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Assessment of Patient Safety Culture in Malaysia Hospital Using Hospital Survey on Patient Safety Culture (HSOPSC) Survey

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Abstract – *Patient safety culture assessments are the basic component in the patient safety improvement programs. The aim of this study is to evaluate the psychometric properties of Malay version of Hospital Survey on Patient Safety Culture (HSOPSC) and its suitability for Malaysian environment. A number of 723 clinical and non-clinical staff was involved from three general hospitals in southern region of Peninsular Malaysia. Principal component analysis and confirmatory factor analysis were used to study the psychometric properties of the translated HSOPSC, while internal consistency of 12-factor (42 items) model was examined by calculating the Cronbach α score. The principal component analysis revealed that an 11-factor model with 40 items was suitable for Malaysian sample. However, a Satorra-Bentler scaled χ2 difference test showed that the original 12-factor model significantly fitted the Malaysian data better than the 11-factor model. The internal consistency was at an acceptable level. Although there were 8 strong relationships among the 12 dimensions of patient safety culture, the relationship was found negative between all the 12 dimensions and patient safety grade. The hospital staff surveyed in Malaysia was practicing a positive working attitude towards the patient safety culture.*

Keywords: Safety climate, Psychometric analysis, Patient safety culture

1.0 INTRODUCTION

Safety culture assessment is one of the important elements in improving the patient safety. It is often conducted by surveying the patient safety climate [1]. Patient safety climate is a mutual understanding among the hospital staff on the essential characteristics of patient safety. It reflects the understanding of patient safety culture as fundamental values, behaviours and beliefs in a healthcare organization's approach to patient safety [2]. Those surveys have been used to develop strategies and programs and to engage the hospital top management and professionals [3].

Patient safety in the context of healthcare organizations was highlighted following the Institute of Medicine (IOM) report "To Error is Human: Building a Safer Health System" [4]. This report argued for a safety culture in which adverse events can be reported without people being blamed and when mistakes happen, lessons are learned. Therefore, if hospitals want to improve the patient safety, it is important to know more about the views of their staff in relation to the culture of patient safety.

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Many countries have begun to measure the perception of patient safety culture of healthcare professionals. Although many instruments for assessing patient safety culture exist [5], Hospital Survey on Patient Safety Culture (HSOPSC) questionnaire developed by US Agency for Healthcare Research and Quality (AHRQ) [6] has met more psychometric criteria compared to other instruments [7]. The questionnaire has been widely applied for patient safety culture assessment research in the USA, Europe and Asian [8-12].

This study aims to evaluate the psychometric properties of a Malay translation of Hospital Survey on Patient Safety Culture (HSOPSC) questionnaire and assesses its appropriateness for Malaysian settings. Results in this study were also compared with US and 6 other Asian countries for benchmarking. The findings from this study will provide healthcare organizations a better understanding about hospital culture and the extent to which patient safety attitudes are present in Malaysia.

2.0 METHODOLOGY

2.1 Questionnaire

The original HSOPSC consists of 42 items on 12 dimensions: 10 safety dimensions and 2 outcome dimensions. Respondent's answers these 42 items based on the 5-point Likert scale of which the labels vary throughout the dimensions; agreement (1 = Strongly disagree to 5 = Strongly agree) or frequency (1 = Never to 5 = Always).

Based from Brislin's classic model for translation and validation of instruments for cross-cultural research [13], the investigators with a team of expert in patient safety performed initial translation of the original HSOPSC survey into Malay and review the 42 items appropriateness to Malaysia culture. Next, an expert in the English language whose native language is Malay reviewed the Malay translated version of HSOPSC. Afterward, a third party independent bilingual translator who not comes across with the original HSOPSC questionnaire had translated it back into English. Modifications were made in demographic items regarding the difference in professional groups and department of the hospitals.

2.2 Sample

The paper based questionnaire was distributed to clinical and non-clinical staff at 3 general hospitals in Johor Bahru, Malaysia (n =1167). Written approval to conduct the survey was obtained from hospitals management. The respondents were explained the purpose of the survey and completed a paper based copy of the questionnaire anonymously and voluntarily. A total of 735 questionnaires were returned with response rate of 78% during the 3 months period (September to November 2013). Out of 735 returned questionnaires, 12 questionnaires were omitted due to the respondents answered less than two-third of the entire questionnaire. As the survey was conducted for management purposes and did not involve any hospital patient, it was exempted from review by the research ethics committee based on local policy.

2.3 Statistical Analysis

Statistical software, SPSS 17 and AMOS 18 was used for the following statistical analyses. From the survey, the average missing values were 3.4% (range 0.7% A3 to 6.8% RF9). In order to include all available data, pairwise deletion was performed to calculate relevant statistics. Descriptive statistics of mean and standard deviation (SD) were calculated. As principal

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component analysis (PCA) and confirmatory factor analysis (CFA) cannot be performed on the same dataset, the sample was divide randomly into two independent groups [14]. The PCA was performed on the first group of the sample (n= 362) to examine the component structure of new translation version of the instrument into another language and different cultural setting. In order to minimize item cross loadings, a 0.4 cut-off value was chosen [15].

Then, the CFA was performed to evaluate the overall fit of the model for Malaysian sample data set [16]. Two separate CFAs were performed on the second group of the dataset (n =361) to compare the model fit of the original 12-factor versus the alternative model. Because different measures of fit capture different elements of the fit of the model, two CFA fit indices were employed; comparative fit index (CFI) and root mean square error of approximation (RMSEA). The CFI with values >0.90 indicating an acceptable fit and >0.95 indicating a good fit, while the RMSEA with values <0.05 and <0.08 provided as an indication of a good and acceptable model fit to the data, respectively [17]. Finally, Satorra-Bentler scaled $\chi 2$ difference test was calculated to evaluate the difference in fit between the original 12-factor (42-items) model with the alternative factor model [18].

Cronbach α score was calculated using the whole sample to examine the internal consistency of the 12-factor (42-items) model. According to George et al., internal consistency of >0.9 shows excellent reliability; >0.8 shows good reliability; >0.7 shows acceptable reliability; >0.6 shows questionable reliability; >0.5 shows poor reliability and <0.5 shows unacceptable reliability [19]. A reliability greater than or equal to 0.6 indicates that the items measure the same construct [20]. Construct validity was determined by calculating scale scores for each factor from the mean score of the items for each particular factor answered by respondents. To determine the discriminant validity, the inter correlations between the scale scores for the 12 factors and the overall patient safety grade was calculated. For the number of events reported, no correlation was calculated due to 58% of the respondents did not report any event in the past 12 months.

Strength dimension were classified with those positively worded items which ≥75% of respondents answering 'agree/strongly agree', 'most of the time /always', or when ≥75% of respondents disagreed with negatively worded items. Areas of improvement were classified when the items answered by respondents received ≤50% of positive answers. The average positive percentage of each dimension and item with 95% confidence interval was calculated as suggested by Julious SA [21]. To compute the difference between the percentage of positive responses on dimensions of patient safety culture at unit-level and hospital-level, z-test was applied.

3.0 RESULTS AND DISCUSSION

From the surveys, 85.7% of the respondents had direct contact with patients with 63% of the sample had worked more than six years in their current organization. Majority of the respondents were nurse (56.4%), physicians (15.3%), management and administrative staff (10.7%), technicians (8.9%), related healthcare professionals (7.4%), and other (1.3%). These percentages show a sensible indication of the real distribution of disciplines in every department.

The Kaiser-Meyer-Olkin measure of sampling adequacy was satisfactory, with a value of 0.856, indicating common variance among the items and the Bartlett test of sphericity ($\chi 2$ = 7179.1; df = 872; $p < 0.001$) demonstrating inter-item correlations sufficient for performing

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PCA. After two items (C4 - Staff feel free to question the decisions or actions of those with more authority and RC6 - staffs are afraid to ask questions when something do not seem right) were exclude because of loadings <0.4, the PCA model results explained 59.6% of the total variance. This model was different from the 12-factor (42-items) model in that two factors from the original model (communication openness and feedback and communication about error) collapsed into a single factor.

The CFA for the original 12-factor model with 42 items ($\chi 2$ = 3793.3; df 820; $p < 0.0005$, n= 361) showed CFI was 0.9 and RMSEA was 0.045. The standardized factor loadings were generally large (>0.60) and ranged from 0.26 (organizational learning and continuous improvement) to 0.92 (frequency of event reporting). For the alternative 10-factor model with 40 items ($\chi 2$ = 3413.0; df 703; $p < 0.0005$, n= 361), it also fitted sufficiently with CFI of 0.9 and RMSEA of 0.047. The standardized factor loadings were also generally large (>0.60) and ranged from 0.22 (organizational learning and continuous improvement) to 0.93 (frequency of event reporting).

CFA was then computed for the nested 10-factor model with the addition of two items (C4 and RC6) that were excluded from the 10-factor (40-items) model. This nested model ($\chi 2$ = 3229.1; df 592; $p < 0.0005$, n = 361) likewise had an acceptable fit (CFI was 0.9 and RMSE was 0.054). The standard factor loading were generally high loadings (>0.60), ranged from 0.23 (organizational learning and continuous improvement) to 0.92 (frequency of event reporting). Satorra-Bentler scaled $\chi 2$ difference test was calculated to evaluate the difference in fit between the original 12-factor (42-items) model and nested 10-factor (42-items) model. Results from the Satorra-Bentler scaled $\chi 2$ difference test showed that the 12-factor model with 42 items was a significantly better fit than the 10-factor nested model with 42 items ($\chi 2$ difference = 121.418; df 30; $p < 0.001$).

Table 1 shows the Cronbach α score of the 12 dimensions with six dimensions were at an acceptable level of internal consistency while six other dimensions achieved low reliability; communication openness (0.54), non-punitive response to error (0.69), staffing (0.53), hospital management support for patient safety (0.68), teamwork across hospital units (0.68) and overall perceptions of safety (0.49). Table 1 also shows the reliability level of the Malay translation version as compared to the original US HSOPSC and few other Asia countries.

Results showed that the inter correlation coefficients between HSOPSC scales were significantly different ($p < 0.01$). The highest correlation was between communication openness and feedback and communication about error (0.71). Table 2 shows the overall patient safety grade was negatively correlated with all 12 factors. In table 3, the highest positive percentage score was on supervisor/manager expectations and actions promoting patient safety (65%) while the lowest was on staffing (29%). With z-score of 4.885 ($p < 0.01$), the unit-level dimensions of patient safety were perceived better than the dimensions at hospital-level. More than 90% of the respondents graded their workplace as acceptable to good in term of patient safety. A total of 58% respondents did not report any adverse event in the last 12 months period (Table 4).

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Table 1: Internal consistency scales.

Scales (number of items)	Cronbach α							
	MLY	US	CHI	TAI	JPN	TUR	PAL	LEB
Unit-level dimensions								
Supervisor/manager expectations (4)	0.70	0.75	0.51	0.73	0.70	0.67	0.75	0.57
Organizational learning and continuous improvement (3)	0.71	0.76	0.74	0.68	0.65	0.56	0.79	0.50
Teamwork within units (4)	0.75	0.83	0.72	0.78	0.83	0.84	0.77	0.68
Communication openness (3)	0.54	0.72	0.47	0.51	0.62	0.67	0.41	0.46
Feedback and communication about error (3)	0.72	0.78	0.64	0.36	0.77	0.81	0.73	0.65
Non-punitive response to error (3)	0.69	0.79	0.75	0.70	0.71	0.71	0.60	0.53
Staffing (4)	0.53	0.63	0.63	0.51	0.46	0.63	0.75	0.48
Hospital-level dimensions								
Hospital management support for patient safety (3)	0.68	0.83	0.67	0.70	0.61	0.59	0.66	0.63
Teamwork across hospital units (4)	0.68	0.80	0.63	0.69	0.70	0.73	0.61	0.69
Hospital handoffs and transitions (4)	0.71	0.80	-	0.76	0.73	0.70	0.73	0.74
Outcome measures								
Overall perceptions of safety (4)	0.49	0.84	0.64	0.52	0.62	0.43	0.43	0.45
Frequency of event reporting (3)	0.72	0.74	-	0.53	0.88	0.93	0.73	0.81

MLY = Malaysia; US = United States of America; CHI = China; TAI = Taiwan; JPN = Japan; TUR = Turkey; PAL = Palestine; LEB = Lebanon.

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Table 2: Mean, standard deviant (SD) and inter correlation coefficients for 12-factor patient safety culture and patient safety grade.

Factor	Composite of patient safety culture	Mean	SD	FA 1	FA 2	FA 3	FA 4	FA 5	FA 6	FA 7	FA 8	FA 9	FA 10	FA 11	FA 12
FA 1	Overall perceptions of safety	3.53	0.71												
FA 2	Frequency of events reported	3.92	0.88	0.32											
FA 3	Supervisor/ manager expectations and actions promoting patient safety	3.66	0.71	0.44	0.21										
FA 4	Organizational learning–continuous improvement	3.61	0.52	0.48	0.33	0.37									
FA 5	Teamwork within units	3.66	0.71	0.31	0.13	0.51	0.42								
FA 6	Communication openness	3.66	0.80	0.39	0.29	0.64	0.42	0.49							
FA 7	Feedback and communication about error	3.56	0.76	0.51	0.42	0.43	0.49	0.45	0.71						
FA 8	Non-punitive response to error	3.21	0.71	0.43	0.16	0.38	0.29	0.19	0.33	0.26					

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FA 9	Staffing	2.81	0.82	0.61	0.08	0.33	0.43	0.15	0.22	0.30	0.38				
FA 10	Hospital management support for patient safety	3.21	0.77	0.54	0.17	0.39	0.40	0.38	0.31	0.46	0.37	0.48			
FA 11	Teamwork across hospital units	3.31	0.90	0.23	0.19	0.33	0.49	0.39	0.61	0.41	0.19	0.29	0.47		
FA 12	Hospital handoffs and transitions	3.55	0.76	0.28	0.13	0.27	0.24	0.31	0.27	0.39	0.21	0.23	0.33	0.59	
–	Safety grade			−0.49	−0.21	−0.43	−0.33	−0.29	−0.30	−0.31	−0.27	−0.32	−0.39	−0.32	−0.36

$p < 0.01$; FA = factor.

A psychometric analysis is necessary to identify if the questionnaire required modifications before the adoption of HSOPSC questionnaires from different cultural settings and languages. Using exploratory factor analysis, the original HSOPSC questionnaire psychometric properties have been validated in US hospital settings and resulted in 12 dimensions [6]. In other Asia countries, exploratory factor analysis and CFA revealed that some modifications were necessary. For examples, the Chinese translated version of HSOPSC showed an 8-factor model for China sample [9], the Turkey sample showed a 10-factor model [22] and the Palestine sample unveil a 11-factor model [8]

In this study, three models were explored to see how they fit the Malaysian data. The three models include the original AHRQ 12-factor (42-items) model, the 10-factor (40-items) model and nested 10-factor (42-items) model. Findings from the PCA analysis revealed that the alternative 10-factor model was slightly differ from the original 12-factor model. In addition, the Satorra-Bentler scaled $\chi 2$ difference test results revealed that a 12-factor model significantly better fit the Malaysian data. This finding was close to Sarac and friends [23] where the difference between their 10-factor model and the original 12-factor model also showed the 12-factor model fit their data better.

The Cronbach α score of the 12 scales indicated an acceptable level of internal consistency for most of the dimensions. The findings were also comparable with other data [8-12]. The internal consistency scores ≥0.6 are considered acceptable while <0.5 are considered unacceptable [19].

Table 3: Scores for 12 dimensions patient safety culture for Malaysian sample

Dimensions and items of patient safety culture	Score	CI (95%)
Overall perceptions of safety	36	31–38
Patient safety is never sacrificed to get more work done (A15)	47	43–49
Our procedures and systems are good at preventing errors from happening (A18)	33	27–35
It is just by chance that more serious mistakes do not happen around here (RA10)	30	28–33
We have patient safety problems in this unit (RA17)	35	31–39
Frequency of events reported	64	62–67
When a mistake is made, but is caught and corrected before affecting the patient, how often is this reported? (D1)	66	62–68
When a mistake is made, but has no potential to harm the patient, how often is this reported? (D2)	56	52–59
When a mistake is made that could harm the patient, but does not, how often is this reported? (D3)	71	70–76
Supervisor/manager expectations and actions promoting patient safety	65	62–66
My supervisor/manager says a good word when he/she sees a job done according to established patient safety procedures (B1)	53	50–57
My supervisor/manager seriously considers staff suggestions for improving patient safety (B2)	61	60–64
Whenever pressure builds up, my supervisor/manager wants us to work faster, even if it means taking shortcuts (RB3)	70	68–73
My supervisor/manager overlooks patient safety problems that happen over and over (RB4)	76	73–79

Organizational learning - continuous improvement	49	46–53
We are actively doing things to improve patient safety (A6)	70	68–73
Mistakes have led to positive changes here (A9)	43	41–46
After we make changes to improve patient safety, we evaluate their effectiveness (A13)	35	31–37
Teamwork within units	54	51–58
People support one another in this unit (A1)	66	63–69
When a lot of work needs to be done quickly, we work together as a team to get the work done (A3)	73	69–75
In this unit, people treat each other with respect (A4)	44	39–48
When one area in this unit gets really busy, others help out (A11)	39	37–41
	37	36–39
Communication openness		
Staff will freely speak up if they see something that may negatively affect patient care (C2)	41	40–46
Staff feel free to question the decisions or actions of those with more authority (C4)	32	31–37
Staff are afraid to ask questions when something does not seem right (RC6)	38	33–40
Feedback and communication about error	52	48–53
We are given feedback about changes put into place based on event reports (C1)	33	31–35
We are informed about errors that happen in this unit (C3)	56	53–58
In this unit, we discuss ways to prevent errors from happening again (C5)	67	63–71
Non-punitive response to error	38	36–43
Staff feel like their mistakes are held against them (RA8)	42	35–43
When an event is reported, it feels like the person is being written up, not the problem (RA12)	39	36–42
Staff worry that mistakes they make are kept in their personnel file (RA16)	33	31–35
Staffing	29	24–31
We have enough staff to handle the workload (A2)	25	21–26
Staff in this unit work longer hours than is best for patient care (RA5)	33	30–35
We use more agency/temporary staff than is best for patient care (RA7)	31	30–34
We work in ‘crisis mode’ trying to do too much, too quickly (RA14)	29	27–33
Hospital management support for patient safety	39	35–41
Hospital management provides a work climate that promotes patient safety (F1)	39	37–43
The actions of hospital management show that patient safety is a top priority (F8)	45	42–47
Hospital management seems interested in patient safety only after an adverse event happens (RF9)	34	31–36
Teamwork across hospital units	39	36–43
There is good cooperation among hospital units that need to work together (F4)	51	50–54

Hospital units work well together to provide the best care for patients (F10)	42	35–45
Hospital units do not coordinate well with each other (RF2)	24	21–27
It is often unpleasant to work with staff from other hospital units (RF6)	41	37–44
Hospital handoffs and transitions	47	44–49
Things 'fall between the cracks' when transferring patients from one unit to another (RF3)	47	43–52
Important patient care information is often lost during shift changes (RF5)	54	51–58
Problems often occur in the exchange of information across hospital units (RF7)	34	29–37
Shift changes are problematic for patients in this hospital (RF11)	51	43–55

R = reversed items; CI = confident interval; N = 723

Table 4: Patient safety grade and number of events reported and submitted in the last 12 months

	Percentage of respondents (%) N = 723
Overall patient safety grade [a]	
Excellent	5
Good	39
Acceptable	48
Poor	7
Failure	1
Number of events reported and submitted in the last 12 months [b]	
None	58
1–2	21
3–5	16
6–10	4
11–20	1
≥21	0

[a] 7% of respondents did not answer [b] 16% of respondents did not answer

The relationship among the 12 dimensions of patient safety culture demonstrated strong correlation for overall perceptions of safety (FA1) and feedback and communication about error (FA7), for overall perceptions of safety (FA1) and staffing (FA9), for overall perceptions of safety (FA1) and hospital management support for patient safety (FA10), for supervisor/manager expectations and actions promoting patient safety (FA3) and teamwork within units (FA5), for supervisor/manager expectations and actions promoting patient safety (FA3) and communication openness (FA6), for communication openness (FA6) and feedback and communication about error (FA7), for communication openness (FA6) and teamwork across hospital units (FA11), for teamwork across hospital units (FA11) and hospital handoffs and transitions (FA12). Other relationships were weak to moderate. The relationship between the 12 dimensions and the patient safety grade was negative shows that this outcome variable is inconsistent with staff perception on the 12 dimensions of patient safety culture. This might

reflect the staff perception of patient safety grades more positive against the rest of patient safety culture dimensions.

None of the patient safety culture dimensions attained the 75% of positive answers set value. There were also some inconsistent between the results, such as frequency of events reported (64% of positive answers) and non-punitive response to error (38% of positive answers). This variance can be explained by the understanding of the importance to report errors by the hospital staff. Although the staff understands the importance to report errors, they refuse to report due to legal actions that can be enforced on them. In Malaysia, those consequences will bring shame and blame culture. In order to create a culture of safety, top management and leaders must eradicate intimidating behaviours that inhibit the reporting of errors and unsafe conditions. They must also hold everyone responsible for adherence to safe practices [24].

A few dimensions of HSOPSC received ≤50% of positive responses. This suggested an opportunities for improvement in safety culture for overall perceptions of safety (36%), organizational learning - continuous improvement (49%), communication openness (37%), non-punitive response to error (38%), staffing (29%), hospital management support for patient safety (39%), teamwork across hospital units (39%) and hospital handoffs and transitions (47%). The score for staffing was particularly low which reflects the perception of respondents that problems of patient safety are mainly due to lack of available staffing. Although staffing is important [25], it is not the only answer to the problems related to patient safety.

This study revealed that survey's items and dimensions are psychometrically acceptable at the individual level. Study done Sorra and Dyer [6] also found the similar findings that the perception of patient safety culture dimensions at unit-level was significantly better than the hospital-level. This could due to good teamwork at unit-level or the respondents tend to give more positive self-descriptions of their working unit [25].

4.0 CONCLUSSION

This study provides an overall assessment of patient safety perceptions among hospital staff in Malaysia. Results demonstrated that amongst the hospital staff surveyed in Malaysia, there was a positive attitude towards patient safety culture in their work place. In spite of that, the results also revealed that there are several areas for improvement including overall perceptions of safety, organizational learning - continuous improvement, communication openness, non-punitive response to error, staffing, hospital management support for patient safety and teamwork across hospital units.

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