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Cross-culture adaptation and validation of the Indonesian version of the Hospital Survey on Patient Safety Culture (HSOPSC 2.0)

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Abstract

Background: Hospital Survey on Patient Safety Culture (HSOPSC) is considered one of the most scientifically rigorous tools available with excellent psychometric properties. However, it is not yet available in an Indonesian version.

Objective: This study aimed to determine the validity of the content and psychometric properties of HSOPSC 2.0 for use in Indonesian hospitals.

Methods: The study was divided into three stages: translation, adaptation, and validation. Culture-adaptation was assessed using cognitive interviews with ten direct care nurses who worked in the hospital to evaluate their perceptions and the coherence of the translated items, response categories, and questionnaire directions. Content validity was also done by ten experts from academic and clinical settings. Finally, Confirmatory Factor Analysis (CFA) and reliability testing were conducted among 220 nurses from two Indonesian hospitals.

Results: The cognitive test results indicated that the language clarity was 87.8 % and 84.5% for cultural relevance. The Content Validity Index (CVI) ranged between 0.73 to 1.00, while the construct validity results indicated that each factor had factor loadings above 0.4, from 0.47 to 0.65. The fit indices showed an acceptable fit for the data provided by the 10-factor model, with RMSEA = 0.052, SRMR = 0.089, and CFI = 0.87. The Pearson correlation coefficients between the ten subscales ranged from 0.276 to 0.579 ($p < 0.05$). The Cronbach's alpha for all sub-scales was more than 0.70, except for organizational learning – continuous improvement, response to error, and communication openness.

Conclusion: This study offers initial evidence of the psychometric properties of the Indonesian-HSOPSC 2.0. Future studies are needed to examine its psychometric features to improve generalizability. However, nurses and other healthcare professionals could use the tool to measure hospital patient safety culture in Indonesia.

Keywords

factor analysis; hospitals; Indonesia; nursing; patient safety; psychometrics

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Background

Patient safety is critical to healthcare quality and is considered one of the most important things that all healthcare organizations worldwide need to evaluate regularly (Ammouri et al., 2015). Patient safety is an effort to prevent any medical errors or adverse effects on the patients (World Health Organization, 2019). Despite a concerted effort over the last 15 years to improve patient safety, the incidence of preventable adverse events in healthcare services remains a significant concern (Gaffney et al., 2016). For example, approximately 400,000 patients die during or after hospitalization due to preventable adverse events, such as adverse drug events, preventable death, pressure ulcers, near-miss, and mistaken patient identity (World Health Organization, 2019). Similarly, studies showed that approximately 10-15% of patients experienced medical errors in the hospital, half of which were preventable, and 14% resulted in disability or death (Davis et al., 2013). A previous systematic review reported that preventable adverse events are estimated from 2% to 94%, with inappropriate prescribing as the most common type of adverse event (Assiri et al., 2018). Additionally, approximately 3% of all hospitalizations are expected to result in some form of unintended harm (Hodkinson et al., 2020).

In the context of health care, patient safety culture is defined as the commitment, style, and skill of the administration in managing patient safety (Lawati et al., 2018; Polo et al., 2018; Viitanen et al., 2018). Policymakers and

managers worldwide call for an assessment of hospital safety culture, using the patient safety culture evaluation to increase patient awareness among staff, assessing the current patient safety culture, identifying areas for improvement, analyzing trends in the safety culture over time, and assessing its impact on safety (Sorra & Dyer, 2010). Strong safety culture is defined by effective employee communication, mutual trust, and shared perceptions of the importance of safety and the effectiveness of preventive measures (Reis et al., 2018).

In the field of healthcare, survey instruments and other methods of measuring patient safety culture have advanced significantly in recent years (Waterson et al., 2010). The Hospital Survey on Patient Safety Culture (HSOPSC) and the Safety Attitudes Questionnaire (SAQ) are the two most commonly used (Olsen & Bjerkan, 2017). The HSOPSC is a validated tool for evaluating work environment efficiency and organization processes to prevent the errors that lead to adverse reactions (Payne et al., 2009). In addition, the HSOPSC can serve as a proxy for the effectiveness of leading efforts to improve patients' quality every year (Palmieri & Peterson, 2010). A previous study stated that developing tools with robust psychometric properties is essential to identify patient safety environments correctly (Flin et al., 2006). In 2019, the Agency for Healthcare Research and Quality (AHRQ) released the HSOPSC 2.0, a revised version of the survey (Sorra et al., 2019), which consists of 32 items in 10 dimensions. HSOPSC is considered one of the most scientifically rigorous tools available today, with excellent psychometric properties and large enough sample sizes (Flin et al., 2006). However, many published studies continue to omit information about the required psychometric properties of questionnaires (Flin, 2007; Flin et al., 2006; Sorra et al., 2019).

The psychometric analysis is how psychometric features are measured, and the underlying dimensions of security culture are identified using established empirical, analytical methods (Singla et al., 2006). Previous research has highlighted the significance of thoroughly testing translated versions of the HSOPSC to guarantee the instrument's applicability in the target context (Perneger et al., 2014). Unfortunately, there are no valid or reliable survey instruments available in Indonesia. Therefore, the purpose of this study was to determine the psychometric properties of HSOPSC 2.0 for use in Indonesian hospitals.

Methods

Study Design

This study consisted of three stages: translation, adaptation, and validation (Guillemin et al., 1993; Levin et al., 2009). During Phase I, the instrument was forward translated into Indonesian and then backward-translated into English. Phase II, culture adaptation, was evaluated for each item's clarity, relevance, and appropriateness (i.e., content validity). Finally, Phase III was conducted to assess the construct validity and internal consistency.

Cross-Culture Validation and Adaptation Process

The HOSPSC 2.0 was reduced from 42 to 32 and was made available to the public in 2019 (Sorra et al., 2019; Wolf et al., 2013). The HOSPSC 2.0 removed two dimensions—overall perceptions of patient safety and cross-unit teamwork. Many of the other items have been rewritten, especially those that were hard to translate. The HSOPSC 2.0 questionnaire is scored on a 5-point scale (strongly disagree to agree strongly) or frequency (never to always), with an option for "does not apply or do not know." The Cronbach's alpha ranged between 0.67 and 0.89 (Agency for Healthcare Research and Quality, 2013). The following sections describe each phase of the instrument validation process.

Phase I. Translation

The translation process of the HOSPSC 2.0 began after obtaining approval from the AHRQ. This tool was translated by a committee, including three bilingual nursing scholars from Indonesia and one bilingual nurse from Indonesia's hospital; all four had studied both outside and in Indonesia and were pretty familiar with both cultures. In the process, each scholar translated HOSPSC 2.0 independently. Following independent translation, the committee assessed the four translated versions that addressed vagueness and disparities and ultimately decided on the final version of the K-HSOPSC 2.0. The reverse-translation process was designed to establish a conceptual meaning rather than a literal "word-for-word" translation (Jones et al., 2001).

Next, an impartial multilingual translator reversed the synthetic instrument from Indonesian to American English. Then both health experts and the principal investigator evaluated the reverse-translated tool compared to the original tool. Although a significant difference was found in the reverse translation, most of these were due to verb choices that were nearly identical to those found in the original. However, there were three areas in which the sentences require special attention to reach the same interpretation as in English in Indonesia.

Phase II. Culture-adaptation

Culture-adaptation was assessed using cognitive interviews with ten direct care nurses who worked in the hospital to evaluate their perceptions and the coherence of the translated items, response categories, and questionnaire directions (Sousa & Rojjanasrirat, 2011). Subjects were required to clarify any points they assumed to be ambiguous. In addition, a panel of ten patient safety experts from academic and clinical settings also reviewed the questionnaire. The experts independently assessed the cultural relevance and acceptability of each item using a four-point scale ranging from 1 to 4. The content validity index (CVI) was calculated by averaging the I-CVI scores and multiplying them by the percentage of experts who rated it three or four. Values greater than 0.80 are considered acceptable (Polit & Beck, 2020).

Phase III. Construct validity and reliability testing

Confirmatory factor analysis (CFA) was used for construct validity. However, the sample size determination for CFA varies because it is influenced by the total number of factors and indicators and the magnitude of factor loadings (Wolf et al., 2013). For example, Furr (2018) recommends a sample size of 50 respondents for simple CFA models, while other researchers suggest sample sizes ranging from 5 to 20 respondents per item (Furr, 2018; Gunawan et al., 2021).

In our study, nurses were selected from two hospitals in Karawang, West Java, Indonesia, using convenience sampling. The hospitals had a total bed capacity of at least 500 patients. The inclusion criterion of the participants was

only nurses with at least six months of clinical experience to join. Due to the pandemic of COVID-19, an online survey was conducted to prevent personal contact during the data collection process. The enrolment notifications with links to the online survey have been distributed to 311 nursing staff. Additional questions about gender, age, years of clinical experience, educational level, working position, and working unit were included. In this phase, a total of 220 nurses (approximately five respondents per item) completed the online survey, yielding a response rate of 70.7%. However, this sample size was considered appropriate to ensure a good confirmatory factor analysis for Indonesian-HOSPSC or I-HOSPSC 2.0.

A descriptive statistic was used to describe the participants' characteristics. All negative-worded items were reversed for statistical analysis. The factor structure of I-HOSPSC 2.0 has been assessed by CFA using the highest probability estimate. The following measurement fit indices have been evaluated, as recommended by Kline (2005): Root Means Square Approximation Error (RMSEA), Standardized Root Means Residual (SRMR), and Confirmatory Fits Index (CFI) (Hu & Bentler, 1999). A good fit is defined as having an RMSEA value less than 0.06 and an SRMR value less than 0.08. CFI values greater than 0.9 indicate a good fit, while values less than 0.8 indicate an acceptable fit (Browne & Cudeck, 1992).

The Pearson correlation was also used to analyze interrelationships between the ten patient safety subscales. Correlation coefficients greater than 0.7 would demonstrate that the dimensions measured the same concept, combining those subscales and removing some items (Browne & Cudeck, 1992). Cronbach's alpha was used to determine each subscale's internal consistency, with 0.7 being regarded as the minimal criterion for satisfactory reliability (Thorndike, 1995). The statistical analyses were carried out using the SPSS version 23 software and LISREL 8.80 (student), with a significance level of 0.05.

Ethical Consideration

The Institutional Review Board of STIKes Horizon Karawang (E.135/ETIK/IV/2020). Participants were informed of the study's objectives, research methods, and impacts of the study. They were also compensated with a $5 gift card for their time. The participants signed informed consent if they agreed to participate in this research, and they could withdraw from the study at any time without penalty. In addition, the Agency for Healthcare Research and Quality gave permission to use and translate the tool (AHRQ) in Bahasa Indonesia.

Results

Cross-Culture Adaptation Results

Cognitive test results indicated that the language clarity was 87.8 percent and 84.5 percent for cultural relevance. In addition, the expert panel concluded that each item was proper for readability, understanding, and cultural relevance. However, minor changes were made as a result of the input received throughout the interviews.

As far as cultural issues were concerned, the primary problems involved cultural definitions, particularly organizational structures that differed between the USA and Indonesia. For example, a working position and a working unit are both included. Nurses are classified into a variety of positions in the USA, including advanced practice nurses (NP, CRNA, CNS, CNM), licensed vocational nurses (LVN), licensed practical nurses (LPN), patient care aides (PCA), hospital aides (HA), nursing assistants, and registered nurses (RN) (RN). So, the *Bahasa Indonesia* version changes the current position from nurse *PK* 1 (novice) to nurse *PK* 4 (proficient). PK stands for *Perawat Klinik* or called Clinical Nurse.

Content Validity Results

Only five completed the entire process among the six experts who agreed to review the content of the tool. The CVI ranged from 0.73 to 1.00. The S-CVI was 0.92 for clarity, and the S-CVI was 0.88 (the two items at 0.83 and three at 0.80). These content validity results were considered valid and acceptable (Polit & Beck, 2020).

Confirmatory Factor Analysis Results

Most of the participants (52.79%) had a nursing diploma, 7% were married, and 70% were nurses at levels 1 to 3. The participants had an average of 18.87 years of working experience (SD = 6.34), and 50% worked in an inpatient department (**Table 1**).

Table 1 Participants' demographic characteristics (*N* = 220)

Characteristics	*n* (%)	Mean ± SD
Age (year)		35.76 ± 13.45
Working experience (year)		18.87± 6.34
Gender		
Male	75 (34.1)	
Female	145 (65.9)	
Educational level		
Diploma III	116 (52.7)	
Bachelor	100 (45.5)	
Master or specialist	4 (1.8)	
Marital status		
Married	154 (70.0)	
Single	66 (30.0)	
Working position		
Nurse levels 1-3	133 (70.0)	
Nurse levels 3-5	57 (30.0)	
Working unit		
Inpatient department	110 (50.0)	
Outpatient department	45 (20.4)	
Surgery department	35 (15.9)	
Emergency department	30 (13.7)	

All items had factor loading above 0.4 and ranged from 0.47 to 0.65 (**Figure 1**). The fit indices indicated an acceptable fit for the data was provided by the 10-factor model: RMSEA = 0.052, SRMR = 0.089, and CFI = 0.87 (**Table 2**). The Pearson correlation coefficients were 0.276 to 0.579 (p 0.05), demonstrating that the subscales were sufficiently independent (**Table 3**).

Table 2 Confirmatory factors analysis results of I-HOSPSC 2.0 (*N* = 220)

Scale	X^2	X^2/df	RMSEA	SRMR	CFI	NNFI	GFI
Total score	37.112	1.652	0.052	0.069	0.902	0.902	0.933
Teamwork	38.865	1.974	0.072	0.065	0.921	0.925	0.926
Staffing and work pace	35.371	1.895	0.068	0.065	0.916	0.917	0.945
Organizational learning – continuous improvement	36.422	1.967	0.071	0.064	0.914	0.914	0.923
Response to error	36.451	1.832	0.063	0.068	0.921	0.913	0.937
Supervisor, manager, or clinical leader support for patient safety	33.215	1.921	0.067	0.062	0.904	0.926	0.956
Communication about error	36.547	1.904	0.076	0.063	0.951	0.932	0.967
Communication openness	37.321	1.972	0.071	0.061	0.937	0.946	0.933
Reporting patient safety events	34.850	1.176	0.070	0.068	0.971	0.915	0.918
Hospital management support for patient safety	34.251	1.892	0.076	0.065	0.945	0.918	0.946
Handoffs and information exchange	38.021	1.890	0.078	0.067	0.956	0.926	0.937

Note: RMSEA: Root Mean Square Error of Approximation; SMRR: Standardized Root Mean Square Residual; CFI Comparative Fit Index; NNFI: Non-Normed Fit Index; GFI: goodness of fit index

Table 3 Item correlation of each subscale of I-HOSPSC 2.0

	1	2	3	4	5	6	7	8	9	10
Teamwork	0.433**									
Staffing and work pace	0.421**	0.434**								
Organizational learning – continuous improvement	0.437*	0.412**	0.523**							
Response to error	0.501**	0.351*	0.301*	0.330*						
Supervisor, manager, or clinical leader support for patient safety	0.407**	0.432**	0.276*	0.465**	0.422**					
Communication about error	0.411**	0.535**	0.389*	0.394**	0.354*	0.394**				
Communication openness	0.386*	0.335*	0.445**	0.415**	0.455**	0.398*	0.407**			
Reporting patient safety events	0.445**	0.411**	0.366*	0.422**	0.387*	0.351*	0.482**	0.386*		
Hospital management support for patient safety	0.579**	0.341*	0.407**	0.412**	0.432**	0.489**	0.356*	*0.377	0.411**	
Handoffs and information exchange	0.276*	0.357*	0.398*	0.360*	0.411**	0.408**	0.405**	0.379*	0.388**	0.445**

Note: * p <0.05; **p <0.001

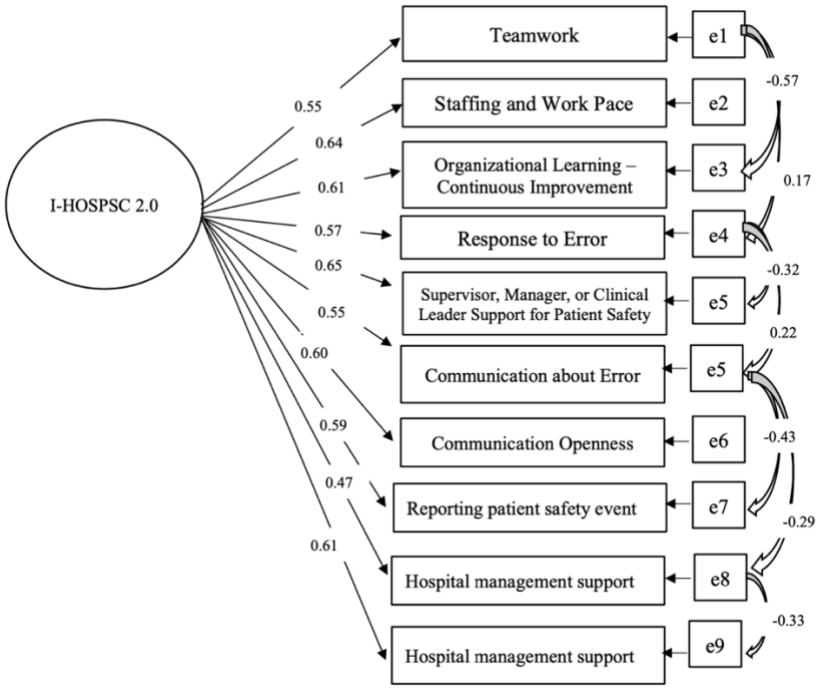

Figure 1 Confirmatory factors analysis

Reliability Testing Results

The instrument was considered reliable, with Cronbach's alpha more than 0.70 for all sub-scales, except for organizational learning – continuous improvement, response to error, and communication openness (**Table 4**).

Table 4 Internal consistency results

	Total item	Cronbach's α
Teamwork	3	0.763
Staffing and work pace	3	0.736
Organizational learning – continuous improvement	3	0.760
Response to error	4	0.682
Supervisor, manager, or clinical leader support for patient safety	3	0.747
Communication about error	3	0.733
Communication openness	4	0.671
Reporting patient safety events	2	0.805
Hospital management support for patient safety	3	0.754
Handoffs and information exchange	3	0.756

Discussion

In this study, the psychometric properties of the HSOPSC 2.0 were assessed after translating and adapting it to the Indonesian healthcare context. Overall, the study found that the I-HSOPSC 2.0 can evaluate patient safety culture in Indonesian hospitals with good internal consistency, content validity, and construct validity. The CFA results for the 32 items of the translated tool confirmed the I-HOSPSC 2.0's ten-factor structure. In addition, each item demonstrates the construct validity of the overall scales. Furthermore, as assumed, all sub-scales were linked to the patient safety degree that further reflects the building validity of the I-HSOPSC 2.0.

The HSOPSC tool has been modified in several ways, and some of the observed modifications have been conducted far less than the original tool (Nie et al., 2013; Perneger et al., 2014; Zhu et al., 2014). This could be because the construct of safety culture is context-specific in its application (Coyle et al., 1995). Specific country features, types of health systems and contexts, organizations of employees, and cultural differences also include considerations noted that such differences could jeopardize the instrument's validity (Ginsburg et al., 2009; Hedsköld et al., 2013; Perneger et al., 2014). Furthermore, several variables appear to be consistent across countries regarding optimal factor models.

The item analysis identified two types of translational problems (Levin et al., 2009), namely words not containing similar constructions when translated from English into Indonesia and phrases or distinctive phrases that were not acquainted with respondents once translated from English into Indonesia because their definition was different between cultural backgrounds or national boundaries.

However, through the process of cognitive interviews, the participants refined such problems into four different fields, reading wrong, not understanding, and looking strange. The fourth list has not been documented in the literature, but it highlights issues with the tool's form and flow. Finally, the participants understood that one of the items in the survey asked about patient safety results. As a result, they all suggested adding questions that concentrated on the type and quantity of detrimental mistakes seen in practice or performed individually. The four categories of general design challenges uncovered throughout the cognitive probing technique are 1) formal structures and processes, 2) nursing workplace environment, 3) professional areas, and 4) public and private sector terminology.

There are several limitations to this study. First, the cognitive interviews should involve health experts who have advanced to near-native English comprehension rather than direct care nurses who might not have a better understanding of safety culture. Second, the translators involved in the translation process acted as language professionals during the expert discussions. Thus, the "pureness" of the forward and backward translation might not be highly maintained with justification. Third, this study was only conducted in one setting, which might limit generalization to represent Indonesia.

Conclusion

This study provides preliminary support for the translation and adaptation of the HSOPSC 2.0 used to collect data from registered nurses in Indonesian hospitals in terms of validity and reliability. However, additional research is needed to examine the instrument's psychometric properties in the context of a broader validation and in a multi-site setting encompassing various locations/hospitals throughout Indonesia to increase generalizability.

Declaration of Conflicting Interest

All authors declare no conflict of interest.

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Authors' Contributions

LS collected data. All authors contributed to data analysis, interpretation, manuscript drafting, and critical article revision. All authors also agreed with the final version of the article to be published.

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Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request. While the Indonesian version of HSOPSC 2.0 can be seen in supplementary file.

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