Development and Validation of Nurse Competency Inventory for Patient Engagement

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Development and Validation of Nurse Competency Inventory for Patient Engagement

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<ABSTRACT>

Development and Validation of Nurse Competency Inventory for Patient Engagement

Patient engagement is “the desire and capability to actively choose to participate in care in a way uniquely appropriate to the individual, in cooperation with a healthcare provider or institution, for the purposes of maximizing outcomes or improving experiences of care.” Patient engagement increases healthcare quality, improves health outcomes, reduces healthcare expenditures, and has other significant effects. Healthcare providers’ encouragement of patient engagement in health care process is positively correlated with both patients’ willingness to participate in health care process and the intervention implementation rate. However, there is not currently a scale that measures patient engagement from the healthcare providers’ perspective. Therefore, in this study, we aimed to develop an inventory that can systematically measure nurse's competency for improving patient engagement by utilizing a theoretical model that can explain the patient-nurse partnership within patient engagement in the transformative healthcare environment system.

The development of the inventory is largely divided into three stages. First, the factors of nurse competency to improve patient engagement were identified through theoretical phase and field-work phase. Second, a preliminary inventory was derived by generating items according to the factors. Third, the inventory was finalized through

validity and reliability test.

For the preliminary items, 44 items were derived according to seven factors, and content validity was tested by eight experts. Based on expert validity and pre-test, 40 preliminary items were derived. In order to test the reliability and validity of the 40 preliminary items, a survey was conducted with 422 nurses who performed direct nursing among nurses with more than three years of experience working in general hospitals with more than 300 beds in South Korea. 50% of the collected 422 data were randomly selected, and item analysis, item-total score correlation, reliability at the time of item removal, exploratory factor analysis, and inter-factor correlation, and internal consistency reliability were first tested with sub sample 1.

As a result, a total of five factors and 26 items were extracted, 1) assessing the patient's physical and psychological conditions, preferences, values and beliefs, 2) encouraging and creating a comfortable atmosphere, 3) sharing information for more equal partnership, 4) managing barriers, 5) cultivating professional knowledge and attitude. Second-order confirmatory factor analysis was performed with sub sample 2 based on the correlation between high factors and the cyclical relationship between factors according to the theoretical framework. GFI=.86, SRMR=.05, RMSEA=.05, CFI=.90, NFI=.77, indicating the overall goodness of fit of the model that met or approached the standard. The Cronbach's α value of the inventory was found to be .92 (.60 to .76 for each factor), so the reliability of internal consistency was also secured.

Based on the above results, a nurse competency inventory for patient engagement

was developed on a self-reported 5-point scale consisting of five factors and 26 questions. This inventory is a second-order model, and it can be measured using the total score of the five factors or the average of the total scores, and the higher the score, the higher the competency is interpreted. It is expected that this tool will be used as basic data for competency development by confirming the nurse's competency to improve patient engagement. In addition, patient engagement is enhanced through the measurement and development of nurses' competency, thereby promoting the ultimate goal of improving patient health outcomes.

Keywords: nurse, patient engagement, competency, inventory development, validation

I. INTRODUCTION

1. Background

Patient engagement is “the desire and capability to actively choose to participate in care in a way uniquely appropriate to the individual, in cooperation with a healthcare provider or institution, for the purposes of maximizing outcomes or improving experiences of care.” (Higgins et al., 2017). Patient engagement increases healthcare quality (Liang et al., 2018), improves health outcomes (Greene & Hibbard, 2012), reduces healthcare expenditures, and has other significant effects (Barello, Graffigna & Vegni, 2012; Shively et al., 2013; Fleurence et al., 2013). Healthcare providers’ encouragement of patient engagement in health care process is positively correlated with both patients’ willingness to participate in health care process and the intervention implementation rate (Bishop & Macdonald, 2017; Davis & Vincent, 2011; Drenkard, Swartwout, Deyo & O’Neil, 2015; Duhn & Medves, 2018; Thyssen & Beck, 2014). Therefore, healthcare providers should promote patients’ agency in promoting their own health (Deyo et al., 2016).

Nurses play a critical role in helping patients actively engage in their own healthcare (Barello et al., 2012;Lammon et al., 2010). Through the relational and educational aspects of nursing care, nurses can support patient engagement, which ultimately improves patients’ quality of life (Gruman et al., 2010; Jerofke et al., 2014; Barello and Graffigna, 2015a; Jenerette and Mayer, 2016). However, many studies on patient engagement have focused on the use of new devices or platforms(Manias et al.,

2020), not patient engagement through the patient-nurse relationship. The role of nurses in these studies is often limited to that of an informant (Welch & Fournier, 2018; McQuaige, Corbitt, Nahm & Son, 2019). In addition, only one nursing study applying the concept of patient engagement has been conducted in South Korea and it was a relatively foundational study (Lee et al., 2019). The numerical and qualitative expansion of patient engagement studies requires appropriate assessment scales to measure patient engagement (Boivinet al., 2018), but few such scales have been found to be effective (Carman et al., 2013; Duke, Lynch, Smith & Winstonley 2015; Graffigna, Barello, Bonanomi & Lozza, 2015).

There is not currently a scale that measures patient engagement from the healthcare providers perspective. The Clinician Support for Patient Activation Measure (CS-PAM) is the most widely used scale to measure patient engagement, but it was developed to measure clinicians' beliefs about patients' roles in treating chronic diseases (Hibbard, Collins, Mahoney, & Baker, 2010), so it is suitable for measuring the attitudes of community-based healthcare providers but is not appropriate for use in acute care settings. In addition, it measures only clinician attitudes, excluding their knowledge, skills, and attitudes about patients' roles in healthcare processes. It is not suitable for measuring healthcare providers' competency to make patients be involved in healthcare.

The Patient-centered Care Competency (PCC) scale developed in South Korea measures patient-centered nursing competencies among nurses working in hospitals (Hwang, 2013). However, it has only been subject to exploratory factor analysis, not

validity analyses, so its validity has not yet been established. In addition, it uses conceptual terms such as “patient-centered care,” “empowerment,” and “partnership,” which makes many questions difficult for respondents to understand because they often do not have the specific knowledge required to understand what is being asked. Furthermore, the CS-PAM and PCC scales were developed in 2010 and 2013, respectively, but the concept of patient engagement, which includes ideas about information technology management and health literacy, was introduced in 2013 (Carman et al., 2013). The measurement scales do not include these contents, essential characteristics of patient engagement (Drenkard, Swartwout, Deyo & O’Neil, 2015). The development of inventory that has been validated by reflecting the concept of patient engagement can be used in relevant research to improve patient healthcare satisfaction, prevent safety incidents involving patients, deliver financial benefits to hospitals, and help nurses improve as professionals by accurately measuring their ability.

Therefore, in this study, we aimed to develop an inventory that can systematically measure nurse's competency for improving patient engagement by utilizing a theoretical model that can explain the patient-nurse partnership within patient engagement in the transformative healthcare environment system (Drenkard., Swartwout, Deyo, & O’Neil, 2015).

2. Purpose

The purpose of this study is to develop an inventory to measure nurse competency for patient engagement. This study's goals were to:

1) To identify the factors that constitute nurse competency to improve patient engagement.
2) To develop a preliminary inventory for measuring nurse competency to improve patient engagement.
3) To identify the validity and reliability of a preliminary inventory for measuring nurse competency for improving patient engagement.

3. Definition of terms

3.1. Patient engagement

Patient engagement is "the desire and capability to actively choose to participate in care in a way uniquely appropriate to the individual, in cooperation with a healthcare provider or institution, for the purposes of maximizing outcomes or improving experiences of care" (Higgins et al., 2017).

3.2. Competency

A competency is an individual's ability to successfully fulfill a socially demanded role and can include both cognitive and non-cognitive characteristics, such as knowledge, skills, attitudes, emotions, values, and motivations (OECD, 2002).

Therefore, nurses' competencies for improving patient engagement in this study refer to their cognitive and non-cognitive characteristics that can be used to encourage patients to actively participate in and make decisions about their care as part of their treatment team. (Al-Tannir, AlGahtani, Abu-Shaheen, Al-Tannir & Al-Fayyad, 2017).

II. LITERATURE REVIEW

This chapter focuses on the concept of patient engagement, nurse competency to improve patient engagement, and patient engagement related scales.

1. Patient engagement

1.1. Concept

Patient engagement has become more important recently with the increasing emphasis on the relationship between patients and healthcare providers as a partnership. It first began to be discussed in the 1990s and the frequency with which it was cited on the Web of Science quadrupled between 2019 and 2020 as an important factor in high-quality healthcare delivery (Schenk, Bryant, Van Son & Odom-Maryon, 2019). However, despite the increasing interest in and implementation of patient engagement concepts, a consensus has not been achieved about its definition (Murali & Deao, 2019). Patient-centered care, which is a similar concept, holds that patients should be provided with "care and that patient values guide all clinical decisions with respect to individual patients' preferences, needs, and values" (Fridberg et al., 2013). Another similar concept, patient activation, is "the willingness and ability of patients to act independently and manage their health," which is different from patient engagement (Hibbard, 2013).

Patient experience, which is also different from patient engagement, is widely used to measure patients' perceptions of their personal healthcare experiences (Ahmed, Burt, & Roland, 2014) and values patients' overall experience as the "whole of the interactions

formed by the organization and culture that affect the patient's perception and treatment" (Wolf, 2013). The similar concept that is most frequently discussed in South Korea is patient participation, which is defined as "participating in the process of determining one's health concerns," which differs from patient engagement because patient participation is limited to patient participation in decision-making, not care (Deyo et al. 2016). Patient engagement is "a set of organizational policies and procedures that include patients and families as members of the healthcare team in the behavior of patients, families and health professionals and encourage collaborative partnership with healthcare providers" (Carman et al., 2013) (Table 1).

Although the concepts of activation and engagement overlap to some degree, they consider different breaths of healthcare relationships. Activation is mainly limited to the prototypical doctor-patient consultations while engagement considers healthcare in multiple ways (Menichetti et al., 2014). Activation is also mainly related to the cognitive and behavioral components of patients' attitudes toward healthcare and is conceptualized as an incremental attitude that patients may develop. However, engagement more holistically considers patients' perceptions about their health conditions and perceives psychological conditions as a multi-stage development process (Graffigna et al., 2014). Patient engagement is a "process-like and multidimensional experience, resulting from the conjoint cognitive (thinking), emotional (feeling), and conative (acting) enactment of individuals toward their health management(Graffigna et al, 2014). In this process, patients go through four subsequent positions. The unachieved synergy among the different

subjective dimensions (thinking, feeling, and acting) at each stage of the process may inhibit patients' ability to engage in their care" (Graffigna et al., 2014).

Patient engagement has four main characteristics: personalization, access, commitment, and therapeutic alliance (Higgins, Larson & Schnall, 2017). Personalization is presenting interventions and therapeutic strategies that reflect the patient's personal disposition, environment, and needs, such as their literacy, cultural background, attitudes toward treatment interventions, and the availability of a care support system, such as their ability to acquire and comprehend information related to therapeutic decision-making. Accessibility refers to a patient's ability to obtain the necessary information or institutional resources with some degree of confidence and includes various characteristics, such as functional literacy, geographic location, and socioeconomic status. Commitment is the cognitive and emotional factors that stimulate patients to use available resources, such as those that induce patients to better understand their conditions and a willingness to take action over a certain period of time by themselves or in cooperation with others. Therapeutic alliances differentiate patient engagement from related concepts, such as patient empowerment, participation, and self-management. Therapeutic alliances are partnerships between patients and healthcare providers formed to pursue health goals. These relationships are different from traditional patient-healthcare provider relationships that are based on the authority of the healthcare provider and the normative role of medicine.

Based on these attributes, patient engagement is the desire and ability of an individual to participate in their own treatment in cooperation with healthcare providers to

maximize health outcomes or treatment experience. To engage patients, their care should be tailored to their individual needs, they should have access to relevant information and resources, they should be addressed with behavioral change strategies appropriate for their cognitive and emotional conditions, a mutually supportive relationship should be established between patients and healthcare providers.

Table 1. Definition of terms related to patient engagement

Term	Definition
Patient-centered care	"Providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions (IOM, 2001)"
Patient activation	"Emphasizes patients' willingness and ability to take independent actions to manage their health and care (Hibbard & Greene, 2013)"
Patient participation	"The involvement of the patient in the decision-making process regarding health issues" (www.ncbi.nlm.nih.gov/mesh)
Patient engagement	"Patients, families, their representatives, and health professionals working in active partnership at various levels across the health care system— direct care, organizational design and governance, and policy making—to improve health and health care" (Carman et al., 2013)

1.2. Patient engagement research in South Korea

A search for the term “patient engagement” in the Research Information Sharing Service returned 20 articles, eight of which were confirmed to be related to patient engagement as determined by their titles and abstracts. Of those eight articles, textual analysis showed that four were about patient participation, three were about patient engagement, and one was about patient participation culture. In South Korea, the term “patient engagement” was used first in 2011 to discuss patient participation (Lee, 2011). Most patient engagement studies conducted in South Korea analyzed the relationship between patient participation and patient safety. Of those eight studies, five studies were conducted on patients and three studies were conducted on healthcare providers (Table 2).

Of the three studies about patient engagement, only Pyo et al. (2018) actually used the concept, but did not present an exact definition of the term. Lee et al. (2019) used the concept of patient engagement for the first time in a domestic nursing study. They investigated the degree to which patient engagement affected nursing service performance and how nurses’ perceptions affected patient engagement in South Korea. They identified the degree to which patients were engaged in nursing. Jang (2019) conducted a qualitative study using focus group interviews with patients, medical professionals, and those involved in medical litigation to identify the factors that affect patient engagement. These two studies showed that patient engagement improves patient health outcomes in South Korea (Jang, 2019) and nursing performance (Lee et al., 2019).

Few studies related to patient engagement and patient participation have been

conducted in South Korea and, of those that were conducted, more were about patient participation than patient engagement. Both concepts were studied to prevent accidents and improve patient safety. Patient engagement still needs to be properly defined quantitatively and qualitatively.

Table 2. Patient engagement research in South Korea

Author (year)	Aim	Results	Definition of patient engagement [Scales]
Lee (2011)	Examining the effects of multidimensional components of patient participation on health outcomes in the medical service environment	The cleanliness of the medical environment has a positive effect on patient participation, the presence of a third party has a negative impact on the patient's emotional participation, the doctor's patient-centered communication has a positive effect on patient participation, and the therapeutic outcome has a positive effect on psychological well-being	Patient participation: behavioral concept that refers to the actions and resources supplied by customers for service production and delivery and includes customer's mental, physical and emotional input [Researcher development]
Kim & Lee (2016)	Analyze the effect of the treatment environment on patient participation in the process of providing medical services and the moderating effect of negative emotions in the relationship between them	The cleanliness of the treatment environment has a positive effect on behavioral participation. The older the patient's ages, the greater the emotional participation and the presence of a third party in the treatment environment positively affect informational and emotional involvement. The patient's negative emotions harmed informational and emotional involvement, and the time pressure of the treatment environment damaged the patient's informational participation level	Patient participation: 'The degree of effort that patients put into behavioral, emotional, and informational participation in providing information necessary for medical services in the production process of medical services' [Researcher development]
Pyo et al. (2018)	Develop and evaluate the effectiveness of patient safety education for the general public in order to promote overall awareness of patient safety, including patients, and to induce engagement in patient safety	Patient safety education led to statistically significant difference in pre and post educating in the tendency to choose medical institutions according to whether they are certified by medical institutions, intention to accompany guardians when visiting medical institutions, intention to reflect patient's opinion on test or treatment, intention to participate in preventive activities related to infections, and to participate in fall prevention activities.	Patient engagement: No definition [Researcher development]

Author (year)	Aim	Results	Definition of patient engagement [Scales]
Shin & Yoon (2019)	Understanding the patient participation culture of nurses in the nursing-care integrated service ward, identifying the nursing work environment, information sharing activities, and attitudes of nurses toward patient participation, which are components of the patient participation culture, and understanding the relationship between each factor	The higher the evaluation of individual competency, organizational support, and human resource appropriateness for patient participation, the higher the degree of information sharing activity, which is interaction with patients, and the higher degree of acceptance of cooperative relationships with patients, indicating a positive attitude toward patient participation.	Patient participation culture: Interaction with patients to improve the quality of medical care refers to common beliefs, values, attitudes, and behaviors formed based on personal competence, organizational situation, and work structural factors. (Malfait, Eeckloo, Van Daele, & Van Hecke, 2016) [PaCT-HCW]
Lee (2018)	Identify the willingness to participate in patient safety for inpatients	Inpatients' willingness to participate in patient safety was generally high, and opinions on patient participation were also positive. The desire to participate in asking questions about the medical staff's judgment or confirming the medical staff's behavior was low, and the opinions about the accessibility of the medical staff and the sufficiency of explanation and information were somewhat negative.	Patient participation: Patient participation in patient safety emphasizes the patient's active role and engages the patient in preventing patient safety events and preventing errors before they reach or harm the patient. (Koutantji, Davis, Vincent & Coulter, 2005; Vincent & Coulter, 2002)
Kang & Park (2019)	Identify the patient safety awareness and patient participation level and identify the influencing factors for patients in the department of hematology and oncology department of daily tertiary general hospitals	To promote patient safety awareness and participation, consider the patient's education level, age, occupation, hospitalization experience, department, surgery and procedure experience, and patient participation education experience.	Patient participation: Emphasizing the active role of the patient in preventing patient safety incidents and patient participation (Lee, 2011)

Author (year)	Aim	Results	Definition of patient engagement [Scales]
Lee (2019)	To investigate the performance of patient engagement nursing services perceived by nurses and necessity.	Recognizing patients and their families as advisors and partners who decide directions together, compliance with communication procedures and sharing of procedures, and education and management of discharge planning are relatively well done. In the case of bed handover, the need for nurses to recognize it was very high, even though it is not currently being implemented.	Patient engagement: The desire and ability to choose active participation in care in unique ways by working with health care providers to maximize treatment outcomes and patient experiences. (JCI, 2009) [Researcher development]
Jang (2019)	Proposal of revitalization measures by exploring patient engagement experiences and influencing factors of patients and medical personnel (doctors and nurses) for patient safety in Korean medical institutions	Influencing factors on patients' engagement in patient safety activities are the patient's active and independent participation attitude, difficulty in requesting cooperation from guardians, lack of trust between patients and medical personnel, access to patient safety education, difficulty in sharing patient safety incidents, insufficient medical personnel, and overworked	Patient engagement: The patient's active participation in care, whereby patients, caregivers, and health care providers work together to strengthen the patient's influence in care decisions at both the individual and organizational levels. (Coulter, 2012)

2. Patient engagement scales

2.1. Patient perspectives

Patient engagement can improve healthcare outcomes, such as mental and physical health, quality of life after discharge, clinical safety, participation in self-management, and reduced patient financial expenditures as a result of reduced use of medical institutions (Duke, Lynch, Smith, & Winstanley, 2015). Reliable data about patient readiness to engage in their treatment can serve as the basis for developing patient engagement strategies (Greene & Hibbard, 2012).

To identify scales for measuring patient engagement in healthcare, a literature review was conducted using the Pubmed, CINAHL, Web of Science, and SCOOUS databases using forward searching. We searched titles, abstracts, keywords, and subject headings of articles written in English that were published before April 1, 2020 using the following search term: "'patient engagement' AND 'measurement' AND 'scale development.'"

A total of 1,158 articles were returned of which 1,100 were excluded for not being related to measuring patient engagement. Studies that measured patient engagement readiness were then selected based a review of their abstracts. The final analysis included three studies, all of which were quantitative and each of which used a different scales, namely either the Patient Activation Measure (PAM), the Patient Engagement in Healthcare Questionnaire, and the Patient Health Engagement Scale (PHE) (Table 3).

The PAM assesses patient activation and related psychological characteristics

(Hibbard, Stockard, Mahoney & Tusler, 2004). Activated patients play essential roles in managing their own care, collaborating with healthcare providers, sustaining their own functioning, and preventing health declines. The PAM consists of 22 items of which two are related to patient roles in managing their own care, 10 are related to their confidence in their ability and knowledge of how to take action related to patients' self-management, six are related to their actual actions related to patients' self-management, and four are related to continuing to maintain these behaviors under stress.

The PAM has a Cronbach's alpha of .91 and it was shown to be valid in a study with 1,515 adults over 45 years old. The PAM's 22 items have a calibrated scale range of 38.3–54.5 on a theoretical 0–100-point scale. A shortened form consisting of 13 questions was developed in 2005 that has been translated into Dutch, Chinese, and Hebrew and is widely used around the world. However, it has a limitation. The limitation is that it only measures patients' self-management. The PAM measures patient self-management ability, which excludes cooperation with medical staff and a more active patient role in their own care. For instance, patients' ability to gather information on providers, treatments, and diagnoses; participate in decision-making; collaborating and communicating with their care team; and providing feedback about the care they have received (Agency for Healthcare Research and Quality, 2018; Drenkard, Swartwout, Deyo, & O'Neill, 2015).

The PHE scale was developed based on the PHE model (Graffigna et al, 2015). According to the PHE model, patients differentially engage in treatment management based on their emotional, cognitive, and behavioral characteristics. For example, patients who are

diagnosed with severe conditions may be unable to fully participate in managing their care for emotional reasons. The PHE scale was designed to measure how well patients can manage their health by dividing acceptance patterns and behaviors into stages.

The PHE scale originally consisted of nine ordinal items but after a pilot phase it was reduced to five items that can be responded to along a 7-point scale. CFA (CFI = 0.981, RMR = 0.018, RMSEA = 0.059) and test-retest reliability tests (ICC = 0.95; CI = 0.90−0.97) conducted on 382 chronically ill adult patients showed that the PHE scale was reliable and valid. It is a useful and convenient way to understand how much patients can participate in their healthcare. In addition, the scale checks the psychological aspect of how prepared the patient is to engage in health care through the composition of the items according to the psychological stage of accepting the disease. However, since all of the items solely focus on the patient's psychological part, other factors that may affect patient participation, such as the patient's surroundings or the ability of the medical staff to utilize the support resource system, are excluded. Therefore, there is a limit to measuring the comprehensive aspect of how much patients can engage in health care and what make them to be engaged.

Lastly, the Patient Engagement in Health Care Questionnaire was developed based on the core components of participation, including acknowledging the patients as having critical knowledge about their own care needs and promoting self-care and autonomy as well as shared decision-making in 2019(Wu, Ye, Wu, & Zhao, 2020). It was designed to measure patient engagement: information interaction, engagement in treatment and care, engagement in decision-making, and engagement in improving care quality and safety. The

patient engagement in health care questionnaire preliminarily consisted of 51 items, and it was reduced to 19 items with the 5-point scale. As a result of the CFA (χ^2/df =2.245, RMSEA=0.054, RMR=0.039, CFI =0.903, PGFI =0.725) and test-retest reliability tests (ICC = 0.88; CI = 0.81−0.89) on 364 patients were those who had been hospitalized for more than three days, the reliability and validity of this scale were secured. Unlike the previous two scales, this scale includes specific questions about how the patient communicates with the medical staff, selects the medical staff, and takes active actions for their safety. In particular, information exchange, which is most emphasized in patient engagement, is the patient's health. It is a scale that reflects the concept of patient engagement well by expanding patient roles. Therefore, the Patient Engagement in Health Care Questionnaire can identify the level of overall patient engagement and specific patient engagement behavior from admission to discharge.

In summary, as a result of reviewing and evaluating the patient engagement scales measured by patients so far, among the scales adapting the concept of patient engagement was only the patient engagement in healthcare questionnaire. Although patient engagement tools for patients began to be developed before those for medical staff, the scales addressed patient-healthcare provider partnerships, which are a key element of patient engagement. Therefore, in order to increase patient engagement, scales to measure it from the patient perspective should continue to be developed.

Table 3. Scales for patient engagement of patient perspective

Scale (Author, year, country)	Components	Number of Items	Reliability	Validity
Patient activation measure [PAM] (Hibbard et al., 2004, USA) Develop a measure for assessing "activation," and the psychometric properties of that measure.	− Believes active role important − Confidence and knowledge to take action − Taking action − Staying the course under stress	22	Cronbach's alpha .91	Construct and criterion validity with SF8 (r=.38,p<.001)
Patient health engagement scale (Graffigna et al, 2015, Italy) The new patient's identity occurring after the disease diagnosis (and of the consequent reframing of daily routines, values, and projects) has to be considered in order to understand patients' engagement	− Black out − Arousal − Adhesion − Eudemonic project	5	Cronbach's alpha .85	CFA CFI = 0.981, RMR = 0.018, RMSEA= 0.059
Patient engagement in health care questionnaire (Wu et al, 2019, China) Develop the Patient Engagement in Health Care Questionnaire and to test its psychometric properties.	− Communication and information exchange − Engaging in treatment and care − Engaging in decision-making − Giving feedback about care quality − Monitoring care safety − Choosing health care providers	19	Cronbach's alpha .92	CFA χ^2/df =2.245, RMSEA=0.054, RMR=0.039 CFI =0.903, PGFI =0.725

2.2. Healthcare provider perspective

To identify tools for measuring patient engagement in healthcare from the healthcare provider perspective, a literature review was conducted using the Pubmed, CINAHL, Web of Science, and SCOOUS databases using forward searching. We searched titles, abstracts, keywords, and subject headings of articles written in English that were published before April 1, 2020 using the following search term: "'patient engagement'

AND ‘measurement’ AND ‘healthcare providers.’”

Of the 1,372 articles returned, 1,303 were excluded for not being related to patient engagement measurement. The remaining articles’ abstracts were reviewed to determine whether they were related to measuring patient engagement readiness. The final analysis included four studies, all of which were quantitative and each of which was concerned with a different scale (Table 4). However, none of the scales measured patient engagement, only similar concepts such as patient engagement, patient activation, and patient-centered care. The scales these studies were about were the Patient Participation Culture Tool for Healthcare Workers (PaCT-HCW), Clinician Support for Patient Activation Measurement (CS-PAM), the PCC scale, and the Patient-Centered Nursing Culture (PCNC) scale(Table 4.).

The PaCT-HCW (Malfait, Eeckloo, Van Daele, & Van Hecke, 2016) was designed to patient participation culture in general wards. It measures healthcare worker-related information, including patient participation in their own healthcare, information-sharing, and dialogues regarding patient participation in their own healthcare (Malfait, Eeckloo, Van Daele & Van Hecke, 2016). It contains 52 items of which four are about competence; nine are about support, including from ward managers and colleagues from the organizational level; four were about perceived lack of time; 18 were about information-sharing and dialogue; five were about factual issues; four were challenging questions; four were notifying questions; and seven were about accepting new roles. This scale measures healthcare providers’ personal competence in promoting patient participation in their own

care, organizational support and factors that hinder patient participation in their own care, healthcare providers' attitudes about communicating with patients and patients' questions, nurses' desire for patient participation in their own care, and healthcare providers' ability to accept new roles. The PaCT-HCW showed strong construct validity (Kaiser-Meyer-Olkin measure = 0.905, Bartlett's test of sphericity χ^2= 15,082.47, df = 1,485, $p < 0.001$) and internal consistency (Cronbach's alpha = .92). This tool is different from related tools in that it has also been shown to be valid for other healthcare providers, including midwives, doctors, pharmacists, and nursing assistants.

However, this tool has 52 items and so takes a long to complete, so it may have a lower completion rate and fidelity of answers than other tools. This scale was developed for healthcare providers who interact with patients admitted to wards, so it is not as appropriate for use with healthcare providers in other contexts. It is also not nurse-centered and so cannot measure nurses' competencies at promoting patient participation in their own care as accurately as other scales.

The CS-PAM is based on the PAM scale and was developed to identify clinicians' beliefs about the chronic illness patients' manage their won care and which patient competencies clinicians believe are the most important for them to have to do so (Hibbard, Collins, Mahoney, & Baker, 2010). It is composed of 14 items of which four are about the importance of patients following medical advice, four are about the importance of patients making their own decisions and the patient's function as a treatment team member, four items about the importance of patients acting as a part of their own treatment team, and two

items on the importance of patients' abilities to find information independently (Hibbard et al., 2010). The CS-PAM has acceptable reliability and can differentiate between clinicians based on their beliefs and attitudes about the importance of patient self-management competencies and behaviors. However, it measures clinicians' subjective judgments and not their actual behaviors. In addition, the scale based on the Chronic Care Model, which is more suitable for managing chronically ill patients, is not appropriate for measuring the attitudes of patients and healthcare providers in hospitals. Therefore, it is insufficient for measuring clinicians' actual abilities to engage with patients. It is mainly focused on physicians and so is of limited use when applied to nurses.

The PCC scale measures the patient-centered care competency of clinical nurses Hwang (2015). It consists of 17 items of which six items are about patients' perspectives, five are about patient involvement in care processes, three are about providing patient comfort, and three are about advocating for patients. It was evaluated on 594 nurses and its internal consistency has a Cronbach's α of 0.92. A study confirmed the content measuring nursing competency in patient-centered care. However, many items are difficult for respondents to understand because they are unfamiliar with the concepts being asked about. For example, in the statements "I am willing to support patient-centered care for individuals and groups with values that differ from mine" and "I describe strategies for empowering patients and families in all aspects of the nursing process," if respondents do not understand what patient-centered nursing and empowerment are, then they could not respond accurately. In addition, the items related to providing patient comfort were limited to pain.

Furthermore, its construct validity has not been tested.

The PCNC scale measures how patient-centered a hospital's nursing culture is and was specifically designed for use in South Korea (Shin & Yoon, 2019). It has 54 items that are divided into nine groups that are themselves divided into three levels. Level 1 addresses things that affect the hospital as a whole, including executive leadership, policy and procedures, and education system factors. Level 2 addresses things that affect nursing units, including intermediate managers, teamwork, and working environments. Level 3 addresses individuals, including their professional competence, how patient-centered their nursing activities are, and their values. The scale's internal consistency has a Cronbach's α of .96 and its Spearman-Brown coefficient is relatively high at .80. This scale is meaningful in that it addresses patient-centered nursing cultures specifically in South Korea and that it addresses factors related to the hospital as a whole, including organizational culture. However, the scale assumes that respondents "have sufficient clinical knowledge to perform patient-centered care" and only asks about respondents' subjective opinions regarding the appropriateness of certain activities and actions. Thus, respondents who do not properly understand certain concepts may not respond accurately. However, in evaluating organizational culture in terms of nurses' competence, this scale ignores other external factors, such as management and policies. Moreover, it is relatively long.

Scales that measure patient engagement from both patients' and healthcare providers' perspectives were examined through a literature review, which showed that these Scales are insufficient for measuring patient engagement (Graffigna et al., 2015). The

scales that measure patient engagement from the patient's perspective only examine how much self-management patients do (Hibbard et al., 2004) or their psychological state relevant to their participation (Graffigna et al., 2015). However, they do not address physical, mental, and environmental factors that might affect the feasibility of patient engagement.

The recently developed Patient Engagement in Healthcare Questionnaire (Wu et al., 2019) measures patient engagement in terms of activities, such as communicating with healthcare providers, sharing information, participating in decision-making, and helping to prevent safety incidents. However, scales for measuring patient engagement from healthcare providers' perspectives measure how much they understand and support patients' self-care (Hibbad et al., 2010) and the hospital's patient participation culture (Malfait et al., 2016). They do not measure healthcare providers' roles in encouraging and inducing patient engagement. Among the scales developed in South Korea, the PCC (Hwang, 2015) was significant in that it measured patient-centered nursing competencies, but it uses terms that can be difficult for respondents to understand. In addition, it has only been validated by exploratory factor analysis, and validity was not secured.

Patient engagement scales from the patient's perspective continue to be developed in terms of content and depth. Scales for measuring nurses' competencies at understanding and encouraging patient engagement should be developed according to the increasing understanding of the importance of patient engagement. However, there are no scales for measuring patient engagement from the healthcare providers' perspective. Therefore, this

study was conducted to develop a scale for measuring nurse competencies related to improving patient engagement. This scale can be used to find ways to improve these competencies, which will lead to improved healthcare quality and health outcomes and greater roles for nurses.

Table4. Scales for patient engagement of health care provider perspective

Scale	Components (Number of items)	Total number of items	Reliability	Validity
Patient Participation Culture Tool for healthcare workers (PaCT-HCW) (Malfait et al., 2016) Measures the healthcare worker-related factors of patient participation and information sharing and dialogue in patient participation from the healthcare worker's perspective on general and university hospital wards	− Competence (9) − Support (9) − Perceived lack of time (4) − Information sharing and dialogue (18) − Factual questions (5) − Challenging questions (4) − Notifying questions (4) − Acceptance of a new role (7)	52	Cronbach's alpha .92	Kaiser–Meyer–Olkin Measure = 0.905 Bartlett's test of sphericity x^2=15,082.47; df = 1485; p < .001.
Clinician support for patient activation measure (CS-PAM) (Hibbard et al,. 2010) To explore clinicians' beliefs about patient self-management and specifically assess which patient competencies clinicians believe are most important for their patients.	− Importance of patients following medical advice (4) − Importance of patients making independent judgements and taking independent actions (4) − Importance of the patient being able to function as a member of the care team (4) − Importance of the patient independently seeking information (2)	14	Cronbach's alpha .86	N/ A

Table4. Scales for patient engagement of health care provider perspective(cont.)

Scale	Components (Number of items)	Total number of items	Reliability	Validity
Patient-centered care competency (PCC) scale (Hwang, 2015) Help to determine which elements of nurses' competency need to be emphasized in order to enhance the transition towards patient-centered care in nursing education and clinical practice	− Respecting patients' perspectives (6) − Promoting patient involvement in care processes (5) − Providing for patient comfort (3) − Advocating for patients (3)	17	Cronbach's alpha .92	N/A
Patient-Centered Nursing Culture (PCNC) scale (Shin and Yoon, 2019) Content analysis of how nurses in Korean hospitals experience and perceive patient-centered nursing culture (PCNC) to measure patient-centered nursing culture (PCNC) in the domestic medical environment and culture	− Top Management Leadership (5) − Policy & Procedure (5) − Education & Training in organization level (4) − Middle Management Leadership (8) − Supportive Teamwork (4) − Nursing Workplace Environment in nursing unit level (7) − Professional Competence (4) − Patient-Centered Nursing Activity (11) − Values of Nurses in individual level (6)	54	Cronbach's alpha .96	Kaiser–Meyer–Olkin Measure = 0.93 Bartlett's test of sphericity x^2= 12667.96, p < .001

3. Concept of nursing competency

Benner (1982) defined nursing competency as the ability to perform tasks with desirable outcomes in a variety of real-world situations. Benner (1984) places competencies in the middle of the continuum from beginner to advanced beginner, competent, proficient, and expert. Competent practitioners can consciously plan actions but lack flexibility and speed (Benner, 1984). Girot (1993) noted that the definition of nursing competence is divided into behaviors such as the ability to perform tasks and psychological constructs equal to cognitive, emotional, and psychomotor skills. However, these two senses were not mutually exclusive. For example, psychomotor skills determine your ability to perform tasks. Eraut & du Boulay (1999) distinguished competence as the ability to perform tasks and roles according to the expected standards of a particular job and an individualized set of abilities or traits of an individual. Eraut & du Boulay (1999) favored the former definition and suggested that abilities explain a person's thoughts or actions. However, Eraut & du Boulay (1999) acknowledged that knowing exactly what constitutes the expected competency criterion can be problematic.

Schwirian (1978) divided nursing competency into six areas: leadership, period issue, education, and cooperation, planning and evaluation, human relations/communication, and professional development. These six areas are included in the standards for nursing practice for registered nurses in the United States. (American Nurse Association, 2010).

Looking at the definition of nursing competence in previous studies, Campbell & Mackay (2001) described it as 'the ability to effectively meet the overall demands of the nursing role'. It refers to the combination of knowledge, skills, motivation, and attitude required in various clinical settings. In other words, it has been suggested as an important internal characteristic factor for an individual to adapt to a new environment and perform advanced professional practice (Zhang et al., 2001). O'Shea (2002) defined it as 'having the skills, abilities, and experience necessary to perform nursing'. In the United States, the Nursing Practice Act defines the competence of registered nurses as 'the application of the knowledge, interpersonal skills, decision-making, and psychomotor skills expected when performing a role in practice within the context of public health, safety, and welfare'. (National Council of State Boards of Nursing, 2011).

The positive results obtained by systematically evaluating nurses' competencies and developing competencies based on them can enhance nurses' confidence as professionals, and foster nurses with autonomous authority and responsibility. In addition, these changes can lead to nursing practice, which can help the subjects gain competitiveness by securing differentiated qualitative nursing services and excellent human resources. In other words, personal competence of nurses and other professionals is an important factor in excellent performance within the organization, and job competency itself can increase the level of competency, completeness, and scope depending on the degree of experience and education (Spenser & Spencer, 1993). Therefore, nursing competency should be able to be the basis for developing future-oriented nursing

professionalism to adapt to and cope with the rapid development of medicine, nursing and overall health care (Ko et al., 2013).

Patient-centered care or patient engagement nursing competency is not specifically specified. Although QSEN (Cronewett, et al., 2007) defined the patient-centered care nursing competency by including 11 knowledge, 15 skills, and 15 attitudes and further defined as “recognize the patient or designee as the source of control and full partner in providing compassionate and coordinated care based on respect for patient’s preferences, values, and needs.” In terms of nursing competency of patient-centered care, it is said that it is necessary to understand and integrate various dimensions of patient-centered care, recognize social values in consideration of cultural and social backgrounds, and have a comprehensive understanding based on pain and comfort models (Lusk, & Fater, 2013). In addition, it is necessary to examine whether stability and cost-effectiveness of medical care can be improved through active participation of patients and families. It is also important to identify factors that hinder the involvement of patients and families, and to explore how to apply patient-centered nursing ethically and legally. It is also essential to know how to explain the boundaries of therapeutic patient-centered nursing and establish basic principles for effective communication and resolving conflicts when they arise. Finally, it was said at the nurse's coordination ability considering the continuity and integration of treatment is included in the patient-centered nursing competency.

In terms of nursing competency of patient-centered care skills:(1) nurses should have skills to conduct clinical interviews, nursing performance and evaluation based on the

patient's preferences and values. (2) Skills to communicate the patient's needs with other health care team members are essential. (3) In addition, nurses should have skills to demonstrate sensitivity to patient-centered care and to show respect for the diversity of each patient's experience. (4) Skills to assess the patient's pain and suffering, to evaluate the patient's physical and emotional state and determine the level of pain relief expected by the patient and family, and to provide care in a patient-preferred manner to reduce pain and improve well-being by engaging surrogates as required are important. (5) Skills should also include the content that the boundaries of the therapeutic relationship should be recognized and the consent process for treatment should be facilitated.

Lastly, in terms of nursing competency of patient-centered care attitudes, nurses should look at the situation from the patient's point of view, encourage patients to express their personal opinions, and acknowledge that patients are experts who know their health best. It should be recognized that the values and needs of each patient may vary according to cultural and social backgrounds, and it should be respected, assessed for pain and suffering relief, and ensured to achieve the patient's expectations. Also, nurses value partnerships, engage patients and surrogates in the nursing process, solve problems through a shared decision-making process, and communicate constantly.

To summarize the patient-centered nursing competency emphasized by QSEN, the patient's diversity should be respected, accepted, and applied to nursing practice. Patients and surrogates should be involved in the care process through continuous communication and shared decision-making. Nurses need to recognize the importance of improving the

patient's pain and comfort.

There has been no study that confirmed the patient engagement competency for general nurses among the previous studies conducted so far. However, through the study of Deyo et al. (2016), it was possible to identify the competency of nursing managers for patient engagement. Nurse managers knowledge, skills, and abilities that can be leveraged to improve patient and family engagement were five domains: communication and relationship building, knowledge of healthcare environment, leadership, professionalism, and business skills, consisting of 15 competencies. An effective health care model should be established by creating a shared vision within the health care system for patient and family engagement and assessing the patient's capacity to engage. Although the overall contents were similar to the competencies presented in QSEN (Cronenwett, et al., 2007), in this patient engagement competency for nurse managers, the scope of patient engagement was expanded by including contents on how to engage patients in the system from the organizational point of view as the competency contents of nursing managers. In addition, it is differentiated from the existing patient-centered care competence in that it reflects the competence required in the present era while emphasizing the need to enhance patient engagement by utilizing information technology applicable to patient care (Deyo et al., 2016).

As a result of reviewing the patient-centered nursing competency and the nursing manager's ability to improve patient engagement, the common contents of the competency were identified. However, it was not adequate to ensure the specific criteria for the

assessment of nurse competency in clinical practice. In particular, the existing patient-centered care nursing competency reported in 2007 lacks the content regarding an information system that actively induces patient engagement through information sharing with patients in the current clinical environment. Therefore, it was identified that the utilization of available resources is a part that needs to be included in nursing competency for improving patient engagement.

III. CONCEPTUAL FRAMEWORK

1. Interactive care model

The theoretical framework of this study was based on the ICM (Drenkard et al., 2015). The ICM was developed in response to the fact that patient engagement was becoming an increasingly important part of healthcare and that existing models had limited explanatory ability related to patient engagement. The key difference between the ICM and related models is that it views patient engagement from an operational perspective rather than a theoretical perspective. The ICM explains how patients should engage given their individual autonomy, the financial aspects of healthcare, and changes in communication as the result of technological development (Millenson & Macri, 2012).

The first driver is the fact that each individual has the right to act autonomously (Millenson & Macri, 2012). Healthcare providers have been educated and socialized to provide care, but to fully engage patients, they must shift their focus from maximizing healthcare outcomes to giving patients more control over their healthcare. The second driver is the financial aspect, which must be considered because new changes within the health system are perceived as improving health outcomes (United States House of Representatives, 2010). Engaged patients can better often judge the costs and benefits of reaching a particular state of health than healthcare providers can. Therefore, it is necessary to focus on changes that benefit both healthcare providers and patients according to individual health outcomes (Millenson & Macri, 2012). The third driver is communication. The way that healthcare providers and patients exchange information is changing as a result

of technological development. In the future, patients may record information directly in their medical records and imaging may become more common. Communication between patients and healthcare providers will become easier and more effective.

The ICM's parental theory is the open system theory (Levasseur, 2004). The ICM's outer ring includes population, international health, community preparation, clinical environment, and healthcare system. These factors affect individual families and healthcare teams. The main outcome of the process is the formation of partnerships between healthcare providers, individuals, and their families. These partnerships are the most important vehicles through which patients engage in their own healthcare. The ICM holds that patient engagement outcomes are the result of five factors: degree of participation, information exchanges, planning, intervention decisions, and regular evaluations (Fig. 1). These factors show how patients engage in their own healthcare as a result of environmental factors and their individual values, needs, preferences, and abilities; how such engagement affects their health and quality of life; and how patients and their families should be viewed as partners in providing healthcare. It also explains that patients and healthcare providers' interactions for 8 reasons: personal preferences based on cultural values, health literacy, motivation, disease, psychosocial support, preventive health maintenance strategies, safety, and using technology for healthcare.

Chronic disease management is a key part of public health. Relationships between patients and healthcare providers is an important part of achieving healthcare goals, improving healthcare quality, and reducing related costs. The ICM provides a conceptual

framework for understanding how patient engagement affects health outcomes. It shows that healthcare quality, safety, and performance can be improved by assessing patients' abilities to engage in their own healthcare, providing them with personalized interventions, and through partnerships between patients and healthcare providers. However, in order to achieve these goals, both patients and healthcare providers will have to adapt to a paradigm shift to promote patient engagement.

ICM is mainly composed of five encounters. First, the assessment of an individual's capacity to engage. General patient circumstances refer to the patient's medical records and physical symptoms. However, patient assessment in ICM includes patient activation and health literacy from a further perspective. The assessment of patient participation capacity should be based on the patient's needs, values, and preferences. These individual characteristics are organically correlated with other factors and the patient's circumstances. For example, to provide tailored education to patients, an appropriate assessment of the patient's condition regarding how much patient engagement is possible must first be made.

Second, information exchange and communication choices. The data collected through patient assessment will be used to form partnerships with patients, communicate, and make shared decisions. In contrast to traditional care, partnering is a skill emphasizing health service providers in the person-driven model (Bernabeo & Holmboe, 2013). Information exchange needs to occur in an egalitarian relationship recognizing the expertise of both parties. This will require a shift in thinking for clinicians into a more equal partnership with the person in control of their health decisions. It has been confirmed

through many previous studies that shared decision-making between patients, and medical staff produces positive results (Bernabeo & Holmboe, 2013; Légaré, & Witteman, 2013; Friedberg, Van Busum, Wexler, Bowen & Schneider, 2013). Individual patients should share their values, beliefs, and preferences with health care providers. Health care providers should listen to understand patients' preferences, provide individualized evidence for treatment plans, and help decipher health alternatives. Health care providers should consider their patients' low health literacy and passive attitude and not make joint decisions. Despite these obstacles, health care providers must educate their patients about their options by encouraging information exchange. Providers must adjust their communication and education methods to meet each patient's needs.

Third, panning between patients and healthcare providers. A crucial element of creating an effective health management plan is the determination of goals and aspirations in the care process. For appropriate interventions and successful measures, health care providers should establish mutual goals and agreed-upon outcomes—the more involved patients in their treatment planning process, the greater their sense of accountability and engagement. Not only healthcare providers but also families and caregivers and should be partners in the treatment process and assist patients in promoting self-management behaviors. In the future, there will be a greater variety of treatments outside the traditional setting, and resources should be made available to all health-related institutions, including technology. At that time, medical personnel should be able to help identify and utilize appropriate information and technical resources.

Fourth, determine appropriate interventions. Appropriate interventions should be determined according to the individual's level of participation and the patient's readiness for self-management. Interventions that provide health interactions and education through mobile and other technologies help patients improve self-management. Education is an essential strategy for strengthening self-management. Education tailored to an individual's level of health literacy is vital (Koh, Brach, Harris & Parchman, 2013). People should be educated on navigating their treatments and making the best use of the health care system (Gruman et al., 2010). Healthcare providers should consult with patients, respond to individual health concerns, and teach them to identify problems early. Suppose people learn to talk to their health care providers before an acute health episode occurs.

In that case, they can proactively manage the condition while reducing complications, reducing readmissions, and improving their health. Interaction and knowledge acquisition across the care continuum can improve processes. In particular, technology can provide a platform to share health problems with medical staff and patients. Patient engagement can be enhanced by using technologies that enable individuals to manage their health from healthcare providers, such as educating patients about prescription drugs, disease-focused or preventative methods, reminders, and alarm sounds. Patients who can track drug use, schedule appointments, receive training, and contact clinicians regularly through this platform are more involved in the treatment process and decision-making process (Coulter, 2011; Martin, 2012; Nease, Frazee, Zarin, & Miller, 2013). In addition, the ability to contribute and validate EHR can also help people manage

their care, potentially improving outcomes. As people understand how to access health care based on their needs most effectively, costs should decrease, and the quality of care should improve.

Lastly, evaluate regularly. Evaluation of outcomes is essential to test the effectiveness of treatment. From an individual point of view, data such as test results, weight, drug use, blood pressure, and a systematic point of view, the number of emergency room visits and hospitalization or readmission rates can be used as objective performance indicators. In summary, the ICM provides a framework for interventions tailored to the patient's engagement capacity to be delivered most effectively. It improves the quality, safety, and care outcomes while enabling patients to engage in their care and forge strong partnerships between patients and healthcare providers. The roles of individuals and healthcare providers must shift to embrace the changing paradigm of individual and family engagement.

Figure 1. Interactive care model (Drenkard, Swartwout, Deyo & O'Neil, 2015)

2. Conceptual framework of this study

This study's framework was based on the ICM and was designed to identify the characteristics that an inventory for measuring nurses' competencies related to patient engagement should have (Fig. 2). The main concept was developed based on the literature and the framework's capabilities were confirmed according to the ICM's process and encounters (Drenkard et al.,2015).

Figure 2. Conceptual framework of this study

The conceptual framework of the tool to be developed in this study was based on the ICM model and so will feature a cyclical process consisting of the following five encounters: assessing patients, building partnerships, planning for patient engagement, determining interventions, and evaluating patient engagement.

IV. METHODS

1. Study design

This study is a methodological research design to develop and validate an inventory that measures nurses' competencies related to improving patient engagement.

2. Study procedures

This study's inventory development and validation process were carried out according to the scale development process suggested by DeVellis (2016) (Fig. 3). The preliminary items of the scale are derived based on the component elements of the inventory through the theoretical and fieldwork phase, their possible responses were determined, and the scale's content validity was tested by experts. The preliminary items of the inventory was then given to 20 nurses who were then currently providing care to patients in hospitals for pre-test. Changes were made based on the results of this pre-test and then the preliminary inventory was tested for its validity and reliability. The inventory was finalized based on these results.

2.1. Factor identification that constitute nurse competency to improve patient engagement

2.1.1. Theoretical phase

A systematic literature review on studies about nurse competency measurement tools used to improve patient engagement identified the competencies that nurses need to improve patient engagement. The literature review was conducted using the Pubmed, CINAHL, Web of Science, and SCOOUS databases using forward searching. We searched

titles, abstracts, keywords, and subject headings of articles written in English and Korean that were published before April 1, 2020 using the following search term: "'patient engagement' AND 'nursing.'"

A total of 813 articles were returned of which 650 duplicates were removed. Of the remaining 163 articles, 42 were about patients and 93 were about medical staff, including nurses. Among those 135 studies, 40 were excluded because they did not involve direct interventions by medical staff, 44 because they did not include the concept of patient engagement, and 10 because they were not quantitative or qualitative. The remaining 41 studies' abstracts were reviewed to determine whether they addressed nurses' competencies for improving patient engagement. The final analysis included six qualitative studies, and three experimental studies

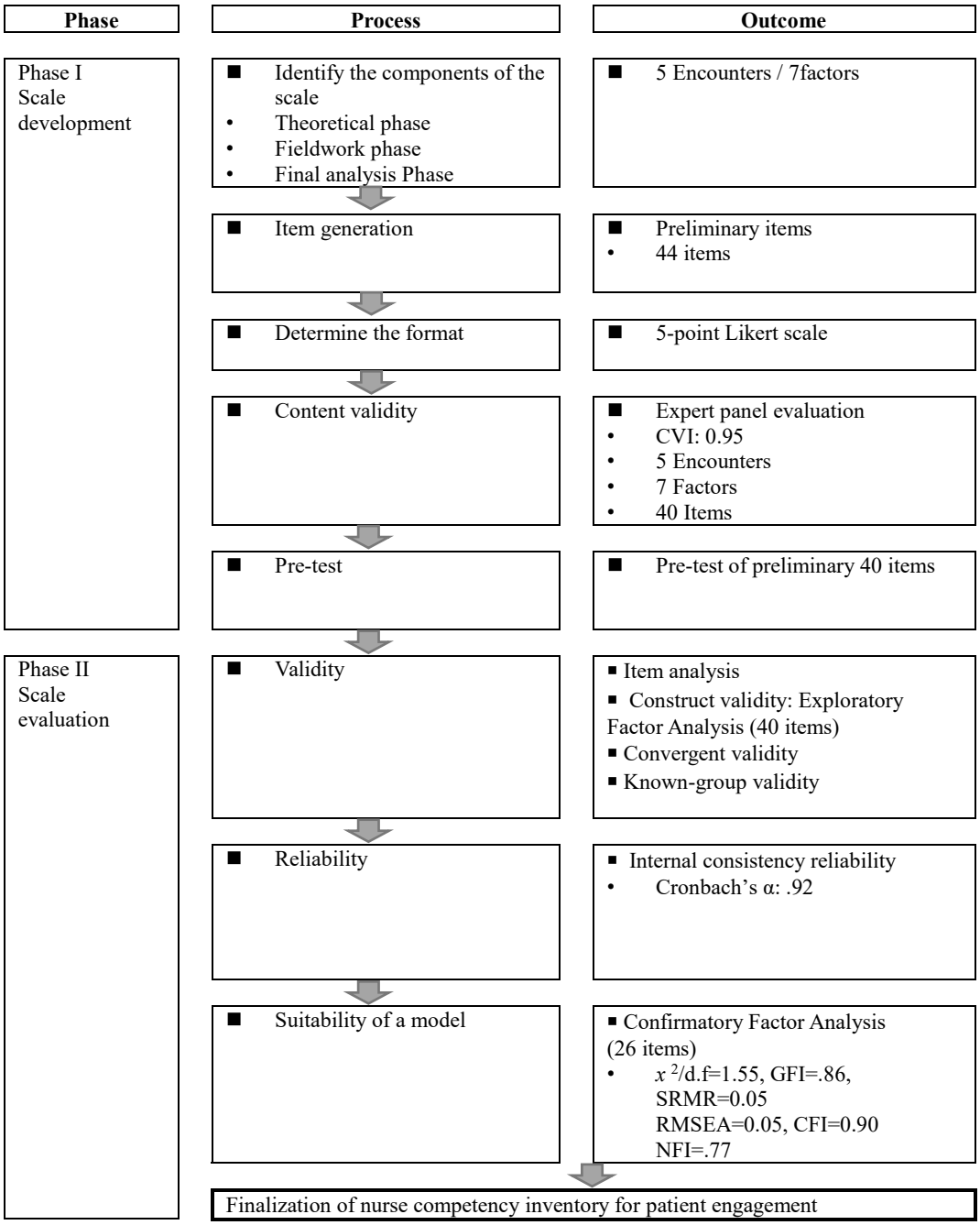

Figure 3. Development processes of nurse competency inventory for patient engagement (NCIPE)

2.1.2. Fieldwork phase

The fieldwork phase, in-depth interviews were conducted to determine whether the properties, uses, and scales identified in the theoretical phase were carried out in the same in the real world.

1) Setting and participants

In-depth interviews were conducted using the clinical career ladder (Benner, 1982) with career criteria specific to South Korea (Cho et al., 2015). Interviewees had to have at least 3 years of professional experience as competent, providing direct care in general hospitals with over 300 beds. Nurses' competencies for improving patient engagement can best be observed in hospitals where frequent interactions occur there between nurses and conscious patients (Malfait et al., 2016). Nurse managers and nurse administrators were excluded. Interviews were conducted with six people (Schwartz-Barcott & Kim, 2000). All interviewees were female, their average age was 31.66 ± 3.44 years old with a range of 26–35 years old, and they had an average of 8.16 years of professional clinical experience (Table 5). At the time of their interviews, two of the participants worked in emergency rooms, one in a delivery room, one in a surgical intensive care unit, and two in nursing care units in integrated service wards.

Table 5. General characteristic of in-depth interview participants (N=6)

ID	Gender	Age (yrs)	Education	Current work department & Experience(yrs)	Past work department	Total Clinical Experience (yrs)
1	Female	35	Bachelor	Emergency room (2)	Medical intensive care unit	10
2	Female	26	Bachelor	Emergency room (3)	-	3
3	Female	31	Bachelor	Delivery room (2)	Surgical unit, Rehabilitation unit	8
4	Female	30	Bachelor	Surgical intensive care unit (7)	-	7
5	Female	33	Bachelor	Comprehensive nursing care service ward (3)	Surgical unit, Medical unit	10
6	Female	36	Master	Comprehensive nursing care service ward (3)	VIP unit, Psychiatric unit	11

2) Data collection

A convenience sample of six participants was recruited from December 2020 to January of. Interviews were conducted face-to-face or via the WebEx video conferencing application to avoid the risk of infection. The interviews took approximately 1–1.5 hours and they were conducted in quiet conference rooms. Before the interviews, the purpose and method of this study were explained to the participants. After confirming that the participants understood this information, their consent to participate was obtained before proceeding. Participants were informed that the interviews were recorded and their consent was obtained for such. They were also told that additional interviews may be necessary. A predetermined fee of USD 90 was provided to participants.

3) Data analysis

The interviews were analyzed using the method developed by Colaizzi (1978). Abstracting was conducted step by step to identify participants' common statements.

2.1.3. Final analysis phase

In the final analysis phase, nurses' competencies for improving patient engagement were identified based on the results of the theoretical and fieldwork phases.

2.2. Development of a preliminary nurse competency inventory for patient engagement

2.2.1. Item generation

The preliminary items were composed based on nurses' competencies for improving patient engagement as determined by the literature review and in-depth interviews. There were approximately 1.5 times as many preliminary items as were expected to be in the final scale (Devellis, 2016). Items were phrased using interviewees' expressions as much as possible to reduce the researcher's influence and were phrased in an ordinary way. A total of 44 items were generated based on five encounters and seven factors. The total number of items was reduced to 40 after content validity testing by eight experts.

2.2.2. Format

All items could be responded to along a Likert scale and were reviewed to determine the appropriate scale formant. Each question could be responded to along a 5-point scale in which 1 = significantly disagree, 2 = disagree, 3 = neither agree nor disagree,

4 = agree, and 5 = strongly agree, which is commonly used to measure things like competencies and concepts related to patient engagement.

2.2.3. Content Validity

Content validity is the degree to which an instrument's items adequately reflect the constructs they are measuring (Mokkinket al., 2010). The content validity of the proposed scale was assessed using the item-level content validity index (I-CVI) (Polit et al., 2007). A panel of eight nursing experts was convened for this purpose of whom one was a patient safety expert, three were nursing faculty, and four had over 10 years of experience. They rated the relevance of the initial 44 items to nurses' competencies for improving patient engagement on a 4-point scale in which 1 = "not relevant," 2 = "somewhat relevant," 3 = "relevant," and 4 = "strongly relevant." I-CVI was defined as the proportion of panelists who answered that the item was either "relevant" or "strongly relevant."

Items whose I-CVI exceeded 0.78 were considered sufficiently relevant for inclusion in the proposed tool. In addition, open questions were asked of the panel to identify the items' jargon, reading level, and ambiguity, which resulted in two items being modified to increase their comprehensibility. The content-validated items were composed as a self-administered scale and each could be responded to along a 5-point Likert-type scale with 1 = "not really" to 5 = "very much" with higher scores indicating greater competency at improving patient engagement. None of the items were reverse-scored. Items that had a CVI value of 80% or more as a result of the test were unmodified while all others were deleted or modified based on the discussion of experts. The preliminary

inventory then consisted of 40 items across seven factors.

2.2.4. Pre-test

A pre-test of the preliminary inventory was conducted with 20 nurses with at least three years of relevant professional experience as suggested by Lynn (1986) and the clinical career ladder (Benner, 1982) reflected the career criteria for South Korea (Cho et al., 2015). Accordingly, a pre-test was conducted for 20 nurses who deliver direct care with more than three years of experience working in general hospitals with more than 300 beds located in the capital and capital areas. Of the 20 pre-test participants, 18 were from capital and two were from capital areas; 19 were women and 1 was a man; their education ranged from a bachelor's degree to above a doctoral degree; they had an average total clinical experience as a nurse of 8.58 years with a range of 2.16–5.42 years; five worked in the adult internal medicine ward and the rest worked in the emergency room, adult intensive care unit, childbirth room, or nursing care integrated service ward.

2.3. Validity and reliability of preliminary nurse competency inventory for patient engagement

A survey was conducted to test the validity and reliability of the preliminary inventory. Item analysis, exploratory factor analysis, confirmatory factor analysis, convergent validity, known-group validity were conducted to confirm the inventory's validity and internal consistency were conducted to determine its reliability.

2.3.1. Survey administration

1) Participants

Participants were selected using the stage of clinical competence (Benner, 1982) using criteria for South Korea (Cho et al., 2015). Experts require at least 7 years of professional experience, proficient professionals require 5–7 years, competent professionals 3–5 years, advanced beginners 1–3 years, and beginners less than 1 year. Those classified as above competent were eligible to participate. Nurses who worked in departments that do not provide direct nursing care to patients, such as in operating rooms, labs, nurse administration departments, and outpatient departments, and nursing managers were excluded.

2) Data collection

A convenience sample of 422 participants was recruited from September 9, 2021 to October 3, 2021 through an online survey. Nurses working in hospitals with more than 300 beds were surveyed remotely to protect them from the risk of COVID-19 infection and for their convenience. Participants were told about the study's purpose, necessity, period, participants, methods, expected effects, risks, confidentiality, anonymity, spontaneity, and retraction using the nursing department and the online nursing communities I am a Nurse and Gandaemo. Recruitment notices were sent out through notification delivery channels related to the Hospital Nursing Departments that agreed to data collection, including online bulletin boards, hospital intranets, and KakaoTalk messenger chat rooms. Participants accessed the survey through a link. Participants from the online communities could access

the survey through a bulletin board link.

3) Ethical consideration

This study was conducted after obtaining approval from the Research Ethics Review Board of the Severance Hospital of the Yonsei Medical Center (approval number: Y-2020-0191). This study's purpose and methods were explained to the participants. If they gave written consent to participate in the study, they were informed that consent could be withdrawn at any time.

4) Data analysis

Data was analyzed using the SPSS for Windows version 25 and AMOS. For the cross-validation of factorial construct validity, the total sample was split into two subsamples using the SPSS random-assignment function. Subsample 1 was used for EFA and Subsample 2 was used for CFA. The number of cases included in each subsample (n = 211) satisfied the EFA requirement the sample be five times as large as the number of items being subject to EFA (Tinsley, 1987) and the CFA requirement that there be at least 200 cases (Cappelleri et al., 2014).

2.3.2. Item analysis

Items with low discriminatory power or similar items were removed through analysis of the mean and standard deviation of each item, skewness, kurtosis, total–item correlation and inter–item correlation, and items that threatened reliability (DeVellis, 2016). The mean and standard deviation mean that on the 5-point Likert scale, the average of the items is close to the extreme values of 1 to 5, or if the standard deviation is small, it means

that the item has low discriminating power. Items with a deviation of 0.75 or more are appropriate (Meir & Gati, 1981). Skewness and kurtosis were analyzed to measure the normality of the data. Curran et al. (1996) stated that normality is satisfied when the absolute value is less than 2 for skewness and less than 4 for kurtosis. The item-total correlations were seen to be within .30 to .70 and can be considered acceptable (de Vaus, 2004).

2.3.3. Construct validity

1) Exploratory factor analysis

For the cross-validation of factorial construct validity, the data was split into two sub-samples using the SPSS random assignment function. Subsample 1 was used for exploratory factor analysis (EFA). These subsamples satisfied the requirement that the sample be five times as large as the number of items being subject to EFA (Tinsley, 1987). Prior to conducting EFA, Bartlett's test of sphericity and the Kaiser-Meyer-Olkin test were conducted to determine whether the data was factorable (Tabachnick & Fidell, 2013). EFA using principal-components analysis with varimax rotation was performed to explore the factors' underlying structure. Factors with an eigenvalue > 1 were extracted. Results were considered to be good when at least 60% of their variance was explained by the identified factors (Polit & Yang, 2016). Factor loadings were considered significant when they were > 0.45 (Comrey & Lee, 1992). Items were considered communality when their h^2 score was > 0.4 (Costello & Osborne, 2005).

2) Confirmatory factor analysis

The fit of the factors' underlying structure was cross-validated with Subsample 2 using CFA. The fit of the CFA model was assessed using the following fit criteria: a normed x^2/df < 3, a root-mean-square error of approximation < 0.08, a standardized root-mean-square residual < 0.05, a goodness-of-fit index > 0.90, a comparative fit index > 0.90), and a normed fit index > 0.90) (Hu and Bentler, 1999; Kline, 2005).

3) Convergent validity

Convergent validity was determined using Pearson's correlation. Items were determined to have internal consistency reliability with corrected item-total correlations = 0.30–0.80 and a Cronbach's of $\alpha > 0.70$ (Pett et al., 2003). The convergent validity between factors in this study was confirmed using the Independent Care Scale version B (Jeong & Park, 2019), which measures the relationships between nurses and patients in hospital environments. The correlation between scales was calculated using the Pearson correlation coefficient.

4) Known-group validity

For the known-group validity test, participants were placed into two or more subgroups according to rational criteria to determine whether these groups' concept of interest scores would differ (Pilot & Yang, 2015). According to Benner's stages of clinical competence (Benner, 1982), using criteria for South Korea (Cho et al., 2015), participants were classified as competent with 3–5 years of experience, proficient with 5–7 years of experience, and expert with seven or more years of experience. Known-group validity was tested by checking whether there was a difference between these groups' competency for

patient engagement scores through ANOVA and post hoc tests.

2.3.4. Reliability: Internal consistency reliability

Internal consistency reliability was determined by a corrected item-total correlation of $r = 0.30–0.80$ and a Cronbach's of $\alpha > 0.70$ (Pett et al., 2003).

V. RESULTS

1. Factor identification that constitute nurse competency to improve patient engagement

1.1. Theoretical phase

The definition nurses' competencies to improve patient engagement were defined broadly as "the ability to identify individual patients' physical and psychological conditions, preferences, values, and beliefs and encourage patients to actively express their intentions in the treatment process through personalized education and information-sharing."

A literature review was conducted to identify factors of nurses' competencies that improve patient engagement in studies about patients and nurses (Table 6). (1) assessment of patients' physical and psychological conditions, preferences, values, and beliefs; (2) ability to encourage and create a comfortable atmosphere for patients, (3) cooperate with other healthcare providers and patients' families; (4) have a consistent attitude about and respond positively to patient engagement; (5) share information; (6) utilize appropriate technologies; (7) engage in active listening and patient-centered communication; (8) provide personalized education, and (9) develop their own knowledge and attitudes regarding patient engagement (Table 7).

Table 6. The literature review results of patient engagement research

Author(year)	Aim	Method	Sample characteristics	Results	Components of a nurse competency for patient engagement
Greysen, et al. (2020)	To understand patient perceptions of using a portal during an episode of acute care and explore patient-perceived barriers and facilitators to portal use during hospitalization	Thematic analysis. All patients received a tablet with a brief tutorial, pre- and post-use surveys, and completed in-person semi structured interviews. Qualitative data were coded using	Enrolled 97 participants: 53 (53/97, 55%) women, 44 (44/97, 45%) nonwhite with an average age of 48 years (19-81 years), and the average length of hospitalization was 6.4 days	− Access: Hospitals Should Provide Access to a Device and Bring-Your-Own-Device Platform to Access the Portal − **Orientation:** Hospitals Should Provide an Orientation on How to Use the Device and the Portal − Usability: Hospitals Should Ensure Portal Content is Up to Date and Easy to Understand	− **Education** for using new devices
Caldwell, et al. (2020)	Medical patients' first few IHC(integrative health coaching) sessions to identify the Actual processes used to help patients embrace this more active learning role	Thematic analysis. The patients participated in 6 months of IHC as part. A larger integrative intervention Randomized, controlled pilot designed to assess feasibility for a larger randomized, controlled trial on	26 patients with severe dysfunction from tinnitus	− **Describing** the Health Coaching Process to patients − Using **Key Procedures** for Action Planning − **Supporting** Action and Building Momentum − **Active Listening** and Inviting the Patient to Articulate Learning	- **Education** - Wheel of Health to **broaden the patient's perspective** - **Self-determined goals** - **Active listening**

Table 6. The literature review results of patient engagement research

Author(year)	Aim	Method	Sample characteristics	Results	Components of a nurse competency for patient engagement
		the clinical effectiveness			
Schenk et al (2019)	Explored the perceptions and attitudes of patients and family members and several clinical disciplines toward patient engagement in reducing preventable harm in hospitalized patients.	Thematic analysis, qualitative study 8 focus groups at 2 nonprofit hospitals	(1) recently hospitalized patients and their family members (n = 14), (2) registered nurses (n = 9), (3) physician hospitalists (n = 6), and (4) physical therapists and pharmacists (n = 8)	− Value of family engagement − **Challenge of the hospital environment** − Significance of **communication**	− **More equal partnership** − **Communication** − **Active listening**
Ren et al. (2019)	To explore the perceptions of patients with tuberculosis (TB) regarding their engagement in health care	Thematic analysis, Semi-structured, audiotaped interviews were conducted and analyzed using	Twenty-three patients participated in the study	− Devaluing engagement − Interacting with health care providers (HCPs). − Facing inability (lack of information) − Seeking external support	− Educating **positive attitude** of patient engagement − collaboration between health care providers and patients**(communication)** − Important to identify **personalized ways of engaging patients** when engagement is appropriate and does not constitute an unwanted burden for them − Making **support system (peer, family)**

Table 6. The literature review results of patient engagement research

Author(year)	Aim	Method	Sample characteristics	Results	Components of a nurse competency for patient engagement
Singh et al. (2019)	Exploring the communication themes of patient engagement from the perspective of nurses in a multi-specialty hospital in Delhi.	Thematic analysis. All patients received a tablet with a brief tutorial, pre- and post-use surveys, and completed in-person semi structured interviews. Qualitative data were coded using	12 nurses, observation at receptions of ICUs and emergency department	− Attendant's role − Communicating with patients of different categories − Doctor's support to nurses − Nurse action − Nurse behavior − Nurse challenges − Patient actions − Patient emotions − Wider role of nurses	− Managing care giver − **Communication** skills with various patients from different health conditions − Relationship with other health care team members − **Encouraging patients** to ask − **Emotional ability** − **Managing barriers** − **Cognitive ability for patients' behavior and feelings**
Jerofke-Owen & Dahlman (2019)	To examine patients' experiences and preferences for engaging in their healthcare while hospitalized.	Semi structured interviews, Inductive thematic analysis	Seventeen patients, eight male and nine female, aged between 19–83 years old were interviewed	− Sharing the subjective − Involvement of family − Information-gathering − Constraints − "I let them take care of me" − Variability	− Sharing subjective **information** − **Engaging family** − Providing information − **Comfortable atmosphere** − **Therapeutic relationship**
Martello et al. (2018)	To explore nurses' perceptions of engaging with patients to reduce the use of restrictive practices in an inpatient psychiatric unit.	Qualitative-descriptive study	6 nurses work at inpatient psychiatric unit	− Welcoming collaboration from the beginning − Building a therapeutic alliance − Regaining sense of control	− **Collaboration** − **Establishing a trusting relationship** − Encouraging patients to voice

Table 6. The literature review results of patient engagement research

Author(year)	Aim	Method	Sample characteristics	Results	Components of a nurse competency for patient engagement
Dykes et al. (2017)	Examines the effectiveness of a patient-centered care and engagement program in the medical ICU.	Prospective intervention study. The Promoting Respect and Ongoing Safety through Patient Engagement Communication and Technology (PROSPECT) intervention was a systems-based patient-centered care and engagement program that was introduced to physicians and nurses	Two thousand one hundred five patient admissions (1,030 before and 1,075 during the intervention)	− The aggregate adverse events fell 29%, from 59.0 per 1,000 patient days (95% CI, 51.8–67.2) to 41.9 per 1,000 Patient days (95% CI, 36.3–48.3; $p < 0.001$), − Satisfaction improved markedly from an overall hospital rating of 71.8 (95% CI, 61.1–82.6) to 93.3 (95% CI, 88.2–98.4; $p < 0.001$) for patients and from 84.3 (95% CI, 81.3–87.3) to 90.0 (95% CI, 88.1–91.9; $p < 0.001$)	− Team communication − **Sharing information** − Encouraging patient to communicate with providers − **Technology skills**
Barello et al. (2017)	Pilot feasibility study and preliminary participants outcomes for nurse education training in patient engagement strategies (NET-PES)	Pilot feasibility study pre-post pilot evaluation of NET-PES	46 nurses working with chronic conditions	− Clinician Support Patient Activation Measure, Clinicians Competence in Patient Engagement Strategies, Participants' experience and satisfaction questionnaire significantly improved	− Nurses' knowledge and skills to engage patients in their care − Nurses' competences in patient centered communication and relational skills

Table 7. Identified factors of a nurse competency for improving patient engagement

Author(year)	1	2	3	4	5	6	7	8	9
Greysen, et al. (2020)						O			
Caldwell, et al. (2020)					O		O	O	O
Schenk et al (2019)		O					O		
Ren et al. (2019)	O	O	O	O			O		
Singh et al. (2019)	O	O	O				O		
Jerofke-Owen & Dahlman (2019)		O	O	O	O				
Martello et al. (2018)		O	O				O		
Dykes et al. (2017)					O	O	O		
Barello et al. (2017)	O						O		O

1. Patients' Physical & Psychological Conditions, Preferences, Value & Beliefs; 2. Emotional ability to encourage and create a comfortable atmosphere for the patients; 3.Cooperation with other healthcare providers and family; 4.Consistent attitude and a positive response to patient engagement;5. Information sharing; 6.Ability to manage new technologies; 7. Active listening and patient-centered communication; 8. Providing personalized Education; 9. Cultivation of Knowledge and attitudes regarding patient engagement

1.2. Fieldwork phase

The provisional appropriate definition derived according to the nurse's competency components and factors for improving patient engagement derived from the field work phase is "the ability to transform patients into active subjects in the treatment process through knowledge, attitude, and skills development."

According to the definition of competency in OECD (2002), competency were identified by focusing on three factors; cognitive skills and non-cognitive abilities such as knowledge, skills, and attitudes to improve patient engagement in the fieldwork phase (Appendix 1). As a result, 19 attributes were identified in the three factors of knowledge, skill, and attitude. To improve patient engagement, nurse's knowledge has three attributes (concept and necessity of patient engagement, medical and nursing knowledge, knowledge related to new information technology). Skill has seven attributes (identification of patient's physical/mental participation possible status, the patient's identifying personal characteristics and needs, basic nursing skills, personalized communication, sharing decision making, sharing specific and accurate information, setting the possible range of patient participation. Attitudes have ten attributes; self-development, caregiver management, the collaboration between other healthcare providers, positive acceptance of patient engagement, formation of an atmosphere where people can speak comfortably, emotional support, empathy, active listening, rewarding as a nurse, and recognition as a profession were derived (Table 8.).

a. Knowledge

The concept and necessity of patient engagement, medical and nursing knowledge and knowledge of information related new technology three attributes were derived as nurse knowledge competency to improve patient engagement.

a. The concept and necessity of patient engagement

It refers to acquiring specialized knowledge about the concept and necessity of patient engagement. Nurses said that the concept of patient engagement itself was very unfamiliar, and that it was not easy to recognize the need for patient engagement in clinical practice. Therefore, it was confirmed that knowledge of the concept and necessity of patient engagement as a nurse's competency to improve patient engagement was necessary.

- *Patient engagement seems to be all about obtaining consent from the patient at the time of obtaining consent or performing an examination. Other than that, we don't say anything about patient engagement to patients, and our nurses and doctors don't know what to do, but if you ask most of the concepts, there are probably a lot more people who don't know (Participants 1,2,3,4, 5,6).*
- *There seems to be a way to reflect patient opinions, such as customer satisfaction and kindness, but they do it because they say that it should be done only at that time as an investigation. I don't even know that patient engagement is necessary as a senior nurse, and the lower grade nurses than me are more likely to don't know that (Participants 1,2,3,4,5,6).*
- *It seems to me that hospitals are always providing only theoretical education. Just for*

the sake of practice, it stopped at the level of the theory like this. I have never been educated about making good communication in practice and the final result of good communication. So, even if there is no patient engagement education, I think it would be okay for a little bit of education about communicating with the patient and doing things like that (Participant 4).

b. Acquaintance of medical and nursing knowledge to build trust with patients

It refers to acquiring medical and nursing knowledge necessary to form a trusting relationship with the patient. In order to improve patient engagement, it is most important to build trust with patients, and in order to form trust, it has been confirmed that medical and nursing knowledge is a necessary competency to build trust relationships with patients.

- *Nurses who have just started working may not know, but those who have accumulated some years of experience can predict that some kind of examination is likely to be undergone for the next step. Anyway, even a nurse can't stop studying. Anyway, there are so many different diseases and new diseases, so I think nurses need to study to explain to engage patients (Participants 2 and 5).*

c. Knowledge of information related new technology

It refers to acquiring knowledge related to information technology that is newly introduced to enhance patient engagement. Recently, hospitals provide various mobile phone applications or tablets to facilitate access to their medical information, and regularly update the medical information system to understand the patient's information, indicating that nurses need the ability to apply and utilize information technology and systems.

- *We have an app called Chart in our hands. So the blood test results appear on the app. I've never looked closely at the chart in my hand, but the blood test results came up. I don't know where the results come from. There are people who use it, and there are people who can't use the smartphone application. I don't know if it's our hospital's characteristics, but the nurse doesn't explain the results in detail* (Participants 2).
- *The nurse needs to know (using tablets related to patient information check) to explain, so if you click this, something will come out, and if you click this, the nurse in charge will definitely know, so I think education is necessary (Participants 3).*

B. Skills

It refers to the nurse's ability to assess and judge whether a patient can engage physically and mentally, identification of the patient's physical and mental availability, identify the patient's personal characteristics and needs, basic nursing skills, personalized communication, sharing specific and accurate information, setting the possible range of patient engagement , those six attributes were derived.

a. Identification of the patient's physical and psychological condition

As a nurse, it means understanding whether the patient is currently physically and psychologically able to engage in the treatment process. Even if a nurse has all the necessary competencies for patient engagement, patient engagement cannot be achieved if the patient is unable to engage. Therefore, the skill to assess and judge the patient's condition first was confirmed as a nurse's competency to improve patient engagement.

- *For example, if the pain is too severe or unconscious, the patients can't do it even if they want to (participate in the patient)* (Participants 1, 4, 5, 6).

- *Acting nurses have a lot of trouble with patients. Usually, they take care of the patient without knowing what they are doing, but when the patient asks this, they can't answer well. Then, the next step in involving the patient cannot be achieved (Participant 1).*
- *I think the most important thing for patient engagement is patient assessment. Patient situation. I think a patient's situation is the basis for everything that sees the patient well. Because we need to know what the problem is so that we can make plans, set plans, activities, and evaluate accordingly (Participants 2,*

b. Identification of the patient's personal characteristics and needs

It refers to the ability to identify needs that may vary according to the individual characteristics of the patient. In order to improve patient engagement, it is necessary to recognize that even patients with the same disease may have different needs depending on the characteristics of the patient, and nurses should be able to understand through interviews as well as medical records.

- *There are a lot of personal reasons, right? There will be economic or social things. Of course, the test results are the same, but if you really have time, you should identify personal and personal things, connect them to the social welfare team, connect them to fundamental problems, and really understand the patient's situation. I think we need something like that for that* (Participant 1, 3).
- *There are people who are negative, irritated, and feel uncomfortable with something else even if they just solve this problem. So in that case, I just solve the inconvenience and take care of the emotion. So that delirium doesn't come now, so that you can go to the ward. That's what I usually did* (Participant 4).

c. Basic nursing skills

It refers to the ability to perform nursing skills that a nurse must have in order to build trust with patients. As patients are admitted to hospitals to receive treatment and procedures, it was confirmed that inexperienced basic nursing skills could undermine the trust relationship between nurses and patients, and patient engagement through building a basic trust relationship between patients and nurses. It was shown in the field work stage that proficient basic nursing skills should be the basis for improvement of patient engagement.

- *I think IV and Foley should be basic skills. Because no matter how good the explanation is and how kind you are, if you can't start IV and poke it four times, that the patient hates the nurse already because it hurts the patient so much. So basically, regardless of whether I'm good at greeting or not, patients lose trust in nurses, trust in wards, trust in hospitals, and more complaints build-up while comparing other hospitals. So I think as a nurse, the skills should be cultivated basically(Participants 1, 5).*

d. Personalized communication

It refers to the ability to provide communication tailored to individual needs by identifying priorities for patient needs through careful observation and reassessing them. It was confirmed that a trusting relationship was formed through communication with the nurse based on the patient's personal information rather than a one-size-fits-all conversation. It has been shown that patient engagement can be improved through personalized communication focusing on individual patient needs and the patient's ultimate health goal.

- *The memo showed me what kind of tendency the patient is, so I looked at it first and said, "Oh, I shouldn't do this to this person." I should do it like this. I tend to keep that*

in mind and talk about it, but what I want is to identify patients and patient tendencies. Patients participate when nurses provide the care what patients want to receive(Participants 1,2,3,4).

- *First of all, if you reassure the mothers first, I think it will be helpful for the next step, slowly preparing for the operation and cooperating. Yes. But if the mothers say they can't do it because they're sick, then we say the baby is at risk. Also we make them encourage, saying When it's okay now, you should do it quickly. The communication is not going well because the mothers have extremely pain* (Participant 3).
- *When taking over, this patient's back hurts more, the surgical site hurts more, or the leg is pulled and uncomfortable, and something like that. Complaints like symptoms, if nurses ask patients one more time, it makes patients feel very good, and just because patients think that this nurse is interested in me, that nurse continues to care about me among so many patients, then patients open their heart more...* (Participants 5 and 6).

e. Sharing specific and accurate information based on health literacy

It refers to the ability to accurately provide information in an easy-to-understand language at the patient's health understanding level, to help understand the problem by explaining specific cases, and to share information about the future process. To this end, nurses must provide accurate information and help patients understand and empathize with specific examples. In addition, nurses should be able to share in easy-to-follow language based on patients' health literacy about the future process to reduce the uncertainty of patients related to treatment that takes place in the hospital.

- *Because the test results are like this, if you don't test, these problems can occur later, so it's better to do the test. There are many cases where even if nurses just say something like this, patients will change their mind* (Participants 1,2, 4).
- *I'll tell you about the previous case, and even in the case of breastfeeding, colostrum doesn't work well for two or three days in the case of a first-time mother. When it doesn't run well, I say you don't' need to worry about it, because other mothers did as*

well. In the case of a first-time mother, I explain it a little bit more, because of the lack of information and experiences. so I make them feel relief through previous case as like them. To say you are not the only one, so you can be reassured. And I let them remind their safety, saying be careful, there are people who have fallen in the similar situations with you(Participant 3).

- *I ask a lot of questions about pain and intervene. Then, when the next shift comes, another nurse will be in charge of the next night's nurse, explaining this and doing it again. But the term is actually 8 hours long, but to us, it is very short, we take it to the patient, and we talk to the patient in such a short period of time (Participant 4).*
- *From the point of view of the healthcare providers, the next question can be asked when the patient understands their condition accurately by repeating the explanation accurately in terms that the patient can understand* (Participant 6).

f. Setting the possible range of patient engagement

It refers to the ability to adhere to consistent principles by setting the extent to which patient engagement is possible and politely and firmly refusing to comply with it. When rapport is formed for patient engagement, patients make demands beyond the scope of nursing, and failure to properly cope with this situation undermines trust between patients and nurses, which acts as a factor that hinders patient engagement.

- *At first, if they ask anything about this, I usually try to meet them, but they ask for something that takes a lot of time. Cut it out, saying it can't be done. just block it altogether. That way, the patients in the future will feel less sad and the trust relationship will not be damaged (Participant 1,2).*
- *If one person asks for a favor and listens to it, people will tell me to do it too, and I want it to do it too. There is not enough time for this to deepen the education and there are some difficulties. So while I do it, I have to do something like this, but I can't say it firmly, I can't, and I think it's a bit difficult. However, if you do not set these things well in the beginning, it is difficult to form a rapport with patients* (Participants 5 and

6).

C. Attitude

It refers to the role of nurses necessary by improving patient engagement.

a. Role

The roles of nurses to improve patient engagement were derived from four attributes: Self-development, Management of caregivers, Collaborating with other health care providers, and positive acceptance of positive engagement. It was found that nurses should have the expertise and be faithful to their role as professional nurses through self-development in terms of knowledge and technology. This sense of responsibility was identified as an internal agitation factor that improve patient engagement. In addition, in hospitals, depending on the patient's condition and characteristics, there are many cases where the patient cannot participate in treatment on his own or needs the help of a caregiver. Therefore, through caregiver management, caregivers should also be able to use as a resource to improve patient engagement. Finally, it was found that patient engagement could be improved through cooperation between healthcare providers. Since collaboration of a multidisciplinary team is essential in order to provide information to patients and to derive successful health outcomes, it has been shown that cooperative competence among healthcare providers is required for nurses.

- *Basically, I think that a nurse who has the ability and knowledge to explain about the patient's health and test results, and who constantly strives for self-development, is needed to catch up with the situation of the patient as a professional nurse. Because we think that we can create more situations or opportunities for patients to participate.* (Participants 1 and 2)

- *Especially in Korea, I think the role of caregiver is huge. In many cases, caregiver make decisions about patients' treatment, so I think caregiver management is also important for patient engagement. If the nurses explains what the patient have to do to the caregivers, the patient often changes their mind to by following caregivers' persuasion* (Participants 1,2,4,6).
- *Usually doctors have an infection and they tell the nurse, uh, if it's appendicitis, this person is sick, so let's take a CT scan and explain that much. Almost most of them. There is no standardized frame, there is no frame, and communication is not good. We're curious too, but we're so busy again, we don't have time to ask. Yes, that is often the case. But the test results do not go well first and cannot be shared among healthcare providers, so in some ways it cannot be transmitted to patients...*(Participants 1 and 2).
- *We have intensive care specialists and specialist professors. Intensive care professor. He resides in the surgical department and communicates well for patients, and I think it is generally well communicated to patients* (Participants 4, 5, 6).
- *The doctor explains the big treatment plan. But patients usually don't understand it enough. Then they all come to the nurse* (Participants 2, 4, 6).
- *Even if patients are in 40s or 50s these days, the internet is developing, so patients gather information through the internet first before coming to the hospitals. So, I think it's right that the nurse needs to explain in order to provide more accurate information because they check a lot of information and are admitted to the hospital* (Participants 1, 5, 6).

b. Images

Four attributes were derived: Create an atmosphere where patient can speak comfortably, emotional support, empathy, and active listening. It was confirmed that the patient's expectation of the nurse was to listen to their story comfortably. Therefore, it was found that in order for patients to actively express their intentions about their treatment, it is possible to identify and reflect the patient's intentions by creating an atmosphere in which

patients can talk comfortably and by empathizing and actively listening through emotional support.

- *First of all, I don't think it's an easy environment to talk about. Patients and caregivers are just talking to the healthcare providers, but the healthcare providers are not like that. Please answer only what I ask. Some doctors say this. Hearing that kind of thing makes me feel very discouraged, I don't want to talk to this doctor, I want to talk to another doctor, and there seems to be something like that. I don't think it's that comfortable. No matter how well the patient or caregiver knows about their disease, there are times when they cannot explain it well. I wish I could lead that kind of thing well... If I could lead the atmosphere and things like that well. (Participants 2, 5, 6)*
- *I think rapport is formed by basically asking about my facial expressions, tone, greetings, and so on (Participant 5).*
- *When I meet the nervous patients give them emotional support , saying you don't have to worry too much about it either. Even if the baby is born prematurely, if the baby is in a bad condition, there were not so many bad cases, and even in this state, you can persist a week or two. Sometime, patients express thank these kind of nurses emotional support. So I think emotional care is really important. Especially those who are pregnant. I'm too sensitive* (Participant 3).
- *There are cases where the nurse makes a decision and decides whether the patient wants to participate or not. Wouldn't it be better if I knew this information from the patient's point of view? Should I call this kind of thinking uh, mind empathy? If there is such a thing, I think it will help patient engagement better* (Participants 3, 5, 6).
- *The best way to form a rapport for patient engagement is to listen. When patients talk about what they want to nurses, but nurses are not ready to listen, they keep complaining about nurses listening attitudes*(Participants 4,5).

c. Motives

Finally, among the nurses' competencies required by the improvement of patient engagement, two attributes were derived as motives: Worth as a nurse and recognition as a profession. When nurses felt rewarding for the nursing care they provided, they thought that patient engagement was successful, and when they were recognized as a professional, they expressed their desire to more actively perform patient engaged nursing.

- *Giving a lot of information like this will improve the patient's health as well as their own health, so that's good, but I think nurses will feel a lot of reward while working. There are cases when the patient gets better and is discharged from the hospital, but it does not get better, but I tried my best and did my best. There is a sense of satisfaction that comes from communicating well with doctors, and at the same time, there is definitely something to learn while communicating with doctors. There is something to learn from patients, and satisfaction in that, satisfaction in work* (Participant 1, 5, 6).
- *(If patient participation is successful) I think the nurses' competency will be highly evaluated. In the old days, you may have thought that you simply needed a nurse to work, but now, after explaining something like that, understanding it, and building trust, it is about a nurse, a job, and a little bit of name value. I think it'll have a really good effect in the future* (Participants 3, 4, 6).

Table 8. Identified factors and attributes of nurse competency to improve patient engagement through fieldwork phase

A. Knowledge
a. The concept and necessity of patient engagement
b. Acquaintance of medical and nursing knowledge to build trust with patients
c. Knowledge of information related new technology
B. Skills
a. Identification of the patient's physical and psychological availability
b. Identification of the patient's personal characteristics and needs
c. Basic nursing skills
d. Personalized communication
e. Shared decision making
f. Sharing specific and accurate information based on health literacy
g. Setting the possible range of patient engagement
C. Attitude
a. Role: aware of own self as a nurse
i) Self-development
ii) Management of caregivers
iii) Collaborating with other health care providers
iv) Positive acceptance of patient engagement
b. Images: the role others expect of nurses
i) Create an atmosphere where patients can speak comfortably
ii) Emotional support
iii) Empathy
iv) Active listening
c. Motives
i) Worth as a nurse
ii) Recognition as a profession

1.3. Final analysis phase

The operational definition of nurse competency to improve patient engagement derived from the final analysis phase is "to identify the patient's physical and psychological conditions, preferences, values, and beliefs, through the ability to encourage patients to become the main agents of the healthcare process by sharing health information with the multidisciplinary healthcare team and their families based on partnerships." Table 9 shows the final encounters and factors of nurse competency for improving patient engagement, which was confirmed in the theoretical phase through literature review and the fieldwork phase through in-depth interviews. In the theoretical phase, the constituent factors according to the encounters were identified based on the theoretical framework. In the fieldwork phase, nurses' competence to improve patient engagement in actual clinical practice was identified. As a result, five final encounters and seven factors were derived.

The nurse's competency for improving patient engagement in the processes based on the ICM model is required from the stage of assessing the patient. In order to improve patient engagement, nurses' competencies needed in the patient assessment stage are broadly divided into three; 1) Patients' physical & psychological conditions, preferences, value & beliefs, 2) cooperation with other healthcare providers and family and 3) consistent attitude and a positive response to patient engagement. Patients' physical & psychological conditions, preferences, value & beliefs. This means that the assessment should be made based on the patient's physical and psychological preferences and value beliefs, and the nurse should be able to understand the possible engagement status through the patient's

physical and psychological assessment before involving the patient. In addition, the patient's characteristics and needs must be identified in the assessment stage to induce active participation of the patient. Second, it was confirmed that it was important to form teamwork as a facilitator to improve patient engagement through cooperation with health care providers and families related to the treatment of patients from the assessment stage. Since treatment in hospitals is carried out by multidisciplinary teams, collaboration with other healthcare providers is particularly important to improve patient engagement.

Teamwork is the basis of smooth communication, and it was confirmed that the relationship with the people involved in the treatment of the patient should be well established from the initial assessment stage. In addition, support from family members is very essential when a patient is unable to make his/her own treatment decisions or needs financial or physical help. Therefore, the cooperation of healthcare providers and family was identified as a basic resource that could enable patients to engage more actively. Finally, Consistent attitude and a positive response to patient engagement mean a positive and consistent attitude toward patient engagement. In the case of patients who misunderstood the concept of patient engagement, it was confirmed in the field work phase that they made unreasonable demands on nurses. In the patient assessment stage, which is the first stage in which nursing begins, it has been confirmed that it is an essential element for improving patient participation to set the acceptable range of demands as nurses and patients so as not to undermine the trust relationship.

The second is exchange information based on patients' health literacy. This

process is essential for forming a partnership between patients and nurses. As confirmed through the theoretical phase and the field work phase, the relationship between the patient and the nurse was found to be formed in the process of communication, that is, exchanging information. In the process of sharing information, the nurse gives trust to the patient by carefully listening to the patient, and based on trust, the patient provides clearer information to the nurse. Since the patient's ultimate desired direction is contained in the information provided by the patient, it was confirmed that a partnership was formed between the nurse and the patient who shared important information. In sharing information, personalized communication based on patient characteristics was also very important for nurses' competency. Because each patient communicates differently, they form a more robust relationship using various communication techniques according to their characteristics. It was able to confirm that nurses-patients become partners who share a lot of emotions.

In particular, it was found that sharing accurate information considering the patient's knowledge level and health literacy for personalized communication is very effective in promoting patient safety accidents and health outcomes that can occur with complicated medical terms. Patients gain confidence to make informed judgments by accurately understanding the treatment process as their health information subject. This confidence motivates patients to become more active in their treatment. Therefore, as a nurse's competency to improve patient participation, personalized communication based on the information confirmed through active listening is required. It is necessary to provide understandable and accurate information considering the patient's health literacy level.

Third, Planning between patients and nurses is a necessary competency for improving patient engagement in making plans between patients and nurses to achieve mutual goals. In order to improve more active patient engagement, it is important to share the treatment plan so that the patient has a sense of purpose. However, according to what was confirmed in the fieldwork, it was found that the sharing of information and education were included in the treatment plan so that the nurses did not proceed with the planning stage separately. Therefore, in the in-depth interview, it was confirmed what competencies are required to extend the patient's engagement to the planning stage, and it was confirmed that emotional ability to encourage and create a comfortable atmosphere for the patient is required. It encourages natural engagement by providing an environment in which patients feel comfortable. In order to create a comfortable atmosphere, it is necessary to provide an environment in which patients can talk comfortably without being disturbed in a quiet atmosphere, and emotionally so that patients can share their worries and concerns. It was found that support and empathy were needed.

Next, the nurse's competency required for intervention determination is as recently as introducing a mobile phone application that allows patients to directly check their health information or a medical information system that will enable them to more quickly and accurately identify patient information to improve patient engagement. It has been shown that the ability of nurses to handle new information technologies is required to provide appropriate interventions to patients. Therefore, nurses should be able to introduce and educate patients by knowing how to handle newly applied devices and information systems

well and skillfully. Inexperience with a new device or system can lead to lower-than-expected results by reducing utilization, and errors due to incorrect use can lead to patient safety accidents. In addition, showing an unprofessional appearance to the patient due to inexperience can hinder the formation of trust between nurses and patients, which makes the patient hesitate to use new devices and information systems so that the patient themselves is the subject of health information. It can act as a stumbling block. Therefore, it was confirmed that patient participation could be improved through the nurse's ability to identify and apply rapidly changing medical information technology and systems.

Finally, it was found in the literature review results and theoretical framework as a necessary process to establish a better strategy by confirming improved health outcomes through patient engagement in the evaluation stage. However, it was a challenging evaluation criterion to check the number of days of stay, monitor the number of patient safety accidents, or confirm patient satisfaction due to the nature of the nurses working in busy clinical settings, especially in hospitals targeting acute patients. Therefore, identifying the intrinsic and extrinsic motivation to continue patient engagement nursing, or the driving force to develop patient engagement further, identified factors that can provide better patient engagement nursing in the following nursing process. As a result, to promote patient engagement, it is crucial to have better nursing through self-development and be recognized for the role of a professional nurse. As a self-development method, it was confirmed that patient engagement could be improved by acquiring nursing and medical knowledge and acquiring knowledge related to the concept and necessity of patient participation.

Table 9. Identified encounter and factors for nurse competency to improve patient engagement though final analysis phase

Encounter	Factor/attribute
Assessment	Patients' physical & psychological conditions, preferences, value & beliefs Identification of the patient's physical and mental availability (S) Identify the patient's personal characteristics and needs(S) Cooperation with other healthcare providers and family Managing caregivers(S) Collaborating with other health care providers(S) Consistent attitude and a positive response to patient engagement Setting the possible range of patient engagement (S)
Exchange information based on health literacy	Information sharing for more equal partnership Active listening(A) Personalized communication(S) Shared decision making(S) Sharing specific and accurate information based on health literacy(S)
Planning between patients and nurses	Emotional ability to encourage and create a comfortable atmosphere for the patient Create an atmosphere where you can speak comfortably(A) Emotional support(A) Empathy(A)
Determining Intervention	Ability to manage new devices and information technologies Knowledge of information related new technology(K)
Evaluating and Motives for patient engagement	Cultivation of Knowledge and attitudes as professional nurses Worth as a nurse(A) Recognition as a profession(A) Self-development(A) Medical and nursing knowledge(K) The concept and necessity of patient engagement(K)

Note. A=attitude, K=knowledge, S=skill

2. Development of a preliminary nurse competency inventory for patient engagement

2.1. Preliminary item generation

In this study, preliminary items were constructed based on the final encounters and factors derived from theoretical considerations and field suitability verification. The items were written using the language used during the in-depth interview as much as possible in the field. In the nurse competency factors for improving patient engagement; patients' physical & psychological condition, preferences, value, &belief three items, cooperation with other healthcare providers and family eight items, consistent attitude and a positive response to patient engagement five items, information sharing for more equal partnership eleven items, emotional ability to encourage and create a comfortable atmosphere for the patient six items, ability to manage new devices and information technologies four items, and cultivation of knowledge and attitudes as professional nurses seven items. Total, 44 items were derived (Appendix. 2).

2.2. Content validity of preliminary items

The expert content validity test was conducted, and the content validity index (CVI) was measured by examining five encounter and seven factors derived through the final analysis phases (Table 10.).Based on the expert content validity test, it was modified to meet the purpose of this study, which is to measure competence by unifying ‘do, can’ and ‘can do’ to the extent that the meaning of the sentence is not significantly impaired. In addition, words with ambiguous meaning in the questions and some questions that require further explanation were corrected, and examples were added.

The CVI result was assessing patient 0.92, exchanging information based on health literacy 0.97, planning between patients and nurses 0.93, determining intervention 0.95, evaluating and motives for patient engagement 0.92. The average CVI index value of all items was 0.95. According to the expert opinion, one item with a CVI score of .80 or lower (No. 4), two items judged to be duplicated (No. 12, 37), and one item determined to be irrelevant to nurse competency to improve patient engagement (No. 43), in total four items were deleted. Based on the above content validity CVI score and expert opinions, the preliminary items for measuring nurse competency to improve patient engagement were derived as 40 preliminary items by reflecting five encounters and seven factors (Table 11).

Table 10. Results of content validity of preliminary 44 items

Encounter (Number of items)	Factor (Number of items)	Item	Item CVI	M±SD	Revise
Assessing patient (16)	Identifying patients' physical & psychological conditions, preferences, value & beliefs (3)	1. I can determine whether a patient can participate in a treatment plan based on the patient's physical, psychological, and psychosocial conditions.	1.00	4.00±0.00	
		2. I can identify each patient's characteristics (preferences, values, beliefs, etc.).	1.00	4.00±0.00	Revised
		3. I can know the nursing needs that vary according to individual characteristics even for patients with the same disease .	1.00	4.00±0.00	
	Cooperation with other healthcare providers and family (8)	5. I can suggest alternatives when the patient is unable to express his/her opinion directly (low consciousness, psychological instability, etc.).	.87	3.75±0.70	Revised
		21. I have identified the caregivers who play the most active role in patient care.	1.00	3.75±0.46	
		23. I can ask the caregiver(family) without difficulty if I need the caregiver's cooperation for the treatment of the patient.	1.00	3.88±0.35	
		22. I try to build a trusting relationship with the patient's primary caregiver.	1.00	3.88±0.35	
		24. I communicate well with healthcare providers and staff related to patient care.	1.00	4.00±0.00	
		25. If I have a problem with other healthcare providers, I can resolve it amicably.	1.00	3.88±0.35	Revised
		26. I am able to work with multidisciplinary professionals for patient care.	1.00	4.00±0.00	
		14. When I have a problem nursing that I cannot solve on my own, I ask for help from someone who can solve the problem (e.g., supervisor, co-worker, etc.).	1.00	3.88±0.35	

	Consistent attitude and a positive response to patient engagement (5)	12. As a nurse, I can explain the available scope of my work to meet the needs of patients.	.87	3.50±1.06	Deleted
		13. I can decline a patient's unreasonable request by rationally explaining it.	1.00	3.88±0.35	Revised
		27. I think the patient must participate in the treatment plan.	1.00	4.00±0.00	
		40. I can explain to patients and caregivers what patient engagement is.	1.00	3.88±0.35	
		41. I can explain to patients and caregivers the importance of patient engagement.	1.00	3.88±0.35	
Exchanging information based on health literacy (11)	Information sharing for more equal partnership (11)	17. As a nurse, I try to form a horizontal relationship with the patient.	.87	3.63±0.74	
		9. When I interview a patient, I respond to the patient's story and listen to the end.	1.00	3.88±0.35	Revised
		10. I apply various communication techniques depending on the patient's characteristics (e.g., in the case of a patient who has a lengthy explanation of a question, use ‘expression in other words’ to confirm the response).	1.00	4.00±0.00	Revised
		30. I actively answer patients' questions.	1.00	4.00±0.00	
		31. I try to reflect on patients' opinions related to treatment.	1.00	3.75±0.46	
		28. When setting up a patient's care (intervention) plan, I can ask for the patient's opinion and set goals based on it.	1.00	4.00±0.00	
		11. When I provide treatment-related information to patients, I can translate medical terminology into a language that is easy for patients to understand.	1.00	4.00±0.00	Revised
		32. I check how well the patient understands the information provided during patient education.	1.00	3.88±0.35	
		8. I try to share information related to treatment-related examinations and procedures related to the patient's treatment with the patient.	.87	3.75±0.70	Revised
		6. When I provide information to patients, I communicate specific facts such as what is needed, why, and when it will be done.	1.00	3.88±0.35	Revised
		7. I provide patients with evidence-based and accurate information.	1.00	4.00±0.00	Revised
Planning between patients	Encouraging and creating a	15. I try to keep my surroundings as quiet as possible when talking to patients.	.87	3.25±1.03	Revised

and nurses (6)	comfortable atmosphere for the patient (6)	16. When I talk to the patient, I make eye contact with the patient and do not rush.	.87	3.75±0.70	
		29. I can create an interview environment by removing distractions from the conversation so that the patient can concentrate when talking with the patient.	1.00	4.00±0.00	
		33. I know what to do to help stabilize the patient if the patient is emotionally unstable.	.87	3.75±0.70	
		34. I understand and empathize with the patient's situation.	.87	3.75±0.70	Revised
		35. I put myself in the patient's shoes and think before providing care.	1.00	3.88±0.35	
Determining intervention (4)	Managing new devices and information technologies (4)	18. I know and can use new devices introduced in a hospital or department proficiently.	.87	3.25±1.03	
		19. I know and can use the up to dated medical information system introduced in a hospital or department proficiently.	.87	3.25±1.03	
		20. I can educate patients about useful devices or software provided to patients in hospitals.	.87	3.63±0.74	
		4. I can analyze the information needed for patient care.	.75	3.50±0.92	Revised
Evaluating and motives for patient engagement (7)	Cultivating of knowledge and attitudes as professional nurses (7)	37. I feel rewarded by providing care to my patients.	.87	3.50±1.06	Deleted
		39. I believe it is my duty as a nurse to encourage patient participation throughout the treatment process.	1.00	3.88±.035	
		38. I provide care to patients with a professional attitude based on my expertise	.87	3.50±1.06	Deleted
		36. I feel rewarded for my work when I feel that the patient has been involved in the care I have provided.	.87	3.63±0.74	Revised
		44. I believe that to provide better quality care to patients, and I need to develop my knowledge and skills continuously.	.87	3.63±1.06	
		42. I have spent time studying outside of work to acquire medical and nursing expertise.	.87	3.25±1.03	
		43. I have spent time outside of work to practice nursing skills (intramuscular injection, intravenous injection, airway suction, catheter insertion, etc.) to improve.	.87	3.25±1.03	Deleted

2.3. Pre-test

Based on the pre-test results, 40 items across seven factors were validated after correcting four items to improve respondent understanding. The survey took 9.25 ± 4.78 minutes to complete the questionnaire with a range of 5–21 minutes. The items had a length appropriateness score of 3.60 ± 0.50 on a 4-point scale and a response score size suitability of 3.45 ± 0.51 on a 4-point scale. None of the respondents thought that any items should be removed and any items that did not make sense were corrected (Appendix 3).

3. Validity and reliability of preliminary nurse competency inventory for patient engagement

Item analysis, construct validity, convergent validity, known-group validity, and internal consistency reliability tests were performed to evaluate the validity and reliability of the nurse competency inventory for patient engagement.

3.1. The First validation of preliminary inventory

In order to evaluate the reliability and validity of the preliminary inventory, sub sample 1 was used. For the construct validity test, item analysis, exploratory factor analysis, and correlation test were performed, and for the reliability test, an internal consistency reliability test was performed.

3.1.1. Participant's characteristics

211 participants data were analyzed for the first validation of the preliminary inventory. The demographic and nursing-related characteristics of the subjects of this study are as follows. The average age was 31.8 years, and the majority were in their 30s (46.4%),

and by gender, women (94.8%) accounted for the majority. The number of unmarried (59.3%) was higher than that of married people, and the highest level of education was those with a bachelor's degree (86.7%). Also, as for the current workplace, the capital was the most at 50.2%, and the number of beds was the highest in 300-499 beds with 43.1%. (Table 11). The average working experience was 7.8±4.5 years, and the average working experience in the current department was 3.0±3.3. As for the position, general nurses accounted for the most at 85.8%, and participants working in the ward accounted for the most at 71.7%.

Table 11. Participant's characteristics of the first validation (N=211)

Characteristics	Categories	n(%)	M ±SD(Min-Max)
Gender	Male	11(5.2)	
	Female	200(94.8)	
Age(yr)			31.8±5.5(25-51)
	29≥	90(42.7)	
	30-39	98(46.4)	
	40-49	17(8.1)	
	50≤	6(2.8)	
Marital status	Married	85(40.3)	
	Unmarried	126(59.7)	
Education	Diploma	4(1.9)	
	Bachelor	183(86.7)	
	Master and above	24(11.4)	
Current working region	Capital	106(50.2)	
	Capital area	48(22.7)	
	Others	57(27.1)	
Number of hospital beds	300-499	91(43.1)	
	500-999	77(36.5)	
	1000<	43(20.4)	
Total working experiences(yr)			7.8±4.5(3-30)
	3≤ <5	77(36.5)	
	5≤ <10	95(45.0)	
	10≤ <15	13(6.2)	
	15≤	26(12.3)	
Current unit experiences (yr)			3.0±3.3(0.4-17.6)
	<1	18(8.5)	
	1≤ <3	93(44.1)	
	3≤ <5	46(21.8)	
	5≤	54(25.6)	
Current position	Staff nurse	181(85.8)	
	Charge nurse	30(14.2)	
Current working unit	General ward	150(71.1)	
	Intensive care unit	29(13.7)	
	Emergency room	24(11.4)	
	Others (Anesthesia/recovery room and delivery room)	8(3.8)	

3.1.2. Items analysis

1) Mean, standard deviation, skewness, and kurtosis of preliminary items

The mean is within the range of 2.68 to 5.0, and the standard deviation, the items were analyzed according to the criterion that a question of 0.75 or higher.

The average of 40 items was minimum 3.67 (item No.15) to 4.16 (item No 1) at the maximum, and there were no items that threatened discrimination. The standard deviation was the minimum of 0.79 (item No. 14) and the maximum of 1.04 (item No. 11), and there were no items less than 0.75.

The absolute value of skewness of each preliminary question was in the range of 0.357 (items No. 15) to 1.327 (items No 1), and the absolute value of kurtosis was in the range of 0.001 (items No 23) to 3.326 (item No. 1). There were no items in which the skewness and kurtosis of all the items were outside the normal distribution (Appendix 4).

2) Item-total correlation and Cronbach's alpha if item is deleted

Table 12 indicated that all items that had relative correlation coefficients (r = .30-.80) were within the range .356-.662. The Cronbach`α value was analyzed when the items were deleted, were within the range .945-.947.

Table 12. Item-total correlation Cronbach's alpha if item is deleted (N=211)

No	Item	Corrected item-total correlations	Alpha if item deleted
1	I can determine whether a patient can participate in a treatment plan based on the patient's physical, psychological, and psychosocial conditions	.501	.947
2	I can identify each patient's characteristics (preferences, values, beliefs, etc.).	.619	.946
3	I can know the nursing needs that vary according to individual characteristics even for patients with the same disease	.568	.946
4	I can comprehensively analyze the information necessary for patient care (physical, psychological, psychosocial status, test results, interview results).	.483	.947
5	I can suggest alternatives when the patient is unable to express his/her opinion directly (low consciousness, psychological instability, etc.).	.527	.946
6	When I provide information to patients, I communicate specific facts such as what is needed, why, and when it will be done.	.650	.945
7	I provide patients with evidence-based and accurate information.	.574	.946
8	I try to share information related to treatment-related examinations and procedures related to the patient's treatment with the patient.	.494	.947
9	When I talk to my patients, I listen to them carefully and give them time to ask questions.	.582	.946
10	I apply various communication techniques depending on the patient's characteristics.	.552	.946
11	When I provide treatment-related information to patients, I can translate medical terminology into a language that is easy for patients to understand.	.636	.946
12	I can decline a patient's unreasonable request by rationally explaining it.	.486	.947
13	I can indirectly understand the patient's opinion through alternatives such as an interview with a care giver(family) or analysis of past medical records.	.617	.946
14	I can create an interview environment by removing distractions from the conversation so that the patient can concentrate when talking with the patient.	.529	.946

No	Item	Corrected item-total correlations	Alpha if item deleted
15	When I talk to the patient, I make eye contact with the patient and do not rush.	.400	.947
16	As a nurse, I try to form a horizontal relationship with the patient.	.523	.946
17	I know and can use new devices introduced in a hospital or department proficiently.	.379	.947
18	I know and can use the up to dated medical information system introduced in a hospital or department proficiently.	.356	.947
19	I can educate patients about useful devices or software provided to patients in hospitals.	.427	.947
20	I have identified the caregivers who play the most active role in patient care.	.535	.946
21	I try to build a trusting relationship with the patient's primary caregiver.	.641	.946
22	I can ask the caregiver(family) without difficulty if I need the caregiver's cooperation for the treatment of the patient	.662	.945
23	I communicate well with healthcare providers and staff related to patient care.	.572	.946
24	If I have a problem with other healthcare providers, I can resolve it amicably.	.495	.947
25	I am able to work with multidisciplinary professionals for patient care.	.547	.946
26	I think it is important to provide personalized education considering the characteristics of the patient for effective intervention.	.593	.946
27	When setting up a patient's care (intervention) plan, I can ask for the patient's opinion and set goals based on it.	.548	.946
28	I can create an environment in which patients are free to express their opinions and participate in treatment planning.	.565	.946
29	I actively answer patients' questions.	.558	.946
30	I try to reflect patients' opinions related to treatment.	.662	.945
31	I check how well the patient understands the information provided during patient education	.582	.946
32	I know what to do to help stabilize the patient if the patient is emotionally unstable.	.613	.946
33	I understand and empathize with the patient's situation.	.527	.946
34	I put myself in the patient's shoes and think before providing care.	.541	.946
35	I feel rewarded for my work when I feel that the patient has been involved in the care I have provided.	.490	.947
36	I believe it is my duty as a nurse to encourage patient participation throughout the treatment process.	.560	.946
37	I can explain to patients and caregivers what patient engagement is.	.482	.947
38	I can explain to patients and caregivers the importance of patient engagement.	.504	.947

No	Item	Corrected item-total correlations	Alpha if item deleted
39	I have spent time studying outside of work to acquire medical and nursing expertise.	.506	.947
40	I believe that to provide better quality care to patients, and I need to develop my knowledge and skills continuously.	.621	.946

3.1.3. Construct Validity: Exploratory factor analysis

As a result of the first factor analysis on 40 items, KMO and Bartlett's sphericity test, which are methods for testing the fit of the collected samples, were KMO=.918, x^2=3558.400 (p<.000), degrees of freedom (df)=780. Bartlett's sphericity test showed p<.05, so the sample was suitable for exploratory factor analysis. In this study, items with a common value less than 0.4 were the standard for deletion, but the minimum value was .475 (item No. 31), which was higher than the deletion standard for all items.

As a result of the principal component analysis of 40 items, a total of nine factors were derived for eigenvalues of 1.0 or higher. The cumulative total variance indicating the explanatory power of the extracted nine factors was 58.644%, and the factor loading value of each factor indicating the correlation between each question and factor was .387~.750. When the factor loading value for each of the nine factors extracted was .45 or higher for each factor, factor 1 had .451 to 662 with five items, factor 2, .469 to.644 with seven items, factor 3 is .467 to .653 with five items, factor 4 ranges from .555 to .724 with three items, factor 5 ranges from .536 to .731 with two items, factor 6 ranges from .552 to .566 with two items, factor 7 with . 594 to.650 was two items, factor 8 was .750 with one item, and factor 9 was .631 and.518 with two items (Table 13).

Table 13. Factor loading from exploratory factor analysis (40 items) (N=211)

Item	Communalities	FactorI	FactorII	FactorIII	FactorIV	FactorV	FactorVI	FactorVII	FactorVIII	Factor IX
4	.555	.662	.044	.089	.138	.223	.061	-.061	.058	.168
5	.657	.618	.136	-.090	.096	.070	.402	.255	.081	-.032
13	.619	.591	.291	.232	.147	.081	-.115	.197	.223	.027
3	.578	.588	.110	.321	.155	.010	.248	.037	-.041	.168
21	.613	.451	.249	.080	.379	.361	.250	-.005	.050	-.048
2	.511	.387	.322	.208	.305	.016	.030	.194	.171	.232
8	.599	-.068	.644	.111	.072	.151	.136	.164	.280	.125
20	.566	.237	.630	.178	.042	.235	-.040	.034	.021	.143
40	.569	.437	.533	.190	.068	.116	.134	.119	.068	-.060
39	.513	.238	.521	.177	.150	-.095	.133	.191	.177	-.190
29	.554	.201	.482	.072	.353	.117	.351	-.098	.063	.016
22	.691	.403	.477	.165	.169	-.092	.407	.200	.003	.176
11	.584	.460	.469	.189	.202	.094	-.070	.190	.162	.003
10	.580	.017	.447	.364	.101	.259	.099	.381	-.098	.069
34	.615	.041	.240	.653	.180	.158	.009	.197	-.022	.181
25	.608	.251	.076	.605	.036	.188	.203	.033	.305	-.032
9	.590	.102	.247	.477	.244	.385	.103	.199	.025	-.180
32	.592	.219	.227	.470	.120	.073	.451	.212	.020	.057
23	.531	.414	.167	.467	.110	.013	.151	-.004	.246	.135
26	.554	.227	.350	.443	.381	.091	.034	-.050	.156	-.050
7	.512	.174	.306	.363	.317	.114	.119	-.083	.326	.123
37	.664	.057	.067	.301	.724	.023	.148	.127	-.040	-.025
35	.591	.197	.011	.091	.675	.184	.110	.113	.009	.174
38	.587	.153	.320	-.100	.555	.075	-.011	.307	.173	.116
31	.475	.224	.173	.339	.386	.104	.266	.199	.048	-.085
6	.554	.378	.185	.241	.384	.232	.120	.071	.313	-.001
15	.621	.040	.028	.230	.091	.731	.117	.010	.092	.038
28	.568	.198	.283	.035	.127	.536	.191	.197	.077	.251
27	.479	.284	.298	.063	.189	.389	-.012	.277	.025	.203
33	.567	.330	.312	.115	.034	.369	.251	.185	.107	-.319
36	.686	.313	.196	.303	.317	.348	-.168	.223	-.211	.337
16	.676	.119	.180	.096	.238	.362	.566	-.152	.285	.090
14	.596	.126	-.005	.292	.136	.238	.552	.247	.099	.209
19	.588	-.025	.216	.023	.220	.050	.158	.650	.126	.161
12	.608	.299	.064	.304	.082	.104	-.040	.594	.184	-.127
30	.585	.365	.297	.211	.225	.150	.324	.374	-.040	-.004
18	.659	.065	.252	.080	-.016	.028	.046	.130	.750	.054
24	.490	.209	-.061	.262	.170	.210	.190	.276	.418	.120
17	.623	.137	.007	.027	.106	.229	.143	.098	.333	.631
1	.648	.419	.317	.181	.080	-.040	.218	.010	-.127	.518
Eigenvalue		4.050	3.765	3.109	2.887	2.283	2.080	2.061	1.742	1.482
% of variance		10.124	9.412	7.772	7.218	5.707	5.199	5.152	4.355	3.704
Cumilative(%)		10.124	19.536	27.309	34.527	40.234	45.434	50.586	54.940	58.644

In addition, the number of factors just before the slope of the scree chart became gentle was the 5th to 9th factors, which was somewhat ambiguous (Fig. 4).

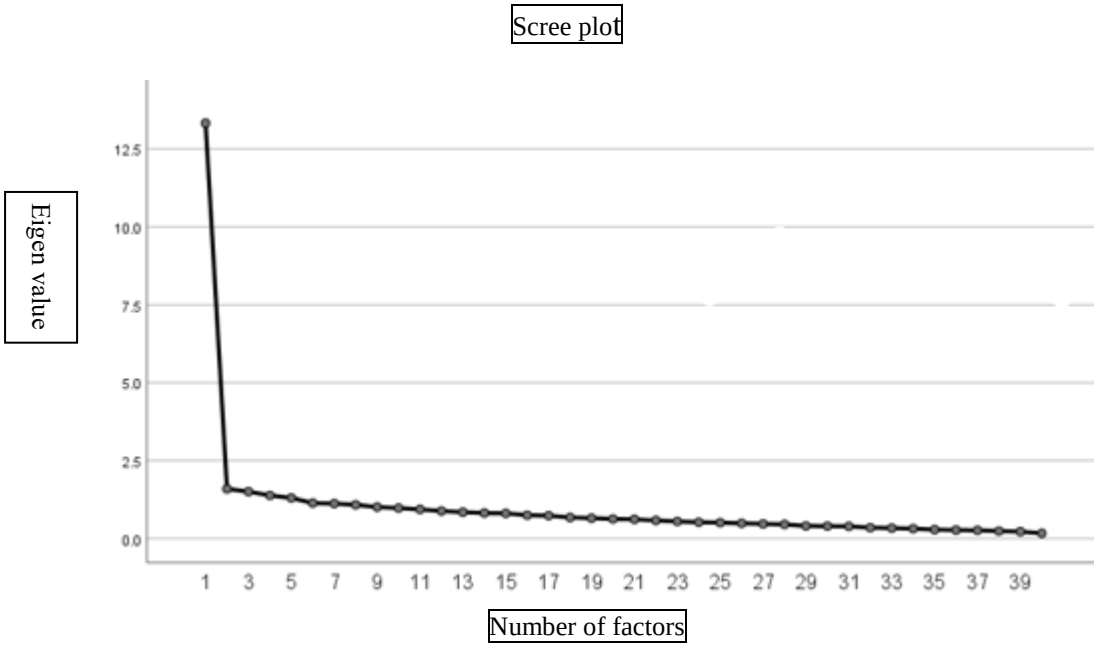

Fig 5. Scree plot (40 items)

As a result of the Parallel analysis (PA) (O'connor, 2000; Henson & Roberts, 2006), the number of factors whose eigenvalues were analyzed in the actual data was more significant than the eigenvalues in the randomly generated data were 2-5 factors (Table 15). Finally, it was found that extracting five factors was most appropriate when judging by synthesizing the factor extraction and screen chart results based on the eigenvalue of one or more, the PA results, and the conceptual framework.

Table 14. Comparison of Factor Analysis and Parallel Analysis eigenvalues (40 items)

Number of factor	FA eigenvalue	PA eigenvalue
1.000000	13.326	1.424
2.000000	1.594	1.266
3.000000	1.503	1.424
4.000000	1.383	1.337
5.000000	1.303	1.271
6.000000	1.136	1.211
7.000000	1.121	1.155
8.000000	1.083	1.094
9.000000	1.010	1.031

The number of 5 factors derived as the most appropriate was designated, and factor analysis was re-performed for 40 items. As a result of the analysis, the common values ranged from .349 to .579. The11 items 7, 12, 24, 29, 33, 30, 6, 10, 2, 19, and 28 were deleted because of factor communality less than 0.45 (Comrey and Lee, 1992). In addition, items 23, 37, and 40 that inhibit discriminant validity were deleted based on a cross loading value of .45 or higher (Comrey & Lee, 1992).

As a result of factor analysis of 26 items, KMO and Bartlett's sphericity test, which are methods for testing the suitability of the collected samples, were KMO=.905, x^2=1970.842 (p<.001), and degrees of freedom (df)=325. The 26-item KMO value showed high relevance (Kaiser, 1974). Also, Bartlett's sphericity test showed p<.05, so the sample was suitable for exploratory factor analysis (Table 14). For each factor, factor 1 was seven items 14.116%, factor 2 was six items 13.120%, factor 3 was five items 9.795%, factor 4 was four items 9.010%, and factor 5 had four items 6.982%. The cumulative explanatory power of factors was 53.022%, satisfying the appropriate standard explanatory power of

psychosocial science. In addition, the eigenvalues for each factor were all greater than 1, and the calculated factor loadings for each item within the factor ranged from 0.464 to 0.744, which satisfies the factor loading standard of less than .45 (Comrey & Lee) for all questions. In the case of cross-loaded items, there were no items that impaired discriminant validity based on a cross-loading value of .45 or higher. Therefore, 26 items of the final inventory were confirmed (Table 15).

Table 15. Factor loading from exploratory factor analysis (26 items) (N=211)

Item	Communalities	FactorI	FactorII	FactorIII	FactorIV	FactorV
Item5	.557	.694	.084	.191	.020	.175
Item3	.575	.663	.337	.010	.134	.064
Item22	.609	.643	.242	.342	.131	.058
Item4	.467	.623	.122	-.006	.219	.126
Item1	.487	.610	.031	.120	.283	.141
Item21	.485	.474	.330	.147	.292	.211
Item13	.504	.464	.276	.383	.254	-.016
Item9	.599	.087	.708	.183	.233	.054
Item34	.530	.058	.628	.154	.323	.056
Item25	.524	.247	.608	.178	-.073	.239
Item32	.474	.372	.522	.170	.104	.154
Item31	.429	.294	.507	.148	.212	.138
Item26	.450	.268	.504	.272	.224	.004
Item8	.581	.038	.211	.701	.148	.148
Item18	.622	.031	.091	.652	-.183	.393
Item20	.476	.228	.212	.506	.350	-.003
Item11	.569	.426	.274	.501	.240	-.059
Item39	.513	.323	.380	.477	-.014	-.189
Item36	.681	.231	.261	.053	.744	.059
Item35	.453	.241	.237	-.017	.539	.220
Item27	.451	.244	.193	.308	.498	.104
Item38	.474	.196	.031	.447	.475	.094
Item17	.629	.209	-.118	.159	.298	.676
Item16	.568	.309	.362	.144	-.052	.564
Item14	.542	.266	.427	.041	.086	.529
Item15	.537	-.085	.418	-.009	.325	.499
Eigenvalue		3.670	3.411	2.547	2.343	1.815
% of variance		14.116	13.120	9.795	9.010	6.982
Cumilative(%)		14.116	27.235	37.030	46.040	53.022

3.1.4. Interpreting factors

Interpreting factors is a step in which factors are named by examining the items classified by each factor. Devellis (2003) suggested that the items with a large factor loading value among the items classified in each factor be named in consideration of the fact that they are most similar to latent variables. , it is said that it is easy if there are several items with factor loading values of .65 or higher for each factor.

Previously, 44 questions were derived accordingly after deriving seven factors according to five encounters: ‘Assessing patient’, ‘Planning between patients and nurses’, ‘Exchanging information based on health literacy’, ‘Determining intervention’, and ‘Evaluating and motives for patient engagement’.’ Then, in the expert content validity test, it was reduced to 40 questions. Accordingly, as 26 items and five factors were found to be the appropriate number of factors through exploratory factor analysis, factor names were named according to the attributes that best explain each factor.

Factor 1 corresponds to 7 items, No. 1 ‘I can determine whether a patient can participate in a treatment plan based on the patient’s physical, psychological, and psychosocial conditions’, No. 3 ‘I can know the nursing needs that vary according to individual characteristics even for patients with the same disease’, No. 4 ‘I can comprehensively analyze the information needed for patient care (physical, psychological, psychosocial status, test results, interview results)’, No. 5 ‘I can suggest alternatives when the patient is unable to express his/her opinion directly (low consciousness, psychological instability, etc.)’, No. 13 ‘I can indirectly understand the patient’s opinion through

alternatives such as an interview with a care giver (family) or analysis of past medical records', No. 21 'I try to build a trusting relationship with the patient's primary caregiver', No. 22 'I can ask the caregiver(family) without difficulty if I need the caregiver's cooperation for the treatment of the patient.' It has the property of identifying needs that can change according to characteristics and has the ability to solve problems that may arise in cases where it is difficult to understand the patient's condition or in the process of identifying the patient's condition. The nurse competency for this purpose was named 'Identifying patients' physical & psychological conditions, preferences, value & beliefs'. The ability to understand the patient's physical and psychological situation preferences, values, and beliefs to determine whether patient engagement is possible, as well as the ability to understand the needs of the patient's characteristics, and reflect on behalf of the patient's healthcare provider if patient engagement is not possible. It refers to the ability to understand the patient's wishes as much as possible through cooperation with caregiver or family and other healthcare providers.

Factor 2 corresponds to 6 items, No. 9 'When I talk to my patients, I listen to them carefully and give them time to ask questions' and No. 25 'I am able to work with multidisciplinary professionals for patient care'. No. 26 'I think it is important to provide personalized education considering the characteristics of the patient for effective intervention', No. 31 'I check how much the patient understands the information provided during patient education', No. 32 'I know what to do to help stabilize the patient if the patient is emotionally unstable', No. 34 'I put myself in the patient's shoes and think before

providing care'. It has the attributes of nurses' competency required to encourage patients by creating a comfortable atmosphere, so it was named 'Encouraging and creating a comfortable atmosphere' for nurses' competency to improve patient engagement necessary for the second factor nursing planning. It refers to the nurse's ability to encourage and provide an atmosphere in which patients can freely express their opinions.

Factor 3 corresponds to 5 items, No. 8 'I try to share information related to treatment-related examinations and procedures related to the patient's treatment with the patient', No. 11 'When I provide treatment-related information to patients, I can translate medical terminology into a language that is easy for patients to understand', No. 18 'I know and can use the up to dated medical information system introduced in a hospital or department proficiently', No 20 'I have identified the caregivers who play the most active role in patient care.', No. 39 'I have spent time studying outside of work to acquire medical and nursing expertise. In the process of exchanging information between patients and nurses, considering the patient's health literacy, based on a horizontal partnership, the competency of nurses required for information sharing was identified. Therefore, the third factor was named 'Sharing information based for more equal partnership'. It refers to the ability to build a horizontal partnership through information sharing based on the patient's health literacy.

Factor 4 corresponds to 4 items, and No. 14 'I can create an interview environment by removing distractions from the conversation so that the patient can concentrate when talking with the patient', No. 15 'When I talk to the patient, I make eye contact with the

patient and do not rush', No. 16 'As a nurse, I try to form a horizontal relationship with the patient', No. 17 'I know and can use new devices introduced in a hospital or department proficiently.' The nurse's competency to manage factors impeding patient engagement in the intervention decision stage was included, so it was named 'managing barriers' in the fourth factor, determining intervention, as nurses' competency to improve patient engagement. It refers to the ability to manage factors that impede patient participation.

Factor 5 corresponds to 4 items, No. 27 'When setting up a patient's care (intervention) plan, I can ask for the patient's opinion and set goals based on it', No. 35 'I feel rewarded for my work when I feel that the patient has been involved in the care I have provided', No. 36 'I believe it is my duty as a nurse to encourage patient participation throughout the treatment process', No. 38 'I can explain to patients and caregivers the importance of patient engagement'. In the evaluation stage, it continuously develops and strives to improve patient engagement, and motivates the 5th factor evaluating and motives for patient engagement. Nurse competency to promote patient participation was named 'cultivating professional Knowledge and attitudes'. It refers to the ability to cultivate knowledge and attitudes for patient engagement as a professional nurse.

3.1.5. Composition of factors and items of the preliminary inventory

The five encounters, five factors, and each component were determined through the integration process of the constituent factors derived through exploratory factor analysis and the nurse competency construct for enhancing patient participation assumed in the development process of this study(Table 16).

Table 16. Preliminary nurse competency inventory for patient engagement (26 items)

Encounter	Factor	No	Items
Assessing patient	Identifying patients' physical & psychological conditions, preferences, value & beliefs	1	I can determine whether a patient can participate in a treatment plan based on the patient's physical, psychological, and psychosocial conditions
		3	I can know the nursing needs that vary according to individual characteristics even for patients with the same disease
		4	I can comprehensively analyze the information necessary for patient care (physical, psychological, psychosocial status, test results, interview results).
		5	I can suggest alternatives when the patient is unable to express his/her opinion directly (low consciousness, psychological instability, etc.).
		13	I can indirectly understand the patient's opinion through alternatives such as an interview with a care giver(family) or analysis of past medical records
		21	I try to build a trusting relationship with the patient's primary caregiver.
		22	I can ask the caregiver(family) without difficulty if I need the caregiver's cooperation for the treatment of the patient
Planning between patients and nurses	Encouraging and creating a comfortable atmosphere	9	When I talk to my patients, I listen to them carefully and give them time to ask questions.
		25	I am able to work with multidisciplinary professionals for patient care.
		26	I think it is important to provide personalized education considering the characteristics of the patient for effective intervention.
		31	I check how well the patient understands the information provided during patient education
		32	I know what to do to help stabilize the patient if the patient is emotionally unstable.
		34	I put myself in the patient's shoes and think before providing care.
Exchanging information based on health literacy	Sharing information for more equal partnership	8	I try to share information related to treatment-related examinations and procedures related to the patient's treatment with the patient.
		11	When I provide treatment-related information to patients, I can translate medical terminology into a language that is easy for patients to understand.

Encounter	Factor	No	Items
		18	I know and can use the up to dated medical information system introduced in a hospital or department proficiently.
		20	I have identified the caregivers who play the most active role in patient care.
		39	I have spent time studying outside of work to acquire medical and nursing expertise.
Determining intervention	Managing barriers	14	I can create an interview environment by removing distractions from the conversation so that the patient can concentrate when talking with the patient.
		15	When I talk to the patient, I make eye contact with the patient and do not rush.
		16	As a nurse, I try to form a horizontal relationship with the patient.
		17	I know and can use new devices introduced in a hospital or department proficiently.
Evaluating and motives for patient engagement	Cultivating professional knowledge and attitudes	27	When setting up a patient's care (intervention) plan, I can ask for the patient's opinion and set goals based on it.
		35	I feel rewarded for my work when I feel that the patient has been involved in the care I have provided.
		36	I believe it is my duty as a nurse to encourage patient participation throughout the treatment process.
		38	I can explain to patients and caregivers the importance of patient engagement.

3.1.6. Correlation between factors

As a result of analyzing the correlation between the factors and the inventory, all factors showed high correlation with the NCIPE(*r*= .738-.889). The correlation results between the factors of the inventory, factor 1 'Identifying patients' physical & psychological conditions, preferences, value & beliefs' and factor 3 'Sharing information for more equal partnership' showed the highest correlation with *r*= .732. Factor 3 sharing information for more equal partnership and factor 5 cultivating professional knowledge and attitudes showed the lowest correlation with *r*=.471 (*p*<.001) (Table 17).

Table 17. Correlations between factors of nurse competency for patient engagement (N=211)

	Factor1	Factor2	Factor3	Factor4	Factor5
		r			
NCIPE	.846**	.845**	.889**	.845**	.738**
Factor1	1	.648**	.725**	.621**	.538**
Factor2	.648**	1	.704**	.593**	.575**
Factor3	.725**	.704**	1	.804**	.471**
Factor4	.621**	.593**	.803**	1	.492**
Factor5	.538**	.575**	.471**	.492**	1

***p<.001*

3.1.7. Reliability: Internal consistency reliability

The coefficients for the corrected item-total correlations for the items of the total scale and subscales ranged from 0.33 to 0.65. Cronbach's alpha for the total scale was 0.92, and the coefficients for the subscales ranged from 0.33 to 0.65. The Cronbach`α value of factor 4 was slightly below the criteria as 0.66 (Table 18).

Table 18. Internal consistency reliability

Factor	Number of items	Mean ± SD	Corrected item-total correlation coefficient	Cronbach's alpha
NCIPE	26	3.90±.53	.33-.65	.92
Factor 1	7	3.97±.62	.52-.63	.82
Factor 2	6	3.88±.63	.52-.58	.79
Factor 3	5	3.93±.62	.37-.56	.71
Factor 4	4	3.91±.65	.37-.49	.66
Factor 5	4	3.79±.63	.44-.54	.70

3.2. The second validation of preliminary inventory

The second validation was performed using subsample 2 to analyze confirmatory factor analysis, convergent validity, known-group validity and internal consistency for the model fit test of the nurse competency inventory for patient engagement confirmed through the first validation test.

3.2.1. Participant's characteristics

211 subjects participated in the second validation test. The demographic and nursing-related characteristics of the subjects of this study are as follows. The average age was 31.4 years old, and the majority were in their 30s (52.1%), and by gender, women (98.6%) accounted for the majority. The number of singles (54.5%) was higher than that

of married people, and the highest level of education was those with a bachelor's degree (88.2%). Also, as for the current workplace, the capital was the most at 43.6%, and the number of beds between 500 and 999 had the most at 43.1%. (Table 19). The average working experience was 7.0±4.5 years, and the average working experience in the current department was 3.0±2.9. As for the position, general nurses accounted for the most at 91.0%, and the participants working in the ward were the most at 73.0%.

Table 19. Participant's characteristics of the second validation (N=211)

Characteristics	Categories	n(%)	M ±SD(Min-Max)
Gender	Male	3(1.4)	
	Female	208(98.6)	
Age(yr)			31.4±4.3(26-51)
	29≥	87(41.2)	
	30-39	110(52.1)	
	40-49	13(6.2)	
	50≤	1(0.5)	
Marital status	Married	96(45.5)	
	Unmarried	115(54.5)	
Education	Diploma	8(3.8)	
	Bachelor	186(88.2)	
	Master and above	17(8.1)	
Current working region	Capital	92(43.6)	
	Capital area	46(21.8)	
	Others	73(34.6)	
Number of hospital beds	300-499	45(21.3)	
	500-999	91(43.1)	
	1000<	75(35.5)	
Total working experiences(yr)			7.0±4.5(3-30)
	3≤ <5	73(34.6)	
	5≤ <10	97(46.0)	
	10≤ <15	21(10.0)	
	15≤	20(9.5)	
Current unit experiences (yr)			3.0±2.9(0.3-17.6)
	<1	28(13.3)	
	1≤ <3	110(52.1)	
	3≤ <5	32(15.2)	
	5≤	41(19.4)	
Current position	Staff nurse	192(91.0)	
	Charge nurse	19(9.0)	
Current working unit	General ward	154(73.0)	
	Intensive care unit	27(12.8)	
	Emergency room	17(8.1)	
	Others (Anesthesia/recovery room and delivery room)	13(6.1)	

3.2.2. Items analysis

1) Mean, standard deviation, skewness, and kurtosis by factors

The average value of nurse competency inventory for patient engagement was 3.89 points, and by sub-components, Identifying Patients' Physical & Psychological Condition, Preferences, Value & Beliefs had the highest average score of 3.99 points, and Managing barriers scored 3.93 points, Sharing information for more equal partnership 3.89 points, Encouraging and creating a comfortable atmosphere at 3.84, and Cultivating professional Knowledge and attitudes at 3.77 points. Regarding skewness, the skewness value of Sharing information for more equal partnership was -.461, which was the largest, but all did not exceed ±1.965 and were normally distributed at the significance level of .05 (Table 20) (Appendix 5).

Table 20. Reliability of Nurse competency inventory for patient engagement (N=211)

Factor	Mean ± SD	Skewness	Kurtosis
Nurse competency inventory for patient engagement	3.89±0.53	-.090	-.607
Factor 1(Identifying patients' physical & psychological conditions, preferences, value & beliefs)	3.99±0.69	-.378	-.344
Factor 2(Encouraging and creating a comfortable atmosphere)	3.84±0.61	-.190	-.547
Factor 3(Sharing information for more equal partnership)	3.89±0.64	-.461	-.079
Factor 4(Managing barriers)	3.93±0.67	-.390	-.518
Factor 5(Cultivating professional Knowledge and attitudes)	3.77±0.65	-.358	-.213

2) Correlations between factors

As a result of analyzing the correlation between the factors of the inventory, factor 1 'Identifying patients' physical & psychological conditions, preferences, value & beliefs' and Factor 3 'Sharing information for more equal partnership' showed the highest correlation with r= .732., and factor 4 'Managing barriers' and factor 5 'Cultivating professional Knowledge and attitudes' showed the lowest correlation with r=.552 (p<.001). The correlation between the total score of the NCIPE and the factors showed a high correlation of .80 or more for all five factors. (Table 21).

Table 21. Correlations between factors of nurse competency for patient engagement (N=211)

	NCIPE	Factor1	Factor2	Factor3	Factor4	Factor5
			r			
NCIPE	1	.867**	.874**	.856**	.823**	.838**
Factor1	.867**	1	.679**	.732**	.630**	.651**
Factor2	.874**	.679**	1	.716**	.729**	.583**
Factor3	.856**	.732**	.716**	1	.598**	.564**
Factor4	.823**	.630**	.729**	.598**	1	.552**
Factor5	.838**	.651**	.583**	.564**	.552**	1

*Note. **<.001. Factor 1: Identifying Patients' Physical & Psychological Condition, Preferences, Value & Beliefs; Factor 2: Encouraging and creating a comfortable atmosphere; Factor 3:Sharing information for more equal partnership; Factor 4:Managing barriers; Factor 5:Cultivating professional Knowledge and attitudes; NCIPE: Nurse competency inventory for patient engagement.*

3.2.3. Construct Validity

1) Confirmatory factor analysis (CFA)

Most of items satisfied the required standardized factor loading (FL) of above 0.50 (Brown, 2015), except for item 14, and 25. However, the FLs of item No. 14 and 25 are 4.89 and 4.64, respectively, which are close to 0.50. The items were not deleted as they were absolutely necessary in terms of content (Table 22).

CFA was performed with subsample 2 to identify whether or not the underlying five-factor structure derived using EFA was empirically supported. A critically important assumption in CFA is the presence of multivariate normality. The fit indices indicated that the five-factor model provided a good fit to the data: x^2 /df ratio = 1.56 (x^2 = 415.30, df = 289, $p < 0.001$), RMSEA = 0.05 (90% CI = 0.04–0.06), SRMR = 0.05, GFI = 0.87, CFI = 0.91, and NFI = 0.78(Table 23). All the items significantly loaded onto the factors, and the bootstrapped standardized item loadings onto the factors ranged from 0.461 to .685(Fig. 5).

Table 22. Confirmatory factor analysis of NCIPE (N = 211)

Item	**Estimate**	**SE**	**FL**	**CR**	***p***
Factor 1					
Item5	1	-	.542		<.001
Item3	1.234	.180	.627	6.847	<.001
Item22	1.278	.188	.619	6.795	<.001
Item4	1.017	.165	.537	6.172	<.001
Item1	.985	.146	.615	6.764	<.001
Item13	1.056	.166	.561	6.365	<.001
Item21	.964	.162	.511	5.960	<.001
Factor2					
Item26	1	-	.587		<.001
Item31	.998	.139	.597	7.180	<.001
Item32	.953	.137	.574	6.967	<.001
Item25	.842	.137	.489	6.140	<.001
Item34	.959	.140	.564	6.873	<.001
Item9	1.093	.144	.643	7.579	<.001
Factor 3					
Item39	1	-	.545		<.001
Item11	1.484	.203	.686	7.317	<.001
Item20	1.166	.178	.578	6.555	<.001
Item18	1.020	.161	.550	6.338	<.001
Item8	1.037	.165	.542	6.270	<.001
Factor4					
Item38	1	-	.592		<.001
Item27	1.021	.147	.613	6.924	<.001
Item35	1.033	.149	.612	6.913	<.001
Item36	1.113	.158	.630	7.062	<.001
Factor 5					
Item14	1	-	.464		<.001
Item15	1.296	.234	.509	5.549	<.001
Item16	1.312	.230	.532	5.694	<.001
Item17	1.532	.246	.632	6.235	<.001

The inter-correlation r=.85-1.00 between the five factors of the primary confirmatory factor analysis model was remarkably high, so no independent relationship was established (Kline, 1998). Therefore, since all five factors are components of nurse competency to improve patient engagement, a second-order factor analysis (second-order CFA) was performed by creating a higher-order factor model including lower-order factors and higher-level concepts, and the results are shown in Figure 6. Since it is preferable to test the fit by analyzing all factors and observation variables at once rather than checking each fit for each sub-factor (Yu, 2012), the fit was calculated by analyzing all the sub-factors and items of the secondary factor model at once.

As a result, the second-order 5-factor CFA reveals that all items for each factors had similar factor loadings compared with those in 5 factor CFA model. All factors had strong factor loadings on the second-order construct. The second order five-factor model provided a good fit to the data: x^2 /df ratio = 1.55 (x^2 = 457.647, df = 294, $p < 0.001$), RMSEA = 0.05 (90% CI = 0.04–0.06), SRMR = 0.05, GFI = 0.86, CFI = 0.90, and NFI = 0.77. As presented in Fig. 5, all the items significantly loaded onto the factors, and the standardized item loadings onto the factor ranged from 0.90 to .10 (Table 23).

If the NFI is more than .90, the improvement of the research model in the original model was good at 90.0%, but in this study, it was only 77.0%. However, the fit criteria of other fit indexes were satisfied. In addition, through the squared multiple correlations (SMC) value, it was possible to figure out how much each of the five sub-factors could explain the nurse's competency for improving patient engagement. Factor 4 'managing

barriers' had a highest explanatory power at 100% which was followed by Factor 2 'Encouraging and creating a comfortable atmosphere' at 98.0%. which is a higher-level concept. %, followed by Factor 2 ' Factor 1 Identifying patients' physical & psychological condition, preferences, value & beliefs', Factor 3 'Sharing information for more equal partnership', Factor 5 'cultivating professional knowledge and attitudes' were also 95.0%, 97.0%, and 90.0%, respectively, indicating explanatory power of more than 50%.

Table 23. Model fit of CFA

	Criterion	5 Factor model	Second order 5 factor model
x^2	(p>.05)	433.839(p<.001)	457.647(p<.001)
x^2 /df ratio	≤3	1.50	1.55
RMSEA	<.08	0.05	0.05
SRMR	<.08	0.05	0.05
GFI	>.90	0.87	0.86
CFI	>.90	0.91	0.90
NFI	>.90	0.78	0.77

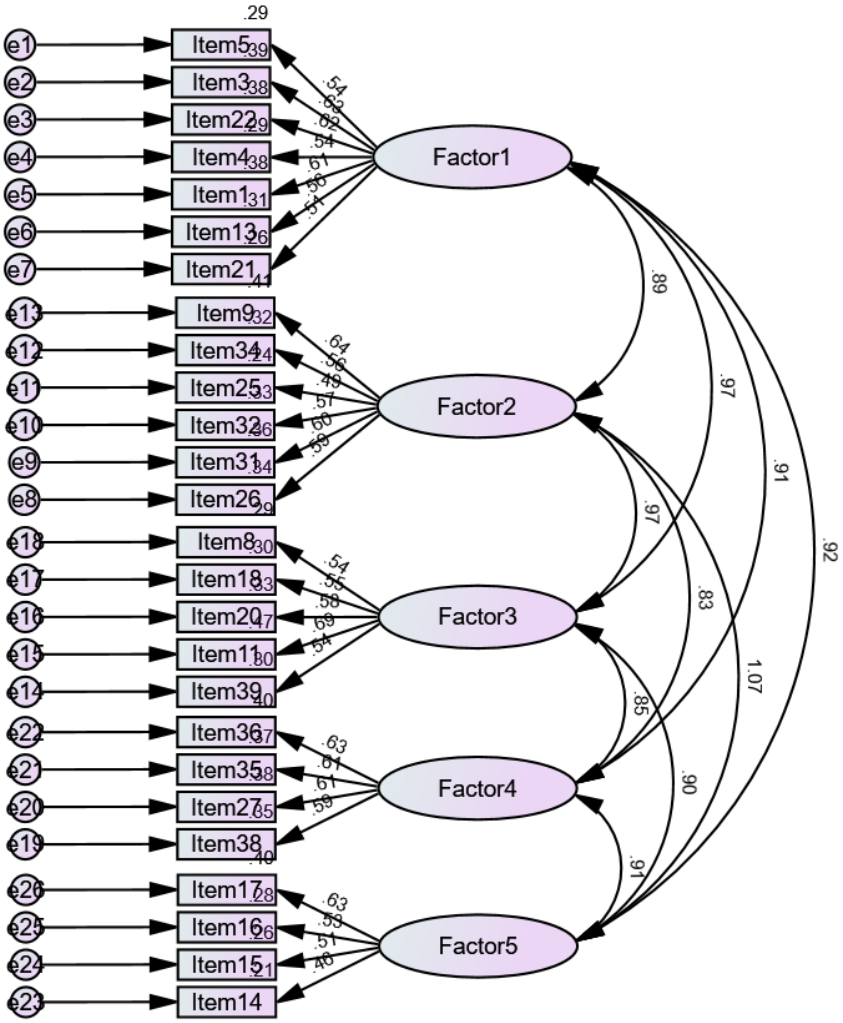

Fig. 5. Five-factor NCIPE CFA model

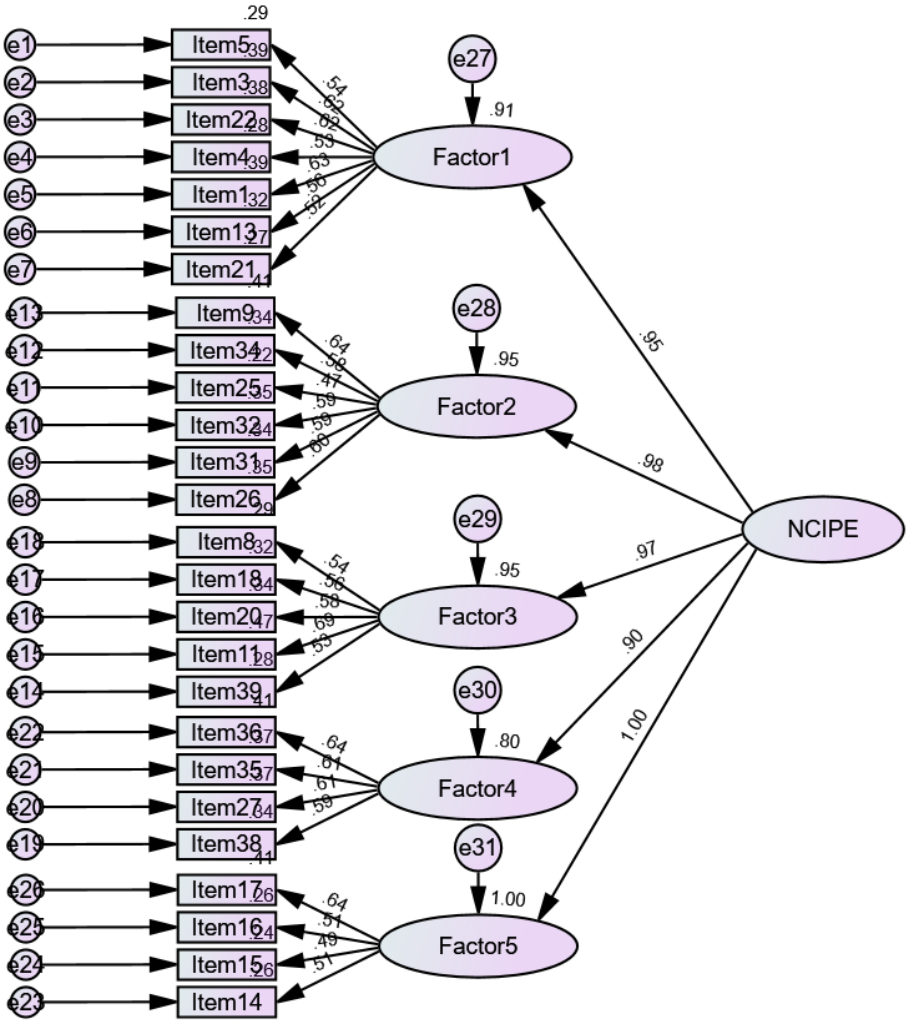

Fig. 6. Second-order five-factor NCIPE CFA model

2) Convergent validity

The Nurse competency for improving patient engagement scale (NCIPE) was highly correlated with Individualized Care Scale [ICS] B version (Jeong & Park, 2019) (r = 0.859, p < 0.001) implying that convergent validity was satisfied (Table 24).

Table 24. Correlation NCIPE& ICS B version (N=211)

	NCIPE	Factor1	Factor2	Factor3	Factor4	Factor5
			r			
Individualized Care	.859**	.736**	.791**	.687**	.746**	.672**

**p<.001

3) Known-group validity

Based on Benner's stages of clinical competence (Benner, 1984), in the study that developed the clinical career management system model for nurses in tertiary hospitals, based on the evidence that the clinical grade was presented as a stage 3 competent for 3 years to less than 5 years, a stage 4 proficient for more than 5 years to less than 7 years, and a stage 5 expert for more than 7 years (Cho et al., 2015) nurses' competency tested to enhance patient participation according to their careers. Group comparison, which is set validity, was performed. As a result of the analysis of 211 people, the competency for promoting patient participation was higher in the expert group than the competent and the proficient, proving the set validity (F=8.976, p<.001) (Table 25).

Table 25. Known-groups validity (N=211)

Variables	Categories	n(%)	NCIPE		
			Mean±SD	F(p)	Scheffe
Total working experience(years)	3≤ <5 [a]	73(34.6)	3.71±.54	8.976(p<.001)	c>a,b†
	5≤ <7[b]	76(36.0)	3.89±.51		
	7≤[c]	62(29.4)	4.09±.48		

†post-hoc (Scheffe) test

3.2.4. Reliability: Internal consistency reliability

The coefficients for the corrected item-total correlations for the items of the total scale and subscales ranged from 0.40 to 0.58. Cronbach's alpha for the total scale was 0.92, and the coefficients for the subscales ranged from 0.62 to 0.76. The Cronbach`α value of Factor 4 was slightly below the criteria as 0.62 (Table 26)(Appendix 6).

Table 26. Internal consistency reliability

Factor	Number of items	Mean ± SD	Corrected item-total correlation coefficient	Cronbach's alpha
NCIPE	26	3.89±.53		.92
Factor 1	7	3.99±.62	.41-.55	.76
Factor 2	6	3.84±.61	.40-.57	.74
Factor 3	5	3.89±.64	.42-.52	.71
Factor 4	4	3.77±.65	.37-.43	.62
Factor 5	4	3.95±.53	.44-.52	.70

3.3. Nurse competency Inventory for patient engagement (NCIPE)

After going through the reliability and validity test process, identification of patients' physical & psychological condition, preferences, value & beliefs 7 items (1-7), encouraging and creating a comfortable atmosphere 6 items (8-13), Sharing information for more equal partnership 5 items (14-18), managing barriers 4 items (19-22), and

cultivating professional knowledge and attitudes 4 items (24-26) with the final 26 items as a nurse competency inventory for patient engagement was confirmed.

This inventory responds on a 5-point Likert scale, rated on a scale of 1 point for ‘not at all’ to 5 points for ‘strongly agree’. Since inverse questions are not included, the response scores are summed up and the average score is calculated. The higher the average score, the higher the nurse’s competency to improve patient engagement(Table27).

Table 27. The final inventory of nurse competency for patient engagement (26 items)

Factor	No	Item	Strongly disagree				Strongly agree
Identifying Patients' physical & psychological conditions, preferences, value & beliefs	1	I can determine whether a patient can participate in a treatment plan based on the patient's physical, psychological, and psychosocial conditions	1	2	3	4	5
	2	I can know the nursing needs that vary according to individual characteristics even for patients with the same disease	1	2	3	4	5
	3	I can comprehensively analyze the information necessary for patient care (physical, psychological, psychosocial status, test results, interview results).	1	2	3	4	5
	4	I can suggest alternatives when the patient is unable to express his/her opinion directly (low consciousness, psychological instability, etc.).	1	2	3	4	5
	5	I can indirectly understand the patient's opinion through alternatives such as an interview with a care giver(family) or analysis of past medical records	1	2	3	4	5
	6	I try to build a trusting relationship with the patient's primary caregiver.	1	2	3	4	5
	7	I can ask the caregiver(family) without difficulty if I need the caregiver's cooperation for the treatment of the patient	1	2	3	4	5
Encouraging and creating a comfortable atmosphere	8	When I talk to my patients, I listen to them carefully and give them time to ask questions.	1	2	3	4	5
	9	I am able to work with multidisciplinary professionals for patient care.	1	2	3	4	5
	10	I think it is important to provide personalized education considering the characteristics of the patient for effective intervention.	1	2	3	4	5
	11	I check how well the patient understands the information provided during patient education	1	2	3	4	5
	12	I know what to do to help stabilize the patient if the patient is emotionally unstable.	1	2	3	4	5
	13	I put myself in the patient's shoes and think before providing care.	1	2	3	4	5
Sharing information for more	14	I try to share information related to treatment-related examinations and procedures related to the patient's treatment	1	2	3	4	5

Factor	No	Item	Strongly disagree				Strongly agree
equal		with the patient.					
partnership	15	When I provide treatment-related information to patients, I can translate medical terminology into a language that is easy for patients to understand.	1	2	3	4	5
	16	I know and can use the up to dated medical information system introduced in a hospital or department proficiently.	1	2	3	4	5
	17	I have identified the caregivers who play the most active role in patient care.	1	2	3	4	5
	18	I have spent time studying outside of work to acquire medical and nursing expertise.	1	2	3	4	5
Managing barriers	19	I can create an interview environment by removing distractions from the conversation so that the patient can concentrate when talking with the patient.	1	2	3	4	5
	20	When I talk to the patient, I make eye contact with the patient and do not rush.	1	2	3	4	5
	21	As a nurse, I try to form a horizontal relationship with the patient.	1	2	3	4	5
	22	I know and can use new devices introduced in a hospital or department proficiently.	1	2	3	4	5
Cultivating professional knowledge and attitudes	23	When setting up a patient's care (intervention) plan, I can ask for the patient's opinion and set goals based on it.	1	2	3	4	5
	24	I feel rewarded for my work when I feel that the patient has been involved in the care I have provided.	1	2	3	4	5
	25	I believe it is my duty as a nurse to encourage patient participation throughout the treatment process.	1	2	3	4	5
	26	I can explain to patients and caregivers the importance of patient engagement.	1	2	3	4	5

VI. DISCUSSION

The discussion of this study was considered in terms of development and validation of inventory. Specific details are as follows.

1. Development of inventory

The nurse competency inventory for patient engagement developed through this study is the first inventory developed to measure the nurse's competency to improve patient engagement. The scales developed so far measure similar concepts (Hwang, 2015, Shin & Yoon, 2019) and do not include parts such as partnership, health literacy, and the use of technology, which are emphasized in the concept of patient engagement. In addition, as the previously developed scales were only for general medical staff or physicians(Malfait et al., 2016; Hibbard et al., 2010), it was not possible to accurately identify the competency required for nurses.

Considering that patient engagement is a relatively recent concept (Higgins et al., 2017), based on the ICM model (Drenkard, 2015), the components of the nurse competency inventory for patient engagement were derived through systematic literature review, fieldwork, and final analysis phase. From this point of view, this inventory is the first scale developed to measure the nurse competency for patient engagement. It is expected to be used as primary data for qualitative and numerical expansion of research. Using this inventory, it is possible to identify and measure the competencies required of nurses for patient engagement in the clinical environment. The number of factors finally confirmed

was 5, and the meaning of each factor is considered as follows.

The first factor, ‘Identifying patients’ physical & psychological conditions, preferences, value & beliefs’, was composed of seven final items as a nurse’s competency to improve patient engagement required in the patient assessment stage. In a general sense, nursing assessment is defined as ‘the process of carefully and systematically collecting, classifying, and analyzing data on a patients’ condition in order to identify the problem that needs to be taken care of for the patient (Kim et al., 2010). The nurse competency to improve patient engagement required in the patient assessment stage identified in this study includes not only the nurse’s knowledge, skills, and attitude necessary to understand the patient’s physical and psychological conditions, preferences, values, and beliefs (Singh et al., 2019), including the ability to identify patients through collaboration with the patient’s caregivers and medical staff in situations where the patient is unable to engage (Ren et al., 2019; Jerofke-Owen & Dahlman, 2019). In addition, it was confirmed through the fieldwork phase that a trusting relationship should be formed to improve patient engagement by giving a consistent and positive response to the patient from the assessment stage. This is different from previous scales(Malfait et al., 2016, Hibbard et al,. 2010, Hwang, 2015, Shin & Yoon, 2019), and the existing scales mainly identified and measured the patient-nurse relationship for patient participation.

Furthermore, in this inventory, the assessment stage for improving patient engagement is not simply collecting and analyzing data, but more active meaning, when patients cannot engage in their care process finding the caregivers or family who know

patients' characteristics to reflect patients' opinion on the care plan. Also, it was found that the patient's characteristics were reflected in the care plan by cooperating with other healthcare providers to the patient was grasped as much as possible. It has the same meaning as the previous research result. Casimiro (2015) conducted an observational study on how much collaboration between medical staff enhances patient and family engagement and confirmed that patients and family members participated more effectively in treatment when medical personnel was mediated as a group or team. Also, some previous studies showed that nurses' individual attitudes and skills affect patient, and identified a positive attitude toward patient participation increases patient participation (Soleimani et al., 2010, Eldh et al., 2010). It has been confirmed that patient participation can be enhanced by having (Kolovos, 2015) the ability of nurses to identify individual characteristics of patients through cooperation with medical staff and caregivers and a consistently positive attitude toward patient engagement from the patient assessment stage to enhance patient engagement.

The second factor, 'Encouraging and creating a comfortable atmosphere', is a nurse's competency required in the planning between patients and nurses stage. It has been confirmed that a comfortable atmosphere allows patients to disclose their opinions in forming a relationship between patient-healthcare providers and has a positive effect on trust building (Hahn et al., 2017). The second factor, 'Encouraging and creating a comfortable atmosphere,' is a nurse's competency required in the planning between patients and nurses. It has been confirmed that a comfortable atmosphere allows patients to

disclose their opinions in forming a relationship between patient-healthcare providers and positively affects trust-building (Hahn et al., 2017). Hwang (2015)'s patient-centered care competency scale included items to assess whether the patient could participate by assessing the patient's comfort through the sub-area of providing for patient comfort. Still, the contents were mainly focused on pain and post-evaluation, also did not include the nurse's reaction how to deal with after the assessment. In this inventory, the nurse's role for enhancing patient engagement was extended to the level of behavioral intervention by including the question of whether the nurse knew what to do if the patient was unstable and unable to engage.

In addition, considering the patient's passive attitude within the medical environment (Jeon, 2019), nurse competency was included to encourage nurses to more actively ask questions that patients did not understand. In this area, cooperation with multidisciplinary experts was also included in the question, and cooperation with multidisciplinary experts is essential for patient safety (Lee et al., 2021). Therefore, it was confirmed that nurses can enhance patient engagement by securing patient safety through collaboration with multidisciplinary experts and having the ability to plan nursing care that is tailored to the patient's characteristics.

The third factor, 'Sharing information for more equal partnership', is the nurse's competency required in exchanging information based on the health literacy stage. In order to effectively exchange information with patients, nurses must be able to basically take into account the patient's health literacy (Drenkard, 2015). In particular, health literacy is a

modifiable factor that can be improved, so if health literacy increases, care should be provided tailored to individual circumstances by giving patients greater autonomy in treatment decisions (Nutbeam, 2000). Based on patients' health literacy, this inventory consists of items to check the patient's understanding when educating them and to measure the nurse's attitude toward whether it is crucial to provide education accordingly. In addition, it was differentiated from the existing similar concept scales by including information technology-related items that are emphasized in the concepts of ICM and patient engagement.

In addition, it was differentiated from the existing similar concept scales by including information technology-related items that are emphasized in the concepts of ICM and patient engagement. According to a study by Sawesi (2016), the information platform contributed to not only enhancing patient engagement but also improving health outcomes. (Bove, 2019). Therefore, as the pace of technological and device development in beneficial medical fields accelerates, nurses must acquire new skills to balance the need to place patients at the center of their care (Elgin & Bergero, 2015). This inventory confirmed the nurse's competency to improve patient engagement by identifying the nurse's competency in information technology through the item of whether they are well adapted to the new medical information system introduced to the hospital or department. Also, in this stage, considering the patient's health literacy, it was emphasized once again that it is a component for promoting patient engagement by checking whether the information was delivered in an easy-to-understand language by the patient.

The fourth factor, ‘Managing barriers’, is the nurse’s competency required in the Determining intervention stage, and it was confirmed as the competency to manage obstacles when performing appropriate interventions for patients. ICM explained that this stage provided patient support, education, and interventions related to self-management through information technology. Therefore, after the field work stage, managing new devices and information technologies, which ICM emphasizes on intervention, were set as the necessary competency of nurses. However, in a domestic clinical environment where even the concept of patient engagement is unfamiliar, clinical nurses are not well aware that newly introduced information systems and devices contribute to patient engagement. In fact, looking at studies conducted in South Korea, there have been studies that confirmed the relationship between nurses’ information competency and related variables (Kwak et al., 2017, Lee et al., 2015, Kim et al., 2012).

No studies have conducted interventions using new information systems or mobile applications, e-platforms or devices. Therefore, the nurse’s competency to manage factors that hinder the promotion of patient engagement was newly derived by analyzing the commonalities of the items constructed through exploratory factor analysis. In this factor, by confirming the nurse’s attitude toward partnership (Bouabida et al., 2021), which is the basic element of patient engagement, one of the factors hindering patient engagement, the vertical relationship with the medical staff (Jeon, 2019). In addition, the information technology competency of nurses to perform interventions to promote patient engagement was confirmed by measuring the skills of proficient use of devices that can be directly used

for interventions to enhance patient engagement.

The fifth factor, ‘Cultivating professional knowledge and attitudes’, refers to the competency of nurses required in the stage of evaluating and motives for patient engagement. It was confirmed as a competency that nurses should develop professional knowledge and attitude in order to evaluate the nursing care provision of patient engagement and to identify nurses’ motivation to continue patient participatory nursing. In the ICM, the conceptual framework of this study, objective clinical indicators such as individual patient test results, weight, blood pressure, number of drug use, number of emergency room visits, readmission rate, and accident rate were presented as the evaluation indicators (Drenkard, 2015). It was found that intrinsic motivation, such as recognition and reward as an individual nurse, as a professional nurse, plays a greater role in the nurses’ motivation and evaluation indicators to keep patient engagement confirmed in the field work phase.

According to Deyo et al. (2016), checking whether patient engagement is enhanced according to clinical results and managing performance indicators is a high-level concept required at the nurse manager or nurse executive stage. As it was judged that it would not be appropriate for this purpose, the items were composed mainly of the contents derived for staff nurse level. As a sub-item of this factor, it was checked whether the patient had professional knowledge by being able to explain the important concept of patient engagement to patients and caregivers (Barello et al., 2017). In addition, as one of the important strategies for patient engagement (James, 2013), when setting up nursing plans

and interventions, ask patients for their opinions and reflect them, thereby measuring whether ‘shared decision making’ provides patients with an opportunity to make decisions. Knowledge and attitudes as a professional nurse to improve patient engagement were composed of items.

In summary, developed as an inventory to measure nurse competency for patient engagement by composing the properties of identifying patients’ physical & psychological conditions, preferences, value & beliefs, and encouraging and creating a comfortable atmosphere that were identified as necessary for improving patient engagement into measurable statements. In addition, it differentiated from the existing scales by deriving the information sharing aspect, which was emphasized in the existing similar scales, as the patient-specific information provision based on health literacy, the core attribute of patient engagement. In today’s clinical environment, the ability to use various information devices introduced to facilitate patient information access is identified as an item in sharing information for more equal partnership and managing barriers, properties were also checked. Lastly, the motivation and evaluation factors that continue to promote patient engagement are identified as internal motives such as recognition and value as a profession, self-development in the aspect of knowledge and attitude toward the profession rather than external motives with temporary attributes, so that they are not significantly affected by external factors. It has the characteristic of being able to continue the action without it (Vallerand & Reid, 1984), so it has the advantage of being suitable as a competency.

2. Validation of inventory

The scarcity of an economical and robust scale to measure nurses' competency for patient engagement resulted in the lack of evidence-based interventions necessary for drawing the attention of professionals and policymakers to encourage patient engagement. A fundamental issue to consider when developing an inventory is the range of the concept to be measured (Devillis, 2017). Several factors influence whether and to what extent patients and nurses should develop an engaged relationship to keep health at different levels and at different points along the healthcare process (Drenkard et al., 2015). Without evaluating validity and reliability, it will be hard to represent the effects of measurement errors on theoretical relationships that are being measured (Forza, 2002). Therefore, this study confirmed the validity and reliability of the inventory through various tests.

Convergent validity is the extent to which a new instrument is correlated with other comparators based on prior hypotheses (de Vet et al., 2011). Therefore, in order to test the convergent validity, a similar concept that is expected to be related to the concept measured by the tool to be tested should be selected first. And based on the methodology that it is necessary to empirically determine whether such a result has been obtained through data collection and analysis with a hypothesis about the magnitude and direction of the relevance (Lee, 2021). Suhonen et al (2010) defined individualized care as a type of nursing care delivery which takes into account patients' personal characteristics in their clinical condition, their personal life situation and their preferences promoting patient participation in decision making. By defining it as mentioned above, they were found to be the most

similar concepts among the developed measuring scales for patients engagement so far. The Individualized Care Scale [ICS]-nurse version is a scale developed by Suhonen in 2005 and has been translated and validated in Finnish and German, and is widely used as a scale to measure nurses' perception of individualized care. In this study, the convergent validity was tested through the correlation between the individualized care scale [ICS] - nurse version and the nurse competency to improve patient engagement. In the results of this study, the two scales showed a high positive correlation.

In addition, as confirmed in the theoretical phase of this study, the most fundamental content of the ICM model is to provide different nursing care according to the patient's personal characteristics (physical, social status, values, beliefs, etc.) (Drenkard, 2015) could predict that there was a significant positive correlation between individualized care provided by nurses. Therefore, through this study, convergent validity with the ICS-nurse version was secured, empirically confirming the significant positive correlation between the two concepts, which was confirmed theoretically. As hypothesized for convergent validity in the present study, the NCIPE exhibited a high correlation with ICS. This is consistent with the findings of the scoping review of patient engagement in care by Clavel et al. (2021). The results for the NCIPE were consistent with these previous findings.

Known-group validity in this inventory, it was confirmed whether there was a difference in the nurses' competency to improve patient engagement according to their careers. In the case of known-group validity, by examining the differences between groups according to the experience grade of Benner (1984), it was confirmed that the nurse's

competency to improve patient engagement differs according to clinical experience. In a validation study of the Nurse Competence Scale (NCS), which is widely used to measure the general competency of nurses (Juntasopeepun et. al, 2019), similar to the results of this study. It was found that the competency score of high-skilled nurses was higher than that of low-skilled nurses. The same results as in the preceding competency study were confirmed as nurses' competency for improving patient engagement showed differences according to careers, just like the general competency of nurses. However, in this study, when divided into the competent, proficient, and expert stage according to clinical experience, the competency score of the expert was significantly higher than that of the competent and the proficient, but there was no significant difference between the competent and the proficient group. Considering the reality in Korea, where the concept of patient engagement in clinical practice is not yet familiar (Lee et al., 2019), it can be interpreted that nurses' competency for improving patient engagement can be cultivated when they are at the expert stage with more than 7 years of experience.

Regarding internal consistency reliability, Cronbach's alpha tends to increase when a scale contains more items (de Vet et al., 2011). Even though the NCIPE is a relatively short instrument, Cronbach's alphas for NCIPE subscales exceeded 0.70 except for 'managing barriers'. According to previous studies, most clinical nurses recognized that the factors hindering patient participation were caused by external factors such as a busy clinical environment, lack of patient participation education for medical staff, patient will or cultural differences (Chegini, Janati, Babaie & Pouraghaei, 2020). Therefore, in this

context, the results of this study can be interpreted as that nurses are not well aware that their new information device management ability or vertical attitude is an obstacle to improving patient engagement.

On the other hand, in the case of this inventory, the factor extracted with a total explanatory power of 53.02% generally fell short of the standard that should explain at least 60% of the total variance (Polit & Yang, 2016). The result is different from PCC, a measurement tool with a similar concept, which showed an explanatory power of 61.8% (Hwang, 2015). This is because the concept of patient engagement itself is unfamiliar to nurses in South Korea(Lee, 2019). Specifically, factor 4 managing barriers and factor 5 cultivating professional knowledge and attitudes, which showed meager explanatory power. It is interpreted that it includes properties such as the information technology ability of nurses to improve patient engagement and shared decision making, which is somewhat ideal to generalize in domestic clinical environment.

This study had methodological strengths. The factorial structure of the NCIPE was cross-validated using both EFA and CFA in different subsamples, and this is the first study to have applied the approach for a psychometric study to patient engagement in nurse for patient engagement. The NCIPE also has practical strengths. Items with more than 15% missing values might be problematic due to participants not understanding them (de Vet et al., 2011). There were no missing values per item in the present study, suggesting the absence of this problem among nurses for measuring competency. In addition, the relatively small number of NCIPE items increases the feasibility of applying this scale in clinical

practice.

The second-order CFA model is a model that explains the covariance between each sub-factor as a general factor, G factor, and is also called a hierarchical factor model (Hull et al., 1991). Since the second-order CFA model also considers the effects of both the G factor and sub-factor, it is relatively widely applied compared to the Bifactor model in the process of verifying the factor structure of the scale. Second-order models are potentially applicable when (a) the lower-order factors are substantially correlated with each other, and (b) there is a higher-order factor that is hypothesized to account for the relationship among the lower-order factors. Such second-order models can be estimated, and the fit of the second-order structure can be statistically tested so long as four or more first-order factors are hypothesized(Chen, West & Sousa, 2006).

Since, if there are only two primary factors in the secondary model, under-discrimination occurs and the secondary factors cannot be estimated with the primary factors, this is because it achieves a statistically equivalent model (Kim, 2016). Based on this perspective, a second-order model was proposed as the underlying structure of the NCIPE in the present study. In the case of the NCIPE, the number of factors was 5, which was suitable for applying the second-order model, because it showed a high correlation between sub-factors. This can be interpreted in the same context as ICM, the conceptual framework of this study, forms an organized cyclical relationship at each stage. Therefore, in this study, a model that can interpret this inventory more clearly through second-order confirmatory factor analysis in NCIPE was tested based on statistical and theoretical

evidence.

This study has validated the second-order five-factor model of the NCIPE. Even though multiple indices of CFA of the newly proposed model were similar to those of the first-order five-factor model, the second-order five-factor model has overcome some obvious problems identified in the study: (i) a strong correlation between five factors in the first-order five-factor model, and (ii) discordance between the theoretical model and empirical evidence for the underlying structure of the NCIPE in the first-order five-factor model. In addition, the second-order five-factor model has provided insight into how the five-first-order factors contribute to (overall) nurse competency for patient engagement. This study empirically demonstrates that nurses' competency is required in the entire nursing process to improve patient engagement. It means that all five factors of nurses' competency for patient engagement can improve patients' engagement when combined.

3. Limitation

This inventory is meaningful in that it was the first to develop an inventory including health literacy and information technology competency, which was not included in existing scales, based on ICM that can reflect the recent medical environment for nurses' competency to improve patient engagement. However, there are some limitations that should be noted.

First, in order to ultimately improve patient engagement within the clinical environment system, patient engagement must be made not only at the organizational level but also at the policy making level (Carman, et al., 2013). Considering the establishment

of the concept of patient participation in South Korea and the clinical environment and social perceptions, there was a limit to developing tools including organizational and policy steps. Patient engagement at the organizational stage requires not only active interest and efforts of individual patients, but also organizational measures by giving patients and their family the following roles: advisors, decision makers, member of quality improvement team, patient safety accident investigation team and patient participation council.

In the United States, already in 2009, the Health Information Technology Policy Committee, established by the American Recovery and Reinvestment Act, gave three of the 20-seat committee seats to patients to allow consumer representatives to make recommendations on policies that promote adoption and utilization of health information technology. and family members to participate (Carman et al., 2013). However, in South Korea, the opportunities for active participation of patients and citizens in the health care policy-making process are very limited, and even if there are opportunities to participate, consumer groups or civic groups have standardized them to be recommended, so the entry barrier is high (Lee, 2012). Considering the domestic clinical environment, it was difficult to include nurses' competency to improve patient engagement even at the organizational and policy stages.

Second, a self-report bias may occur because this inventory evaluates the nurse's own competence in the form of self-report responses. Self-reporting bias occurs when respondents are asked about their experiences, feelings, attitudes, beliefs, intentions, etc. (Park, 2013). According to Donaldson and Grant-Vallone (2002), in reality, this bias is

difficult to avoid even if researchers introduce complex and sophisticated analytical procedures and study designs that focus on controlling response bias. Therefore, it is reported that the validity threat can be excluded by using two different types of data sources. Thus, to compensate for this inventory's self-report bias, it is necessary to measure and compare reliable data through patient satisfaction, patient safety accident rate, or longitudinal follow-up.

4. Significance of the study

The significance of this study is as follows. First, in terms of nursing practice, it is expected that identifying the nurse's competency in patient engagement will be expanded in the clinical field by confirming the nurse's role to improve patient engagement, which has never been attempted in South Korea. By presenting a standard to nurses who know about the role of nurses to improve patient engagement, but do not know how, it will be possible to confirm the nurse's competency to promote objective patient engagement. Based on the competencies identified in this inventory, it will be possible to conduct competency training for nurses to enhance patient engagement.

Furthermore, it can be confirmed that the competency of nurses to promote patient engagement is improved through the inventory. Through the enhancement of nurses' competency, in clinical practice, it can be expected that the subjective index of patients, caregivers, medical staff, and nurses will also increase their satisfaction level. Also, in terms of health performance, as patient engagement is enhanced through patient engaged nursing, it can be confirmed that health outcomes such as the number of days hospitalized,

readmission rate, side effects, and safety accidents are improved. It is expected that this will lead to the financial benefits of hospitals in the long term, and will also have a positive effect on the national insurance finances.

Second, in terms of nursing education, measuring nurses' competency for patient engagement is expected to be an opportunity to recognize the importance of nurses' role in promoting patient engagement according to competency in the educational field. By educating nursing students on the competency of nurses to promote patient engagement, it is possible to prepare a foundation to expand and think about the role of nurses required in the clinical field. It will be a support for growth as an advanced nursing professional. Based on this, it is expected that in the long term, the gap between practice and theory will be reduced, contributing to a reduction in the turnover rate of new nurses due to the reduction of the reality shock when nursing students become new nurses.

Lastly, in terms of nursing theory and research, there were limitations in various studies because, in the case of Korea, scales suitable for the domestic situation were not developed despite the increasing demand for patient engagement due to changes in the clinical environment. It is expected to be provided as primary data for research on nurse competency and factor identification. In addition, it will be possible to use it as a scale to measure the outcome of the development and application of an intervention program to enhance nurse competency to improve patient engagement.

VII. CONCLUSION AND SUGGETIONS

1. Conclusion

The nurse competency for patient engagement inventory developed and validated in this study comprises a total of five factors with 26 items scored on a 5-point Likert scale. Items related to the skills, knowledge and attitudes for 1) identifying Patients' physical & psychological conditions, preferences, value & beliefs, 2) encouraging and creating a comfortable atmosphere, 3) sharing information for more equal partnership, 4) managing barriers and 5) cultivating professional knowledge and attitudes. The NCIPE inventory exhibits good psychometric properties for four validity metrics (content, structural, convergent, and known-group validity) and one reliability metrics (internal consistency). In addition, the shortness of this new scale makes it highly feasible to apply in clinical practice. The NCIPE inventory can be applied in surveys and clinical trials, and to identify the levels of readiness for providing patient engaged nursing of nurses when designing appropriate patient engaged nursing interventions.

2. Suggestions

Based on the results of this study, the following suggestions are made. First, it is suggested to develop an inventory that can measure nurses' competency, including policy level, when policy and social discussions on patient participation are sufficiently conducted in South Korea and an organizational consensus is reached in the future. Second, in order to understand the accurate nurse competency based on the ICM model, it is suggested to

re-analyze when the concept of patient engagement is established in the domestic medical environment and the conditions for nurses to perform nursing work for patient engagement are improved. Lastly, in the future, a study was conducted to identify nurse competency to improve patient engagement according to the careers of all nurses, including nurses and managers with beginner and advanced beginner careers, which were not included in this study. It is suggested to generalize it as an inventory that can be applied to various levels of nurses.

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Appendix 1. Provisional definition of fieldwork phase

A. Knowledge

a. The concept and necessity of patient engagement

It refers to acquiring specialized knowledge about the concept and necessity of patient engagement.

- **The concept of patient participation is unfamiliar**

Patient engagement seems to be all about obtaining consent from the patient at the time of obtaining consent or performing an examination. Other than that, we don't say anything about patient engagement to patients, and our nurses and doctors don't know what to do, but if you ask most of the concepts, there are probably a lot more people who don't know (Participants 1,2,3,4, 5,6).

- **Lack of awareness of the need for patient engagement**

There seems to be a way to reflect patient opinions, such as customer satisfaction and kindness, but they do it because they say that it should be done only at that time as an investigation. I don't even know that patient engagement is necessary as a senior nurse, and the lower grade nurses than me are more likely to don't know that. (Participants 1,2,3,4,5,6)

- **Lack of information and education related to patient engagement**

It seems to me that hospitals are always providing only theoretical education. Just for the sake of practice, it stopped at the level of the theory like this. I have never been educated about making good communication in practice and the final result of good communication. So, even if there is no patient engagement education, I think it would be okay for a little bit

of education about communicating with the patient and doing things like that. (Participant 4)

d. Medical and nursing knowledge

It refers to acquiring medical and nursing knowledge necessary to form a trusting relationship with the patient.

- **Needs knowledge for explanation to form a trusting relationship with the patient**

Nurses who have just started working may not know, but those who have accumulated some years of experience can predict that some kind of examination is likely to be undergone for the next step. Anyway, even a nurse can't stop studying. Anyway, there are so many different diseases and new diseases, so I think nurses need to study to explain to engage patients. (Participants 2 and 5)

e. Knowledge of information related new technology

It refers to acquiring knowledge related to information technology that is newly introduced to enhance patient engagement.

- **Need to adapt to various technological changes being attempted to improve patient engagement**

We have an app called Chart in our hands. So the blood test results appear on the app. I've never looked closely at the chart in my hand, but the blood test results came up. I don't know where the results come from. There are people who use it, and there are people who can't use the smartphone application. I don't know if it's our hospital's characteristics, but the nurse doesn't explain the results in detail (Participants 2).

- **Building a trust relationship by delivering new information**

The nurse needs to know (using tablets related to patient information check) to explain, so if you click this, something will come out, and if you click this, the nurse in charge will definitely know, so I think education is necessary (Participants 3).

D. Skills

It refers to the ability to assess and judge whether a patient can participate physically and mentally.

e. Identify the patient's physical and mental participation status.

- For example, if the pain is too severe or unconscious, the patients can't do it even if they want to (participate in the patient) (Participants 1, 4, 5, 6).
- *Acting nurses have a lot of trouble with patients. Usually, they take care of the patient without knowing what they are doing, but when the patient asks this, they can't answer well. Then, the next step in involving the patient cannot be achieved (Participant 1).*
- *I think the most important thing for patient engagement is patient assessment. Patient situation. I think a patient's situation is the basis for everything that sees the patient well. Because we need to know what the problem is so that we can make plans, set plans, activities, and evaluate accordingly (Participants 2, 6).*

f. Identify the patient's personal characteristics and needs

It refers to the ability to identify needs that may vary depending on the patient's personal characteristics.

- **Needs that vary depending on the patient's personal characteristics**

There are a lot of personal reasons, right? There will be economic or social things. Of course, the test results are the same, but if you really have time, you should identify personal and personal things, connect them to the social welfare team, connect them to fundamental problems, and really understand the patient's situation. I think we need something like that for that (Participant 1, 3).

- **Identify patient needs based on experience, not records.**

There are people who are negative, irritated, and feel uncomfortable with something else even if they just solve this problem. So in that case, I just solve the inconvenience and take care of the emotion. So that delirium doesn't come now, so that you can go to the ward. That's what I usually did (Participant 4).

g. Basic nursing skills

It refers to the ability to perform nursing skills that must be basically equipped as a nurse to build trust with patients.

- **Skills are the basis for building trust with patients.**

I think IV and Foley should be basic skills. Because no matter how good the explanation is and how kind you are, if you can't start IV and poke it four times, that the patient hates the nurse already because it hurts the patient so much. So basically, regardless of whether I'm good at greeting or not, patients lose trust in nurses, trust in wards, trust in hospitals, and more complaints build-up while comparing other hospitals. So I think as a nurse, the skills should be cultivated basically(Participants 1, 5).

h. Personalized communication

It refers to the ability to provide communication tailored to individual needs by grasping the priorities of patient needs through careful observation and re-evaluating them.

- **Careful observation.**

The memo showed me what kind of tendency the patient is, so I looked at it first and said, "Oh, I shouldn't do this to this person." I should do it like this. I tend to keep that in mind and talk about it, but what I want is to identify patients and patient tendencies. Patients participate when nurses provide the care what patients want to receive(Participants 1,2,3,4).

- **Identifying priorities**

First of all, if you reassure the mothers first, I think it will be helpful for the next step, slowly preparing for the operation and cooperating. Yes. But if the mothers say they can't do it because they're sick, then we say the baby is at risk. Also we make them encourage, saying

When it's okay now, you should do it quickly. The communication is not going well because the mothers have extremely pain (Participant 3)

- **Reassessment**

When taking over, this patient's back hurts more, the surgical site hurts more, or the leg is pulled and uncomfortable, and something like that. Complaints like symptoms, if nurses ask patients one more time, it makes patients feel very good, and just because patients think that this nurse is interested in me, that nurse continues to care about me among so many patients, then patients open their heart more... (Participants 5 and 6)

i. Sharing specific and accurate information

It refers to the ability to accurately provide information about the problem patients are curious about in an easy-to-understand language, to explain specific cases to help understanding, and to share information about the future process.

- **Provide accurate information**

Because the test results are like this, if you don't test, these problems can occur later, so it's better to do the test. There are many cases where even if nurses just say something like this, patients will change their mind (Participants 1,2, 4).

- **Introduction of specific cases**

I'll tell you about the previous case, and even in the case of breastfeeding, colostrum doesn't work well for two or three days in the case of a first-time mother. When it doesn't run well, I say you don't' need to worry about it, because other mothers did as well. In the case of a first-time mother, I explain it a little bit more, because of the lack of information and experiences. so I make them feel relief through previous case as like them. To say you are not the only one, so you can be reassured. And I let them remind their safety, saying be careful, there are people who have fallen in the similar situations with you(Participant 3).

- **Share the patient's progress in the future**

I ask a lot of questions about pain and intervene. Then, when the next shift comes, another nurse will be in charge of the next night's nurse, explaining this and doing it again. But the

term is actually 8 hours long, but to us, it is very short, we take it to the patient, and we talk to the patient in such a short period of time (Participant 4).

- **Use easy-to-understand language**

From the point of view of the healthcare providers, the next question can be asked when the patient understands their condition accurately by repeating the explanation accurately in terms that the patient can understand (Participant 6).

j. Patient engagement possible range setting

It refers to the ability to adhere to consistent principles by setting the possible scope for patient engagement and politely and firmly rejecting patients who do not comply with them.

- **A polite and firm refusal**

At first, if they ask anything about this, I usually try to meet them, but they ask for something that takes a lot of time. Cut it out, saying it can't be done. just block it altogether. That way, the patients in the future will feel less sad and the trust relationship will not be damaged (Participant 1,2).

- **Consistent application of range**

If one person asks for a favor and listens to it, people will tell me to do it too, and I want it to do it too. There is not enough time for this to deepen the education and there are some difficulties. So while I do it, I have to do something like this, but I can't say it firmly, I can't, and I think it's a bit difficult. However, if you do not set these things well in the beginning, it is difficult to form a rapport with patients (Participants 5 and 6).

E. Attitude

d. Role

It refers to the role of nurses necessary by improving patient engagement.

i) Self-development

- *Basically, I think that a nurse who has the ability and knowledge to explain about the*

patient's health and test results, and who constantly strives for self-development, is needed to catch up with the situation of the patient as a professional nurse. Because we think that we can create more situations or opportunities for patients to participate. (Participants 1 and 2)

- *What really matters is education. Because if I don't know, I can't explain enough to the patient, and it's hard for the patient to trust me enough. As I study, I find that the gap between clinical practice and practice is dramatically narrowing (Participant 6).*

ii) Caregiver and family management

- *Especially in Korea, I think the role of caregiver is huge. In many cases, caregiver make decisions about patients' treatment, so I think caregiver management is also important for patient engagement. If the nurses explains what the patient have to do to the caregivers, the patient often changes their mind to by following caregivers' persuasion (Participants 1,2,4,6).*

iii) Collaboration among healthcare providers

- **Dissonance among healthcare providers negatively affects patients**

Usually doctors have an infection and they tell the nurse, uh, if it's appendicitis, this person is sick, so let's take a CT scan and explain that much. Almost most of them. There is no standardized frame, there is no frame, and communication is not good. We're curious too, but we're so busy again, we don't have time to ask. Yes, that is often the case. But the test results do not go well first and cannot be shared among healthcare providers, so in some ways it cannot be transmitted to patients... . (Participants 1 and 2)

- **Good collaboration between healthcare providers has a positive effect on patients**

We have intensive care specialists and specialist professors. Intensive care professor. He resides in the surgical department and communicates well for patients, and I think it is generally well communicated to patients. (Participants 4, 5, 6)

- **If there is no cooperation within the medical staff, unnecessary work will occur**

The doctor explains the big treatment plan. But patients usually don't understand it enough. Then they all come to the nurse. (Participants 2, 4, 6)

iv) Positive acceptance of patient engagement

- **As the role and participation of patients increases, the role and attitude of nurses must also change**

Even if patients are in 40s or 50s these days, the internet is developing, so patients gather information through the internet first before coming to the hospitals. So, I think it's right that the nurse needs to explain in order to provide more accurate information because they check a lot of information and are admitted to the hospital (Participants 1, 5, 6).

e. Image

i) Create an atmosphere where patients can speak comfortably

- **Unspeakable busy atmosphere hinders patient engagement**

First of all, I don't think it's an easy environment to talk about. Patients and caregivers are just talking to the healthcare providers, but the healthcare providers are not like that. Please answer only what I ask. Some doctors say this. Hearing that kind of thing makes me feel very discouraged, I don't want to talk to this doctor, I want to talk to another doctor, and there seems to be something like that. I don't think it's that comfortable. No matter how well the patient or caregiver knows about their disease, there are times when they cannot explain it well. I wish I could lead that kind of thing well... If I could lead the atmosphere and things like that well. (Participants 2, 5, 6)

- **Creating a comfortable atmosphere through non-verbal expression**

I think rapport is formed by basically asking about my facial expressions, tone, greetings, and so on (Participant 5).

ii) Emotional support

- **Encourage them to comfort and focus on treatment.**

When I meet the nervous patients give them emotional support , saying you don't have to worry too much about it either. Even if the baby is born prematurely, if the baby is in a bad condition, there were not so many bad cases, and even in this state, you can persist a week or two. Sometime, patients express thank these kind of nurses emotional support. So I think

emotional care is really important. Especially those who are pregnant. I'm too sensitive (Participant 3).

iii) Empathy

- **Be in Someone Else's Shoes**

There are cases where the nurse makes a decision and decides whether the patient wants to participate or not. Wouldn't it be better if I knew this information from the patient's point of view? Should I call this kind of thinking uh, mind empathy? If there is such a thing, I think it will help patient engagement better (Participants 3, 5, 6)

iv) Active listening

- **Continue to listen carefully**

The best way to form a rapport for patient engagement is to listen. When patients talk about what they want to nurses, but nurses are not ready to listen, they keep complaining about nurses listening attitudes(Participants 4,5)

f. Motivation

It refers to the intrinsic motivation that is the driving force behind continuously improving patient engagement.

i) Worth as a nurse

- **Satisfaction with work as a nurse**

Giving a lot of information like this will improve the patient's health as well as their own health, so that's good, but I think nurses will feel a lot of reward while working. There are cases when the patient gets better and is discharged from the hospital, but it does not get better, but I tried my best and did my best. There is a sense of satisfaction that comes from communicating well with doctors, and at the same time, there is definitely something to learn while communicating with doctors. There is something to learn from patients, and satisfaction in that, satisfaction in work (Participant 1, 5, 6).

ii) Recognition as a profession

- **Visualization of nursing profession through patient engagement**

(If patient participation is successful) I think the nurses' competency will be highly evaluated. In the old days, you may have thought that you simply needed a nurse to work, but now, after explaining something like that, understanding it, and building trust, it is about a nurse, a job, and a little bit of name value. I think it'll have a really good effect in the future. (Participants 3, 4, 6)

Appendix 2. Preliminary items of nurse competency inventory for patient engagement

Encounter (Number of items)	Factor (Number of items)	Items
Patient assessment (16)	Identification of patients' physical & psychological condition, preferences, value & beliefs (3)	
	• Identification of the patient's physical and psychological availability	나는 환자의 신체, 정신, 심리사회적 사정을 통해 환자가 치료계획에 참여 가능한 상황인지 판단할 수 있다.
	• Identify the patient's personal characteristics and needs	나는 환자마다 가지고 있는 개인적 특성(선호도, 가치, 신념 등)에 대해 파악하고 있다. 나는 같은 질환의 환자를 간호하더라도 개인의 특성에 따라 달라지는 구체적 요구(needs)를 알고 있다.
	Cooperation with other healthcare providers and family (8)	
	• Managing caregivers	나는 환자가 직접 자신의 의견을 표현할 수 없는 경우(의식저하, 심리적 불안정 등) 대안을 제시할 수 있다. 나는 환자치료에 가장 적극적인 역할을 하는 보호자를 파악하고 있다. 나는 환자의 치료를 위한 보호자의 협조가 필요한 경우(예: 퇴원 후 약물복용, 식단 관리 등) 어려움 없이 보호자에게 요청할 수 있다 나는 환자의 주보호자와 신뢰관계를 형성하기 위해 노력한다.
	• Collaborating with other health care providers	나는 환자의 치료와 관련된 의료진 및 직원들과 원활하게 의사소통 한다. 나는 다른 의료진과 문제가 발생할 경우 원만하게 해결할 수 있다. 나는 환자의 치료를 위해 다학제 전문가들과 협력한다 나는 환자 간호 시 스스로 해결 불가능한 문제가 발생하는 경우 문제해결이 가능한 사람(예: 상사, 동료 등)에게 도움을 요청한다.
	Consistent attitude and a positive response to patient engagement (5)	
	• Setting the possible range of patient engagement	나는 간호사로서 환자의 요구에 응할 수 있는 업무 내에서의 가능 범위에 대해 설명할 수 있다. 나는 환자의 무리한 요청에 대해 합리적으로 설명하여 거절할 수 있다 나는 환자가 치료계획에 참여하는 것이 중요하다고 생각한다.

		나는 환자참여(patient engagement)가 무엇인지 환자 및 보호자에게 설명할 수 있다. 나는 환자참여(patient engagement)의 중요성에 대해 환자 및 보호자에게 설명할 수 있다.
Exchange information based on health literacy (11)	Information sharing for more equal partnership (11)	
	• Active listening	나는 간호사로서 환자와 수평적(파트너) 관계를 형성하기위해 노력한다. 나는 환자의 이야기에 반응하며 끝까지 들어준다.
	• Personalized communication	나는 환자의 특성에 따라 다양한 의사소통기법을 적용한다.
	• Shared decision making	나는 환자의 질문에 대해 적극적으로 대답한다. 나는 환자가 치료와 관련된 의견을 제시하는 경우 반영하기위해 노력한다. 나는 환자의 간호계획을 설정할 때 환자의 의견을 묻고 이를 반영하여 목표를 설정한다.
	• Sharing specific and accurate information based on health literacy	나는 환자가 이해하기 쉬운 언어를 사용하여 환자에게 치료정보를 제공한다. 나는 환자교육시 제공한 정보에 대해 환자에게 얼마나 이해하였는지 확인한다. 나는 환자의 치료적 정보에 대해 환자와 공유하려고 한다. 나는 환자에게 정보를 제공할 때 무엇이 왜 필요한지 등과 같은 정보를 포함하여 구체적으로 제공한다. 나는 환자에게 근거에 기반한 정확한 정보를 제공한다.
Planning between patients and nurses (6)	Encouraging and creating a comfortable atmosphere for the patient (6)	
	• Create an atmosphere where you can speak comfortably	나는 환자와 대화할 때 주변을 최대한 조용히 정리한다. 나는 환자와 대화할 때 환자와 눈을 맞추며 서두르지 않는다. 나는 환자가 자신의 의견을 자유롭게 제시할 수 있는 환경을 만들어 치료계획에 참여할 수 있도록 한다.
	• Emotional support	나는 환자가 정서적으로 불안한 모습을 보이는 경우 안정을 위해 무엇을 해주어야 할지 알고 있다.
	• Empathy	나는 환자의 상황을 이해하고 공감해준다. 나는 간호를 제공하기 전 환자의 입장에 서서 생각해본다.
Determining intervention (4)	▪ Managing new devices and information technologies (4)	
	• Knowledge of information related new technology	나는 병원 혹은 부서에 도입되는 새로운 기기(device)에 대해 알고 능숙하게 사용할 수 있다. 나는 병원 혹은 부서에 도입되는 새로운 software program 에 대해 알고 능숙하게 사용할 수 있다.

		나는 환자에게 유용한 device 나 software 에 대해 소개하고 교육할 수 있다. 나는 환자의 간호를 위해 필요한 정보를 분석할 수 있다.
Evaluating and motives for patient engagement (7)	▪ Cultivating of Knowledge and attitudes as professional nurses (7)	
	• Worth as a nurse	나는 환자에게 간호를 제공함으로써 보람을 느낀다. 환자의 최적의 건강성과를 위해 치료계획 전반에 대한 간호사의 환자 참여 독려는 간호사로서 해야 할 의무라고 생각한다.
	• Recognition as a profession	나는 내가 제공한 간호에 대해 환자가 만족한다고 느낀다.
	• Self-development	나는 환자에게 더 나은 양질의 간호를 제공하기 위해서는 지속적인 지식적, 기술적 발전이 필요하다고 생각한다.
	• Medical and nursing knowledge	나는 의학 및 간호학적 전문지식의 습득을 위해 업무 외 시간을 할애하여 학습한 적이 있다. 나는 간호술기(근육주사, 정맥주사, 기도흡인, 도뇨관 삽입 등)의 향상을 위해 업무 외 시간을 할애하여 연습한 적이 있다. 나는 전문지식을 기반으로 전문적 태도를 가지고 환자에게 간호를 제공한다

Appendix 3. Derived items after pre-test

Encounter (문항 수)	Factor (문항 수)	Item
Assessing patient (15)	Identification of patients' physical & psychological condition, preferences, value & beliefs (3)	1.나는 환자의 신체, 정신, 심리사회적 사정을 통해 환자가 치료계획에 참여 가능한 상황인지 판단할 수 있다.
		2. 나는 환자마다 가지고 있는 개인적 특성(선호도, 성향 등)에 대해 파악할 수 있다.
		3. 나는 같은 질환의 환자라도 개인적 특성에 따라 달라지는 간호요구를 알수 있다
	Cooperation with other healthcare providers and family (8)	5. 나는 환자가 직접 자신의 의견을 표현할 수 없는 경우(의식저하, 심리적 불안정 등) 대안을 제시할 수 있다.
		20. 나는 환자치료에 가장 적극적인 역할을 하는 보호자를 파악하고 있다.
		22. 나는 환자의 치료를 위한 보호자의 협조가 필요한 경우 어려움 없이 보호자에게 요청할 수 있다
		21. 나는 환자의 주보호자와 신뢰관계를 형성하기 위해 노력한다.
		23. 나는 환자의 치료와 관련된 의료진 및 직원들과 원활하게 의사소통 한다.
		24. 나는 환자의 치료를 위해 협력하는 과정에서 다른 의료진과 갈등이 발생한 경우 원만하게 해결할 수 있다..
		25. 나는 환자의 치료를 위해 다학제 전문가들과 협력할 수 있다.
		13. 나는 환자 간호 시 스스로 해결 불가능한 문제가 발생하는 경우 문제해결이 가능한 사람에게 도움을 요청할 수 있다.
	Consistent attitude and a positive response to patient engagement (4)	12 나는 환자가 내 업무범위를 넘어서는 요구를 할 경우 환자에게 합리적으로 설명하여 거절할 수 있다.
		26. 나는 효과적인 중재를 위해 환자의 특성을 고려한 맞춤식 교육이 이루어지는 것이 중요하다고 생각한다.
		37. 나는 환자참여가 무엇인지 환자 및 보호자에게 설명할 수 있다.
		38. 나는 환자참여의 중요성에 대해 환자 및 보호자에게 설명할 수 있다.

Appendix 3. Items derived after pre-test (cont.)

Factors (문항 수)	Attributes (문항 수)	Item
Exchanging information based on health literacy (11)	Information sharing for more equal partnership (11)	17. 나는 간호사로서 환자와 수평적관계를 형성하기위해 노력한다.
		9 나는 환자와 대화할 때 환자의 이야기에 경청하며, 환자에게 질문할 시간을 준다.
		10. 나는 환자의 특성에 따라 다양한 의사소통기법을 활용할 수 있다.
		29. 나는 환자의 질문에 대해 적극적으로 대답한다.
		30. 나는 환자가 치료와 관련된 의견을 제시하는 경우 반영하기위해 노력한다.
		27. 나는 환자의 간호(중재) 계획을 설정할 때 환자의 의견을 묻고 이를 반영하여 목표를 설정할 수 있다.
		11 나는 환자에게 치료와 관련된 정보를 제공할 때 의학용어를 환자가 이해하기 쉬운 언어로 바꾸어 내용을 전달할 수 있다.
		31. 나는 환자교육시 제공한 정보를 환자가 얼마나 이해했는지 확인한다
		8.나는 환자의 치료와 관련된 검사나 시술관련 정보를 환자와 공유하기 위해 노력한다.
		6. 나는 환자에게 치료와 관련된 정보를 제공할 때 치료의 필요성, 방법과 같은 구체적인 내용을 포함하여 설명할 수 있다.
		7. 나는 환자에게 과학적 근거에 기반한 정확한 치료관련 교육을 제공할 수 있다.
Planning between patients and nurses (6)	Encouraging and creating a comfortable atmosphere for the patient (6)	14. 나는 환자와 대화할 때 환자가 집중할 수 있도록 대화에 방해되는 요인을 제거함으로써 면담환경을 조성할 수 있다.
		15. 나는 환자와 대화할 때 환자와 눈을 맞추며 서두르지 않는다.
		28. 나는 환자가 자신의 의견을 자유롭게 제시할 수 있는 환경을 만들어 치료 계획에 참여하도록 할 수 있다.
		32.나는 환자가 정서적으로 불안한 모습을 보이는 경우 안정을 돕기 위해 무엇을 해주어야 할지 알고 있다.
		33.나는 환자의 상황을 이해하고 공감해줄 수 있다.
		34.나는 간호를 제공하기 전 환자의 입장에 서서 생각해본다.

Appendix 3. Items derived after pre-test (cont.)

Factors (문항 수)	Attributes (문항 수)	Item
Determining intervention (4)	Managing new devices and information technologies (4)	17.나는 병원 혹은 부서에 도입되는 새로운 기기(device)에 대해 알고 능숙하게 사용할 수 있다.
		18.나는 병원 혹은 부서에 도입되는 새로운 의료정보 시스템에 대해 알고 능숙하게 사용할 수 있다.
		19.나는 병원에서 환자에게 제공하는 기기나 스마트폰 어플리케이션에 대해 소개하고 교육할 수 있다.
		4. 나는 환자의 간호를 위해 필요한 정보(신체, 정신, 심리사회적 상태, 검사결과, 면담결과)를 종합적으로 분석할 수 있다.
Evaluating and motives for patient engage ment (4)	Cultivating of knowledge and attitudes as professional nurses (4)	36. 나는 치료과정 전반에 환자참여를 격려하는 것이 간호사로서 해야 할 의무라고 생각한다.
		35 나는 내가 제공한 간호에 대해 환자가 참여했다고 생각될 때 업무에 대한 보람을 느낀다.
		40. 나는 환자에게 더 나은 양질의 간호를 제공하기 위해서는 나 스스로의 지속적인 지식적, 기술적 발전이 필요하다고 생각한다.
		39. 나는 의학 및 간호학적 전문지식의 습득을 위해 업무 외 시간을 할애하여 학습한 적이 있다.

Appendix 4. Mean, standard deviation, skewness, and kurtosis of preliminary 40 items (N=211)

No	Item	Mean±SD	Skewness	Kurtosis
1	나는 환자의 신체, 정신, 심리사회적 사정을 통해 환자가 치료계획에 참여 가능한 상황인지 판단할 수 있다.	4.16±0.81	-1.327	3.326
2	나는 환자마다 가지고 있는 개인적 특성(선호도, 성향 등)에 대해 파악할 수 있다.	3.91±0.83	-0.416	-0.360
3	나는 같은 질환의 환자라도 개인적 특성에 따라 달라지는 간호요구를 알수 있다.	4.01±0.90	-.652	-0.309
4	나는 환자의 간호를 위해 필요한 정보(신체, 정신, 심리사회적 상태, 검사결과, 면담결과)를 종합적으로 분석할 수 있다.	4.01±0.81	-0.708	0.757
5	나는 환자가 자신의 의견을 직접 표현할 수 없는 경우(인지기능 저하, 심리적 불안정 등) 보호자 면담 또는 과거 의무기록 분석과 같은 대안을 통해 환자의 의견을 간접적으로 파악할 수 있다.	3.89±0.88	-0.701	.360
6	나는 환자에게 치료와 관련된 정보를 제공할 때 치료의 필요성, 방법과 같은 구체적인 내용을 포함하여 설명할 수 있다.	3.90±0.94	-0.541	.043
7	나는 환자에게 과학적 근거에 기반한 정확한 치료관련 교육을 제공할 수 있다.	3.89±0.85	-0.473	-0.319
8	나는 환자의 치료와 관련된 검사나 시술관련 정보를 환자와 공유하기 위해 노력한다.	4.09±0.86	-0.887	0.541
9	나는 환자와 대화할 때 환자의 이야기에 경청하며, 환자에게 질문할 시간을 준다.	3.87±0.93	-0.588	-0.116
10	나는 환자의 특성에 따라 다양한 의사소통기법을 활용할 수 있다.	3.73±0.95	-0.447	-0.405
11	나는 환자에게 치료와 관련된 정보를 제공할 때 의학용어를 환자가 이해하기 쉬운 언어로 바꾸어 내용을 전달할 수 있다.	3.97±0.96	-0.789	-0.319

No	Item	Mean±SD	Skewness	Kurtosis
12	나는 환자가 내 업무범위를 넘어서는 요구를 할 경우 환자에게 합리적으로 설명하여 거절할 수 있다.	3.78±0.95	-0.508	-0.172
13	나는 환자 간호 시 스스로 해결 불가능한 문제가 발생하는 경우 문제해결이 가능한 사람에게 도움을 요청할 수 있다.	3.96±0.97	-0.839	0.098
14	나는 환자와 대화할 때 환자가 집중할 수 있도록 대화에 방해되는 요인을 제거함으로써 면담환경을 조성할 수 있다.	3.86±0.78	-0.363	-0.242
15	나는 환자와 대화할 때 환자와 눈을 맞추며 서두르지 않는다.	3.67±0.97	-0.357	-0.433
16	나는 간호사로서 환자와 수평적관계를 형성하기위해 노력한다.	3.82±1.014	-0.646	-0.078
17	나는 병원 혹은 부서에 도입되는 새로운 기기(device)에 대해 알고 능숙하게 사용할 수 있다.	3.85±0.81	-0.566	.559
18	나는 병원 혹은 부서에 도입되는 새로운 의료정보 시스템에 대해 알고 능숙하게 사용할 수 있다.	3.83±0.85	-0.463	-.055
19	나는 병원에서 환자에게 제공하는 기기나 스마트폰 어플리케이션에 대해 소개하고 교육할 수 있다.	3.68±0.91	-0.324	-0.471
20	나는 환자치료에 가장 적극적인 역할을 하는 보호자를 파악하고 있다.	3.90±0.90	-0.444	-0.611
21	나는 환자의 주보호자와 신뢰관계를 형성하기 위해 노력한다.	3.90±0.93	-0.579	-0.297
22	나는 환자의 치료를 위해 보호자의 협조가 필요한 경우 어려움 없이 보호자에게 요청할 수 있다.	3.90±0.90	-0.767	0.319
23	나는 환자의 치료와 관련된 의료진 및 직원들과 원활하게 의사소통 할 수 있다.	4.07±0.86	-0.757	0.001
24	나는 환자의 치료를 위해 협력하는 과정에서 다른 의료진과 갈등이 발생한 경우 원만하게 해결할 수 있다.	3.87±0.91	-0.459	-0.559

No	Item	Mean±SD	Skewness	Kurtosis
25	나는 환자의 치료를 위해 다학제 전문가들과 협력할 수 있다.	3.80±0.94	-0.753	0.478
26	나는 효과적인 중재를 위해 환자의 특성을 고려한 맞춤식 교육이 이루어지는 것이 중요하다고 생각한다.	3.89±0.91	-0.674	-0.102
27	나는 환자의 간호(중재) 계획을 설정할 때 환자의 의견을 묻고 이를 반영하여 목표를 설정할 수 있다.	3.85±0.89	-0.494	-0.253
28	나는 환자가 자신의 의견을 자유롭게 제시할 수 있는 환경을 만들어 치료 계획에 참여하도록 할 수 있다.	3.74±0.93	-0.451	-0.305
29	나는 환자의 질문에 대해 적극적으로 대답한다.	3.98±0.90	-0.702	-0.006
30	나는 환자가 치료와 관련된 의견을 제시하는 경우 반영하기위해 노력한다.	3.82±0.97	-0.647	-0.112
31	나는 환자교육시 제공한 정보를 환자가 얼마나 이해했는지 확인한다.	3.91±0.85	-0.519	-0.236
32	나는 환자가 정서적으로 불안한 모습을 보이는 경우 안정을 돕기 위해 무엇을 해주어야 할지 알고 있다.	3.89±0.90	-0.635	-0.082
33	나는 환자의 상황을 이해하고 공감해줄 수 있다.	4.00±0.83	-0.551	-0.001
34	나는 간호를 제공하기 전 환자의 입장에 서서 생각해본다.	3.85±0.92	-0.403	-0.511
35	나는 내가 제공한 간호에 대해 환자가 참여했다고 생각될 때 업무에 대한 보람을 느낀다.	3.89±0.91	-0.605	-0.185
36	나는 치료과정 전반에 환자참여를 격려하는 것이 간호사로서 해야 할 의무라고 생각한다.	4.01±0.91	-0.696	-0.112
37	나는 환자참여가 무엇인지 환자 및 보호자에게 설명할 수 있다.	3.93±0.85	-0.463	-0.422
38	나는 환자참여의 중요성에 대해 환자 및 보호자에게 설명할 수 있다.	3.90±0.92	-0.486	-0.613
39	나는 의학 및 간호학적 전문지식의 습득을 위해 업무 외 시간을 할애하여 학습한 적이 있다.	3.93±1.00	-0.636	-0.400

No	Item	Mean±SD	Skewness	Kurtosis
40	나는 환자에게 더 나은 양질의 간호를 제공하기 위해서는 나 스스로의 지속적인 지식적, 기술적 발전이 필요하다고 생각한다.	4.08±0.97	-0.794	-0.388

Appendix 5. Mean, standard deviation, skewness, and kurtosis of 26 items (N=211)

No	Item	Mean±SD	Skewness	Kurtosis
1	나는 환자의 신체, 정신, 심리사회적 사정을 통해 환자가 치료계획에 참여 가능한 상황인지 판단할 수 있다.	4.22±0.75	-0.997	1.274
3	나는 같은 질환의 환자라도 개인적 특성에 따라 달라지는 간호요구를 알수 있다.	4.09±0.92	-1.039	0.760
4	나는 환자의 간호를 위해 필요한 정보(신체, 정신, 심리사회적 상태, 검사결과, 면담결과)를 종합적으로 분석할 수 있다.	3.92±0.88	-0.598	-0.66
5	나는 환자가 자신의 의견을 직접 표현할 수 없는 경우(인지기능 저하, 심리적 불안정 등) 보호자 면담 또는 과거 의무기록 분석과 같은 대안을 통해 환자의 의견을 간접적으로 파악할 수 있다.	3.85±0.86	-0.653	.394
13	나는 환자 간호 시 스스로 해결 불가능한 문제가 발생하는 경우 문제해결이 가능한 사람에게 도움을 요청할 수 있다.	4.04±0.88	-0.676	-0.023
21	나는 환자의 주보호자와 신뢰관계를 형성하기 위해 노력한다.	3.95±0.88	-0.579	-0.117
22	나는 환자의 치료를 위해 보호자의 협조가 필요한 경우 어려움 없이 보호자에게 요청할 수 있다.	3.86±0.96	-0.416	-0.675
9	나는 환자와 대화할 때 환자의 이야기에 경청하며, 환자에게 질문할 시간을 준다.	3.76±0.93	-0.296	-0.771
25	나는 환자의 치료를 위해 다학제 전문가들과 협력할 수 있다.	3.79±0.94	-0.534	-0.238
26	나는 효과적인 중재를 위해 환자의 특성을 고려한 맞춤식 교육이 이루어지는 것이 중요하다고 생각한다.	3.94±0.93	-0.593	-0.487
31	나는 환자교육시 제공한 정보를 환자가 얼마나 이해했는지 확인한다.	3.88±0.91	-0.815	0.516
32	나는 환자가 정서적으로 불안한 모습을 보이는 경우 안정을 돕기 위해 무엇을 해주어야 할지 알고 있다.	3.90±0.90	-0.520	-0.303

No	Item	Mean±SD	Skewness	Kurtosis
34	나는 간호를 제공하기 전 환자의 입장에 서서 생각해본다.	3.81±0.93	-0.361	-0.730
8	나는 환자의 치료와 관련된 검사나 시술관련 정보를 환자와 공유하기 위해 노력한다.	3.98±0.92	-0.517	-0.646
11	나는 환자에게 치료와 관련된 정보를 제공할 때 의학용어를 환자가 이해하기 쉬운 언어로 바꾸어 내용을 전달할 수 있다.	3.93±1.04	-0.790	-0.206
18	나는 병원 혹은 부서에 도입되는 새로운 의료정보 시스템에 대해 알고 능숙하게 사용할 수 있다.	3.79±0.89	-0.759	0.706
20	나는 환자치료에 가장 적극적인 역할을 하는 보호자를 파악하고 있다.	3.83±0.97	-0.503	-0.416
39	나는 의학 및 간호학적 전문지식의 습득을 위해 업무 외 시간을 할애하여 학습한 적이 있다.	3.96±0.88	-0.471	-0.557
14	나는 환자와 대화할 때 환자가 집중할 수 있도록 대화에 방해되는 요인을 제거함으로써 면담환경을 조성할 수 있다.	3.83±0.85	-0.308	-0.547
15	나는 환자와 대화할 때 환자와 눈을 맞추며 서두르지 않는다.	3.70±1.01	-0.367	-0.593
16	나는 간호사로서 환자와 수평적관계를 형성하기위해 노력한다.	3.85±.979	-0.460	-0.524
17	나는 병원 혹은 부서에 도입되는 새로운 기기(device)에 대해 알고 능숙하게 사용할 수 있다.	3.74±0.96	-0.490	-0.387
27	나는 환자의 간호(중재) 계획을 설정할 때 환자의 의견을 묻고 이를 반영하여 목표를 설정할 수 있다.	3.88±0.90	-0.541	-0.393
35	나는 내가 제공한 간호에 대해 환자가 참여했다고 생각될 때 업무에 대한 보람을 느낀다.	4.05±0.91	-0.736	-0.071
36	나는 치료과정 전반에 환자참여를 격려하는 것이 간호사로서 해야 할 의무라고 생각한다.	3.97±0.95	-0.769	0.170
38	나는 환자참여의 중요성에 대해 환자 및 보호자에게 설명할 수 있다.	3.86±0.91	-0.656	0.086

Appendix 6. Inter-item correlation with subsample 2

	Item No	Chronbach's α	Corrected item-total correlations	Alpha if item deleted
Total		.921		
Factor 1		.769		
	1		.553	.730
	3		.585	.719
	4		.415	.755
	5		.430	.752
	13		.486	.741
	21		.433	.751
	22		.534	.730
Factor 2		.748		
	9		.549	.694
	25		.401	.736
	26		.483	.713
	31		.449	.722
	32		.468	.717
	34		.570	.688
Factor 3		.719		
	8		.428	.691
	11		.522	.654
	18		.502	.663
	20		.488	.684
	39		.495	.666
Factor 4		.617		
	14		.398	.549
	15		.385	.558
	16		.377	.563
	17		.434	.520
Factor 5		.704		
	27		.483	.645
	35		.529	.616
	36		.501	.634
	38		.445	.668

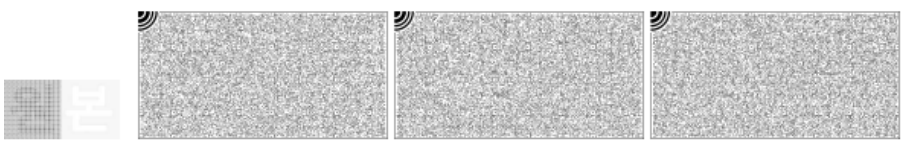
Appendix 7. Research approval from IRB

연세의료원 연구심의위원회
Yonsei University Health System, Institutional Review Board
서울특별시 서대문구 연세로 50-1 (우) 03722
Tel. 02 2228 0454, Fax. 02 2227 7888 Email. irb@yuhs.ac

심 의 일 자	2020년 12 월 7 일
접 수 번 호	2020-3079-002
과제승인번호	Y-2020-0191

연세의료원 연구심의위원회의 심의 결과를 다음과 같이 알려 드립니다.

Protocol No.	
연 구 제 목	환자참여 증진을 위한 간호사 역량 측정도구 개발 및 타당화
연 구 책 임 자	지윤정 / 연세대학교 간호대학 김모임 연구소
의 뢰 자	(학)연세대학교
연구예정기간	2020.12.07 ~ 2021.12.06
지속심의 빈도	12개월마다
과 제 승 인 일	2020.12.07
위 험 수 준	Level I 최소위험
심 의 방 법	신속
심 의 유 형	질의답변 + 계획변경
심 의 내 용	- 본 연구의 대상자 수는 Tinsley(1987)가 제시한 문항의 5배수 이상과 최소 200명 이상이 되어야 한다는 기준과 탐색적 요인분석의 경우 150명~200명을 권장(Hinkin, 1998), 확인적 요인분석의 경우 최소 150명 이상의 표본이 적절하며, 측정변수가 12개 미만인 경우 최소 200명 이상이 적절하다(Anderson & Gerbing, 1988)는 기준에 따라 탈락율 10.0%를 고려하여 최소 440명의 대상자를 모집하여 타당도, 신뢰도 검정을 실시할 것이다. =)와 같이 탐색적 요인분석에 필요한 인원 200명, 확인적 요인분석에 필요한 인원 200명, 총 400명의 탈락율 10%로 계획하고 있습니다. (연구계획서 내에 포함되었던 내용입니다.) - 공고문 내 연구대상자 항목에 제외기준 함께 명시하여 수정하였습니다. - 예비조사의 경우 심층면담과 같이 이메일로 동의서 및 설명문 발송하고 서명 사인하여 동의의사 밝히는 것으로 수정하였습니다. - 예비조사가 완료된 후 설문지 완성되면 계획변경하여 설문지 제출하도록 하겠습니다. - [변경후] 임상 연구계획서(국문) : 연구계획서_본조사_20201030 IRB.doc 삭제 - [변경후] 대상자 모집 문건 : 대상자 모집 문건 삭제 - [변경후] 대상자 설명문 및 동의서 : 설명문 및 동의서_201030_예비조사.pdf 삭제 - [변경후] 임상 연구계획서(국문) : 연구계획서_본조사_20201201 IRB.doc 추가 - [변경후] 대상자 모집 문건 : 대상자 모집 문건 추가



- [변경후]대상자 설명문 및 동의서 : 설명문 및 동의서_201201_예비조사.pdf 추가
- [변경후]대상자 모집 문건 : 대상자 모집 문건 삭제
- [변경후]대상자 모집 문건 : 대상자 모집 문건 추가

심 의 위 원 회	연세의료원 IRB
참 석 위 원	연세의료원 IRB 신속심의자
심 의 결 과	승인
심 의 의 견	-

※ 연세의료원 연구심의위원회는 생명윤리 및 안전에 관한 법률을 준수합니다.
연구책임자 및 연구담당자가 IRB 위원인 경우, 해당 위원은 위 연구의 심의과정에 참여하지 않았습니다.

연세의료원
연구심의위원회
위원장

*** 유의사항 ***

1. 연세의료원 연구심의위원회 규정 준수

연구책임자께서는 모든 연구관련자들이 규정을 이행할 수 있도록 협조하여 주시기 바랍니다.

2. 이의신청

연구자는 심의결과에 이의가 있을 경우 이의신청을 통해 심의관련 의견제시가 가능합니다.
관련 질의에 대한 의견과 충분한 근거를 제출하여 주시기 바라며, 자료 미흡 또는 근거가 불충분할 경우 연구자에게 추가 자료를 요청할 수 있습니다.

3. 질의답변

승인 통보받지 않은 과제는 연구를 진행할 수 없습니다. 시정승인 또는 보완 결과를 받은 과제는 관련 질의에 대한 답변서와 그에 따른 변경 및 수정된 자료를 심의원로부터 6개월 이내에 제출하여야 합니다.

4. 대상자 동의

IRB 승인을 받은 동의서를 사용하여야 하며, 강제 혹은 부당한 영향이 없는 상태에서 충분한 설명에 근거하여 동의절차가 진행되어야 합니다. 또한, 대상자에게 연구참여여부를 고려할 수 있도록 충분한 시간을 제공하여야 합니다.
대상자 모집공고문을 사용하는 경우에는 모집공고문과 게시방법에 대해 IRB의 사전 승인을 받아야 합니다.

5. 중간보고

관련 법령에 따라 연구의 승인 유효기간은 최대 1년을 넘을 수 없습니다.
IRB가 결정한 심의 빈도에 따라 승인 만료일 최소 6주전에 중간보고를 제출하여 승인 유효기간을 갱신하셔야 합니다.

6. 계획변경

연구진행 시, 대상자 보호를 위해 불가피한 경우를 제외하고 연구절차, 대상자 수 등 IRB로부터 승인받은 내용에 변경이 있을 경우에는 반드시 IRB의 승인을 득한 이후에 적용할 수 있으며, 대상자 보호를 위해 취해진 응급상황에서의 변경도 즉시 IRB에 보고하여 주시기 바랍니다.

7. 안전성 정보 보고

대상자의 안전이나 임상연구에 부정적인 영향을 미칠 수 있는 새로운 정보에 대해 신속히 IRB에 보고하여야 합니다.

8. 종료보고

대상자의 관찰이 종료되고 자료 수집이 완료된 후 20일 이내에 보고하여야 합니다.

9. 결과보고

종료보고 이후, 자료분석 결과에 대해 보고하여야 합니다.

10. 내부점검 시 협조 요청

대상자 보호와 계획서 및 관련 규정 준수를 확인하기 위해 점검을 실시하는 경우, 원활한 점검절차 진행을 위해 연구진행과 관련된 서류를 준비하고 협조하여 주시기 바랍니다.

Appendix 8. Research participant consent form

대 상 자 동 의 서

연구제목 : 환자참여 증진을 위한 간호사 역량 측정도구 개발 및 타당화

※ 아래 항목을 읽고 동의한다면, 좌측 상자 기호에 V 표시해 주시기 바랍니다.

□ 본인은 이 설명문을 읽었으며, 본 연구의 목적, 방법, 기대효과, 가능한 위험성, 건강 정보 관리 등에 대한 충분한 설명을 듣고 이해하였습니다.

□ 이 연구목적으로 개인(민감)정보 수집·이용·제공 등에 관한 설명을 이해하였습니다.

□ 모든 궁금한 사항에 대해 질문하였고, 충분한 답변을 들었습니다.

□ 이 연구에 동의한 경우라도 언제든지 철회할 수 있고, 철회 이후 어떠한 불이익도 발생하지 않을 것임을 확인하였습니다.

□ 충분한 시간을 갖고 생각한 결과, 본인은 이 연구에 참여하기를 자유로운 의사에 따라 동의합니다.

대상자 성명		서명		서명날짜	
참관인 성명 *(필요 시)*		서명		서명날짜	
설명한 연구자의 성명		서명		서명날짜	

Appendix 9. Survey paper

대 상 자 설 명 문

연구 제목 : 환자참여 증진을 위한 간호사 역량 측정도구 개발 및 타당화
연구 책임자 : 연세대학교 간호대학 지윤정

본 연구는 환자참여 증진을 위한 간호사 역량 측정도구 개발 및 타당화 연구입니다. 귀하는 본 연구에 참여할 것인지 여부를 결정하기 전에, 설명서와 동의서를 신중하게 읽어보셔야 합니다. 이 연구가 왜 수행되며, 무엇을 수행하는지 귀하가 이해하는 것이 중요합니다. 다음 내용을 신중히 읽어보신 후 참여 의사를 밝혀 주시길 바라며, 필요하다면 가족이나 친구들과 의논해 보십시오. 만일 질문이 있다면 담당 연구원이 자세하게 설명해 줄 것입니다. 만일 어떠한 질문이 있다면 아래 기재되어 있는 담당 연구원의 연락처로 문의하십시오. 아래 동의 관련 항목을 읽고 동의한다면, 동의서에 서명해 주시기 바랍니다.

1. 연구의 배경과 목적

의학의 발전으로 평균수명의 연장과 시대적 변화에 따라 건강에 대한 관심이 높아지고, 환자의 권리가 신장되며 환자참여는 의료의 질 향상을 위한 핵심요소로 주목받고있습니다. 이에 간호사는 환자와 제일 가까운 곳에서 가장 많은 시간을 함께하는 의료진으로 환자 및 가족과 협력하여 가장 최적의 건강성과를 위해 환자의 건강을 관리할 책임이 있으며, 환자의 치료과정 전반에 걸쳐 환자참여 정도에 큰 영향을 미칠 수 있는 핵심적인 역할을 합니다. 본 연구에서는 환자참여 증진을 위한 간호사의 역량을 확인하기 위해 문헌고찰 단계를 마쳤으며, 문헌에서 확인된 내용과 현장에서의 적용이 적절한지 확인하기 위해 심층면담을 진행하게 되었습니다. 따라서, 환자참여 증진을 위한 간호사의 역량 확인을 위한 개인적인 경험과 생각을 자유롭게 말씀해주시면 감사하겠습니다. 본 연구는 연세대학교 간호대학 박사학위 논문을 위해 진행되는 연구입니다.

2. 연구에 참여하는 대상자의 수, 기간과 장소

본 연구는 총 6명의 대상자가 참여하며, 귀하께서 연구 참여에 동의하실 경우, 연구승인일로부터 1년 동안 총 1번의 심층면담에 참여하시게 됩니다. 귀하께서 연구 참여에 동의하실 경우, 비대면 방식으로 약 한 시간가량 심층면담이 진행됩니다. 구체적인 선정기준 및 제외기준은 다음과 같습니다.

o **대상자 선정기준**

1) 300병상 이상 종합병원에 근무
2) 3년이상 경력의 간호사
3) 직접간호를 제공하는 부서에 근무하는 간호사
4) 위의 조건을 충족하며 본 설문참여에 동의하는 자

o **대상자 제외기준**

1) 환자에게 직접간호를 제공하지 않는 부서(간호부 및 행정부서, 검사실, 수술실 등)에 근무하는 간호사
2) 3년 미만 경력의 간호사
3) 간호관리자
4) 대상자 선정기준에 부합하나 본 설문 참여에 동의하지 않는 자

3. 연구 방법

본 연구는 귀하가 참여의사를 밝혀 주시면 다음과 같은 과정으로 진행될 것입니다. 귀하는 환자참여 증진을 위한 간호사 역량과 관련된 심층면담을 하게 될 것이며 면담에는 한 시간정도 소요될 것입니다. 모집공고문을 보고 연구자에게 참여의사를 밝혀오면, 이메일로 설명문 및 동의서를 발송하고, 동의하시는 경우 동의서에 서명하여 연구자의 이메일로 다시 보내주시면 됩니다. 서명한 동의서를 확인한 연구자가 귀하에게 연락하여 면담을 위한 날짜를 조율할 것이고, 면담은 Webex(비대면 온라인)를 통해 진행될 것입니다. 면담분석을 위해 모든 내용은 녹음됩니다.

4. 연구에 참여하여 기대할 수 있는 이익

귀하가 제공하는 정보는 추후에 환자참여 증진을 위한 간호사의 역량 개발 프로그램과 중재에 도움이 될 것입니다.

5. 연구에 참여하여 예상되는 위험 및 불편

환자참여 증진을 위한 간호사의 역량 측정도구 개발을 위한 타당화 단계에 참여하는 것으로 개인에게 민감한 정보는 수집하지 않으므로 위험은 거의 없을 것으로 예상됩니다. 근무하는 기관에 대한 정보 및 개인의 신원을 파악할 수 있는 자료는 가명이나 기호로 대치하여 보관할 예정입니다. 면담 도중 피로감, 불편감을 느끼신다면 언제든지 연구 참여에 대한 동의를 철회하실 수 있으며, 피로감을 최소화하기 위해 면담 중간에 적절한 휴식을 제공할 예정입니다.

6. 연구 참여에 따른 보상

귀하가 이 연구 참여시 설문지 작성에 대한 보상으로 10 만원 상당의 소정의 답례품이 제공될 것입니다.

7. 정보 수집 및 제공

본 연구에서는 연구대상자의 사생활을 보호하기 위해 대상자의 신원을 파악할 수 있는 사적인 정보를 수집하지 않을 것이고, 그러한 어떤 자료도 본 연구의 분석과정에 포함하지 않을 것입니다. 모든 자료를 무기명으로 처리하고 코드화하여 참여자의 정보가 노출되지 않도록 할 것이며, 연구의 목적에 의해서만 자료를 이용할 것입니다. 또한 개별화된 자료가 아닌 전체자료 형태로 연구결과를 기술할 것입니다.

8. 개인정보 및 기록에 대한 비밀보장

본 연구에서는 IRB 승인 후부터 종료되는 기간 동안에만 수집된 자료를 이용할 것입니다. 수집된 자료는 즉시 연구 책임자의 컴퓨터에 보관될 것입니다. 파일은 열쇠로만 접근이 가능한 연구자의 연구실의 열쇠로 잠글 수 있는 서랍에 연구 종료 후 3 년간 보관할 예정이고, 3 년 후 파기할 것입니다. 분석이 완료된 자료는 접근이 제한된 컴퓨터에 저장될 것으로 이 컴퓨터는 연구책임자만 식별할 수 있는 암호를 입력하여 접근이 가능하며 각 데이터 파일도 비밀번호를 입력하여 접근할 수 있도록 할 것입니다.

연구가 최소위험 수준이라고 판단되어 연구자가 자료안전모니터링을 시행할 것이며, 본 연구자는 자료의 보안을 보장하기 위해 1 개월마다 주기적으로 파일 및 컴퓨터의 암호화를 확인할 것입니다. 본 연구를 통해 수집된 개인정보는 타인에게 제공되지 않습니다.

9. 참여/철회의 자발성

연구 대상자는 자발적으로 연구에 참여하는 것입니다. 참여여부에 따른 어떠한 불이익도 초래되지 않으며, 대상자가 제공한 자료는 연구 목적 이외에는 절대로 사용하지 않고, 연구를 진행하는 중이라도 귀하가 원하는 경우 언제든지 어떠한 불이익 없이 연구에 대한 참여를 중단할 수 있습니다. 참여 중지 의사 표현 그 즉시 연구 참여자가 작성한 자료는 폐기할 것입니다.

또한 연구의 수행과 자료의 신뢰성을 검증하기 위해 모니터링 요원, 점검자, 기관위원회 및 정부 관련 부처장 등이 관련 규정이 정하는 범위 안에서 연구대상자의 비밀보장을 침해하지 않으며 연구대상자의 기록 등을 열람할 수 있습니다.

10. 연락처

이 연구에 관하여 궁금한 점이 있거나 연구와 관련이 있는 상해가 발생한 경우에는 아래의 연구자에게 연락하여 주십시오.

연구자 성명: 지윤정
연구자 주소: 03722 서울특별시 서대문구 연세로 50-1 연세대학교 간호대학
E mail: jiyoonjung0113@gmail.com
☎ 24 시간 연락처: 010-634400463

대상자로서 귀하의 권리에 대하여 질문이 있는 경우에는 연구자에게 말씀하시거나 다음의 번호로 문의하실 수 있습니다.

연세의료원 연구심의위원회 ☎ 02-2228-0454

I. 다음의 질문을 읽고 귀하의 생각에 가장 가깝다고 생각하는 번호에 V 표시해 주시기 바랍니다 (총 40문항).

설문내용	매우 그렇지 않다	그렇지 않다	보통 이다	그렇다	매우 그렇다
1. 나는 환자의 신체, 정신, 심리사회적 사정을 통해 환자가 치료계획에 참여 가능한 상황인지 판단할 수 있다.	1	2	3	4	5
2. 나는 환자마다 가지고 있는 개인적 특성(선호도, 성향 등)에 대해 파악할 수 있다.	1	2	3	4	5
3. 나는 같은 질환의 환자라도 개인적 특성에 따라 달라지는 간호요구를 알 수있다.	1	2	3	4	5
4. 나는 환자의 간호를 위해 필요한 정보(신체, 정신, 심리사회적 상태, 검사결과, 면담결과)를 종합적으로 분석할 수 있다.	1	2	3	4	5
5. 나는 환자가 자신의 의견을 직접 표현할 수 없는 경우(인지기능 저하, 심리적 불안정 등) 보호자 면담 또는 과거 의무기록 분석과 같은 대안을 통해 환자의 의견을 간접적으로 파악할 수 있다.	1	2	3	4	5
6. 나는 환자에게 치료와 관련된 정보를 제공할 때 치료의 필요성, 방법과 같은 구체적인 내용을 포함하여 설명할 수 있다.	1	2	3	4	5
7. 나는 환자에게 과학적 근거에 기반한 정확한 치료관련 교육을 제공할 수 있다.	1	2	3	4	5
8. 나는 환자의 치료와 관련된 검사나 시술관련 정보를 환자와 공유하기 위해 노력한다.	1	2	3	4	5
9. 나는 환자와 대화할 때 환자의 이야기에 경청하며, 환자에게 질문할 시간을 준다.	1	2	3	4	5
10. 나는 환자의 특성에 따라 다양한 의사소통기법을 활용할 수 있다.	1	2	3	4	5
11. 나는 환자에게 치료와 관련된 정보를 제공할 때 의학용어를 환자가 이해하기 쉬운 언어로 바꾸어 내용을 전달할 수 있다.	1	2	3	4	5

	설문내용	매우 그렇지 않다	그렇지 않다	보통 이다	그렇다	매우 그렇다
12.	나는 환자가 내 업무범위를 넘어서는 요구를 할 경우 환자에게 합리적으로 설명하여 거절할 수 있다.	1	2	3	4	5
13.	나는 환자 간호 시 스스로 해결 불가능한 문제가 발생하는 경우 문제해결이 가능한 사람에게 도움을 요청할 수 있다.	1	2	3	4	5
14.	나는 환자와 대화할 때 환자가 집중할 수 있도록 대화에 방해되는 요인을 제거함으로써 면담 환경을 조성할 수 있다.	1	2	3	4	5
15.	나는 환자와 대화할 때 환자와 눈을 맞추며 서두르지 않는다.	1	2	3	4	5
16.	나는 간호사로서 환자와 수평적관계를 형성하기위해 노력한다.	1	2	3	4	5
17.	나는 병원 혹은 부서에 도입되는 새로운 기기(device)에 대해 알고 능숙하게 사용할 수 있다.	1	2	3	4	5
18.	나는 병원 혹은 부서에 도입되는 새로운 의료정보 시스템에 대해 알고 능숙하게 사용할 수 있다.	1	2	3	4	5
19.	나는 병원에서 환자에게 제공하는 기기나 스마트폰 어플리케이션에 대해 소개하고 교육할 수 있다.	1	2	3	4	5
20.	나는 환자치료에 가장 적극적인 역할을 하는 보호자를 파악하고 있다.	1	2	3	4	5
21.	나는 환자의 주보호자와 신뢰관계를 형성하기 위해 노력한다.	1	2	3	4	5
22.	나는 환자의 치료를 위해 보호자의 협조가 필요한 경우 어려움 없이 보호자에게 요청할 수 있다.	1	2	3	4	5
23.	나는 환자의 치료와 관련된 의료진 및 직원들과 원활하게 의사소통 할 수 있다.	1	2	3	4	5
24.	나는 환자의 치료를 위해 협력하는 과정에서 다른 의료진과 갈등이 발생한 경우 원만하게 해결할 수 있다.	1	2	3	4	5

설문내용	매우 그렇지 않다	그렇지 않다	보통 이다	그렇다	매우 그렇다
25. 나는 환자의 치료를 위해 다학제 전문가들과 협력할 수 있다.					
26. 나는 효과적인 중재를 위해 환자의 특성을 고려한 맞춤식 교육이 이루어지는 것이 중요하다고 생각한다.	1	2	3	4	5
27. 나는 환자의 간호(중재) 계획을 설정할 때 환자의 의견을 묻고 이를 반영하여 목표를 설정할 수 있다.	1	2	3	4	5
28. 나는 환자가 자신의 의견을 자유롭게 제시할 수 있는 환경을 만들어 치료 계획에 참여하도록 할 수 있다.	1	2	3	4	5
29. 나는 환자의 질문에 대해 적극적으로 대답한다.	1	2	3	4	5
30. 나는 환자가 치료(중재)와 관련된 의견을 제시하는 경우 반영하기위해 노력한다.	1	2	3	4	5
31. 나는 환자교육시 제공한 정보를 환자가 얼마나 이해했는지 확인한다.	1	2	3	4	5
32. 나는 환자가 정서적으로 불안한 모습을 보이는 경우 안정을 돕기 위해 무엇을 해주어야 할지 알고 있다.	1	2	3	4	5
33. 나는 환자의 상황을 이해하고 공감해줄 수 있다.	1	2	3	4	5
34. 나는 간호를 제공하기 전 환자의 입장에 서서 생각해본다.	1	2	3	4	5
35. 나는 내가 제공한 간호에 대해 환자가 참여했다고 생각될 때 업무에 대한 보람을 느낀다.	1	2	3	4	5
36. 나는 치료과정전반에 환자참여를 격려하는 것이 간호사로서 해야 할 의무라고 생각한다	1	2	3	4	5
37. 나는 환자참여가 무엇인지 환자 및 보호자에게 설명할 수 있다.	1	2	3	4	5
38. 나는 환자참여의 중요성에 대해 환자 및 보호자에게 설명할 수 있다.	1	2	3	4	5
39. 나는 의학 및 간호학적 전문지식의 습득을 위해 업무 외 시간을 할애하여 학습한 적이 있다.	1	2	3	4	5
40. 나는 환자에게 더 나은 양질의 간호를 제공하기 위해서는 나 스스로의 지속적인 지식적, 기술적 발전이 필요하다고 생각한다.	1	2	3	4	5

II. 다음의 질문을 읽고 귀하의 생각에 가장 가깝다고 생각하는 번호에 V 표시해 주시기 바랍니다. (총 17문항).

설문내용	매우 그렇지 않다	그렇지 않다	보통 이다	그렇다	매우 그렇다
나는~					
1. 환자의 시각을 통해서 간호 상황을 보는 것은 가치 있다.	1	2	3	4	5
2. 면담, 간호 계획의 실행과 평가의 일부로서, 환자의 가치, 선호도, 욕구를 파악한다.	1	2	3	4	5
3. 환자중심 간호의 다양한 영역을(예. 환자/가족의 선호도와 가치) 이해하고 통합한다.	1	2	3	4	5
4. 환자의 가치, 선호도, 욕구를 의료팀의 다른 구성원들에게 의사소통한다.	1	2	3	4	5
5. 인간 경험의 다양성에 대한 민감성과 존중을 가지고, 환자중심 간호를 제공한다.	1	2	3	4	5
6. 나와 다른 가치를 가진 개인과 집단을 위한 환자중심 간호를 나는 기꺼이 지원한다.	1	2	3	4	5
7. 간호과정에 환자의 적극적인 관여를 어렵게 하는 장애물을 조사한다.	1	2	3	4	5
8. 의사결정에 있어서, 환자의 갈등수준을 사정하고, 자원에 대한 접근을 제공한다.	1	2	3	4	5
9. 간호과정의 모든 측면에서, 환자와 가족을 임파워먼트하기 위한 전략을 설명한다.	1	2	3	4	5
10. 건강, 안전, 안녕, 자기간호 관리를 증진하는 적극적인 파트너십에 환자(혹은 대리인)를 참여시킨다.	1	2	3	4	5
11. 환자의 선호도를 간호과정에 적극적으로 포함하는 것을 존중한다.	1	2	3	4	5
12. 통증이나 고통이 있는 지와 그 범위를 사정한다.	1	2	3	4	5
13. 신체적 및 정서적 안위의 수준을 사정한다.	1	2	3	4	5

	설문내용	매우 그렇지 않다	그렇지 않다	보통 이다	그렇다	매우 그렇다
14	통증, 불편감, 고통의 완화를 위해 환자와 가족의 기대를 파악한다.	1	2	3	4	5
15.	의료에 대한 환자동의서를 장려한다.	1	2	3	4	5
16.	환자 이동 시에 제공되고 요구되는 간호를 의사소통한다.	1	2	3	4	5
17.	환자간호 상황에서 합의를 도출하고 갈등을 해결하는데 참여한다.	1	2	3	4	5

III. 각 문장을 주의 깊게 읽고 아래 질문에 본인이 느끼는 대로 답변하여주시기 바랍니다. 해당되는 번호에 V 표시하시길 바랍니다.

	설문내용	매우 그렇지 않다	그렇지 않다	보통 이다	그렇다	매우 그렇다
	나는/내가 제공하는 간호는~					
1.	환자의 질병에 대한 감정을 고려하여 간호가 제공되었다.	1	2	3	4	5
2.	환자가 필요로 하는 요구를 고려하여 간호가 제공되었다	1	2	3	4	5
3.	환자가 자신의 간호에 책임감을 갖고 참여하였다.	1	2	3	4	5
4.	환자의 감정의 변화를 고려하여 간호가 제공되었다.	1	2	3	4	5
5.	환자의 두려움과 불안을 고려하여 간호가 제공되었다.	1	2	3	4	5
6.	환자의 질병이 환자에게 미치는 영향을 고려하여 간호가 제공되었다.	1	2	3	4	5
7.	환자의 질병이 환자에게 주는 개인적인 의미를 고려하여 간호가 제공되었다.	1	2	3	4	5
8.	환자의 입원 전 일상생활을 고려하여 간호가 제공되었다. (예: 일, 여가활동 등).	1	2	3	4	5
9.	환자의 과거 입원 경험을 고려하여 간호가 제공되었다.	1	2	3	4	5
10.	환자의 일상습관을 고려하여 간호가 제공되었다. (예: 손씻기 습관, 대소변 습관 등)	1	2	3	4	5
11.	환자가 원하는 경우 가족이 환자 간호에 참여하였다.	1	2	3	4	5

설문내용	매우 그렇지 않다	그렇지 않다	보통 이다	그렇다	매우 그렇다
12. 환자가 제공받은 정보에 대해 이해하였는지 확인하였다.	1	2	3	4	5
13. 환자의 질병에 대한 충분한 정보를 제공하였다.	1	2	3	4	5
14. 환자의 개인적인 바람을 고려하여 간호가 제공되었다.	1	2	3	4	5
15. 환자가 자신의 간호에 대한 의사결정에 참여하도록 하였다.	1	2	3	4	5
16. 환자가 자신의 간호에 대해 표현한 의견을 고려하여 간호가 제공되었다	1	2	3	4	5
17. 환자는 세수하거나 목욕하는 시간을 스스로 결정하였다.	1	2	3	4	5

IV. 다음은 귀하의 일반적 특성에 대한 질문입니다. 해당하는 곳에 V 표시 해주시기 바랍니다.

1. 귀하의 성별은?

   ① 남 ② 여

2. 귀하의 연령은? 만 _____세

3. 귀하의 결혼여부는? ①기혼 ②미혼 ③기타( )

4. 귀하의 최종 학력은?

   ① 전문학사 ②학사 ③ 석사 ④ 박사이상 ⑤기타( )

5. 현재 귀하가 근무하는 지역은?

   ① 서울특별시 ② 부산광역시 ③ 대구광역시 ④ 인천광역시 ⑤ 광주광역시

   ⑥ 대전광역시 ⑦ 울산광역시 ⑧ 세종특별자치시 ⑨ 경기도 ⑩ 강원도

   ⑪ 충청남도 ⑫ 충청북도 ⑬ 경상남도 ⑭ 경상북도 ⑮ 전라남도

   ⑯ 전라북도 ⑰ 제주특별자치도

6. 귀하가 근무하는 병원의 이름은? (예: 신촌 세브란스 병원)

   _____

7. 귀하가 근무하는 병원의 병상수는?

① 300병상-500병상미만 ②500병상-1000병상미만 ③1000병상 이상

8. 귀하의 근무부서는?

① 병동 ② 분만실 ③응급실 ④ 마취/회복실 ⑤중환자실 ⑥ 기타( )

9. 귀하의 직위는?

① 일반간호사 ②책임 간호사 ③ 기타( )

10. 귀하의 총 임상 경력은? (예: 123개월)

_____개월

11. 귀하의 현 부서 경력은? (예: 155개월)

_____개월

12. 1-2주 후 진행될 검사, 재검사 참여를 원하시는 경우 '참여를 원합니다'에 표시해 주시기 바랍니다. 참여를 원하시는 선생님들께는 약 2주일 이내로 재검사 설문(40문항)을 진행하겠습니다(50명 선착순, 검사-재검사 설문 완료 후 5,000원 기프티콘 추가 제공).

□ 검사-재검사 설문에 참여를 원합니다.

□ 검사-재검사 설문에 참여를 원하지 않습니다.

V. 모든 설문을 완료하셨습니다. 기프티콘 제공을 위해 성함과 휴대전화 번호를 남겨주시기 바랍니다(기프티콘은 설문 완료 후 1개월 이내에 제공될 예정입니다.) 감사합니다.

성함:_____ 휴대전화 번호:_____

Appendix 10. Measurement accepted approval mail for convergent validity test


환자중심간호 도구 승인메일입니다.

지윤정(간호대학)
08-30 (월) , 오후 4:32

정 현 교수님께,

교수님, 빠른 회신 감사드립니다.
좋은 연구결과로 보답드릴 수 있도록 하겠습니다.
감사합니다.

지윤정 드림.
•••

정현 <hyunjeong@hit.ac.kr>
08-30 (월) , 오후 4:03
지윤정(간호대학)

개인 정보 보호를 위해 이 메시지의 일부 내용을 차단했습니다. 차단된 기능을 다시 사용하려면 여기를 클릭하세요.

이 보낸 사람의 내용을 항상 표시하려면 여기를 클릭하세요.

환자중심간호 인식 최...
107KB

다운로드

안녕하세요. 대전보건대학교 간호학과 정 현 입니다.
좋은 연구 되시길 바라며 도구 첨부하여 보냅니다.

Patient-centered care competency 도구 사용 건입니다.

받은편지함 ×

지윤정 <jiyoonjung0113@gmail.com> 5월 26일 (수) 오후 11:43
jihwang@khu.ac.kr에게

황지인 교수님께,

교수님, 안녕하세요. 저는 연세대학교 간호대학에 재학중인 박사과정생 지윤정입니다.
다름이 아니라, 저의 박사학위논문 주제인 '환자참여 증진을 위한 간호사 역량 측정도구 개발 및 평가' 의 동시타당도를 위해 교수님이 개발하신 patient-centered care competency 도구의 사용 허가를 요청드리기 위해 메일드렸습니다.
저의 논문에 대해 간략히 말씀드리면 patient engagement를 위한 간호사 역량 측정 도구를 개발하여 환자안전에 기여할 수 있는 기초자료를 마련하고자 합니다.

도구 사용 허가해주시면 연구에 큰 도움이 될 것 같습니다.
감사합니다.

지윤정 드림.

Windows 10용 메일에서 보냄

jihwang@khu.ac.kr 5월 28일 (금) 오전 11:08
나에게

안녕하세요? 지윤정 선생님,

본 도구에 관심을 가지어 주셔서 감사 드립니다.
적절한 인용을 하시고 사용하시면 됩니다. 한글본을 부탁하실 것 같아 미리 전달 드립니다~
좋은 연구 되시기 바랍니다.
감사합니다.

황지인 드림

국문초록

환자참여 증진을 위한 간호사 역량 측정도구 개발 및 타당화

지윤정

연세대학교 일반대학원 간호학과

환자 참여는 "건강성과를 극대화하거나 치료 경험을 개선하기 위해 의료 제공자 또는 기관과 협력하여 개인의 고유한 방식으로 치료에 적극적으로 참여하려는 욕구와 능력"을 의미한다. 간호사는 환자의 적극적인 참여를 독려하는데 가장 중추적인 역할을 할 수 있는 건강관리자로 다수의 연구에서 간호사의 환자참여 증진을 위한 지지가 실제 환자의 환자안전 사고 및 건강문제를 개선하는 것으로 나타났다. 그러나, 환자참여 증진을 위해 필요한 간호사의 역량에 대해서는 연구된 바가 없는 것으로 확인되었다. 특히 비교적 환자참여 개념이 국내에 비해 활발하게 이루어지고 있는 국외의 경우에도 환자중심, 환자 경험과 같이 환자참여와 유사한 개념들을 바탕으로 이루어져, 환자참여에서 강조되는 환자-의료진 파트너십, 정보기술 관리 능력, 건강문해력과 같은 속성을 확인하기에는 한계가 있었다. 도구는 관련 개념 연구의 수적, 질적 확장을 위해 필요한 필수적 요소로 환자참여와 관련된 유사 개념의 측정 도구는 있었으나, 간호사를 대상으로 환자참여 역량 측정을 위해 개발된 도구는 없었다. 따라서, 본 연구는 환자참여 개념을 잘 설명할 수 있는 이론적 모델을 기반으로 환자참여 증진을 위한 간호사 역량 측정도구를 개발하고 타당도를 검정하였다.

본 도구의 개발은 크게 세 단계로 첫째, 환자참여 증진을 위한 간호사 역량의 속성을 확인하고, 둘째, 속성에 따른 문항을 생성하여 도구의 초안을 도출하고, 셋째, 타당도 신뢰도 검정을 통해 최종 도구를 확정하였다. 환자참여 증진을 위한 간호사 역량 속성 확인을 위한 이론적 단계의 체계적 문헌고찰을 통해 총 9개의 요인을 도출하였고, 현장작업 단계에서 3년이상 직접 간호를 제공하는 부서에 근무 중인 간호사 6인의 심층인터뷰를 통

해 19개의 요인을 도출하였다. 최종분석단계를 통해 이론적 단계와 현장 작업 단계에서 확인된 속성을 통합하여 최종 7개의 요인을 도출하였다.

초기 문항은7개의 요인에 따라 44문항이 도출되었고, 8인의 전문가로부터 내용 타당도를 검정하였고, 20인의 3년이상 경력의 직접 간호를 제공하는 간호사를 대상으로 실시하였다. 전문가 타당도와 사전조사 결과를 토대로 40문항을 예비 문항을 도출하였다. 40문항의 예비 문항의 신뢰도와 타당도를 검정하기 위해 국내 300병상 이상의 종합병원에 근무하는 3년 이상 경력의 간호사 중 직접 간호를 시행하는 간호사 422명을 대상으로 설문조사를 실시하였다. 수집된 422명의 자료 중 50%를 무작위 추출하여 문항 분석, 문항-총점 상관관계, 문항 제거 시 신뢰도, 탐색적 요인분석 및 요인 간 상관관계, 내적 일관성 신뢰도를 1차 검정하였다. 그 결과, 총 5개요인과 26문항을 추출하여, 1)환자의 신체적, 심리적 상태, 선호도, 가치 및 신념 사정, 2) 편안한 분위기 형성 및 독려, 3) 수평적 관계를 위한 정보공유, 4) 장애요인 관리, 5) 전문적 지식과 태도 함양으로 명명하였다.

2차 검정은1차 검정에서 활용되지 않은 나머지 211명의 자료를 활용하여 문항 분석, 확인적 요인분석, 수렴 타당도, 집합 타당도, 내적 일관성 신뢰도를 2차 검정하였다. 높은 요인 간의 상관관계 결과와 이론적 기틀에 따른 요인 간의 순환적 관계에 근거하여 2차 모형 확인적 요인분석을 실시하였다. GFI=.86, SRMR =.05, RMSEA=.05, CFI=.90, NFI=.77로 전반적으로 기준을 충족하거나 기준치에 근접한 모형의 적합도를 보였다. 도구의 Cronbach s α 값은 .92(요인별 .60~.76)인 것으로 나타나, 내적 일관성 신뢰도 역시 확보되었다.

이상의 결과를 토대로 5개 요인, 26문항으로 구성된 자기 기입식 5점 척도의 환자참여 증진을 위한 간호사 역량 측정도구를 개발하였다. 본 도구는 2차모형으로 5개의 하위 영역의 총점, 혹은 총점의 평균을 사용하여 측정 가능하며 점수가 높을수록 역량이 높은 것으로 해석된다. 본 도구를 활용하여 환자참여 증진을 위한 간호사 역량을 확인함으로써, 역량 개발을 위한 기초자료로 활용될 것으로 기대된다. 또한, 간호사의 역량 측정과 개발을 통해 환자참여가 증진됨으로써 궁극적 목표인 환자의 건강성과 증진을 도모할 수 있을 것이다.

핵심되는 말: 간호사, 환자참여, 역량, 도구개발, 타당화