Original Articles

Technological Competency as Caring in Nursing as Perceived by ICU Nurses in Bangladesh and Its Related Factors

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Abstract

This descriptive study purposed to examine Technological Competency as Caring in Nursing (TCCN) as perceived by Intensive Care Unit (ICU) nurses in Bangladesh, and to examine the relationship between TCCN and selected factors (nurses' age, level of nursing education, length of working experience, continuing education and training, and self-awareness). One hundred and twenty ICU nurses at tertiary level public hospitals in Dhaka city participated in this study. The Technological Competency as Caring in Nursing Inventory (TCCNI), and Nurses' Self-Awareness Questionnaire (NSAQ) were used as data collection tools. The content of each tool was validated by three experts with reliability yielding a Cronbach's alpha coefficient of 0.80 for the TCCNI and of 0.83 for the NSAQ. The data were analyzed using descriptive statistics, Pearson's product-moment correlation and independent t-test. The results of this study showed that the mean score of nurses' perception regarding TCCN was high level (M = 4.14, SD = 0.34). Among the five assumptions of TCCN, four assumptions were at high level, but only one assumption, "knowing a person is a process of nursing allowing for continuous appreciation of persons" was at moderate level (M = 3.35, SD = 0.37). Regarding the five selected factors namely nurses' age, level of nursing education, length of working experience, continuing education and training, and self-awareness, only the nurses' self-awareness was significantly and moderately correlated with nurses' perception on TCCN (r = 0.42, p < 0.01). The study

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showed that the ICU nurses in Bangladesh had high perception or agreement on the TCCN, and that this perception was related to their self-awareness. This research evidence can serve as fundamental data for developing critical care nursing practice in Bangladesh.

Keywords: Bangladesh; caring; intensive care unit; nurse; nursing; technological competency.

Introduction

The intensive care unit (ICU) first emerged in the late nineteen fifties in the United States of America. Afterwards, ICUs were built in other countries all over the world (Dudley, as cited in Faruq et al., 2013). In Bangladesh, the ICU was first established in 1980 in the National Institute of Cardiovascular Diseases (NICVD) hospital in Dhaka. At present, there are many ICUs in Bangladesh and 90% of them are located in the tertiary level hospitals in Dhaka (Faruq et al., 2010). From the outset, caring in the ICUs has emphasized using advanced scientific knowledge and technologies to secure lives and extend the life of critically ill patients (Halpern, Stephen, & Pastores, 2010).

Caring in the ICU is complex and dynamic, and appropriate nursing is considered the most vital in this situation (Ashworth, as cited in Wilkin & Slevin, 2004). There are numerous forms of machine technology employed to cure the patients in critical condition, including mechanical ventilators, electrocardiography monitoring machines, infusion pumps, and hemodialysis machines. Nurses use machine technologies in order to sustain life. Thus, the nurses require an enormous amount of technical skills, effort, and competency when managing technologies harmoniously toward positive human health perspectives in the ICUs (Locsin & Kongsuwan, 2011).

Caring is the core of the nursing profession (Boykin & Schoenhofer, 2001). Nurses' competence is a caring attribute mentioned by Roach (2002). The relationship between technology and caring was addressed by Leininger (1988) who asserted that technology could take away the real meaning of caring in nursing, and that the nurse-patient relationship might be at risk in this situation. Nurses may be viewed as uncaring when competency is used as an over-arching attribute in using technology (Leininger, 1988).

However, expert use of technology plays a significant role in caring in the ICU (Kongsuwan & Locsin, 2011). Locsin (1998) pointed out that nursing as caring in the ICU includes technology, caring, and competency. Locsin developed the theory of Technological Competency as Caring in Nursing (TCCN) (Locsin, 2005) in which technological competency and caring are understood as co-existing and are in harmonious relationship within nursing practice. Technological competency as caring is the expert use of technologies to know persons as whole in the moment (Locsin, 2005). Concepts in

Locsin's theory could guide the appreciation of caring in nursing practice to maintain humanistic care and patients' well-being in a technological environment in the ICUs (Kongsuwan & Locsin, 2011; Locsin & Kongsuwan, 2011). To determine technological competency among practicing nurses, the Technological Competency as Caring in Nursing Inventory (TCCNI) was developed which was found to be reliable and valid (Parcells & Locsin, 2011). There were several factors related to the nurses' caring expressions in the ICUs, these factors were nurses' characteristics which included age (Salonen, Kaunonen, Meretoja, & Tarkka, 2007), level of nursing education (Cho et al., 2009; Laila, Ahmed, & Mojahed, 2011), length of working experience (Laila et al., 2011; Salonen et al., 2007), and nurses' continuing education and training (Huggins, 2004). In addition, a nurse's self-awareness was found to be a significant individual factor associated with nurses' caring behavior (Daodee, 1994; Prompahakul, 2011).

Awareness refers to one's own thoughts, feelings, and perception about his/her personality traits; including strength, weakness, beliefs and emotion that can influence nurses behaviors and motivation towards enhancing therapeutic relationships with their patients (Gessler & Ferron, 2012). Self-awareness helps to improve nurses' caring behavior and understanding them-selves in respect to their own values and believes in order to understand the client's perspective (Burnard, 1988). Two studies showed a positive association between nurses' self-awareness and their caring behavior in terminally ill patients (Daodee, 1994; Prompahakul, 2011).

From reviewing the literature, it is apparent that many studies relating to caring and nursing in the ICUs have been conducted in many countries. A study by O'Connell and Landers (2008) which compared the perceptions of nurses and of relatives' regarding critical care nurses caring behavior in Ireland. Both groups placed a higher value on caring behavior which was demonstrated by the technical competence, the altruistic and emotional pieces of caring in critical care setting. Wilkin and Slevin (2004) explored the meaning of nurses' caring in an ICU in the United Kingdom. They summarized the essential structure of caring, and identified that caring was a process of competency involving physical and technical action imbued with affective skills. In addition, Wikstrom, Cederborg, and Johanson (2007) conducted a qualitative research in Sweden with 12 ICU nurses that investigated the nurses' perceptions of technology in their daily activities. This study reported technology decreased the workload and made the treatment safe. The nurses stated that technology was vital in the ICU as it directed and controlled medical treatments in regard to the patients' well-being.

One study was conducted in Ireland by McGrath (2008), regarding nurses' caring experiences through using technology in an intensive care setting. The nurses explicated that technology saved the life of critical patients and made nurses closer to patients in their caring in nursing. Similarly, another study, conducted in the South of Thailand by Kongsuwan and Locsin (2011), examined nurses' experience of caring for patients who were dependent on life-sustaining technologies in ICUs. The study found that nurses' valued technological competency as caring, whereas they felt different uncertainties to use machine technology to know the patients as whole.

In Bangladesh, ICU nurses employ many forms of technology such as mechanical ventilator, infusion pump, pulse oximeter, electrocardiography machine, and arterial blood gas analysis machine. However, there is limited study related to the ICUs, and no study has been found regarding caring for the patients in the ICUs in Bangladesh. In order to survey nurses' perception or thoughts regarding caring in the ICUs, the theory of Technological Competency as Caring in Nursing (Locsin, 2005) provides a suitable framework for researching this issue.

Objectives of the Study

1. To examine Technological Competency as Caring in Nursing as perceived by ICU nurses in Bangladesh.

2. To examine the relationship between selected factors (age, level of nursing education, length of working experience, continuing education and training, and nurses' self-awareness) and the perception of ICU nurses in Bangladesh about Technological Competency as Caring in Nursing.

Framework of the Study

The theory of Technological Competency as Caring in Nursing (Locsin, 2005) is used as a framework of the study. It is a middle-range theory that is grounded in the General Theory of Nursing as Caring by Boykin and Schoenhofer (2001). The theory of TCCN views technology and caring co-existing harmoniously in nursing practice (Locsin, 2005). Technological competency is the expression of caring. Its main focus is on the process of knowing persons as whole in the moment through the efficient use of technology (Locsin, 2009). Technology can be an instrument, a tool or human (nurse) activity that makes things efficient. The expectation of this knowing process is to enhance mutual trust and respect between the nurse and patient in order nursing to occur (Locsin, 2010). The theory highlights that nurses use technological competency as a tool to express caring and build a relationship between technology, caring, and nursing. The focus of nursing

in this theory is person (Locsin, 2010). Five assumptions underpin the theory (Locsin, 2005) are described as follows:

1. Persons are caring by virtue of their humanness (Boykin & Schohenhofer, 2001). The assumption emphasizes the understanding that everyone is caring; it is part of their characteristics. In the situation of caring in the ICU settings; the nurses, patients, patients' families, all are caring person. This perspective assists the ICU nurses to see the patients and their families as participants in care.

2. Persons are whole and complete in the moment (Boykin & Schohenhofer, 2001). In this assumption, human beings are complete persons, regardless of composite parts. Viewing this concept, the ICU nurses share an experience with the person being nursed, rather than focus on fixing the person's missing parts.

3. Knowing a person is a process of nursing allowing for continuous appreciation of person as whole person (Locsin, 2005). This assumption guides nursing in ICU to use the process of knowing persons being nursed in order to understand the person as a subject, not an object of care. The nurse and patient focus on appreciating, celebrating, supporting and affirming each other, allowing each other and to know each other mutually as participants in care. Four patterns of knowing are used in knowing person; such as empirical knowing, aesthetic knowing, personal knowing, and ethical knowing (Carper, 1978).

4. Technology is used to know the persons as whole (Locsin, 2005). This assumption works on the understanding that technologies of health and nursing are aspects of care that allows ICU nurses to know patients in a moment more fully as they are human beings who are participants in their care.

5. Nursing is a professional discipline (Boykin & Schoenhofer, 2001). This assumption offers the critical view of nursing as integral to the practice of health care. As a member of a discipline and professionals, ICU nurses use knowledge of nursing in their practice in ICU and focus on wellness of human beings as whole persons.

Several factors are related to caring in nursing in the ICUs. These were the nurse's age, level of nursing education, length of working experience, continuing education and training, and self-awareness. Self-awareness involves understanding of one's own characteristics and responses to a situation. With respect to a nurse, she can build an affirmative relationship with patients by confronting stressful situations in an ICU (Burnard, 1988). There was a significant correlation between nurses' self-awareness and nurses' caring behavior (Daodee, 1994; Prompahakul, 2011). According to Buss (1980), there are two dimensions of self-awareness: 1) Private self-awareness, and 2) Public self-awareness. Private self-awareness refers to awareness to the inner and personal characters of one's self that related with own perceptions, whereas public self-awareness is self-attention to own characteristics which

are presented to others through behavior, by talking, and by action.

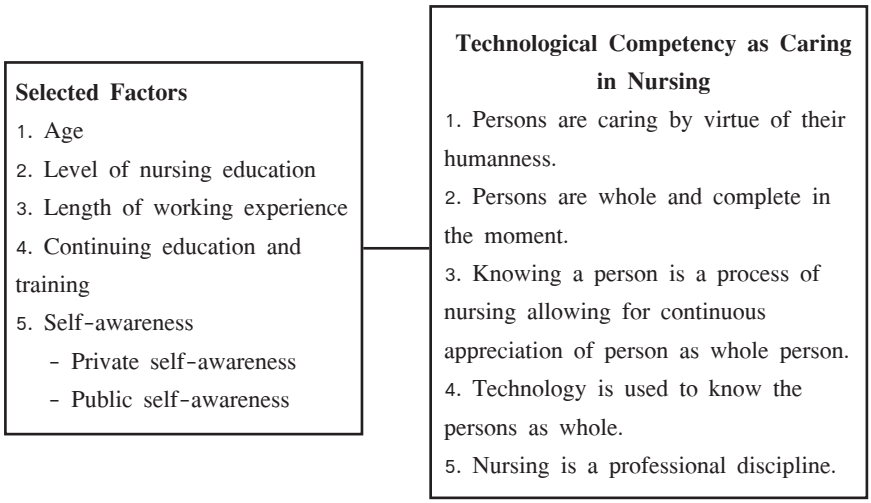

Figure 1 Research Framework of the Study

Methods of the Study

Design and Setting

This study was designed as a descriptive correlational study. In Bangladesh, the hospitals are classified into three levels based on location. Sub-district hospitals are considered as primary level, district hospitals are secondary level, and divisional hospitals are tertiary level. There are approximately 400 registered nurses working in ICUs including all public and private hospitals in Bangladesh, ninety percent of all ICUs in Bangladesh were classified as tertiary level based on their location (Faruq et al., 2010).

Sample

In this study, the data were collected from 120 nurses who worked in ICUs at the tertiary level public hospitals in Dhaka, Bangladesh. The following inclusion criteria were used to select participants in this study 1) must be registered nurses of Bangladesh, 2) had earned at least a diploma in nursing or a higher educational qualification, 3) working in ICU in tertiary level public hospitals, Dhaka, and 4) agreed to participate in this study.

The number of participants was determined by power analysis. The necessary sample size was estimated at the level of significance of (α) 0.05, which was the accepted minimum level of significance. The power estimate of 0.80 was a conventional standard for the power of the test (Polit & Beck, 2012), and the medium effect size (*ES* = 0.37) found in the previous study by Prompahakul, 2011, was deemed acceptable. Due to the difference of study context and setting, the researcher decided to take a smaller effect size

for calculation. In this study, the effect size of 0.25 was used for calculating sample size. Using these parameters, the estimated sample size was 123 participants. However, because of a limited number of Registered Nurses in ICUs at tertiary level public hospitals in Dhaka, Bangladesh, only 120 ICU nurses were selected for this study.

Instrumentation

A set of questionnaires was used in the study consisting of three parts. Part I: Demographic Data Form (DDF), Part II: Technological Competency as Caring in Nursing Inventory (TCCNI), and Part III: Nurses' Self-Awareness Questionnaire (NSAQ).

Part I: Demographic Data Form (DDF). This part consisted of seven items which were developed by the researcher in order to get information about the nurses' demographic characteristics including age, gender, religion, marital status, level of nursing education, length of working experience, and continuing education and training.

Part II: Technological Competency as Caring in Nursing Inventory (TCCNI). This study used TCCNI to examine TCCN as perceived by ICU nurses in Bangladesh. The revised TCCNI (Parcells & Locsin, 2011) consisted of 25 items, categorized into five sub-scales based on five assumptions of the theory. The TCCNI was developed by Parcells and Locsin (2011) consisted of 25 items. The item content validity was 0.96 (Parcells & Locsin, 2011). The five statements of the rating scale were as follows: 1 = strongly disagree with the item statement, 2 = disagree with the item statement, 3 = neutral, 4 = agree with the item statement and 5 = strongly agree with the item statement. The mean scores were interpreted generally so that a high score indicates the perception score of the nurses in this study, in that they have high agreement with the statements of TCCN. It can be inferred that the nurses are practicing caring in the ICU through the lens of the theory of TCCN. Use of the TCCNI was permitted by the developers. Score interpretation was divided into three levels, score 1.00-2.33 (low level), 2.34-3.66 (moderate level), and 3.67-5.00 (high level).

Part III: Nurses' Self-Awareness Questionnaire (NSAQ). The NSAQ, was developed by Daodee in Thai language (1994), and translated to English language by Prompahakul (2011), and was used to assess ICU nurses' self-awareness. Permission was obtained by the researcher from the author of the English version of the NSAQ (Prompahakul, 2011) to use this tool in this study. The NSAQ had shown adequate validity and reliability in the previous studies. The internal consistency reliability was 0.80 (Daodee, 1994), and 0.84 (Prompahakul, 2011). The NSAQ is a 20 items self-report instrument which measures nurses' perception on knowing and understanding oneself when providing care of patients. The scale was designed to measure two dimensions of nurses' self-awareness: private self-awareness and public self-awareness. Each dimension consists of 10 items. The participants

were asked to rate their perception of each item that measured self-awareness on a 4-point scale ranging from 1 (disagree) to 4 (strongly agree). The score of negative statements were reversed to be comprised between 4 (disagree) and 1 (strongly agree). The total score of a nurses' self-awareness ranged from 20-80. Score interpretation was divided into three levels, score 1.00-2.00 (low level), 2.01-3.00 (moderate level), and score 3.01-4.00 (high level).

Translation of the instruments. The original version of the TCCNI and the NSAQ were in English. In this study, both instruments were translated into the Bengali language version using the back translation procedure as specified by Sperber, Devellis, and Boehlecke (1994).

Validity and reliability of the instruments. The three experts agreed with the content items in the instruments. Reliability of the two instruments calculated with 120 participants, Cronbach's alpha coefficient of the TCCNI was 0.80 and the NSAQ was 0.83.

Ethical Considerations

The study was approved by the Research Ethics Committee of the Faculty of Nursing, Prince of Songkhla University, Thailand and at tertiary level public hospitals in Dhaka, Bangladesh. Written informed consent was obtained from the participants before the data collection started. The participants were reassured that they could refuse to participate in the study and could withdraw at any time and they were free to ask any question about the study. The confidentiality of the collected data was maintained. Only the researcher and her advisors were able to access the data.

Data Collection

The researcher contacted the participants, and explained the purposes of the study to the participants. After receiving the explanation, the participants who agreed to participate in the study were asked to sign an informed consent form. Written informed consent was obtained from each participant after she agreed to participate in the study. The researcher distributed a set of questionnaires including the DDF, TCCNI, and NSAQ to the participants with the help of Nursing Superintendent. The researcher requested the participants to give back the completed questionnaire directly to the researcher. The necessary checking was done to confirm the completion of the questionnaires appropriately. The researcher coded the questionnaires to ensure anonymity of the participants.

Data Analysis

Descriptive statistics was used to analyze demographic data, the score and level of the nurses' perception on TCCN, and the score and level of the nurses' perception on self-awareness. Pearson's product-moment correlation was used to examine relationship between the nurses' perception on TCCN and selected factors. As two variables (level of

nursing education and continuing education and training) did not meet the assumptions of Pearson's product-moment correlation coefficient, t-test was used to examine the mean difference of nurses' perception on TCCN based on the level of nursing education, and continuing education and training.

Results

Nurses' Characteristics

Demographic data. The study recruited one hundred and twenty participants. The findings illustrated that the age of participants ranged from 23 to 50 years, whereas, the major group (45.2%) of nurses were in middle adult ranged from 32 to 40 years. All of them were female and the majority of them were married (83.3%). More than half of the participants (64.2%) were Muslim. The majority of participants earned a diploma degree (84.2%), 12.5% had a bachelor degree, and very few participants had earned master's degree (3.3%). Their professional experience ranged from 1 to 29 years with a mean score of 9.72 years (SD = 7.25). More than half of the participants (61.7%) had experience as a registered nurse for 1 to 10 years. Nearly half of the participants (48.3%) received continuing education and training by attending workshops and conferences regarding caring in nursing in ICU.

Self-awareness. The result showed that the majority of participants (55.8%) rated overall self-awareness at a high level, whereas, 44.2% of the participants rated their perception on overall self-awareness at a moderate level. The overall mean score of self-awareness was at a high level (M = 3.32, SD = 0.25). For the dimension of private self-awareness, nearly 52% of the participants rated at a high level and 48% rated at a moderate level. For the second dimension, public self-awareness, 52.5% of participants perceived a moderate level of self-awareness and 47.5% rated at a high level on public self-awareness. The mean score of private and public self-awareness were at a high level (M = 3.11, SD = 0.38 and M = 3.54, SD = 0.27, respectively).

Technological Competency as Caring in Nursing as Perceived by ICU Nurses in Bangladesh

The results are presented in Table 1 and 2.

Table 1 Frequency, Percentage, and Level of Technological Competency as Caring in Nursing (N = 120)

Level of TCCN	Frequency (n)	Percentage (%)
Moderate (2.34 - 3.66)	54	45.0
High (3.67 - 5.00)	66	55.0

Table 2 Range Score, Mean, Standard Deviation, and Levels of Nurses' Perception on Technological Competency as Caring in Nursing based on Overall and Each Subscale (N = 120)

TCCN	Range Score (Min-Max)	Mean	SD	Level
Overall	3.08 - 4.84	4.14	0.34	High
1. Persons are caring by virtue of their humanness	2.80 - 4.80	4.21	0.36	High
2. Persons are whole and complete in the moment	2.00 - 5.00	4.20	0.53	High
3. Knowing a person is a process of nursing allowing for continuous appreciation of person as whole person	2.29 - 4.00	3.35	0.37	Moderate
4. Technology is used to know the persons as whole	3.00 - 5.00	4.12	0.43	High
5. Nursing is a professional discipline	3.00 - 5.00	4.16	0.43	High

From Table 2, the overall mean score of TCCN was at a high level (M = 4.14, SD = 0.34). The highest mean scores of TCCN of the ICU nurses were found on the subscale of "persons are caring by virtue of their humanness" (M = 4.21, SD = 0.36), followed by the subscale of "persons are whole and complete in the moment" (M = 4.20, SD = 0.53), and the next was "nursing is a professional discipline" (M = 4.16, SD = 0.43). The subscale of "technology is used to know the person as whole" which was ranked the fourth high level (M = 4.12, SD = 0.43). The subscale of "knowing a person is a process of nursing allowing for continuous appreciation of person as whole person" was rated at a moderate level with the lowest mean score (M = 3.35, SD = 0.37).

The Relationship between Technological Competency as Caring in Nursing as Perceived by ICU Nurses in Bangladesh and Selected Factors

Pearson's product - moment correlation coefficient was used to examine the relationship between age, length of working experience, and nurses' self-awareness, and TCCN. The result is presented in Table 3.

Table 3 Correlation Coefficients Between Three Selected Factors and Nurses' Perception on Technological Competency as Caring in Nursing (N = 120)

Selected Factors	TCCN	
	r	p
Age	0.08	0.93
Length of working experience	-0.08	0.37
Self-awareness:	0.42	0.01
- Private self-awareness	0.57	0.00
- Public self-awareness	-0.01	0.86

Table 3 shows that there was a statistically significant and moderate positive correlation between self-awareness and nurses' perception on TCCN (r = 0.42, p = 0.01). The private self-awareness was also statistically significant and correlated with TCCN (r = 0.57, p = 0.00). However, there was no correlation between age, length of working experience, and nurses' perception on Technological Competency as Caring in Nursing (r = 0.08, p = 0.93; r = -0.08, p = 0.37, respectively).

A t-test was done to compare the nurses' perception on TCCN based on the level of nursing education and continuing education and training. The results revealed a non-significant difference for nurses' perception on TCCN by those two factors; nurses' education levels (t = 0.51, p = 0.61) in Table 4, and continuing education and training (t = 0.88, p = 0.38) in Table 5.

Table 4 The Comparison of Technological Competency as Caring in Nursing Based on the Level of Nursing Education (N = 120)

Level of Nursing Education	Diploma		> Diploma		t	p-value
	Mean	SD	Mean	SD		
TCCN	4.14	0.33	4.10	0.37	0.507	0.613

Table 5 The Comparison of Mean Differences Between Perception on Technological Competency as Caring in Nursing based on Continuing Education and Training (N = 120)

Continuing Education and Training	Yes		No		t	p-value
	Mean	SD	Mean	SD		
TCCN	4.16	0.36	4.11	0.31	0.877	0.382

Discussion

This was the first study that used TCCNI in Bangladesh. The overall mean score of nurses' perception on TCCN was at a high level (M = 4.14, SD = 0.34) indicating that the participants in this study had high agreement with the statements of the TCCN. It is interesting that although in Bangladesh, the theory of TCCN is not integrated into the existing nursing curriculums; the ICU nurses' agreement score on TCCN showed a high level. The nurses' high level of perception on TCCN may be related with the existing course contents of the diploma nursing education. Nurses in Bangladesh were educated based on Fawcett's (1984) nursing metaparadigms which includes 'person', 'environment', 'health', and 'nursing' (Bangladesh Nursing Council, 2006). In the metaparadigm of nursing, a person is an

individual who is being nursed, who must be recognized as a person in his or her totality (Fawcett, 1984). The view of a total person is similar with the concept of TCCN where person is considered as a whole person (Locsin, 2005). In the metaparadigm of health, it refers to a person's wellbeing, which can range from high-level of wellness to terminal illness (Fawcett, 1984). Congruently, TCCN focuses health on human well-being (Locsin, 2005). Fawcett, (1984) refers the environment as the context surrounding the person during the period of wellness and illness that could affect the person's views, believes and behaviors.

According to Locsin (2013), environment refers to technologically-demanding world of the human care that is conducive to human living (Locsin, 2013). Finally, nursing is a process of diagnosis and treatment of human responses to actual or potential health problems (Fawcett, 1984). According to Locsin (2005), nursing is a process of knowing persons as whole through expert use of technology. It seems that the concepts of nursing metaparadigm, the person, health, and environment are interrelated to the concepts of TCCN except "nursing". Therefore, Bangladeshi ICU nurses could understand the most of the assumptions of TCCN and had high agreement with it.

The participants reported high agreement on the assumption of "persons are caring by virtue of their humanness" (M = 4.21, SD = 0.36). This assumption reflected that all human beings are caring in their characteristics which are integral to the practice of nursing profession (Locsin & Kongsuwan, 2011). The participants in this study had high agreement on this assumption, possibly because this assumption is a general truth of human nature; humans are caring, and morally grounded. The participants would have learned this perspective from the ethics of the nursing profession. There was an evidence that nurses' perception on moral and ethical behavior helps them to be accountable for their practice and to the patients (Jormsri, Kunaviktikul, Ketefian, & Chaowalit, 2005).

Regarding the second assumption of "persons are whole and complete in the moment", the participants' agreement was at a high level (M = 4.20, SD = 0.53). According to Locsin (2001), wholeness is a philosophical perspective that allows nurses to see the person as whole person, regardless of a missing body part and will not cause them to focus nursing on fixing the person. This idea of a person might be commonly known by all nurses. The literature review found many articles presented on this topic (Gottilieb, & Gottilieb, 2007; Murphy & Walker, 2013; Thompson & Smith, 2002). Another similar term is holism in which often is used in nursing (Allen, 2014; Drick, 2013). Therefore, the participants in this study had this perspective and understood its value.

The participants rated agreement at a moderate level in the assumption of "knowing a person is a process of nursing allowing for continuous appreciation of person as whole person" (M = 3.35, SD = 0.37). This assumption is a significant principle of the theory

of Technological Competency as Caring in Nursing. Knowing a person is a process of nursing: in the process of knowing a person, the four patterns of knowing, such as empirical, ethical, aesthetic and, personal knowing are used to know a person as whole continuously in order to affirm, support, and celebrate person's hopes, dreams, and aspirations (Locsin, 2010). The participants might not have learnt the essence of this specific tenet in their nursing course or ongoing nursing educations. Even though, knowing is one of the caring ingredients (Mayeroff, 1971) that nurses may be taught in fundamental nursing from published articles (Cook & Cullen, 2003; Meyerhoff, Van, Harwood, Drury, & Emblen, 2002). It is a basic caring that has some differences from the process of knowing a person as described by Locsin (2005; 2010). Therefore, the result showed that the score of agreement on this assumption was at the moderate level.

For the assumption of "technology is used to know the persons as whole", the participant agreement was at a high level (M = 4.12, SD = 0.43). From the perspective of the theory, technology is an aspect of care that assists nurses to know a person. Nurses can use technology in the forms of an instrument, a tool, or nurses' activities to know the person as whole (Locsin, 2005; 2010). This idea might be understood well by the participants who were working in ICU settings. They might have good understanding about person's wholeness. In addition, they might know how technology could be used to assist in knowing person from their working experience in an ICU setting. Few studies addressed that ICU nurses used technology to assess the patients' data (Dean, 1998; Locsin & Kongsuwan, 2011). However, to know the patient as a whole person, it includes both the objective and subjective data. ICU nurses also were concerned about the assessment of persons as whole (Locsin, 2005; Rew, 1990).

The fifth assumption, "nursing is a professional discipline", the participants had agreement at a high level (M = 4.16, SD = 0.43). This assumption asserted that nurses used knowledge of nursing such as nursing theories, nursing research evidence in their practice in nursing and focus on human well-being (Locsin, 2005; 2010; Locsin & Kongsuwan, 2011). The essence of this assumption is common in nursing; the participants might be educated while studying nursing at diploma level (Majid et al., 2011). "Nursing is a professional discipline" is unique to nursing (Leininger, as cited in Vance, 2003). Therefore, the participants in this study had agreement with the statements of this assumption at the high level.

According to Parse (1999) "the goal of the profession is to provide service to humankind through living the art of the science" (p. 1). The nursing profession is responsible for maintaining the professional standards of practice based on disciplinary education and knowledge that reflects safe health service to society. Parse in 1999 also stated that the

discipline of nursing encompasses the knowledge in the existing of theories that are embedded in the totality and simultaneity of nursing paradigms. In Bangladesh, the ICU nurses' agreement on TCCN was at high level that may have a relation with the nurses' belief about the concept of 'nursing is a professional discipline'. Although the discipline and the profession of nursing have different goals, but it is interrelated (Parse, 1999). As a profession nursing is the enhancement of quality of life for humankind and the discipline provides nurses the scientific knowledge and the art of practice to ensure patients safety.

Regarding the findings of the study, the results showed that there was no significant correlation between nurses' age and their perception on TCCN ($r = 0.08$, $p = 0.93$). This result was contrary to the study finding of Salonen, Kaunonen, Meretoja and Tarkka, (2007) who found a positive correlation between nurses' age and positive caring attitude in intensive care setting ($r = 0.129$, $p < 0.001$). In addition, Prompahakul (2011) stated that nurses' age could influence positive caring behaviors at the end of life. Lange, Thom, and Kline (2008) found a significant association between the nurses' age and their positive caring attitude for terminally ill patients. However, in this study, there was no relationship between age and nurses' perception on TCCN. From the researcher's point of view, this might be the reasonable that age does not alter the ICU nurses' thoughts or perceptions in caring expressions in nursing. Another reason is that every nurse has professional obligations of caring in nursing, and accountability for maintaining up-to-date care in their professional discipline that are not articulating with the age of a nurse (International Council of Nurses, 2012). Moreover, the study found that nearly 80% of participants were with the age range from 23 to 40 years, reflecting a more homogenous age group. This may be a cause of no relation between the TCCN and age.

The findings of the study showed that there was no significant difference of nurses' perception on TCCN based on their level of nursing education ($t = 0.51$, $p > 0.05$). This result was different with the previous studies of Cho et al. (2009), and Laila, Ahmed and Mogahed, (2011), where they found significant correlation between nurses' education levels and their perceptions on caring. Usually, the higher educated nurses should have high perception on caring because of their education may affect in changing attitudes on developing their clinical skills or knowledge (Barriball, While, & Norman, 1992). But in the present study, the non significant result of the perception on TCCN based on nurses' level of education might be related to the nurses' demographic characteristics who participated in this study. The data revealed that in this study nearly 85% of the participants had a diploma nursing degree, 12.5% had a bachelor degree, and close to the 3% had a master's in nursing which might be not enough to make a significant difference in the level of education.

The other selected factor, length of working experience was also non-significant correlation with nurses' perception on TCCN ($r = -0.08$, $p = 0.37$). This study finding was dissimilar with the study of Mizuno, Ozawa, Evans, Okada and Takeo (2005), who found a significant difference of nurses' perception on caring behaviors based on the level of working experience. In the present study, the non-significant result of working experience of nurses' perception on TCCN may be related to the staffing pattern of the selected hospitals. For instance, usually the nurses in these hospitals work on a rotational basis in each ward for a short duration and the collected data on working experience were not in the specific field of ICU, rather it was nurses' working experience in general in the public hospitals.

A non-significant difference was found regarding the nurses' perception on TCCN based on continuous education and training. This result indicated that nurses' perception on TCCN may not depend on their absence or presence when continuing education and training. Huggins (2004) suggested that intensive care nurses learn knowledge and skills continually based on working situation in practice and through a lifelong learning process. Therefore, understanding the TCCN can be derived from learning by doing in ICU or experience caring in ICUs.

Finally, the selected factor, nurses' self-awareness was contributed to perception on TCCN: the result revealed that nurses' self-awareness was significantly and moderately correlated with TCCN ($r = 0.42$, $p = 0.01$). It means that self-awareness could influence the nurses' perceptions on TCCN. In addition, it can be inferred that self-awareness could influence caring performance based on TCCN. This result was congruent with the previous studies conducted in Thailand (Daodee, 1994; Prompahakul, 2011) which found that nurses' self-awareness is significantly correlated with nurses' caring behaviors for patients at the end of life. In the present study, the significant correlation between nurses' perceived self-awareness and TCCN may be due to a result of nurses' perceived value of self-awareness for using the different technologies in the ICUs during caring critical patients. According to Burnard (1992), self-awareness is the process of understanding of individuals' own beliefs, thoughts, and behaviors and identifying how they concern to others (Burnard, 1992). High perception level of self-awareness allows nurses to accept patients' disparities and uniqueness that is helpful to express more empathetic caring attitude to patients (Townsend, 2003). In addition, self-awareness is an important skill of nurses that enables them to deliver quality care for the patients in critical situations (Burnard, 1992).

Conclusion and Implications

The results of this study showed that the mean score of nurses' perception regarding TCCN was high level. Among the five assumptions of TCCN, only one assumption, "knowing a person is a process of nursing allowing for continuous appreciation of persons" was at moderate level. Regarding the five selected factors, only the nurses' self-awareness was significantly and moderately correlated with nurses' perception on TCCN.

The results of this study can serve as basic data for nursing in Bangladesh. However, nurse educators and nurse administrators should concern or aware of the finding of the participants' perception being at a moderate level for the assumption "knowing a person is a process of nursing that allows for continuous appreciation of a person moment to moment". Perception, thought or attitude can influence practice (Ajzen, 1991). According to Locsin (2010), knowing persons is a considerable process in order to understand the persons as whole and participate in the care that would prevent risk to life and enhance patients' wellness. To increase a better understanding on this assumption, the theory of TCCN (Locsin, 2005) should be taught to ICU nurses in their continuing education or short course training. Nurse educators can consider integrating this theory in a nursing course for a bachelor or master's program.

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