ORIGINAL

Criterion-related Validity of the Perceived Inventory of Technological Competency as Caring in Nursing (PITCCN) in Acute Care Settings

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Abstract : The Perceived Inventory of Technological Competency as Caring in Nursing (PITCCN) based on Locsin's theory of Technological Competency as Caring in Nursing (TCCN, 2005) was developed (Kato *et al*. 2016) and revised by Miyamoto *et al*. (2017). The purpose of this study was to verify criterion-related validity of PITCCN using the Practice of Caring Behavior Questionnaire (PCBQ, Shigehisa, 2007). The study was approved by the Ethical Review Board of Tokushima University Hospital. Data were collected from September 2017 to October 2017. Of the 402 questionnaire copies distributed, only 299 copies were returned and analyzed to determine correlations between total score value and Mean Factor Point of each factor for PITCCN and PCBQ. These were analyzed using Pearson correlation coefficients. Statistical significance was at .01 levels. Strong positive correlation coefficient was obtained between total score values (r=.76, p<.01) and factors of PITCCN and PCBQ (r=.19 to .68, p<.01) , except the PITCCN's factor 3 : "Utilization of information obtained from technology and continuous knowing" and PCBQ's factor 6 : "Enriched relationships between patient and nurse", (r=.13, not significant). From these results, the criterion-related validity of PITCCN as the inventory of TCCN could be confirmed. J. Med. Invest. 66 :42-45, February, 2019

INTRODUCTION

Since Mayeroff (1971) described "caring" in his book (1), these Ingredients of Caring has attracted attention in the nursing discipline as evidenced by its use as foundation of curriculum in various educational institutions and in hospital institutions as well. Unfortunately, the dynamic essence of nursing as caring has led to different terms such as care, care-giving, care-receiving, care-cure, nursing care, etc. Oftentimes, these terms are used interchangeably, then promoting confusion and thereby acknowledging the concept of caring as one of the least understood aspects of nursing (2).

Care is a powerful and dynamic force towards understanding the totality of human behavior in health and illness. Action modes related to care which are culturally-based, and maintained, influence beneficial health outcomes. Care needs to be understood and actualized in diverse and specific cultural contexts (3). Leininger (4) declared that culture is the broadest, most comprehensive, holistic and universal feature of human beings and care is predicted to be embedded in cultures.

In Japan, Sato *et al*. (5) described the key words forming the core of caring as "self-actualization, self-development, mindfulness, empathy and human relationship." However, with 'technological competency as caring in nursing' the link between technology and caring in nursing as coexisting harmoniously in the moment (Locsin, 2005, p. 6) has created this caring practice view

that today, requires measurement to determine is value in practice.

Caring is an important and indispensable concept (6) in nursing ; however, it is difficult for non-nurses to understand its ontology or nature of being (7). Katsuhara (8) has also declared that in the current nursing situation, the concept of caring in advanced nursing practice is also challenging to understand such as the scope and practice of nurse specialists. Therefore, when the thoughts and actions of caring expressions by nurses are visualized and measured, this may facilitate an easier way for others to understand what is caring in nursing as expert nursing practice.

Watson (9) has provided the essential tools for assessing and measuring caring in nursing for nurses. These measurements address quality of care, patient, client, and nurse perceptions of caring, and caring behaviors, the abilities, and its efficacy. Two of these instruments are the Caring Assessment Report Evaluation Q-sort (CARE-Q) (10), and the Caring Behaviors Inventory (CBI) (11). Both are introduced as measurements for evaluating the recognition of nurses' caring behaviors.

In addition, another instrument that measures caring in nursing, specifically the expression of technological competency as caring in nursing is the Technological Competency as Caring in Nursing Instrument (TCCNI) (12-14). Even with this recent instrument, none exists that relates to technological competency as caring in nursing considering Japanese culture, social influences, and nursing practice. For these critical socio-politically and culturally-based reasons, Kato *et al*. (2016) (15) developed and tested the Perceived Inventory of Technological Competency as Caring in Nursing (PITCCN) in the intensive care unit.

The purpose of this study was to verify criterion-related validity of PITCCN by using the Practice of Caring Behavior Questionnaire (PCBQ, Shigehisa, 2007) (16).

MATERIALS AND METHODS

1. PITCCN and PCBQ

As the PITCCN was developed using the Japanese language, the authors translated it into English. The PITCCN based on Locsin's theory of *Technological Competency as Caring in Nursing* (TCCN, Locsin 2005) was developed (Kato *et al*. 2016) and revised (Miyamoto *et al*. 2017) for the purpose of determining the validity of the instrument to measure the TCCN.

The PITCCN overall data obtained high internal consistency for each factor (Cronbach's alpha, .74- .95). These 4 factors are : (1) Training of nurses to provide optimal care, (2) Intentional and ethical nursing of person, (3) Utilization of information obtained from technology and continuous knowing, and (4) Empirical knowledge and knowing of persons.

The measuring caring behaviors have not been done in a greater scale within Japanese culture. The PCBQ have been verified reliability and validity as a scale, and the same five levels of Likert scale are used as PITCCN. For this reason, PCBQ's 7 factor structures and 41 question items were used as external criterion for this research with permission by Sigehisa (16).

PCBQ is a measuring scale focused on caring behavior for nurses involved in cancer nursing, patient' quality of life such as psychological aspects, response to suffering, patient centered medical care environment.

Meanwhile, PITCCN is targeted to nurses who care for patients in the acute phase, and the concept of technology is added to the perceived inventory. From above, it was considered PITCCN can measure nurses' recognition and practice situation on use technology, caring in nursing, and technological competency as caring in nursing.

2. Analysis method

Data collection was done from September 2017 to October 2017. Demographic characteristics of the subjects, the total score value, and Mean Factor Point (MFP) of each factor for PITCCN and PCBQ were calculated using the Pearson correlation coefficients. Statistical significance was at .01 levels.

3. Ethical Considerations

This research study was approved by the Clinical Study Ethical Review Board (Approval No. 2914) of Tokushima University Hospital. Furthermore, source of PITCCN (15) and PCBQ (16) were acknowledged and shown as references.

RESULTS

Of the 402 questionnaire copies distributed, only 299 copies were returned without missing values (response rate was 74.3%) (Table1). For the number of respondents who are shown as 0% comprising, this was displayed up to the third decimal place.

The background of each respondent is shown on Table 1. There were 13 (4%) males, 258 (87%) females, 136 (46%) persons from 20 years old to 29 years old, 70 (24%) persons from 30 years old to 39 years old, and 58 (19%) persons from 40 years old to 49 years old. Regarding the experience of being educated on caring in nursing, 74 (25%) persons had the experience, and 217 (72%) persons were without experience.

As to the final academic background in the specialized field, 177 (59%) were from vocational schools.

These data were analyzed using correlational studies between the total score value and MFP of each factor for PITCCN and PCBQ as shown in Table 2. For the criterion-related validity, strong positive correlation coefficient was obtained between total score values of PITCCN and PCBQ (r=.76, p< .01).

PITCCN has 18 items and 4 factors, while PCBQ has 41 items and 7 factors. Strong positive correlations between factors of PITCCN and PCBQ were found other factors(r=.19 to .68, p< .01). However, there was no significant correlation between PITCCN's factor 3 : "Utilization of information obtained from technology and continuous knowing" and PCBQ's factor 6 : "Enriched relationships between patient and nurse" (r=.13).

DISCUSSION

First is to compare the background of the subjects with the outline of the health report (examples of employment medical personnel) in 2016 (17) (refer to the outline below). The male-to-female ratio of nurses in the general population was 7.3% for males and 92.7% for females. It was found that the male subjects of this survey were less than the females, and overall, the sample population was young females (46%), compared with 21.1% who were under the age of 30 years old.

The educational background of the subjects were 59% from the vocational school, and 27% from high school advanced course, while 72% had no educational experience on caring in nursing. However, the respondents' answer to the PITCCN items that was most selected were "sometimes practicing" and "practicing" in many items, therefore it was thought that technological competency as caring in nursing was being practiced by the respondents.

As a current state of caring education in Japan, only 25% had experienced receiving education on caring. The remaining 75% did not. This was also the same finding revealed in the study by Kato *et al* (15). According to Nagashima (18), in recent years, many studies or literature review articles on caring have been published in nursing education and academic journals. Since the subject of this

Table 1.   Demographic Characteristics of the Samples (n = 299)

	Personal date	n (%)
	Male	13 (4%)
Gender	Female	258 (87%)
	No response	28 (9%)
	Less than 20 years old	1 (0%)
	20-29 years old	136 (46%)
Age	30-39 years old	70 (24%)
	40-49 years old	58 (19%)
	over than 50 years old	34 (11%)
	Less than 1 year	6 (2%)
	1-less than 5 years	83 (28%)
Clinical experience as Nurse	5-less than 10 years	59 (20%)
	10-less than 20 years	77 (26%)
	20 years or more	73 (24%)
	No response	1 (0%)
Existence of experience receiving education	Yes	74 (25%)
	No	217 (72%)
	No response	8 (3%)
	Nursing school	177 (59%)
	College (Nursing)	7 (2%)
	University (Nursing)	31 (11%)
Education levels	High School Advanced Course (Nursing)	81 (27%)
	Masters	3 (1%)

Table 2. Pearson's correlation coefficient between PITCCN and PCBQ factors

PCBQ \ PITCCN	F1	F2	F3	F4	F5	F6	F7	Total score value
F1	.67**	.68**	.68**	.53**	.61**	.56**	.53**	.73**
F2	.66**	.61**	.63**	.56**	.56**	.58**	.61**	.71**
F3	.34**	.19**	.20**	.27**	.24**	.13	.25**	.29**
F4	.47**	.42**	.41**	.33**	.42**	.29**	.25**	.46**
Total score value	.74**	.66**	.67**	.59**	.63**	.56**	.58**	.76**

**p<.01
PITCCN : Perceived Inventory of Technological Competency as Caring in Nursing
PCBQ : Practice of Caring Behavior Questionnaire
Factors of PITCCN : (F1) Training of nurses to provide optimal care, (F2) Intentional and ethical nursing of person, (F3) Utilization of information obtained from technology and continuous knowing, and (F4) Empirical knowledge and knowing of persons.
Factors of PCBQ : (F1) Accomploshing of roles and responsibilities of nurses in team medical treatment, (F2)Providing information so that patients can undergo medical treatment voluntarily, (F3) Patient–centered support, (F4) Changing the environment so that patients can undergo medical treatment in peace, (F5) The support predicting what would be needed by patients and families, (F6) Enriched relationships between patientand nurse, and (F7) Communication.

study is not a survey of the whole of Japan, this finding suggests that it is necessary to continuously investigate whether or not nurses who have not had educational experiences on caring in nursing are practicing their nursing based on caring science.

The total score of PITCCN and PCBQ had a significant positive correlation. Both MFP also showed strong significant positive correlations except for factor 6 of the PCBQ, "Enriched relationships between patient and nurse". This finding confirmed the criterion-related validity of a measuring scale of the PITCCN for a caring as an external criterion of the PCBQ.

Shigehisa (16) defined caring as "the patient recognized the subject as an important existence, and nurses' care can maximize the capability of each patient". Also, the PCBQ was developed to clarify nurses' behavior of taking care of patients with cancer.

On the other hand, PITCCN was developed based on Locsin's middle range theory of TCCN (19). PITCCN has been influenced by epistemological patterns in nursing as defined by Carper (1978) (20). In addition, PITCCN assumed through empirical findings that nursing is a process of knowing persons as caring by using technologies to contribute to the nursing care of patients.

Both PITCCN (15) and PCBQ (16) include behaviors reflecting caring, such as 'trying to understand the other person'. PITCCN Q.10 "I know the whole patient" and the following items on the PITCCN. Question 18 is stated "I behave in a way to care in order to gain the trust of patients", and PCBQ Q.20, "Endeavors to communicate with patients", and PCBQ Q.19 "Listen to the patient's story intently."

Therefore, there is a strong correlation between the items in the PITCCN and PCBQ, it was thought that question items about the caring about supports for the patients and their family, and their behavior to know the other person intentionally.

There was no significant correlations between PITCCN's factor 3 "Utilization of information obtained from technology and continuous knowing" and PCBQ's factor 6 "Enriched relationships between patient and nurse ".

For example, the PITCCN's factor 3 were constructed : Q.2 "I understand the condition of the patients based on information acquired from technology", Q.1 "I assess patient's condition from information acquired using technology", and Q.3 "I share patient information acquired from technology to illustrate team medical care, effectively."

On the other hand, the PCBQ's factor 6 were constructed : Q.17 "When listen to the patient talk consciously with sit down", Q.18 "When nurses feel patient is seeking console and encouragement,

nurse grasp, place patient hand, and touching patient's back gently ", Q.16 "nurses are cheerfulness ".

Regarding knowing the patient as caring, Locsin declared that the nurse can be competent in using technology in order to understand the patient (21) more fully as persons. It is the nurse's competent ability to use technology that is the expression of caring in nursing. This does not only mean that monitoring the patient simply by technology, but also as actions of the nurse who is truthfully wanting to understand patients through more evidenced information obtained from technology. Therefore, technology as a means to know the patient intentionally as a human activity must be competent in his/her practice, clearly providing evidence-based and nursing theory-based practice. Not that technology can be only used safely, but also to an understanding of the patient and their lived experiences.

Technological competency as caring in nursing is the harmonious coexistence between technologies and caring in nursing (22). Regarding the PITCCN is targeted to nurses who care for patients in the acute phase, and the concept of technology has been added to the perceived inventory. Also, factor 3 of PITCCN : "Utilization of information obtained from technology and continuous knowing" showed only weak correlation in all items in comparison with other factors of PITCCN.

It was considered PITCCN construct validity of technological aspect, and can be a specific measure in recognizing nurses' practice situation on the use of technology in nursing while expressing technological competency as caring in nursing. From this, it was thought that PITCCN could be measured the concept of "Utilization of information acquired from technology and continuous knowing".

CONCLUSION

The results of the PITCCN and PCBQ study showed a significant positive correlation. Criterion-related validity of PITCCN as an inventory of the TCCN could be confirmed. However, there was no significant correlation between PITCCN's factor 3 : "Utilization of information obtained from technology and continuous knowing" and the factor 6 of PCBQ : "Enriched relationships between patient and nurse". As a reason, PCBQ is a measuring scale focused on caring behaviors of nurses involved in cancer nursing, patient's quality of life such as psychological aspects, response to suffering, and patient centered medical care environment. Meanwhile,

PITCCN has targeted nurses' technological competencies as expressing caring in the acute phase of illness. The concept of technology was added to the perceived inventory, therefore, PITCCN can be a specific measure in recognizing nurses' practice situation on the use of technology in nursing while expressing technological competency as caring in nursing.

COMPETING INTERESTS

The author declares that have no competing interest exists.

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