ADAPTATION AND VALIDATION OF THE SAFETY ATTITUDE QUESTIONNAIRE (SAQ) IN MALAYSIAN HEALTHCARE SETTING

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ABSTRACT

Safety culture has been shown to be related to patient outcomes and Safety Attitude Questionnaire (SAQ) is one of the measures of safety culture that has good psychometric properties. The present study attempts to adapt the short version of the Generic SAQ for use in Malaysian healthcare setting. The process of adaptation included forward translation and backward translation method, followed by content validity analysis by seven subject matter experts. All 36 items of the SAQ was retained for the field test. The Malaysian SAQ (MSAQ) was distributed to 400 healthcare workers in a hospital in Kuala Lumpur. There were 126 returned and usable questionnaires (31.5% return rate). The internal consistency indices of the MSAQ is acceptable but two items were revised due to low corrected item-total correlation. The revised MSAQ and the Barriers to Medication Administration Error Reporting scale was administered to nurses (n=175, with 76.1% response rate) of two public hospitals in East Peninsula of Malaysia. Internal consistency of the dimensions improved to .71 to .91. Dimensions of MSAQ correlated negatively with the barriers to error reporting, providing evidence of convergent validity. Thus, the revised MSAQ is suggested to be used for research and interventions in Malaysian healthcare organizations.

Keywords: *safety culture, adaptation, validation, healthcare,*

INTRODUCTION

The term adaptation refers to the process of modifying existing questionnaire in terms of content or design of a questionnaire to make it more suitable for another context or a specific population (Harkness, 2010). In addition, Beaton, Bombardier, Guillemin, and Ferraz (2000) described cross-cultural adaptation as a process that includes translation and cultural adaptation of an existing test to produce another equivalent test. In order to ensure that the new test is equivalent to the original test, psychometric properties of the resulting new test such as reliability and validity should be assessed (Beaton et al., 2000).

The present paper reports a study that attempted to adapt Safety Attitude Questionnaire (SAQ) into Malaysian healthcare setting. Specifically, the objectives of the study are to translate the original version of SAQ into Malay language (MSAQ) and examine its content validity, internal consistency and convergent validity. The next section describes the need for the adaptation for research purposes followed by a review of previous adaptation studies of the same questionnaire.

Background of Study

In 2003, Malaysian Ministry of Health established Malaysian Patient Safety Council (MPSC) to improve patient safety in Malaysian health care. MPSC introduced 'systems approach' as a strategy to improve patient safety. Systems approach is based on the principle that errors are more commonly caused by faulty systems, processes, and conditions that cause peoples to make mistakes or fail to prevent them' (Mohd Ismail, 2009, p. 13). It is an attempt to build safety learning culture where every medical error must be reported. The error then will be discussed in order for others to learn from it. This represents a shift from a blame culture to a learning culture. However, this approach is

reactive: in order to detect the weakness of a system, errors or accidents must happen first.

According to Dellemin, Noor-Shufiza, and Mohamed-Izham (2004), about 20 cases of medication errors occurred daily and estimated cost of the medication errors was RM301 daily or RM9 327 a month and approximately RM 111 924 a year among geriatrics at one outpatient pharmacy in Malaysia. Note that the estimated cost was only on medication error at one outpatient pharmacy. The overall cost would be very high. In the United States of America and United Kingdom, the estimated cost for adverse events is approximately between $17 to $29 billion and £2 billion annually (Sandars & Cook, 2007). In addition, when an adverse event occurred, the patient may be forced to prolong their stay at the hospital and have to undergo additional medical procedures, which in turn, would cost more medication expenses. Thus, adverse event is very expensive.

Kohn, Corrigan and Donaldson (2000) suggested that, to improve patient safety, the first thing healthcare institutions need is to change the attitude of their personnel and work culture. Thus, safety culture is seen as a way to improve patient safety. Safety climate assessment has been increasingly recognized as a necessary approach to improve patient safety (Flin, Mearns, & Bryden, 2000; Pronovost & Sexton, 2005) and to assess the quality of care provided (Nordén-Hägg, Sexton, Kalvemark-Sporrong, Ring & Kettis-Lingblad, 2010; Nieva & Sorra, 2003). Safety climate measures are based on the assumption that an individual perception or attitude regarding safety is an opinion, while the aggregate opinions of employees' working in the same area, unit, department, or organization are safety climate (Sexton et al., 2006). In other words, safety climate denotes shared perceptions and attitudes of the priority of safety among the employee in their unit and organization (Zohar, Livne, Tenne-Gazit, Admi, & Donchin, 2007). For instance, if the level of safety climate is high, it is expected that the workers prioritize patient safety at work. In sum, patient safety is a very important issue in health care worldwide, especially in Malaysia, as Malaysian government is currently promoting Malaysia as a medical tourism destination. Improving safety culture is a necessity for healthcare institutions in order to improve patient safety and gain a competitive advantage.

Published reviews of safety climate measures (e.g., Colla et al., 2005; Flin, Burns, Mearns, Yule & Robertson, 2006; Singla, Kitch, Weissman & Campbell, 2006; Robb & Seddon, 2010) show that most of the measures were developed in English-based culture. In order to use safety climate measures in Malaysia, there are two options: developing a new measure or adapting an existing measure. However, developing a new measure needs a lot of resources such as time, money and available expertise (Hambleton & Patsula, 1998). Therefore, adapting an existing measure is a better option. Colla et al. (2005) listed three general guidelines on choosing appropriate instruments to measure safety climate. Based on these guidelines, Safety Attitudes Questionnaire (SAQ) was chosen for adaptation.

1. First, the instrument should have comprehensive and sound psychometric properties. Sexton et al. (2006) had administered SAQ in a variety of inpatient and outpatient settings in over 200 sites across US, UK and New Zealand and their composite scale reliability that measured through Raykov's ρ coefficient is high (ρ = .90).

2. Second, it should be chosen based on its purpose. SAQ is used to measure caregivers' attitudes and perceptions relevant to the safety of healthcare. It was also used as a diagnostic tool to assess safety climate in healthcare as well as a tool for improvement (Nieva & Sorra, 2003). SAQ has been used as part of training, either as a need assessment measure, or as a tool to measure improvement. In addition, SAQ is the only survey that demonstrates a link between survey responses and patient outcomes like medication errors, pneumonia rates, bloodstream infection rates and mortality rates (Colla et al., 2005).

3. The third guideline states that if the instrument is to be used to examine the

association between safety climate and patient safety outcomes, one should choose an instrument that has been used extensively. According to Deilkås and Hofoss (2008) SAQ is the most thoroughly adapted and widely used instrument to assess safety climate in health care setting.

Previous Adaptations of SAQ

Safety Attitude Questionnaire is a modification of Intensive Care Unit Management Attitudes Questionnaire (ICUMAQ), which in turn was derived from Flight Management Attitudes Questionnaire (FMAQ) that was used in commercial aviation industry for more than 20 years (Sexton, Thomas & Grillo, 2003). The full version of SAQ has six domains and 60 items, including demographic variables. The short version has 40 items, including demographics. The generic version of SAQ is intended for general frontline health care staffs. SAQ also was adapted into different versions involving minor modification of items to reflect the corresponding clinical areas (Sexton, Thomas & Grillo, 2003) like intensive care units, operating rooms and Ambulatory Clinics. Never the less, all SAQ versions includes similar 30 core questions that are used to assess caregivers' attitudes in six domains namely Teamwork Climate, Safety Climate, Perceptions of Management, Job Satisfaction, Working Conditions and Stress Recognition. Other additional questions include items for additional aspects of safety, which vary according to the particular unit type being surveyed. SAQ has been translated and cross-culturally adapted to more than ten languages as presented in Table 1.

The most used translation methods in past adaptation studies are back-translation method and a combination of forward and backward translation method. Some of the adaptation studies were conducted in English-speaking countries, but with different cultures. These studies usually involved simple modification of the terms.

In addition, the purpose of the adaptation is related to the amount of psychometric details reported. Studies like Relihan et al. (2009)'s and Lee et al. (2010)'s were conducted as big-scale research to cross-culturally adapt SAQ and provide benchmarking data. For this type of studies, the authors reported detailed psychometric properties of the SAQ. In contrast, other studies adapted SAQ as part of a bigger research, thus, little information about psychometric properties of their SAQ were reported. Table 2 provides a snapshot of the psychometric properties of selected non-English versions of SAQ.

Table 1 Adaptation studies of SAQ

Author(s)	Country/ Language	Sample	Adaptation process	SAQ's version
Sexton et al. (2006)	UK, US & New Zealand English	General	Simple translation of terminology (e.g., 'Residents' to 'Registrar')	SAQ
Nordén-Hägg et al. (2010)	Sweden Swedish	Pharmacist	1. Forward translation 2. Preliminary test (n= 10) 3. Back-translation 4. Pilot study (n= 155) 5.	GSSF
Deilkås & Hofoss (2008)	Norway Norwegian	General	1. Back- translation 2. Review 3. Pilot study	GSSF

Lee et al. (2010)	Taiwan Chinese	General	1. Back- translation 2. Pilot study	GSSF
Carvalho (2011)	Brazil Portuguese	General	1. Back- translation 2. Content validity 3. Pre-test	GSSF
Poley et al. (2011)	Netherland Dutch	Paediatrics Surgical Intensive Care Unit	1. Forward translation 2. Reconciliation 3. Backward translation 4. Harmonization 5. Pre-test 6. Cognitive interviewing 7. Finalization	SAQ-ICU
Relihan et al. (2009)	Ireland English	Acute Medical Admission Unit	Simple translation of terminology (e.g., 'Attendings' change to 'consultants')	SAQ
Abdou & Saber (2011)	Egypt Arabic	Nurse	1. Translation into Arabic 2. Content validity 3. Pilot Study	GSSF
Mahfoozpour & Mojdehkar (2010)	Iran Farsi	General	1. Translation into Farsi 2. Content validity 3. Pilot study	Partial SAQ
Kaya, Barsbay & Karabulut (2010)	Turkey Turkish	General	Back Translation	SAQ
Raftopoulos, Savva, & Papadopoulou (2011)	Greek Cyprus	Maternity Units	. Forward translation . Review . Backward translation . Review . Content validity	SAQ Labour version
Harmsen et al (2010)	Netherland Dutch	Primary Care personnel	. Forward translation . Backward translation	SAQ Ambulatory version

Note: GSSF = Generic SAQ Short Form

Table 2 Cronbach alpha for dimensions of various versions of SAQ

SAQ's version	Teamwork Climate	Safety climate	Working conditions	Job satisfaction	Stress recognition	Perceptions of management
Swedish SAQ Nordén-Hägg et al. (2010)	0.81	0. 75	0.72	0.89	0.86	0.72

Norwegian SAQ Deilkås & Hofoss (2008)	0.68,	0.76	0.71	0.85	0.82	H: 0.82 U: 0.84
Chinese SAQ Lee et al. (2010)	0.79	0. 82	0.79	0.91	–	0.87
Portuguese SAQ Carvalho (2011)	0.65	0.67	0.65	0.77	0.78	H: 0.75 U: 0.79

Notes: α = Cronbach's alpha. H: Hospital management level; U: Unit management level

The most common method to measure reliability is Cronbach alpha. Sexton et al.'s (2006) is the only research that used Raykov ρ. Job satisfaction domain is consistently reported as the most reliable domain, while teamwork climate has the weakest reliability index. On the other hand, Mahfoozpour and Mojdehkar (2010) assessed the reliability of the Farsi SAQ using test-retest method with two-week interval. They reported a high correlation coefficient (r = 0.9) which indicates high stability. Overall, the various versions of SAQ have sound reliability.

Adaptation of SAQ in Malaysia health care research is based on the combination of guidelines provided by Hambleton and Patsula (1998) and past adaptation studies. Hence, this adaptation study undergone five similar processes, (1) to determine whether the test can assess same construct cross-culturally, (2) choose translators, (3) determine accommodations to be made for the test to be use in target culture, (4) adapting the test and (5) analyse the reliability and validity of the adapted version. The five processes were carried out in three phases as described in the next section.

METHOD AND RESULTS

Phase 1: Translation Phase

Participants

The translation involved five participants selected using a simple convenience sampling method. Selection of the participants for forward and backward translation processes were based on the following criteria: fluent in both Malay language and English, and familiar with tests construction. Translation processes involved two translators for forward translation and one backward translator and two reviewers.

The participants for the translation processes were female psychology postgraduate students (26 and 30 years old). The two reviewers were a 36-year-old male teacher with 13 years teaching experience, and a 28 year-old female English lecturer with two years teaching experience.

Measure

The short version of the Generic Safety Attitude Questionnaire (SAQ) was used. There are three reversed-scored items (2, 11 and 36). The response format is 5-point Likert scale, which ranges from (Disagree Strongly, Disagree Slightly, Neutral, Agree Slightly, Agree Strongly).

Procedure

First, the original version of SAQ was translated independently into Malay by two translators. The two translated versions were compared and a working version was derived by a discussion between the researcher (second author) and one of the translators. The MSAQ was translated back into English by a translator who has no knowledge about original version of SAQ. Then, the back-translated version and the original version were compared and reviewed by the researcher (first and second authors) and one of the translators. No modification was made to the MSAQ. Finally, a reviewer was responsible to 'smooth out' and to check for grammar. Another reviewer was asked to

check the equivalency of both original SAQ and MSAQ and the use of words for the items. Modifications were made accordingly.

Phase 2: Pre-Test Phase

Participants

Seven subject matter experts (SME) were approached to rate the items in MSAQ for content validity using convenient sampling. SMEs were staffs working in a health care institution. The inclusion criterion was the staffs must work at least four weeks prior to the administration. The respondents were one male and six female age range from 27 to 41 years old, holding different positions (one resident physician, two nurses, two clinical social workers and two administration support staff) with working experience ranging from one to 20 years.

Measure

The MSAQ includes the 40 translated items, and demographic items. Meanwhile, the validation instrument includes four scales; relevance, clarity, simplicity, and ambiguity. The response format for the validation is as follow.

a. relevance scale: 1 = not relevant, 2 = item need some revision, 3 = relevant but need minor revision and 4 = very relevant.
b. clarity scale: 1 = not clear, 2 = item need some revision, 3 = clear but need minor revision and 4 = very clear.
c. simplicity scale: 1 = the item is not simple, 2 = the item needs some revision, 3 = the item is simple but need some revisions and 4 = the item is very simple.
d. ambiguity scale: 1 = doubtful, 2 = item need some revisions, 3 = no doubt but need minor revisions and 4 = meaning is clear.

Procedure

The researcher briefly explained the scales and the rating process involved to the SMEs. After consents were obtained, the researcher gave the respondents a week to complete the content validity form.

Data Analysis

Acceptance level for CVI for present study is .80 and above. The formula for CVI is:

$$\text{CVI} = \frac{\text{number of judges rated 3 and 4}}{\text{Total number of judges}}$$

Furthermore, Intraclass Correlation Coefficient (ICC) method was done to assess inter-rater consistency of the raters. The ICC model that was used is (2, 7). The inter-rater consistency coefficient was analysed used two-way random and the unit of reliability in interest is consistency among the raters. This model was used because the raters were considered as random sample from the population of raters.

RESULTS

Items that have CVI less than .80 were revised. CVI for item 1 “Maklum balas dari jururawat diterima baik di kawasan klinikal ini” is low for relevancy scale (.57), clarity scale (.57) and ambiguous scale (.50). The item was revised and changed to “Pandangan dan maklum balas dari jururawat diterima baik di kawasan klinikal ini”. In addition, the only item that was not clear is item 26 “Pihak pengurusan menjalankan tugas dengan baik” (CVI clarity scale = .67). The item was revised and changed to “Pihak pengurusan menjalankan tugas mereka dengan baik”. Meanwhile, item 24 “Pihak pengurusan menyokong usaha harian saya” is ambiguous (CVI ambiguity scale = .71). The items are reviewed and changed into “Pihak pengurusan menyokong usaha harian saya (mengenai hal keselamatan pesakit)”. These items (see Appendix) were included in field test study phase.

The benchmark for the ICC is as follow: >.75 = excellent, between .40 and .75 = moderate, <.40 = poor (Stone, et al., 2010).

Table 3 Intraclass Correlation Coefficient for Average Measure

Scale	Intraclass	95% Confidence Interval	*F* Test with True Value 0

	Correlation	Lower Bound	Upper Bound	Value	df1	df2	Sig
Relevance	.631	.404	.793	2.708	33	198	.000
Clarity	.616	.362	.794	2.605	29	174	.000
Simplicity	.533	.224	.749	2.140	29	174	.001
Ambiguous	.688	.473	.837	3.206	27	162	.000

Based on the benchmark of ICC, the result showed that the inter-rater consistencies for the seven raters during pre-test study across the four scales are moderate. The result showed that the inter-rater consistency coefficients for the pre-test study is moderate, indicates the reliability of the measurement and the ratings are moderate. The result means that the scales have moderate ability to derive scores in a systematic way by various raters with enough training.

Phase 3: Field Test Phase

Participants

The field test phase for MSAQ was conducted at a teaching hospital in Klang Valley area. Convenience sampling method was used. Inclusion criteria are (1) the staff must work at least four weeks prior to the administration, (2) (for physicians) admit two or more patients per month, and (3) those who work about 20 hours per week in/for the clinical area. Four hundred questionnaires were distributed with the aim to get at least 100 participants. According to Kline (2000), in relation with internal consistency measurement, sample size should be at least 100.

Measure

No item was removed or added to the MSAQ based on the findings in the previous phase.

Procedure

The researcher sought permission from the Director of the Health Care Centre to conduct the study. When the permission was granted, the researcher asked the staffs at the health care centre to participate through a representative from the health care centre. The written informed consent was obtained from the health care staff. All participants were informed about the nature and the purpose of the study. On receiving the informed consent, the researcher distributed the MSAQ to the health care staffs. The questionnaire took between 20 to 30 minutes to complete.

Data Analysis

Descriptive statistics was used to analyse the demographic data of the participants. Cronbach alpha was used to measure the MSAQ's internal reliability. The score on the first 5-point Likert scale (1 = disagree strongly, 5 = agree strongly) were converted into 100-point scale (1=0, 2=25, 3=50, 4=75 and 5=100) to calculate the 100-point scale score for an individual respondent as recommended by the SAQ developers. In order to create a scale score, responses to each item in a scale was summed and divided by the number of items in that scale to create scores that range from 0 to 100. The scores obtained represented individual perceptions with higher scores reflecting more favourable perceptions of the item.

RESULTS

Table 4 Demographic variables

Position	*N*	Percentage	Primary Working Unit	*N*	Percentage
Physician Assistant	5	4.1%	Adult	53	43.8%
Nurse Manager or Matron	2	1.7 %	Paediatric	8	6.6%
Nurse	42	34.7%	Both Units	59	49.6%
Pharmacist	4	3.3 %			
Therapist	2	1.7%	Working Experience	*N*	Percentage

Clinical Social Worker	12	9.9%	6 to 11 months	8	6.6%
Dietician	1	0.8%	1 to 2 years	19	15.6%
Clinical Support	21	17.4 %	3 to 4 years	22	18%
Technologist or Technician	30	24.8 %	5 to 10 years	29	23.8%
Administration Support	2	1.7%	11 to 20 years	26	21.3%
			21 years and more	21	14.8%
Gender					
Male	31	25.2%			
Female	92	74.8%			

Response rate for the field test is 31.5% (126 questionnaires were returned). All of the returned questionnaires were complete and used for data analysis. Demographic questions on MSAQ cater for four aspects (as in Table 4): position, gender, primary working unit and working experience.

Table 5 Cronbach Alpha for MSAQ and its dimensions

	Cronbach Alpha
MSAQ	0.85
Teamwork Climate	0.68
Safety Climate	0.67
Job Satisfaction	0.80
Stress Recognition	0.85
Perception of Management	0.80
Working Condition	0.78

The Cronbach alphas for MSAQ and its dimensions are listed in Table 5. Two of the dimensions have values lower than .70. However, values between .65 to .70 are still acceptable (Cohen & Swerdlik, 2005). Therefore, the alpha values for teamwork climate and job satisfaction climate are considered acceptable.

For dimension level, internal structure consistency for all of the six dimensions of MSAQ is acceptable. Corrected item-total correlations were computed. The cut-off point for the correlations was set at 0.3. According to Pallant (2007), if the values are lower than 0.3, it could indicate that the item is measuring a different construct. All items have corrected item-total correlation above 0.3 except for two items. The item-total correlation for item 13 (from Safety Climate dimension) is 0.25. However, if deleted, the α for Safety Climate dimension would decrease by 0.01. Item 29 (Perception of Management dimension) also has a low corrected item-total correlation (.18). However, if deleted, the α would increase by 0.01.

Phase 4: Validation study

Participants

The participants (*n*=175) were recruited from one accredited and one non-accredited public hospitals in the East Peninsula of Malaysia with a minimum of 100 beds. Using a purposive sampling method, participants were selected if they met the criteria as stated by Sexton et al. (2006). In general, the participants were sampled from all available units.

Measures

Cronbach alpha and item-total correlations did not sufficiently justify the exclusion of any items. Thus, the MSAQ as used in phase three was utilized in this phase. The second scale used is the Medication Administration Errors (MAE) (Wakefield, Uden-Holman, & Wakefield, 2005) which measures the perceived barriers towards MAE reporting

among nurses. It has three content areas (i.e. reasons why MAE occur, barriers towards MAE reporting, and estimated percentage of MAE actually reported). For the purpose of the study, only the 'Barriers towards MAE reporting' scale was used. The barriers towards medication errors reporting in the scale are inclusive of individual and organisational factors namely disagreement over error definition (α=.77), reporting effort (α=.86), fear (α=.86), and administrative response (α=.86) (Wakefield et al., 2005).

For the purpose of this study, the original items were translated to Bahasa Malaysia. First, the items were translated by researcher from English to Bahasa Malaysia, and the translated items were harmonized with another expert in health system research. Then, the translated items were forwarded to five translators (i.e. proficient in English and Bahasa Malaysia) to be reviewed. Then, the researcher made amendments based on comments by the translator to ensure that the meanings of the items remain. The items were also pre-tested among 23 nurses. The items (n=16) in this scale were rated on a 6-point continuum ranged from 1=*Sangat tidak bersetuju (Strongly disagree)* to 6=*Sangat bersetuju (Strongly agree)*. Based on the pre-testing of the scale, the alpha values were slightly lower than its generic version (disagreement over error definition (α=.67), reporting effort (α=.74), fear (α=.69), and administrative response (α=.72)).

Procedure

Ethic approval was obtained from the Medical Registry and Ethical Committee (approval number NMRR-13-778-15061). The director and nurse manager of the hospitals were approached by the researcher in order to obtain permission for the study by forwarding a letter requesting for consent to conduct the study. The questionnaire was distributed by the assistance of nurse managers and nurse administrators. Attached together with the questionnaire was an informed consent form. The participants were given at least three working days to complete and return the pen-and-paper survey. The response rate was 76.1%.

Data Analysis

The data analysis procedures used in the previous phase were used in this phase. Additionally, independent samples t-test was used to compare overall safety culture score of the two hospitals. Pearson correlation was used to examine the relationship between safety culture and barriers to MAE reporting.

RESULTS

The demographic characteristics of participants in the study are presented in Table 6.

Table 6 Nurses' demographic characteristics in validation study

Demographic variables		*M* (*SD*)	(%)
Age		40.47 (5.51)	
Sex	Male		2.3
	Female		97.7
Educational qualification	Certificate		13.9
	Diploma		84.4
	Bachelor degree		1.2
	Master degree		0.6
Race	Malay		95.4
	Chinese		3.4
	Others		1.1
Religion	Islam		95.4
	Others (e.g. Buddha)		4.6
Clinical Unit	Medical		33.6

	Multidisciplinary	7.4
	O&G	45.6
	Paediatric	12.1
	ICU/CCU/CICU/HDU	1.3
	Others	5.0
Contact hour	20-30	4.4
	21-40	31.5
	>40	64.2

Table 7 Alpha Cronbach of MSAQ and BMAER

Scale	α value
MSAQ	.914
Teamwork climate	.713
Safety climate	.753
Job satisfaction	.906
Stress recognition	.818
Perceptions of management	.834
Work condition	.725
BMAER	.877
Disagreement over definition of error	.666
Reporting effort	.740
Fear	.685
Administrative response	.722

The alpha Cronbach for the MSAQ is much more satisfactory than results found in Phase 3. None of the dimensions have alpha below .6. The BMAER has satisfactory overall internal reliability. However, the Fear (.69) and Disagreement Over Error Definition (.67) subscales have alpha values below .70. Such values can still be considered acceptable (Cohen & Swerdlik, 2005) especially when they are being used to demonstrate convergent validity of another scale.

The overall safety culture score of nurses in the accredited hospitals (M = 73.25, SD = 13.75) was almost similar to the score of those at the non-accredited hospital (M = 74.25, SD = 12.75), t (120) =.357, p = .722. Thus, the correlations between MSAQ and BMAER were done on combined data from both hospitals. Correlations among the dimensions of MSAQ and BMAER show adequate evidence of convergent validity. Significant relationships in the expected directions are observed among all dimensions except for Administration Response. Table 8 summarizes the correlations among between the two scales.

Table 8 Correlations between MSAQ and BMAER

	1	2	3	4	5	6	7	8	9	10	11

1 Total MSAQ	-										
2 Teamwork	.994	-									
3Safety	.995	.992	-								
4 JS	.978	.969	.972	-							
5 Stress	.885	.865	.865	.817	-						
6 Management	.986	.975	.974	.950	.844	-					
7 Work Condition	.977	.974	.970	.954	.821	.964	-				
8Total MAE	-.278	-.280	-.283	-.307	*-.122*	-.311	-.358	-			
9 Definition	-.263	-.252	-.267	-.295	*-.134*	-.282	-.296	.796	-		
10 Effort	-.367	-.370	-.380	-.399	-.208	-.398	-.417	.802	.687	-	
11 Fear	-.217	-.225	-.226	-.243	*-.098*	-.255	-.296	.886	.536	.586	-
12 Admin	*-.115*	*-.119*	*-.126*	*-.142*	*-.038*	-.167	-.211	.827	.504	.491	.736

Note: JS = Job satisfaction. Co-efficients in italics are not-significant at .05 level.

DISCUSSION

During the field test, MSAQ received both positive and negative responses. Many of the respondents mentioned that MSAQ is a good measure for performance evaluation and feedback as well as for teamwork evaluation and feedback. Anecdotal evidence seems to support the statistical findings for future use of MSAQ. On the other hand, as the sampling for the field test was convenient sampling, some of the respondents were not front line personnel like technicians, technologists and administration support staff. Most of them commented that the questionnaires are not suitable for them as many of the items are not applicable for them. This is a cause for concern given that safety is supposed to be everyone's agenda at the hospital. Alternatively, this could indicate that the 'generic' nature of the SAQ is not perceived as generic enough. The same problem was reported even for a domain-specific measure of SAQ. The Ambulatory version of the SAQ was found to have 25% of the items that do not apply to support staff (Modak, Sexton, Lux, Helmreich, & Thomas, 2007).

The samples obtained in this study are limited in its sociodemographic characteristics. The sampling of the field study phase did not capture all of health care's front line personnel (e.g., attending physicians, nurses, therapists, pharmacists, unit coordinators, environmental health, clinical and laboratory workers). During the field test stage, there were no physicians participating in the study and only one-third of the respondents were male. In the validation study, there is a heavy bias for female Malay Muslim nurses. Nonetheless, the main focus of present study is not the generalization of the result, but, to test whether SAQ can be adapted in Malaysia's healthcare setting or not. Result showed that the MSAQ have acceptable psychometric properties, indicating that the adapted SAQ can be used in Malaysia.

Future research can build on the works reported in this paper. The MSAQ items should be further reviewed and modified to make them sound as natural as possible. Second, a more comprehensive sample that represents front line healthcare personnel is needed to establish the norm of MSAQ for use in Malaysia healthcare setting. Third, the factor structure of the MSAQ should be investigated to reveal cultural variations in the perception of safety culture. It is desirable to have a more robust and psychometrically-sound measure of safety culture in Malaysia. The measure will assist further research and practice in improving patient safety in hospitals.

Acknowledgements

The authors would like to thank the Director General of Health Malaysia for permission to publish this paper. Part of this study was funded by a grant from the Ministry of Higher Education (RAGS12-059-0059).

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