
8. You assessed skin of premature infants in an area that retained tube drain.	0-100	0-100	92.90	15.32
9. In premature infants who have suitable clinical condition, you used only warm and clean water for bathing during 1-2 week of life especially infants who less than 32 weeks gestational age.	0-100	0-100	65.18	38.22
10. You used mild baby soap for bathing premature infants after 2-3 weeks of life and they have suitable clinical condition.	0-100	0-100	74.20	36.84

Skin Care for Premature Infants Score (Continued)

	Possible range	Actual range	Mean	S.D.
11. When you bathed premature infants, you scrubbed their skin area.	0-100	0-100	66.93	40.08
12. You bathed premature infants on a daily when they have suitable clinical condition.	0-100	0-100	41.07	42.66
13. You bathed premature infants beneath radiant warmer or switched off air condition in ward.	0-100	0-100	76.47	35.52
14. You gave tub baths for premature infants after umbilical cord have healed.	0-100	0-100	65.46	38.74
15. You kept umbilical cord clean and dry.	0-100	77-100	98.33	4.50
16. You avoided urine or feces to staining an umbilical cord.	0-100	34-100	96.43	9.23
17. You used antiseptics on premature infants' skin before have invasive procedures.	0-100	12-100	98.50	8.06
18. You removed antiseptic solutions that used to clean premature infants' skin especially povidine with sterile water or normal saline after procedures is complete.	0-100	0-100	74.49	34.41
19. In premature infants who have dry skin, you used ointment or baby lotion for rubbing their skin.	0-100	0-100	46.78	36.78
20. You cleaned the buttocks and perineal area with warm water and kept dry immediately after they excreted urine and feces.	0-100	0-100	91.89	15.42
21. You exposed clean and dry buttocks to air or light when you found irritant or diaper dermatitis.	0-100	0-100	57.71	39.75
22. You used skin barrier such as Tegaderm or Opsite beneath adhesive tapes or plasters in premature infants.	0-100	0-100	42.33	39.05

Skin Care for Premature Infants Score (Continued)

	Possible range	Actual range	Mean	S.D.
23. You removed adhesive tapes or plasters from premature infants' skin with gentle or used cotton ball with water for removing.	0-100	8-100	91.03	13.76
24. When adhesive tapes or plasters were applied on area of premature infants' skin, you used adhesives sparingly.	0-100	14-100	91.61	12.69
25. You wrapped preterms' body, arms, legs, and head with transparent plastic wraps within the first week of their life especially premature infants who less than 32 week gestational ages or risk to hypothermia.	0-100	0-100	36.14	38.87
26. You used incubator or radiant warmer in servo controlled mode.	0-100	2-100	87.28	20.03
27. You keep skin probes with affixed to premature infants' skin.	0-100	0-100	89.10	23.53
28. You changed probe sites of skin probes or pulse oximeter probes at least every shift.	0-100	0-100	84.61	23.69
29. You chose water heat bag with premature infants, when you wanted to increase their temperature.	0-100	0-100	79.85	32.60
30. You put premature infants who have edema or limited positioning on air bed or water bed.	0-100	0-100	54.69	39.39
31. You checked concentration of glucose in intravascular fluid before administrated premature infants by peripheral line.	0-100	0-100	74.71	37.43
32. You assessed the junction skin area on peripheral line, when you care premature infants.	0-100	72-100	96.63	6.92

Skin Care for Premature Infants Score (Continued)

	Possible range	Actual range	Mean	S.D.
33. You observed skin breakdown or infection on skin area of premature infants.	0-100	50-100	94.94	10.14
34. If skin of premature infants in your care was broke, you assessed these areas.	0-100	4-100	93.84	13.48
35. You report physician immediately, when you found the skin breakdown of premature infants beginning to infection.	0-100	45-100	96.06	10.41
36. When you found the area that retained tube drain stained with heavily excreted, You removed them immediately.	0-100	68-100	96.68	7.35
37. You monitored and carefully managed the fluid and electrolyte balance belong to physicians order in premature infant who have operative wound or skin breakdown.	0-100	69-100	97.12	6.34
38. You wash your hands before and after contacted premature infants.	0-100	72-100	97.34	5.80
Sum	0-3800	2311-3522	3080.50	217.63
Percentages of sum score	0-100	60.82-92.68	81.07	5.72

APPENDIX C

The Rosenberg's Self-esteem Scores

Contents	Possible range	Actual range	Mean	S.D.
Item 10 At times I think I am no good at all.	1-4	1-4	3.73	0.50
Item 6 I take a positive attitude toward myself.	1-4	1-4	3.66	0.49
Item 9 I certainly feel useless at times.	1-4	1-4	3.66	0.55
Item 5 I feel I do not have much to be proud of.	1-4	2-4	3.54	0.56
Item 3 All in all, I am inclined to feel that I am a failure.	1-4	1-4	3.51	0.54
Item 7 On the whole, I am satisfied with myself.	1-4	2-4	3.46	0.51
Item 1 I feel that I'm a person of worth, at least on an equal plane with others.	1-4	2-4	3.43	0.58
Item 2 I feel that I have a number of good qualities.	1-4	2-4	3.39	0.52
Item 4 I am able to do things as well as most other people.	1-4	2-4	3.20	0.50
Item 8 I wish I could have more respect for myself	1-4	1-4	2.58	0.91
Total	10-40	27-40	34.16	2.91

APPENDIX D

The credit of continuing nursing education

Type of continuing nursing education	min-max	Median	Mode	Mean	S.D.
1. Lecture participation, panel discussion, seminar, in-service training, and refresher courses of skin care for premature infants	0-100	0	0	2.62	11.19
2. Reading text books, documents, journals, researches or learning associate with CAI, Internet CNE about skin care for premature infants	0-10	1	0	1.57	2.08
3. Participating to assess skin problems of premature infants, develop nursing quality, personal quality, knowledgeable quality about skin care for premature infants	0-48	0	0	2.87	6.32
4. Developing clinical nursing practice guidelines about skin care for premature infants	0-4	0	0	0.007	0.45
5. Writing skin care for premature infants for journal publication	0	0	0	0	0
Total	0-117	3	0	7.13	15.38

APPENDIX E

Demographic Data Form

Directions: The following questionnaire represents your data. Please fill your data in fact.

1. You have been worked in neonatal intensive care unit for.....years. (over six months to number as one year)
2. Your average income per month bahts (salary & other resources)
3. Your continuing nursing education in skin care for premature infants after you finished in Bachelor of Nursing.

Skin care for premature infants means nursing care about skin of premature infants including skin assessment, bathing, emollients, adhesive application and removal, skin disinfection solutions, control of transepidermal water loss, care of diaper dermatitis, umbilical cord care, prevention of skin breakdown, and treatment and care of skin breakdown.

Put a mark ✓ into the box () in front **never** if you had not that learning activity and Put a mark ✓ into the box () in front **ever** if you had that learning activity with specify amount of your continuing education and put a mark ✓ into the box () in front the year that you had activity.

- 3.1. You had lectures participating, panel discussion, seminar, in-service training, or refresher course.

() never

() ever sum of activities about hours

Year of activities () 2545 () 2544 () 2543 () 2542 () 2541

() before 2541

() can't remember

- 3.2. You had.....

() never

() ever

APPENDIX F

Self-Esteem Questionnaire

The Rosenberg Self-Esteem (RSE) Scale

Directions: Read each statement carefully and put a circle round the number which most closely reflects your degree of agreement or disagreement. No answer is right or wrong.

- 4 (strongly agree) means you have this feeling all the time
 3 (agree) means you have this feeling many times
 2 (disagree) means you have this feeling once in a while
 1 (strongly agree) means you never have this feeling

Please put only one circle in each item

Statements	Your feeling			
	Strongly agree	agree	Disagree	strongly disagree
1. I feel that I'm a person of worth, at least on an equal plane with others.				
2. I feel that I have a number of good qualities.				
3. All in all, I am inclined to feel that I am a failure.				
4. I am able.....				
5.				
.				
.				
.				
10.				
Sum				

APPENDIX G

The facilitating factors to skin care practices questionnaire

Directions: The following statements in this questionnaire represent facilitating factors to skin care practices in your neonatal intensive care unit. Please answer in fact by put a mark ✓ into the box (.....) infront **lacking** if you had not that facilitating factors and put a mark ✓ into the box (.....) infront **possessing** if you had that facilitating factors in each category of skin care for premature infants.

Example you have text books for Master degree's test, or not

...✓... possessing	 lacking	English
...✓... possessing	 lacking	Mathematics
..... possessing	...✓....lacking	Economics
..... possessing	...✓....lacking	Thai
...✓... possessing	 lacking	Nursing

1. Your organization had guidelines or handbooks or standard practices for premature infants' skin care, or not

..... possessing	 lacking	skin assessment
..... possessing	 lacking	bathing
..... possessing	 lacking	emollients
..... possessing	 lacking	adhesive application and removal
..... possessing	 lacking	skin disinfection solutions
..... possessing	 lacking	control of transepidermal water loss
..... possessing	 lacking	care of diaper dermatitis
..... possessing	 lacking	umbilical cord care
..... possessing	 lacking	prevention of skin breakdown
..... possessing	 lacking	treatment and care of skin breakdown.

1. Your organization

..... possessing	 lacking	
..... possessing	 lacking	

APPENDIX H

Skin care for premature infants questionnaire

Directions: This questionnaire has 38 items. Please put a cross (X) on the straight line that coincide to your practice in six months ago.

0 means never practice and 100 means always practice

Between 0-100 means increase continuously level of practice

Example: You pray before sleep.

X ————— |
0 100
Never all the time
Means you never pray before sleep.

| ————— X
0 100
Never all the time
Means you always pray before sleep.

| ————— X |
0 100
Never all the time
Means you often pray before sleep but not always.

1. You assessed the skin of premature infants who had had less than 32 weeks of gestational age.

| ————— |
0 100
Never all the time

2.

.

.

38.

APPENDIX I

Human Rights for Research Population

Information Sheet

I am Nonglak Sang-aroon, a graduate nursing student (Pediatric Nursing), of the Nursing Department, Faculty of Medicine, Ramathibodi Hospital, Mahidol University. I am interested in doing a research study called “ **Factors affecting skin care for premature infants among nurses in neonatal intensive care units**”. The research will be of benefit to neonatal intensive care nurses studying premature neonatal skin care’s increasingly interesting, developing guidelines, enhancing training, and leading to further research into the quality of premature neonatal skin care.

I would like to ask the favour of your participation by answering the enclosed questionnaire accurately. Your name will not appear in the report or in any other place. Your answers will be protected in accordance with human rights and personal data will not be revealed. They will be presented in the overall result, which will not affect the quality of your work in any way. The result be used only to advance research and will help improve the quality of premature neonatal skin care. If you would not like to participate in this study, you can refuse and may withdraw from the study at anytime.

The questionnaire consists of four parts, as follow:

- Part One The data form
- Part Two The self-esteem questionnaire
- Part Three The facilitating factors to skin care practices questionnaire
- Part Four The skin care for premature infants questionnaire

I would like you to answer the questionnaire fully. You should send it to me at the Neonatal Intensive Care Unit, Maharaj Nakorn Chiang Mai Hospital, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand, 50200 within 2 weeks of your receiving the questionnaire. If you have any questions, I would be glad to answer them. You can contact me at my address or by telephone, number

Your gratefully

Nonglak Sang-aroon

APPENDIX J

List of expert consultation on validation of continuing nursing education questionnaire, the facilitating factors to skin care practices questionnaire, and the skin care for premature infants questionnaire.

For construction the research tool and testing its quality, the content validity of protocol was determined by five consulting experts included.

1. Dr. Watchalee Tantiprapa, M.D.
Newborn Unit, Pediatric Department, Faculty of Medicine,
Chiang Mai University
2. Assist. Prof. Prisana Soonthornchai
Pediatric Nursing Department, Faculty of Nursing,
Chiang Mai University
3. Assoc. Prof. Wilai Leesuwarn
Nursing Department, Faculty of Medicine, Ramathibodi Hospital,
Mahidol University
4. Assist. Prof. Dr. Waraporn Chaiwat
Faculty of Nursing, Chulalongkorn University
5. Miss. Wimonwan Warorarn
Head nurses of neonatal intensive care unit (NICU),
Ramathibodi Hospital

APPENDIX K

List of participant hospitals in this study

1. Maharaj Nakorn Chiang Mai Hospital
2. Lumpang Hospital
3. Uttaradit Hospital
4. Chaing Rai Prachanukara Hospital
5. Puttachinnaraj Hospital
6. Nakhonping Hospital
7. Prae Hospital
8. Srisangwan Hospital
9. Kumpangpret Hospital
10. Somdej Prachao Taksin Maharaj Hospital
11. Mae Sort Hospital
12. Pichit Hospital
13. Petchaboon Hospital
14. Payao Hospital
15. Mae lae dek Chaing Mai Hospital

Biography

NAME	Mrs. Nonglak Sang-aroon
DATE OF BIRTH	16 June, 1973
PLACE OF BIRTH	Chiang Mai, Thailand
INSTITUTIONS ATTEND	Chiang Mai University, 1990-1993 Bachelor of Nursing Science (2 nd class honor) Mahidol University, 2001-2003 Master of Nursing Science (Pediatric Nursing)
RESERCH GRANT	Support in part by the Thesis Grant, Faculty of Graduate Studies, Mahidol University
POSITION & OFFICE	1994-Present, Maharaj Nakorn Chiang Mai hospital, Faculty of Medicine, Chiang Mai University, Thailand. Position: Register Nurse 5 TEL: (662) 0-5394-5895 E-mail: jeabchan@doramail.com
HOME ADDRESS	7 Moo 4, Tumbon Tungtom, Sanpatong district, Chiang Mai, Thailand 50120