Validation of the Malay version of the Amsterdam Preoperative Anxiety and Information Scale (APAIS)

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ABSTRACT

Background: Preoperative anxiety is a significant problem worldwide that may affect patients' surgical outcome. By using a simple and reliable tool such as the Amsterdam Preoperative Anxiety and Information Scale (APAIS), anaesthesiologists would be able to assess preoperative anxiety adequately and accurately.

Objective: The purpose of this study was to develop and validate the Malay version of APAIS (Malay-APAIS), and assess the factors associated with higher anxiety scores.

Methods: The authors performed forward and backward translation of APAIS into Malay and then tested on 200 patients in the anaesthetic clinic of University Malaya Medical Centre. Psychometric analysis was performed with factor analysis, internal consistency and correlation with Spielberger's State-Trait Anxiety Inventory (STAI-state).

Results: A good correlation was shown with STAI-state (r = 0.59). Anxiety and need for information both emerged with high internal consistency (Cronbach's alpha 0.93 and 0.90 respectively). Female gender, surgery with a higher risk and need for information were found to be associated with higher anxiety scores. On the other hand, previous experience with surgery had lower need for information.

Conclusion: The Malay-APAIS is a valid and reliable tool for the assessment of patients' preoperative anxiety and their need for information. By understanding and measuring patient's concerns objectively, the perioperative management will improve to a much higher standard of care.

KEY WORDS:
Preoperative anxiety, anaesthetic clinic, validation, questionnaire, Cronbach's alpha coefficient, and internal consistency

INTRODUCTION

Preoperative anxiety is a common problem worldwide and it has been a subject of interest for many years. Anxiety is described as an unpleasant state of uneasiness or tension associated with abnormal haemodynamic signs as a consequence of sympathetic, parasympathetic and endocrine stimulation. It begins as soon as the surgical procedure is planned and increases to a maximal intensity at the moment of entering the hospital.[1]

Proper management of fear and anxiety by anaesthesiologists provides a better quality of preoperative assessment, less pharmacological premedication, smoother induction and possibly a better outcome.[2] Thus, anxious patients should be routinely identified during their preoperative visit.[3] However, in practice, anaesthesiologists have little time to do so and more often; the anaesthesiologists will attempt to rate patients' anxiety themselves with variable results.[4]

Several instruments have been reported for use to assess preoperative anxiety and one of the most commonly used method is Spielberger's State-Trait Anxiety Inventory (STAI-state).[5] It consists of two separate, 20-item self-report scales for measuring anxiety 'trait' and anxiety 'state' which has been adapted and validated for use in Malaysia.[6] However, STAI can be unpractical and rather time consuming for preoperative assessment due to its long list of non-specific questions.

Moerman *et al.* developed the Amsterdam Preoperative Anxiety and Information Scale (APAIS) in 1996.[7] Written originally in Dutch, the questionnaire consisted of six self-report items representing anxiety and the need for information on a five point Likert scale with a high correlation with STAI-state (r = 0.74). From the original Dutch version, the questionnaire had been translated to other different languages such as English, Japanese, French, and German with consistent reliability and validity.[8-11] It is a simple and reliable instrument that can become a standard tool to assess preoperative anxiety around the world.[12]

To date there is no Malay version of APAIS, therefore our primary aim was to translate the Amsterdam Preoperative Anxiety and Information Scale into Malay (Malay-APAIS), evaluate its psychometric properties, and investigate the relationship between different demographic factors and APAIS scores. Eventually, with the validated Malay-APAIS, we hope to encourage its use for preoperative screening among our patient population who speaks only Malay.

MATERIALS AND METHODS

The Ethics Committee of University Malaya Medical Centre (MECID.NO: 20145-278) approved our study. The validation process included two steps. The initial step involved the production of a Malay version of the APAIS. The authors,

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both bilingual English and Malay speakers, translated the APAIS with several forward and backward translations based on existing guidelines.[13,14] Pilot studies with the Malay version were performed in three groups of five electively listed patients each to test the ease of administrating the questionnaire. After every batch, discussions were held among the authors and further editing was performed. The items of the final questionnaire in the original English version and Malay translations are shown in Table I. There are six items in APAIS; four are dedicated to the assessment of anxiety related to anaesthesia and surgery whilst the remaining two assess the desire for information.[9]

All patients who were 18 years old and above, ASA I - III and could understand, read and write in Malay coming for preoperative assessment in the Anaesthetic Clinic between January and September of 2014 were included. Patients who were unable to answer the questions for themselves and those who refused to give consent were excluded.

Eligible patients were briefed about the study and had their written consent obtained. They were then asked to fill in the questionnaires for demographic information and the Malay-APAIS using a five-point Likert scale ranging from 1 ("not at all") to 5 ("extremely") together with STAI-state. For the purpose of our study, surgical risks were classified as low, intermediate, or high according to the joint European Society of Cardiology/ European Society of Anaesthesiology guidelines for non-cardiac surgery.[15] (Appendix 1)

In the second step, psychometric evaluation of the Malay-APAIS was conducted using IBM software SPSS statistics version 22. We started by conducting factor analysis to describe variability among observed and correlated variables in terms of a potentially lower number of unobserved variables.[16] We expected the result of factor analysis to be consistent with the original study by Moerman *et al.*, which had described two factors: anxiety and need for information.[7] To assess the concurrent validity, we analysed correlation between the Malay-APAIS and STAI-state.

The reliability of the questionnaires was finally assessed using Cronbach's alpha coefficient as a measure of internal consistency. A scale was considered reliable if Cronbach's alpha coefficient was above 0.7. Both Mann-Whitney U and Kruskal Wallis tests were performed to analyse all non-parametric data.

RESULTS

A total of 200 patients attending the pre-operative clinic of our institution participated in the study (Table II). Seventy-four percent of the respondents were female, and the mean age of the respondents was 44.65 (Standard Deviation (SD) 16.10) years. From the responses, 56% had history of previous surgeries while 55.5% had no known co-morbidities and were mostly planned for low and intermediate risk surgeries.

When the construct validity was investigated with factor analysis, the inter-item correlations ranged from 0.40 to 0.88 while Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was at 0.755; a result that proved the sampling as adequate. Principal axis factoring with promax rotation revealed two factors that explained 79% of total variances; anxiety (Eigenvalues = 4.10) and need for information (Eigenvalues = 1.00) (Table III). These two factors were moderately correlated with each other ($r = 0.59$, $p < 0.001$).

Next, the concurrent validity was analysed to measure the correlation between patients' APAIS and STAI-state scores. The combined anxiety component of APAIS correlated moderately with STAI-state ($r = 0.588$, $p < 0.001$), whereas the information desire component of APAIS although lower, still had significant correlation with STAI-state ($r = 0.205$, $p = 0.001$). Table IV shows the measurement of internal consistency of the scales with Cronbach's alpha coefficient. We found the alpha values to be 0.926 and 0.900 for anxiety and information desire scales respectively. A total scale of 0.906 was achieved, indicating high reliability of the scales.

Table V demonstrates the mean scores of the APAIS components, which included anaesthesia related anxiety (5.33, SD 2.31); surgery related anxiety (6.41, SD 2.50); combined anxiety scale (11.73, SD 4.51); and need for information scale (7.21, SD 2.36). The mean score of STAI-state was 43.14 (SD 11.22).

Subsequently, we wanted to determine a cut-off score that would adequately represent anxiety in our population. To do so, we investigated the characteristics of different APAIS anxiety sub-scale cut-off values, using STAI-state score ≥ 46 as a reference.[7] Based on the results shown in Table VI, a cut-off score of 11 indicated the most acceptable balance between sensitivity, specificity and predictive values since the number of false positive and false negative are lowest at score 11. This finding was similar to the cut-off value suggested by Moerman *et al.*[7]

The relationship between different demographic factors and the APAIS and STAI-state scores was also investigated (Table VII). Females had significantly higher anxiety score compared to males ($p<0.05$). The mean ranks of anxiety sub-scale were 86.13 and 105.55 for male and female genders respectively. Although the information sub-scale and STAI-state were not significantly different between gender groups, a significant difference was noted in the anxiety sub-scale between patients who were undergoing low risk surgery (mean rank = 91.65) and intermediate-high risk surgery (mean rank = 116.58, $p<0.005$). Patients who have had previous surgery had significantly lower desire for information as compared to those who have not had surgery (mean ranks = 110.69 and 92.49 respectively, $p<0.05$). There were no significant differences between age, co-morbidities, education levels, and the anxiety scores.

And finally, to investigate the relationship between information desire and anxiety, we divided our respondents into 3 groups: low (score 2- 4), intermediate (score 5-7), and high information desire (score 8-10). Patients with high information requirement had significantly higher anxiety scores and also STAI-state scores as compared to other groups ($p<0.005$).

Table I: Translated items of Amsterdam Preoperative Anxiety and Information Scale (APAIS)

#	Original items	Malay items
1	I am worried about the anesthetic	Saya bimbang tentang pembiusan saya
2	The anesthetic is on my mind continually	Pembiusan sentiasa berada di fikiran saya
3	I would like to know as much as possible about the anesthetic	Saya ingin tahu sebanyak yang mungkin tentang pembiusan saya
4	I am worried about the procedure	Saya bimbang tentang prosedur pembedahan saya
5	The procedure is on my mind continually	Prosedur pembedahan sentiasa berada di fikiran saya
6	I would like to know as much as possible about the procedure	Saya ingin tahu sebanyak yang mungkin tentang pembedahan saya

Table II: Descriptive characteristics of the sample

		N = 200 (%)
Age (mean ± SD)		44.65 ± 16.10
Gender	Males	52 (26)
	Females	148 (74)
Education level	Primary	15 (7.5)
	Secondary	83 (41.5)
	College	32 (16)
	University	70 (35)
Previous surgery	No	88 (44)
	Yes	112 (56)
ASA Status	I	111 (55.5)
	II	85 (42.5)
	III	4 (2)
Surgical risks	Low	129 (64.5)
	Intermediate	70 (35)
	High	1 (0.5)

Table III: Principal axis factoring with promax rotation

Items	Anxiety	Information
1	0.883	
2	0.873	
3	0.86	
4	0.832	
5		0.995
6		0.801
Eigenvalues	4.1	1
Percentage of variance	65%	14%

Table IV: Cronbach's alpha coefficient

APAIS component	Cronbach's alpha	N items
Anxiety	0.926	4
Information	0.900	2
Total scale	0.906	6

Table V: Mean and median for APAIS sub-scale and STAI

	Anxiety scale	Information scale	STAI
Mean ± SD	11.7 ± 4.5	7.2 ± 2.4	43.1 ± 11.2
Median (Inter-quartile range)	12 (8)	8 (3)	46 (14)

Table VI: Characteristics of APAIS anxiety sub-scale at different cutoff points

	APAIS anxiety sub-scale cutoff values			
	10	11	12	13
Sensitivity	82.2%	77.6%	71.0%	56%
Specificity	53.8%	62.4%	67.7%	77.4%
Positive predictive value	67.2%	70.3%	71.7%	74.1%
Patients, n (%)				
True positive	88 (44%)	83 (41.5%)	76 (38%)	60 (30%)
False positive	43 (21.5%)	35 (17.5%)	30 (15%)	21 (10.5%)
False negative	19 (9.5%)	24 (12%)	31 (15.5%)	47 (23.5%)
True negative	50 (25%)	58 (29%)	63 (31.5%)	72 (36%)

Table VII: The relationship between different factors and the anxiety, information, and STAI scores

	N	Anxiety	Information	STAI
		Mean Rank	Mean Rank	Mean Rank
Gender				
Male	52	86.13	97.58	89.42
Female				
	148	105.55	101.53	104.39
p-value[a]		0.04*	0.67	0.11
Age				
Below 50	126	102.50	106.16	101.21
Above 50	74	97.09	90.86	99.30
p-value[a]		0.07	0.07	0.82
Prev. surgery				
No	88	107.61	110.69	106.44
Yes	112	94.91	92.49	95.83
p-value[a]		0.12	0.03*	0.20
Co-morbidities				
No	111	97.79	104.00	98.92
Yes	89	103.88	96.14	102.47
p-value[a]		0.46	0.33	0.67
Surgical risk				
Low	129	91.65	96.01	95.38
Intermediate/high	71	116.58	108.65	109.80
p-value[a]		0.003**	0.13	0.09
Education				
Primary	15	89.87	92.87	101.07
Secondary	83	104.47	97.53	108.93
College	32	108.17	104.23	105.81
University	70	94.56	103.95	87.95
p-value[b]		0.53	0.83	0.15
Information desire				
Low	32	44.11		71.86
Intermediate	65	83.15		97.84
High	103	128.97		111.08
p-value[b]		0.000**		0.000**

p-value[a] = Mann-Whitney U test between mean ranks
p-value[b] = Kruskal Wallis Test between mean ranks
* = p-value significant at <0.05; ** = p-value significant at <0.005

DISCUSSION

The incidence of preoperative anxiety has been reported as high as 11-80% in the adult patient population. Those with history of cancer, smoking and psychiatric disorders are associated with a higher level of anxiety.[17] Apart from those, different pain levels, the extent of surgery to be performed, female gender, years of formal education and physical status also represent independent risk factors for anxiety.[18] It is by no means an exhaustive list which also includes other triggering conditions such as anticipation of postoperative pain, intra-operative awareness, waiting for operation, separation from the family, incapacitation, loss of independence and fear of surgery and death.[1,19]

Anxious patients may react differently compared to non-anxious patients during anaesthesia. Autonomic fluctuations, requirement for larger doses of anaesthetics,[20] higher perioperative analgesic requirement and prolonged hospital stay[3] are some of the common findings shown. The level of preoperative anxiety can be influenced by psychological intervention and therefore, extra attention and information from anaesthesiologists will benefit this group of patients.[21]

The APAIS was developed to evaluate anxiety among patients before surgery. It was designed to be short, easy to complete and suitable for busy clinical settings. Our results

demonstrated consistent psychometric qualities of the Malay-APAIS as compared with the original Dutch and other translated versions.[7-11] Two main factors emerged from factor analysis; anxiety and desire for information. The anxiety sub-scale of APAIS was moderately correlated with STAI-state, while the information sub-scale had lower correlation with STAI-state. Moderate correlation between anxiety and information sub-scale of APAIS suggested that both components were related to our current preoperative situation. Both sub-scales also showed excellent internal consistency as evidenced by very high Cronbach's alpha coefficients.

Our study also found that the females had significantly higher anxiety sub-scale scores than their male counterpart, which was not unlike Moerman *et al.*'s finding.[7] Similarly, patients who were undergoing intermediate/high risk surgeries were more anxious than those in the low risk surgery group. This was understandable given the nature of the higher risks involved in the operations. However, even though the intermediate or high-risk groups were more anxious, they did not necessarily want to know more about their surgery as their information sub-scale scores did not differ compared to the low risk group. Interestingly, STAI-state score was not significantly different among gender and surgical risks. This would suggest that APAIS is more specifically related to preoperative anxiety in our setting.

Miller *et al.*'s monitoring-blunting theory of coping suggested that when faced with a threatening situation, individuals respond either by attending and getting as much information about the situation (monitors), or avoiding the situation as much as possible (blunters).[22] They reported that monitors were more anxious people. As with the Dutch and Japanese APAIS study, we divided our respondents into three groups based on information seeking; low (score 2-4), intermediate (score 5-7), and high (score 8-10). The low information desire group could be considered as blunters, while the high desire group becomes monitors. Our result also showed that monitors had significantly higher anxiety sub-scale and STAI-state score compared to other groups. Generally, 84% of patients showed a positive attitude towards information (information sub-scale score ≥ 5), which was indeed comparable to previous studies.[7]

By using STAI-state score of ≥ 46 as a reference point, we suggest APAIS anxiety score of ≥ 11 as a cut-off point to classify patients as anxious. At this score, the false positives and false negatives were lowest to have the least falsely classified patients. Although sensitivity and positive predictive values of the Malay-APAIS were comparable to the Dutch study, specificity was lower. We suspected that it could be related to using STAI-state as a "gold standard". Even though STAI-state is a reliable questionnaire, our respondents reported that it was harder to understand and answer compared to the Malay-APAIS questionnaire. In addition, the STAI-state is not specific to the preoperative situation and as such, may not support the requirement as a "gold standard" for preoperative assessment. Therefore we believe that APAIS will be a better and more relevant tool to assess preoperative anxiety.

Our findings could provide important information to surgeons and anaesthesiologists on how to tailor their approach to suit different patients during preoperative visits. As a routine, patients are given standard information on surgery, anaesthesia and their risks, but it will be useful to screen further for those who need extra care and information. The monitors will want to know more about the procedures and become more anxious if we ignore their needs, while the blunters will be more anxious if they are given too much information. Additionally, sedative premedication can be selectively given to only highly anxious patients who need them instead of administering to everyone as a general practise.

LIMITATIONS

There were several limitations in our study. Firstly, there was a large difference between the number of female and male respondents (148 vs. 52). The larger group of females might have skewed our results toward higher anxiety scores. Only one patient was scheduled for high-risk surgery. It has been shown that different stratified risks of surgery may affect preoperative anxiety[18] and even though we found significant difference in the anxiety scores between low-risk and combined intermediate-high risk group, we were unable to identify the difference between high-risk and low-intermediate risk surgery groups. Our recruitment was conducted entirely in the pre-operative anaesthetic clinic, therefore most patients recruited were stable enough to ambulate on their own or at least with support or wheelchair. Preoperative patients who were admitted in the ward were not included. A large proportion of the latter group could have been more ill requiring in-hospital care and diagnosed with a different spectrum of diseases with high preoperative anxiety levels such as malignancies awaiting complicated high risk surgeries.

CONCLUSION

The Malay version of Amsterdam Preoperative Anxiety and Information Scale is a valid and reliable instrument that could potentially be a useful tool in preoperative assessment among Malay-speaking patients. Taking a patient's concerns into account through an objective assessment using tools such as the APAIS is a step toward quality improvement in anaesthesia.

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Appendix 1: Classification of surgical risks according to the European Society of Cardiology / European Society of Anaesthesiology guidelines

Low risk	Intermediate risk	High risk
Superficial surgery	Intraperitoneal: splenectomy, cholecystectomy	Aortic and major vascular surgery
Breast	Carotid symptomatic (CEA or CAS)	Open lower limb revascularisation or thromboembolectomy
Endocrine: thyroid	Peripheral arterial angioplasty	Duodeno-pancreatic surgery
Eye	Endovascular aneurysm repair	Liver resection, bile duct surgery
Reconstructive	Head and neck surgery	Oesophagectomy
Carotid asymptomatic (CEA or CAS)	Neurological or orthopaedic: major (hip and spine surgery)	Repair of perforated bowel
Gynaecology: minor	Urological or gynaecological: major	Adrenal resection
Orthopaedic: minor	Renal transplant	Pneumonectomy
Urological: minor (TURP)	Intra-thoracic: non-major	Pulmonary or liver transplant