ORIGINAL PAPER

The Norwegian version of Patient Observation Skills in Critical Care Nursing (POS-CCN) instrument: a cross-cultural adaptation of the instrument and nurses' self-assessed level of patient observation skills

Edmar Agustin[1] iD**, Toni Haapa[1]** iD**, Mika Alastalo[2]** iD**, Monica Evelyn Kvande[1]** iD

[1]*Lovisenberg Diaconal University College, Oslo, Norway*
[2]*Laurea University of Applied Sciences, Master School, Vantaa, Finland*

Abstract

Aim: To translate and cross-culturally adapt the instrument "Patient Observation Skills in Critical Care Nursing" into Norwegian. *Design:* A cross-sectional survey was conducted to assess the psychometric properties of the instrument and Norwegian critical care nurses (CCNs') self-assessed patient-observation skills. *Methods:* Ninety-five Norwegian critical care nurses completed an electronic survey, and the results were statistically analyzed. *Results:* Exploratory factor analysis produced a seven-factor model with Cronbach's alpha values ranging from 0.62 to 0.94, and the instrument's content validity was high (S-CVI/Ave 0.96). The instrument "Patient Observation Skills in Critical Care Nursing" was successfully modified for the Norwegian context and showed outstanding psychometric qualities. Nurses rated their patient observation skills as excellent in respiratory, renal, and metabolic areas (which had the highest scores). Gastrointestinal and coagulation observations had the lowest scores. *Conclusion:* The instrument is valuable for nurse educators and managers as it provides knowledge to facilitate the development of nursing competence.

Keywords: critical care nursing, cross-cultural adaptation, intensive care unit, instrument patient observation skills, self-assessment.

Introduction

Patient observation is a fundamental component of nursing practice and is essential for identifying changes in a patient's health status across diverse clinical settings (Milhomme et al., 2018; Miller & Hill, 2017). In intensive care units (ICUs), patient observation is an essential component of critical care (Marshall et al., 2017). ICU patients' complicated physical and mental conditions necessitate a high degree of technical proficiency (Giuliano, 2017; Pfrimmer et al., 2017), as well as the continuous and focused bedside presence of Critical Care Nurses (CCNs) (Henriksen et al., 2021). A key component of CCNs' expertise is patient observation, which is crucial for identifying changes in patients' clinical conditions (European federation of Critical Care Nursing associations [EfCCNa], 2013; Milhomme et al., 2018) and ensuring patient safety

(Jones & Johnstone, 2017; Miller & Hill, 2017; Romare et al., 2022).

According to Benner et al. (2011), nurses who are able to identify changes in the patient and family, assess the significance of those changes, and react appropriately are exhibiting expert practice. Research has shown that nurses use a sensitive and focused approach to anticipate clinical outcomes and evaluate changes in a patient's condition (Kvande et al., 2015, 2017). A thorough explanation of patient observation skills in critical care nursing has been given by Alastalo et al. (2017). These skills include cooperation, decision-making, information processing, and information gathering.

As a result of major scientific and technological advancements in intensive care units (ICUs) (Vincent et al., 2017; 2018), CCNs enhance their skills throughout their careers (Welch & Carter, 2018). CCNs must have their clinical skills evaluated and assessed in order to identify any areas that may require improvement (Rosli et al., 2023; Windsor et al., 2012). It is possible to evaluate skills

Corresponding author: Monica Evelyn Kvande, Lovisenberg Diaconal University College, Lovisenberggata 15b, Oslo, Norway; email: monica.kvande@ldh.no

objectively through structured tests, observations, and evaluation of others (Alastalo et al., 2021; Jeon et al., 2017; Takase et al., 2018) or subjectively through self-assessment (Forsman et al., 2020; Humburg & Van der Velden, 2015). However, subjective and objective evaluations of CCNs' patient observation abilities were found to be inconsistent by Alastalo et al. (2022). Knowledge tests, peer and mentor evaluations, and performance evaluations in actual clinical settings are all necessary tools to support self-assessment in clinical nursing practice.

Nonetheless, nurses can critically examine themselves and request resources to address perceived skill deficiencies through the practical and appropriate method of self-assessment of clinical competence (Cowan et al., 2008; Wangensteen et al., 2018). Alastalo et al. (2019) created the "Patient Observation Skills in Critical Care Nursing" (POS-CCN) tool to evaluate the self-assessed patient observation skills of Finnish CCNs. The theoretical structure of the tool was based on thematic analysis of interviews with experienced CCNs and previous literature. The POS-CCN measures patient observation skills across three dimensions: (1) the biophysiological basis of observation, (2) the ability to apply observation techniques (2.1 technical techniques; 2.2 non-technical techniques), and (3) the ability to identify changes in clinical conditions. In addition, these three dimensions are further organized into seven physiological domains: cardiovascular, respiratory, neurological, renal, gastrointestinal, metabolic, and coagulation. In its development phase, the POS-CCN's content validity was evaluated as excellent (S-CVI 0.96) by Finnish critical nursing experts. The tool has previously been used to evaluate Finnish CCNs' (n = 372) patient observation skills, and in this context, it was found to be internally consistent. Exploratory factor analysis did not confirm the theoretical structure or yield a meaningful alternative structure, a finding consistent with observations from other studies evaluating competence assessment tools (Alastalo et al., 2019). In addition to research use, the POS-CCN has been used in some ICUs in Finland, for example during orientation in competence assessment. It is available in English in addition to the Finnish version but has not been used before in an international context. The present study was inspired by the need for a valid instrument to identify and assess areas of patient observation competence in clinical practice that may require strategies for improvement in Norwegian critical care nursing education and clinical practice.

Consequently, the tool must go through translation and psychometric testing before it can be used in a different language and culture.

Aim

The main objective of this study was to translate and cross-culturally adapt the "Patient Observation Skills in Critical Care Nursing" (POS-CCN) into Norwegian.

The following research questions were developed to address the study objective:

1. To what extent is the cross-culturally modified POS-CNN tool valid (content and structural validity)?

2. To what extent is the cross-culturally modified POS-CNN instrument reliable (internal consistency)?

3. What is the self-assessed level of patient observation proficiency among Norwegian ICU nurses?

Methods

Design

The translation and cross-cultural adaptation procedure adhered to the recommendations of Beaton et al. (2000). In addition, a cross-sectional survey was carried out to assess the instrument's psychometric properties and the Norwegian CCNs' self-assessed skills in patient observation. The study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for cross-sectional studies (von Elm et al., 2008).

Sample

It was a nationwide study, with the study population consisting of Norwegian CCNs. The researchers invited all nurses working in ICUs at local hospitals and university hospitals in Norway to participate in the study. Participants were eligible if they (1) were employed as critical care nurses (CCNs) in an ICU and (2) had experience with patient observation in an ICU setting.

Data collection

Translation and cross-cultural adaptation procedure

The three primary domains of the POS-CNN instrument, which was created in Finland by Alastalo et al. (2019), evaluated the bio-physiological basis of observation (14 items), the ability to use observation techniques (28 items for technical and non-technical techniques), and the ability to identify changing clinical conditions (14 items).

All seven physiological observation areas were covered by these 56 items. Skills were assessed using a visual analogue scale (VAS, 0–100), with 100 representing the highest skill level and 0 indicating no skill at all. According to Alastalo et al. (2019), nurses' ratings fall into one of the following categories: fair (> 20–40), average (> 40–60), good (> 60–80), and excellent (> 80–100). Alastalo et al. (2019) chose the VAS because of its sensitivity in detecting differences among respondents (DeVellis & Thorpe, 2021) and its suitability for measuring skills (Meretoja et al., 2004). Permission to cross-culturally adapt including translation and validation the English version of the POS-CCN instrument was obtained from the developer through email correspondence with the first author (EA).

Step 1 Initial translation

The forward translation was carried out independently by two translators. Both translators were fluent in English, and Norwegian was their mother tongue. As a CCN, one of the translators (TL1) was conversant in the terminology used in the field that the POS-CCN instrument covered. The other translator (TL2) was a professional translator with no clinical or nursing experience and no knowledge of the terminology used in the field covered by the POS-CCN instrument.

Step 2 Synthesis of the translations

The first and last authors (EA and MEK) used the original POS-CCN instrument to reconcile the T1 and T2 translations. During this process, T1 revealed a single word discrepancy. The term "metabolic disorders" was replaced with "arterial blood gas" and "acid-base" in the Norwegian language translation. T2 revealed seven word discrepancies during the translation process: in item 1, the phrase "normal functioning" was removed; in items 11 and 27, the term "patient" was added; in items 35 and 36, "monitor" was replaced with "observe" and "assess"; in item 46, "gastric secretions" was replaced with "gastric fluid"; and in item 48, "system" replaced "function" in the Norwegian translation. These discrepancies were reconciled to produce a common version (T–12). When differences arose between the two translations, the first and last authors (EA and MEK) discussed and resolved them through consensus.

Step 3 Back-translation

Two qualified translators and native English speakers (B-TL1 and B-TL2) translated the POS-CCN instrument back into English. The POS-CCN instrument was unknown to the back-translators (B-TL1 and B-TL2), and they were not shown the source version either before or during the back-translation. The creator of the original instrument reviewed the Norwegian-to-English translation.

Step 4 Evaluation by an expert committee

An expert committee consisting of ten CCNs evaluated the translated POS-CCN instrument to reach agreement between the source and target versions (Beaton et al., 2000). Additionally, during this phase, the content validity of the instrument was evaluated (DeVellis & Thorpe, 2021). The content validity index (CVI) was used to assess the instrument's content validity.

A four-point Likert scale was used to rate the items: 1 = not relevant, 2 = somewhat relevant, 3 = considerably relevant, and 4 = highly relevant. The content validity index (CVI) for each item (I-CVI) and the entire scale (S-CVI/Ave) were determined using the scores provided by the group of specialists. Relevance was re-coded in this way: scores 1 and 2 were grouped as 0 indicating irrelevance, while scores 3 and 4 were grouped as 1 indicating relevance. The number of experts who received a score of 1 (signaling relevance on a scale of 3 or 4) was divided by the total number of experts to determine the I-CVI. The S-CVI/Ave was computed by dividing the total number of items in the instrument by the sum of the I-CVIs. I-CVI values of 0.78 or higher were considered relevant and acceptable (Yusoff, 2019).

In step 5 a cross-sectional survey was conducted to assess the Norwegian nurses' self-assessed level of patient observation skills while working in ICUs and to pilot test the prefinal version of the POS-CCN instrument. From January 2024 to May 2024, the data were gathered via an online survey administered by the official Norwegian survey platform "Nettskjema" (University of Oslo, n.d.). Ward managers facilitated the recruitment process by sending invitation emails to nurses and CCNs, which included information about the study and a link to the online survey. Posts on the Facebook page of the Norwegian Critical Care Nurses' Association were used to recruit more people. The survey was promoted twice on Facebook, and two reminders were sent to participating units. Through email recruitment, 65 participants (68%) took part in the study, while 30 participants (31%) accessed the survey via the Facebook page of the Norwegian Critical Care Nurses' Association.

The survey was completed by 95 nurses in total and included nurses from two local hospitals and three university hospitals in Norway.

The participating ICUs treated adult patients with a range of illnesses, including trauma, general, surgical, and medical conditions.

The average age of the participants was 43, with a range of 25 to 65. With a mean of 19 years, the participants' nursing work experience ranged from 3 to 46 years. Sixty-one percent of the respondents were employed in university hospital ICUs, in charge of delivering more complex and specialized care. Six percent of participants had a specialty in a different area of nursing, while 82.1% were specialized in critical care nursing. Additionally, 37.9% held a master's degree in nursing (Table 1).

Table 1 Demographic information of respondents (N = 95)

Characteristics				N (%)
Gender				
female				80 (84.20%)
male				14 (14.70%)
I don't want to reveal				1 (1.10%)
Health region				
Health South-East RHF				61 (64.20%)
Health North RHF				18 (18.90%)
Health West RHF				11 (11.60%)
Central Norway Health RHF				5 (5.30%)
Type of hospital				
university hospital (level 3)				58 (61.10%)
local hospital (level 1 and 2)				35 (36.80%)
missing values				2 (2.10%)
Type of intensive care unit (ICU)				
general				68 (71.60%)
medical				5 (5.30%)
surgical				21 (22.10%)
missing values				1 (1.10%)
Education*				
specialisation in critical care nursing				78 (82.10%)
specialisation other than critical care nursing				6 (6.30%)
masters in nursing				36 (37.90%)
doctoral degree				1 (1.10%)
	Mean	**Min.**	**Max.**	**SD**
Age in years	43.93	25	65	10.87
Experience as a nurse in years	19.03	3	46	10.64

multiple choice question; RHF – Regionalt helseforetak (Regional Health Authority)

Data analysis

Version 26 of IBM SPSS Statistics for Windows was used to analyze the collected data. Descriptive statistics such as mean, standard deviation, minimum, and maximum were used to analyze the data. Principal component analysis with varimax rotation was used in an exploratory factor analysis (EFA) to assess the instrument's structural validity. EFA was chosen over CFA, as the POS-CCN was still in early development and previous validation (Alastalo, 2021) showed weak support for its theoretical structure in EFA. Thus, there was not a strong preliminary assumption regarding the theoretical structure. An acceptable factor model was determined by setting a threshold for item loadings at 0.40, considering eigenvalues greater than 1, and examining the EFA scree plot. Because the study did not reach the recommended number of respondents for EFA according to methodological guidelines (e.g., MacCallum et al., 1999), Bartlett's Test of Sphericity (BTS) and the Kaiser-Meyer-Olkin (KMO) measure were used to assess the adequacy of the sample for EFA.

Finally, Cronbach's alpha was calculated to evaluate the internal consistency of the instrument.

Results

Content validity

The I-CVI values were between 0.4 and 1. With a score of 0.96, the S-CVI/Ave satisfied the requirements for acceptance. Due to its low I-CVI value (0.4), one item (19. EEG monitoring) was eliminated. Additionally, each item's second and final category's wording was modified in response to input from the expert committee and instrument developer. There were 55 items in the modified POS-CCN instrument after one item was removed (Table 2).

Table 2 Expert (N = 10) evaluations of the POS-CCN instrument's content validity index (CVI)

Item Inter-pretation	Experts in agreement	I-CVI	Item Inter-pretation	Experts in agreement	I-CVI	Item Inter-pretation	Experts in agreement	I-CVI
Q1 relevant	9	0.9	Q20 relevant	9	0.9	Q39 relevant	10	1
Q2 relevant	9	0.9	Q21 relevant	10	1	Q40 relevant	10	1
Q3 relevant	10	1	Q22 relevant	10	1	Q41 relevant	10	1
Q4 relevant	10	1	Q23 relevant	10	1	Q42 relevant	10	1
Q5 relevant	7	0.7	Q24 relevant	10	1	Q43 relevant	9	0.9
Q6 relevant	10	1	Q25 relevant	10	1	Q44 relevant	9	0.9
Q7 relevant	9	0.9	Q26 relevant	10	1	Q45 relevant	9	0.9
Q8 relevant	10	1	Q27 relevant	10	1	Q46 relevant	8	0.8
Q9 relevant	10	1	Q28 relevant	10	1	Q47 relevant	9	0.9
Q10 relevant	10	1	Q29 relevant	8	0.8	Q48 relevant	9	0.9
Q11 relevant	10	1	Q30 relevant	10	1	Q49 relevant	10	1
Q12 relevant	10	1	Q31 relevant	10	1	Q50 relevant	10	1
Q13 relevant	10	1	Q32 relevant	10	1	Q51 relevant	10	1
Q14 relevant	10	1	Q33 relevant	10	1	Q52 relevant	10	1
Q15 relevant	10	1	Q34 relevant	10	1	Q53 relevant	9	0.9
Q16 relevant	10	1	Q35 relevant	10	1	Q54 relevant	9	0.9
Q17 relevant	10	1	Q36 relevant	10	1	Q55 relevant	9	0.9
Q18 relevant	10	1	Q37 relevant	10	1	Q56 relevant	10	1
Q19 not relevant	4	0.4	Q38 relevant	10	1			
S-CVI/Ave: 0.96								

S-CVI/Ave – content validity index for the entire scale; I-CVI – content validity index for each item

Structural validity

The Bartlett's Test of Sphericity (BTS) yielded a value of 5387.83 (df = 1485; p < 0.001), and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.80, indicating that the sample size was suitable for factor analysis. Two items (37 and 38) were removed from the instrument during the exploratory factor analysis (EFA) due to cross-loadings. The final model consisted of seven factors comprising 55 items, which together accounted for 72.58% of the total variance. Full EFA results are presented in Table 3 and 4.

Internal consistency

According to Table 4, the internal consistency of the self-assessed POS-CCN instrument varied between 0.63 and 0.95 across sum-variables. With a Cronbach's alpha of 0.63, the cardiovascular sum-variable showed irregular measurement and might require item modification. Conversely, the respiratory, renal, and metabolic sum-variables exhibited high internal consistency, as indicated by their respective Cronbach's alpha-values of 0.91, 0.91, and 0.89. This implies that these constructs were reliably measured. The gastrointestinal and coagulation sum-variables had high levels of consistency, with Cronbach's alpha values of 0.88 and 0.95, respectively, whereas the neurological sum-variable had a moderate level of consistency, with a value of 0.76. With the exception of the cardiovascular sum-variable, the instrument generally demonstrated favorable internal consistency.

Self-reported proficiency in patient observation

With average scores of 90.51, 88.90, and 88.79 for respiratory, renal, and metabolic observations, respectively, the evaluation of Norwegian CCNs' observational skills revealed outstanding performance in these areas. The mean scores for the neurological and cardiovascular findings were lower, at 84.46 and 84.85, respectively. The lowest mean scores were 83.69 and 80.14 for coagulation and gastrointestinal observations, respectively (Table 5).

Table 3 Exploratory factor analysis of the POS-CCN instrument's structural validity (Part 1)

Items	Factor						
	1	**2**	**3**	**4**	**5**	**6**	**7**
Cardiovascular observation							
I understand how the circulatory system works.	0.728						
I understand the most common disorders of the circulatory system.	0.706						
I am able to monitor the patient's electrocardiogram (ECG).	0.681						
I am able to monitor the patient's circulation using invasive blood pressure measurements.	0.668						
I am able to assess the patient's peripheral circulation using my senses.	0.729						
I am able to detect changes in the patient's circulation.	0.827						
I am able to follow up the effects of the treatment on the patient's circulation.	0.847						
Respiratory observation							
I understand how the respiratory system works.		0.806					
I understand the most common disorders of the respiratory system.		0.815					
I am able to assess the patient's breathing by monitoring parameters.		0.889					
I am able to assess the patient's gas exchange based on an arterial blood test.		0.693					
I am able to assess the patient's breathing by listening to the respiratory sounds.		0.680					
I am able to assess the patient's breathing visually.		0.867					
I am able to detect changes in the patient's breathing.		0.862					
I am able to follow up the effects of the treatment on the patient's breathing.		0.924					
Neurological observation							
I understand how the central nervous system works.			0.827				
I understand the most common disorders of the central nervous system.			0.810				
I am able to assess the patient's pupil size and reaction to light.			0.787				
I am able to assess the patient's neurological condition using the Glasgow Coma Scale.			0.714				
I am able to detect changes in the patient's neurological condition.			0.823				
I am able to follow up the effects of the treatment on the patient's neurological condition.			0.869				
I understand how the kidneys work.			0.643				
Renal observation							
I understand the most common kidney disorders.				0.880			
I am able to monitor the patient's kidney function based on laboratory tests.				0.859			
I am able to monitor the patient's urine output.				0.554			
I am able to monitor the patient's urine quality.				0.643			
I am able to monitor the patient's fluid balance.				0.786			
I am able to detect changes in the patient's kidney function.				0.894			
I am able to follow up the effects of the treatment on the patient's kidney function.				0.925			
I understand how the body's metabolism works.				0.745			
Metabolic observation							
I understand the most common metabolic disorders in the body.					0.851		
I am able to assess the patient's acid-base balance based on an arterial blood test.					0.729		
I am able to assess whether the patient's tissue oxygenation is sufficient, based on an arterial blood test.					0.764		
I am able to monitor the patient's blood sugar.					0.499		
I am able to monitor the patient's electrolyte balance.					0.718		
I am able to detect changes in the patient's metabolism.					0.850		
I am able to follow up the effects of the treatment on the patient's metabolism.					0.855		
I understand how the gastrointestinal system works.					0.764		

Table 3 Exploratory factor analysis of the POS-CCN instrument's structural validity (Part 2)

Items	Factor						
	1	2	3	4	5	6	7
Gastrointestinal observation							
I understand the most common disorders of the gastrointestinal system.						0.789	
I am able to monitor the patient's intra-abdominal pressure (IAP).						0.468	
I am able to assess the patient's abdomen using palpation.						0.720	
I am able to assess the patient's gastrointestinal system by listening to bowel sounds using a stethoscope.						0.789	
I am able to assess the quality of the patient's gastric secretion.						0.860	
I am able to detect changes in the patient's gastrointestinal system.						0.901	
I am able to follow up the effects of the treatment on the patient's gastrointestinal system						0.913	
I understand how the coagulation system works.						0.691	
Coagulation observation							
I understand the most common disorders of the coagulation system.							0.888
I am able to monitor the patient's blood clotting based on laboratory tests.							0.871
I am able to assess the type of bleeding.							0.856
I am able to assess the amount of blood loss.							0.839
I am able to assess signs of internal bleeding.							0.776
I am able to detect changes in the patient's coagulation system.							0.936
I am able to follow up the effects of the treatment on the patient's coagulation system.							0.948
Cronbach's alpha	0.628	0.913	0.757	0.905	0.894	0.884	0.948
Overall mean	84.85	90.51	84.46	88.9	88.79	83.69	80.14
N	95	95	95	95	95	95	95
Standard deviation	9.18	8.23	11.24	9.64	9.26	12.66	15.09

Table 4 Internal consistency of the POS-CCN instrument across various sum-variables

Variable	Number of items	Cronbach's alpha
Cardiovascular observation	8	0.628
Respiratory observation	8	0.913
Neurological observation	8	0.757
Renal observation	8	0.905
Metabolic observation	8	0.894
Gastrointestinal observation	8	0.884
Coagulation observation	7	0.948

Table 5 Norwegian CCNs' self-assessed level of patient observation skills (N = 95)

Descriptive statistics	N	Minimum	Maximum	Mean	Std. deviation
Cardiovascular observation	95	54.5	100	84.852	9.184
Respiratory observation	95	68.75	100	90.511	8.228
Neurological observation	95	52.5	100	84.465	11.235
Renal observation	95	62.5	100	88.900	9.637
Metabolic observation	95	63.13	100	88.793	9.260
Gastrointestinal observation	95	46.5	100	83.696	12.656
Coagulation observation	95	34.57	100	80.145	15.091

Discussion

The study objectives were to translate and cross-culturally adapt the "Patient Observation Skills in Critical Care Nursing" into Norwegian and assess intensive care nurses' self-assessed patient observation skills. The POS-CCN was created in the original Finnish version to conform to the unique clinical procedures and nursing culture of Finland, and it had not been tested previously in other countries. The original instrument's structure and content reflect the high degree of nurse autonomy and emphasis on evidence-based practice that are hallmarks of the Finnish healthcare system (Alastalo et al., 2017; Alastalo et al., 2022). Although autonomy and evidence-based practice are also valued in Norway's nursing culture, there are minor variations in clinical procedures, educational programs, and the importance placed on particular patient observation abilities (Landsverk et al., 2024). According to national regulations in Norway, CCNs have competences to make independent clinical assessments, set priorities, and make decisions to ensure early detection of patient deterioration and the implementation of appropriate measures (Helsedirektoratet, 2021). This cross-cultural adaptation is important since it gives Norwegian nurses a clinically and culturally relevant tool that allows them to accurately evaluate their own patient observation abilities.

The original Finnish version of the POS-CCN features a three-factor structure reflecting the core aspects of patient observation skills within the context of critical care nursing in Finland. In contrast, the Norwegian adaptation yielded a seven-factor structure, providing a more detailed delineation of patient observation abilities. According to Liljamo and Kaakinen (2009), the Finnish healthcare system emphasizes a standardized nursing process, which may condense observation skills into fewer categories. Conversely, Norway's healthcare system may support a broader conceptualization of nursing roles, resulting in a greater number of distinct observation factors. Differences in the adaptation process may also contribute to this discrepancy. The Norwegian adaptation employed more extensive qualitative research methods, potentially capturing a wider range of nursing observations (Kisiel & Perkins, 2006) and identifying elements not present in the Finnish version.

The adaptation process showed that the POS-CCN instrument's questions were appropriate for CCNs and pertinent to Norwegian culture. This supports the findings of Alastalo et al. (2019), who emphasized the importance of employing culturally aware instruments in medical research. In order to identify changes in a patient's clinical condition (EfCCNa, 2013; Milhomme et al., 2018) and to ensure patient safety (Jones & Johnstone, 2017; Miller & Hill, 2017; Romare et al., 2022), CCNs must be able to observe their patients.

The POS-CCN is a self-assessment tool designed to evaluate a nurse's ability to observe critically ill patients in the intensive care unit (ICU), including detecting changes in respiratory, circulatory, and renal functions (Alastalo et al., 2019). Proficiency in these skills is essential for recognizing physiological changes and disease progression, thereby enhancing patient safety and improving outcomes (Henriksen et al., 2021). The study's findings indicate that the POS-CCN may be used as a tool to evaluate nurses' abilities to observe patients in intensive care units in Norway. To assess nurses' observational skills, the POS-CCN could be incorporated into clinical practice and nursing education in Norway.

Nurses in our study rated their patient observation skills as excellent, particularly in respiratory, renal, and metabolic observations, which had the highest scores, while gastrointestinal and coagulation observations had the lowest. Research has shown that self-assessment of clinical competence is a practical and suitable approach that gives nurses the chance to critically examine themselves and ask for resources to address perceived skill deficiencies (Cowan et al., 2008; Wangensteen et al., 2018). Nonetheless, a discrepancy between CCNs' subjective and objective evaluations of their patient observation abilities was discovered by Alastalo et al. (2022). According to other studies, objective assessment techniques such as structured knowledge tests, peer and mentor evaluation, and performance evaluation in actual clinical settings are necessary to supplement subjective assessment methods (Alastalo et al., 2021; Alastalo et al., 2022; Jeon et al., 2017; Takase et al., 2018).

Limitation of study

The primary strength of this study is that the POS-CCN instrument was translated and cross-culturally adapted in accordance with Beaton et al. (2000) guidelines. The involvement of multiple translators, back-translators, and an expert committee enabled careful consideration of linguistic nuances and cultural differences (Beaton et al., 2000). To establish the instrument's psychometric properties, the study also employed rigorous

validation and reliability testing using robust statistical methods, including exploratory factor analysis and Cronbach's alpha (Mikkonen et al., 2022). This method enhanced the instrument's credibility and guaranteed that it was a valid tool for evaluating CCNs' abilities in patient observation in Norway. Additionally, nurses were recruited from a number of university hospitals and local hospitals throughout Norway in order to obtain a wide and representative sample of the target population. The use of social media and email platforms for recruitment resulted in higher participation rates and broader audience reach. Additionally, by obtaining the necessary approvals and participants' informed consent, the study adhered to ethical protocols, underscoring the integrity of the research (Gelling et al., 2021).

There are, however, certain limitations. Although adequate for initial validation, the small sample size of 95 CCNs limits the generalizability of the findings (Tipton et al., 2016). Recruitment challenges may have introduced potential biases in the sample population. Additionally, the use of a self-administered tool carries the risk that participants may overestimate their skills due to biases such as social desirability bias. Thus, self-evaluation and actual skills might not always match (Perinelli & Gremigni, 2016). Additionally, the study only looked at the accuracy and consistency of the POS-CCN instrument; it did not assess other psychometric qualities such as responsiveness to changes or outcome prediction ability (Mowbray et al., 2022). Future studies could explore these areas to enhance the tool's effectiveness. Based on the present study, further testing of the POS-CCN is warranted, such as verifying its theoretical structure through confirmatory factor analysis (CFA). The cross-sectional design of this study limits the ability to infer causality. Longitudinal studies would be valuable for examining the development of patient observation skills over time and evaluating the effectiveness of interventions designed to improve these skills (Raymaekers et al., 2020). Despite efforts to ensure linguistic and cultural adaptation, minor nuances may have been overlooked. The instrument could be further refined through continuous feedback from the target population.

Implications for practice, education and research

A helpful tool for assessing and eventually improving CCNs' observational abilities, the POS-CCN (Norwegian version) instrument promotes better patient outcomes and more efficient patient monitoring. This tool can be incorporated into regular evaluations by healthcare institutions in Norway to give certified clinical nurses the tools they need to avoid complications and provide high-quality care. Additionally, nursing students' and practicing nurses' observation skills can be systematically developed and reinforced by integrating the Norwegian version of the POS-CCN instrument into training programs. By bridging the gap between clinical practice and theoretical knowledge, this focused approach can help prepare future nurses for work in critical care settings. This validated tool can be used by researchers to investigate the efficacy of different interventions meant to enhance the competencies of CCNs, ultimately adding to the body of evidence supporting best practices in critical care nursing.

Conclusion

The Norwegian version of the POS-CCN may prove to be a valuable tool for assessing CCNs' self-reported abilities to observe patients in intensive care units. The POS-CCN (Norwegian version) is a useful tool for clinical practice and academic settings since it is both culturally relevant and psychometrically sound, according to the cross-cultural validation conducted in this study. A more thorough and context-specific understanding of patient observation skills, influenced by cultural, clinical, and methodological variations, is reflected in the seven-factor structure of the Norwegian version of the POS-CCN. In addition to making the instrument more applicable to Norwegian nurses, this expanded structure offers a more comprehensive framework for evaluating and enhancing patient observation abilities in Norwegian intensive care units. The Norwegian version of the POS-CCN captures key aspects of critical care nurses' (CCNs) patient observation skills. Overall, CCNs demonstrated high proficiency in these skills; however, some variations were observed, underscoring the need for ongoing professional development to ensure high-quality ICU patient care. This study emphasizes the need for additional investigation to examine the consequences of these structural variations and guarantee that the tool maintains its validity and reliability in various clinical and cultural contexts.

Ethical aspects and conflict of interest

The study was conducted in accordance with the Declaration of Helsinki (World Medical Association, 2013). Approval was obtained from the Norwegian Agency for Shared Services

References

Alastalo, M. (2021). *Patient observation skills in critical care nursing: a theoretical construction and evaluation* [Doctoral dissertation, University of Turku]. University of Turku Repository. https://urn.fi/URN:ISBN:978-951-29-8458-9

Alastalo, M., Salminen, L., Jeon, Y., Vahlberg, T., & Leino-Kilpi, H. (2019). Critical care nurses' self-assessed patient observation skills: a cross-sectional survey study. *Nursing in Critical Care*, *24*(5), 268–275. https://doi.org/10.1111/nicc.12412

Alastalo, M., Salminen, L., Lakanmaa, R. L., & Leino-Kilpi, H. (2017). Seeing beyond monitors – critical care nurses' multiple skills in patient observation: descriptive qualitative study. *Intensive and Critical Care Nursing*, *42*, 80–87. https://doi.org/10.1016/j.iccn.2017.03.004

Alastalo, M., Salminen, L., Vahlberg, T., & Leino-Kilpi, H. (2021). Knowledge of patient observation among critical care nurses. *Nursing in Critical Care*, *26*(5), 341–351. https://doi.org/10.1111/nicc.12573

Alastalo, M., Salminen, L., Vahlberg, T., & Leino-Kilpi, H. (2022). Subjective and objective assessment in skills evaluation: a cross-sectional study among critical care nurses. *Nordic Journal of Nursing Research*, *43*(1). https://doi.org/10.1177/20571585221089145

Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*, *25*(24), 3186–3191. https://doi.org/10.1097/00007632-200012150-00014

Benner, P., Hooper-Kyriakidis, P., & Stannard, D. (2011). *Clinical wisdom and interventions in acute and critical care: a thinking-in-action approach*. Springer Publishing Company.

Cowan, D. T., J, Wilson-Barnett, J., D, Norman, I. J., & Murrells, T. (2008). Measuring nursing competence: development of a self-assessment tool for general nurses across Europe. *International Journal of Nursing Studies*, *45*(6), 902–913. https://doi.org/10.1016/j.ijnurstu.2007.03.004

DeVellis, R. F., & Thorpe, C. T. (2021). *Scale development: Theory and applications*. Sage publications.

EfCCNa. (2013). *EfCCNa competencies for European critical care nurses*. European federation of Critical Care Nursing associations. https://www.efccna.org/images/stories/publication/competencies_cc.pdf

Forsman, H., Jansson, I., Leksell, J., Lepp, M., Sundin Andersson, C., Engström, M., & Nilsson, J. (2020). Clusters of competence: relationship between self-reported professional competence and achievement on a national examination among graduating nursing students. *Journal of Advanced Nursing*, *76*(1), 199–208. https://doi.org/10.1111/jan.14222

Gelling, L., Ersser, S., Heaslip, V., Tait, D., & Trenoweth, S. (2021). Ethical conduct of nursing research. *Journal of Clinical Nursing*, *30*(23–24), e69–e71. https://doi.org/10.1111/jocn.16038

Giuliano, K. K. (2017). Improving patient safety through the use of nursing surveillance. *Biomedical Instrumentation & Technology*, *51*(s2), 34–43. https://doi.org/10.2345/0899-8205-51.s2.34

Helsedirektoratet. (2021). *Forskrift om nasjonal retningslinje for intensivsykepleierutdanning* [Regulation on the National Guideline for Intensive Care Nursing Education]. https://lovdata.no/dokument/SF/forskrift/2021-01-01-1

Henriksen, K. F., Hansen, B. S., Wøien, H., & Tønnessen, S. (2021). The core qualities and competencies of the intensive and critical care nurse: a meta-ethnography. *Journal of Advanced Nursing*, *77*(12), 4693–4710. https://doi.org/10.1111/jan.15044

Humburg, M., & Van der Velden, R. (2015). Self-assessments or tests? Comparing cross national differences in patterns and outcomes of graduates' skills based on international large-scale surveys. *Studies in Higher Education*, *40*(3), 482–504. https://doi.org/10.1080/03075079.2015.1004237

Jeon, Y., Lakanmaa, R. L., Meretoja, R., & Leino-Kilpi, H. (2017). Competence assessment instruments in perianesthesia nursing care: a scoping review of the literature. *Journal of PeriAnesthesia Nursing*, *32*(6), 542–556. https://doi.org/10.1016/j.jopan.2016.09.008

Jones, A., & Johnstone, M. J. (2017). Inattentional blindness and failures to rescue the deteriorating patient in critical care, emergency and perioperative settings: four case scenarios. *Australian Critical Care*, *30*(4), 219–223. https://doi.org/10.1016/j.aucc.2016.09.005

Kisiel, M., & Perkins, C. (2006). Nursing observations: knowledge to help prevent critical illness. *British Journal of Nursing*, *15*(19), 1052–1056. https://doi.org/10.12968/bjon.2006.15.19.22105

Kvande, M., Delmar, C., Lykkeslet, E., & Storli, S. L. (2015). Foresight and awareness of incipient changes in a patient's clinical conditions – perspectives of intensive care nurses. *Intensive and Critical Care Nursing*, *31*(5), 261–268. https://doi.org/10.1016/j.iccn.2015.06.002

Kvande, M., Delmar, C., Lykkeslet, E., & Storli, S. L. (2017). Assessing changes in a patient's condition – perspectives of intensive care nurses. *Nursing in Critical Care*, *22*(2), 99–104. https://doi.org/10.1111/nicc.12258

Landsverk, N. G., Olsen, N. R., Titlestad, K. B., Pripp, A. H., & Brovold, T. (2024). Adaptation and validation of the evidence-based practice profile (EBP2) questionnaire in a Norwegian primary healthcare setting. *BMC Medical Education*, *24*(1), 841. https://doi.org/10.1186/s12909-024-05842-z

Liljamo, P., & Kaakinen, P. (2009). Cross-mapping the Finnish classification of nursing diagnosis, nursing interventions and the Oulu patient classification. *Studies in Health Technology and Informatics*, *146*, 774–775. https://doi.org/10.3233/978-1-60750-024-7-774

MacCallum, R. C., Widaman, K. F., Zhang, S., & Hong, S. (1999). Sample size in factor analysis. *Psychological Methods*, *4*(1), 84–99. https://doi.org/10.1037/1082-989X.4.1.84

Marshall, J. C., Bosco, L., Adhikari, N. K., Connolly, B., Diaz, J. V., Dorman, T., Fowler, R. A., Meyfroidt, G., Nakagawa, S., & Pelosi, P. (2017). What is an intensive care unit? A report of the task force of the World Federation of Societies of Intensive and Critical Care Medicine. *Journal of Critical Care*, *37*, 270–276. https://doi.org/10.1016/j.jcrc.2016.07.015

Meretoja, R., Isoaho, H., & Leino-Kilpi, H. (2004). Nurse Competence Scale: development and psychometric testing. *Journal of Advanced Nursing*, *47*(2), 124–133. https://doi.org/10.1111/j.1365-2648.2004.03071.x

Mikkonen, K., Tomietto, M., & Watson, R. (2022). Instrument development and psychometric testing in nursing education research. *Nurse Education Today*, *119*, 105603. https://doi.org/10.1016/j.nedt.2022.105603

Milhomme, D., Gagnon, J., & Lechasseur, K. (2018). The clinical surveillance process as carried out by expert nurses in a critical care context: a theoretical explanation. *Intensive Critical Care Nursing*, *44*, 24–30. https://doi.org/10.1016/j.iccn.2017.07.010

Miller, E. M., & Hill, P. D. (2017). Intuition in clinical decision making: differences among practicing nurses. *Journal of Holistic Nursing*, *36*(4), 318–329. https://doi.org/10.1177/0898010117725428

Mowbray, F. I., Manlongat, D., & Shukla, M. (2022). Sensitivity analysis: a method topromote certainty and transparency in nursing and health research. *Canadian Journal of Nursing Reearch*, *54*(4), 371–376. https://doi.org/10.1177/08445621221107108

Perinelli, E., & Gremigni, P. (2016). Use of social desirability scales in clinical psychology: a systematic review. *Journal of Clininical Psychology*, *72*(6), 534–551. https://doi.org/10.1002/jclp.22284

Pfrimmer, D. M., Johnson, M. R., Guthmiller, M. L., Lehman, J. L., Ernste, V. K., & Rhudy, L. M. (2017). Surveillance: a nursing intervention for improving patient safety in critical care environment. *Dimensions of Critical Care Nursing*, *36*(1), 45–52. https://doi.org/10.1097/DCC.0000000000000217

Raymaekers, K., Luyckx, K., & Moons, P. (2020). A guide to improve your causal inferences from observational data. *European Journal of Cardiovascular Nursing*, *19*(8), 757–762. https://doi.org/10.1177/1474515120957241

Romare, C., Anderberg, P., Sanmartin Berglund, J., & Skär, L. (2022). Burden of care related to monitoring patient vital signs during intensive care; a descriptive retrospective database study. *Intensive Critical Care Nursing*, *71*, 103213. https://doi.org/10.1016/j.iccn.2022.103213

Rosli, S. N., Soh, K. L., Ong, S. L., Halain, A. A., Abdul Raman, R., & Soh, K. G. (2023). Physical assessment skills practised by critical care nurses: a cross-sectional study. *Nursing in Critical Care*, *28*(1), 109–119. https://doi.org/10.1111/nicc.12748

Takase, M., Yamamoto, M., & Sato, Y. (2018). The factors related to self-other agreement/disagreement in nursing competence assessment: comparative and correlational study. *International Journal of Nursing Studies*, *80*, 147–154. https://doi.org/10.1016/j.ijnurstu.2018.01.011

Tipton, E., Hallberg, K., Hedges, L. V., & Chan, W. (2016). Implications of small samples for generalization: adjustments and rules of thumb. *Evaluation Review*, *41*(5), 472–505. https://doi.org/10.1177/0193841x16655665

University of Oslo. (n.d.). *Nettskjema*. https://nettskjema.no/?lang=en

Vincent, J.-L., Lefrant, J. Y., Kotfis, K., Nanchal, R., Martin-Loeches, I., Wittebole, X., Sakka, S. G., Pickkers, P., Moreno, R., Sakr, Y., ICON and SOAP investigators, & SOAP investigators. (2018). Comparison of European ICU patients in 2012 (ICON) versus 2002 (SOAP). *Intensive Care Medicine*, *44*(3), 337–344. https://doi.org/10.1007/s00134-017-5043-2

Vincent, J.-L., Slutsky, A. S., & Gattinoni, L. (2017). Intensive care medicine in 2050: the future of ICU treatments. *Intensive Care Medicine*, *43*(9), 1401–1402. https://doi.org/10.1007/s00134-016-4556-4

von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2008). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Journal of Clinical Epidemiology*, *61*(4), 344–349. https://doi.org/10.1016/j.jclinepi.2007.11.008

Wangensteen, S., Finnbakk, E., Adolfsson, A., Kristjansdottir, G., Roodbol, P., Ward, H., & Fagerström, L. (2018). Postgraduate nurses' self-assessment of clinical competence and need for further training. A European cross-sectional survey. *Nurse Education Today*, *62*, 101–106. https://doi.org/10.1016/j.nedt.2017.12.020

Welch, T. D., & Carter, M. (2018). Deliberate practice and skill acquisition in nursing practice. *Journal of Continuing Education Nursing*, *49*(6), 269–273. https://doi.org/10.3928/00220124-20180517-07

Windsor, C., Douglas, C., & Harvey, T. (2012). Nursing and competencies – a natural fit: the politics of skill/competency formation in nursing. *Nursing Inquiry*, *19*(3), 213–222. https://doi.org/10.1111/j.1440-1800.2011.00549.x

World Medical Association. (2013). World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. *JAMA*, *310*(20), 2191–2194. https://doi.org/10.1001/jama.2013.281053.

Yusoff, M. S. B. (2019). ABC of content validation and content validity index calculation. *Educational Resource*, *11*(2), 49–54. https://doi.org/10.21315/eimj2019.11.2.6