AGMR
Annals of Geriatric Medicine and Research

Original Article
pISSN 2508-4798 eISSN 2508-4909
Ann Geriatr Med Res 2020;24(2):115-124
https://doi.org/10.4235/agmr.20.0005

Translation and Validation of the Malay Version of Comprehensive Geriatric Assessment Questionnaire for Older Adults in Malaysia

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Received: February 9, 2020
Revised: May 7, 2020
Accepted: May 18, 2020

Background: This study aimed to translate and validate the comprehensive geriatric assessment (CGA) questionnaire among older adult patients in Malaysia in the Malay language. **Methods:** The questionnaire contained items on the socio-demographic characteristics, medical condition, quality of life (QOL), nutritional status, functional capacity, and depression status. The forward and backward translation processes of the original English language version of the questionnaire were undertaken by three independent linguistic translators, while its content was validated by an expert team consisting of seven geriatricians, physicians, dietitian, and lecturers. The Malay version of the questionnaire was tested for face validity in 10 older adult patients over 65 years of age. The internal consistency reliability and construct validity were evaluated among 166 older adult patients (mean age, 71.0 years; 73.5% male). The questionnaire was administered through face-to-face interviews with the patients. Minor amendments were made after the content and face validity tests. **Results:** The internal consistency reliability was good, as the Cronbach's alpha for most of the scales surpassed 0.70, ranging from 0.70 to 0.98, with only one exception (Mini Nutritional Assessment Short-Form, Cronbach's alpha=0.62). The factor loadings for all scales were satisfactory (>0.40), ranging from 0.45 to 0.90. **Conclusion:** The Malay-version CGA showed evidence of satisfactory internal consistency reliability and construct validity in Malaysian geriatric patients.

Key Words: Translation, Validation, Geriatic assessment, Older adult, Malaysia

INTRODUCTION

Aging is a global phenomenon. Worldwide, the proportion of older adult population consisting of people aged ≥ 60 years is growing faster than any other age group.[1)] According to the World Health Organization, the 703 million older adult individuals in the world today is expected to increase to 1.5 billion by 2050.[2)] In Malaysia, the older adult population (age ≥ 65 years) is also the fastest-growing age group. In 2017, 6.2% of 32.3 million people in Malaysia were aged over 65 years. In terms of ethnicity, 7% of Malaysian older adults are from the Malay population. The Malaysian Healthy Ageing Society reported that the proportion of Malaysians aged 60 years and older had increased from 6.2% in 2000 and is predicted to reach 13.6% by 2030.[3)] This increasing trend of aging population implies that Malaysia is moving towards an aging population. Based on data reported by the National Population and Family Development Board (LPPKN), Malaysia is predicted to reach aging population status by 2035, in which citizens aged 60 years and older will comprise 15% of the total population (5.6 million).[4)]

The occurrence of a variety of conditions and disorders unique to this age group has increased notably in recent years, in line with the rapidly aging society. Older adults experience progressive declines in their biological and psychological functions. A compre-

hensive assessment is thus required to ensure a holistic approach in their care plans. Comprehensive Geriatric Assessment (CGA) is a multidimensional and interdisciplinary diagnostic process to determine the medical, psychological, and functional capabilities of older adults. CGA has been applied widely in many medical contexts including orthopedic[5], coronary artery disease[6], and multimorbidity.[7] Its purpose is tailored towards developing a coordinated and integrated plan for treatment and long-term follow-up. The basic components of the CGA include functional status, co-morbidity, cognition, depression, polypharmacy, nutrition, presence of geriatric syndromes, and socioeconomic factors. While integrating standard medical diagnostic evaluation, CGA emphasizes the quality of life (QOL) and functional status, prognosis, and outcome that entail a workup with more depth and breadth.[8-10]

Most of the standardized questionnaires in CGA that are developed in English-speaking countries are not applicable in Malaysia, which is a country with a multi-ethnic population and more than one spoken language. Thus, the questionnaires must be translated into the local Malay language, adapted to the local culture, and validated against the original version while also considering important cultural differences. The Malay language is the language of knowledge and union and it is the national language in Malaysia.[11] This language is related to the Austronesian family of Malay, which has spread across nearly half of the world, with more than 300 million speakers, making it the fourth-largest language globally in terms of the number speakers.[12] Thus, the objectives of this study were to translate the original English version of CGA questionnaires into the Malay language and determine the reliability and validity of this Malay version among the Malaysian older adult population.

MATERIALS AND METHODS

Instrument Translation

The CGA questionnaire consists of five sections (A to E): Section A enquires about participant socio-demographic data, medical conditions, and health and nutritional risk factors, while Sections B–E comprise the screening tools to assess nutritional status (Mini Nutritional Assessment-Short Form [MNA-SF]), QOL (36-items Short Form Health Survey version 2.0 [SF-36 Health Survey v2]), functional capability (activities of daily living [ADLs] and instrumental activities of daily living [IADLs]), and depression status (Geriatric Depression Scale-Short Form [GDS-SF]). All five sections were translated together according to the international guidelines after obtaining permission from the respective original authors of the questionnaires.

The first step of the translation involved the forward translation of the original English questionnaire into the Malay language by two qualified and independent linguistic translators fluent in both languages. The translators were requested to produce a forward translation that was conceptually equivalent to the original English-version questionnaire. Each translator produced a forward translation version without mutual consultation. The translations were then reviewed and reconciled by the researchers to create a preliminary version of the forward translation. This version was subsequently given to a third translator, who translated the questionnaire back into English. The backward translation version was compared to the original English questionnaire by the researchers, with consideration regarding whether the items were rewritten using the same words (literal assessment) or if the original meaning had been retained (semantic equivalence). When discrepancies between backward translation and original versions arose, the word choices were discussed among the researchers and translators until a final forward translation version was reconciled. The comprehensibility and appropriateness of the language in the Malaysian cultural context were emphasized during the translation procedure.

Ethical Clearance

This study was approved by the Malaysia Research Ethics Committee (MREC) of the Ministry of Health Malaysia (Registration No. (2)dlm.KKM/NIHSEC/08/0804/P10-337) and the Human Research Ethics Committee (HREC) of USM (No. USMKK/PPP/JEPeM (228.4[1.6])).

Content and Face Validity

An expert team comprising seven geriatricians, physicians, dietitian, and lecturers assessed the final forward translation questionnaire for its content. They made their judgments about the relevance of the questionnaire and suggested the use of better terms and format.

For face validity, we tested the questionnaire in 10 geriatric patients aged ≥ 65 years who were admitted to the medical wards in Hospital Universiti Sains Malaysia (HUSM) after obtaining informed consent from all participants. The researcher went through each item and allowed the patients to clarify their doubts and comment on the questions and response choices. The researchers discussed these comments and developed the final Malay version of the CGA questionnaire, which was then evaluated for its reliability and validity among Malaysian geriatric patients.

Internal Consistency Reliability and Construct Validity

Study design and participants

A cross-sectional study was conducted using convenience sam-

pling at the Medical Outpatients Department (MOPD) and medical wards of Hospital Sultanah Nur Zahirah (HSNZ), Kuala Terengganu, Malaysia. This study was approved by the MREC of Ministry of Health, Malaysia in November 2010.

The inclusion criteria were geriatric patients aged ≥ 65 years and admitted to the medical wards or who visited the MOPD. We identified eligible participants from the patient admission list at the admission counter of the medical wards and the patient appointment list located at the registration counter of daily MOPD. A trained interviewer collected data collection via face-to-face interviews.

Measures

This study integrated a revised MNA-SF[13] in the CGA tool to screen the patients' nutritional status. The revised MNA-SF consisted of six items and included the calf circumference (CC) parameter as a substitute for body mass index (BMI). This change enabled its application to immobile individuals or in circumstances where the weight and height could not be measured. A total score ranging from 0–14 distinguishes patients into those with normal nutritional status (12–14 points), risk of malnutrition (8–11 points), and who are malnourished (0–7 points).

The CGA applies the SF-36 Health Survey v2[14] with standard 4-week recall periods to assess the health-related QOL among the participants. It contained 36 items across eight different scales of health; namely: physical functioning (PF), role limitations due to physical problems (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role limitations due to emotional problems (RE), and mental health (MH). These eight scales were further aggregated into two summary measures; namely, physical (21 items: PF, RP, BP, GH) and mental (14 items: VT, SF, RE, MH) components. The survey additionally included a single-item scale on health translation (HT) to describe the comparison between current health status and health status 1 year prior. The response choices of these 36 items based on 3-, 5-, or 6-point scales, with item scores of 1–3, 5, or 6 points. We recoded the scores for 11 items so that all 36 items would score in the same direction, with higher values indicating better health status.

The functional capacity of patients was measured as the ability to perform both the ADL and IADL. This entailed the use of the 10-item Barthel Index[15,16] for the ADL; and 7-item IADL subscale of the Older Americans Resources and Services (OARS)[17] for the IADL assessment.

The Barthel Index[15,16] measures patients' level of independence using 10 basic activities rated with scores ranging between 0 and 3 and a maximum total score of 20 points. Scores of 15–19 and < 14 points indicated mild and moderate to severe functional disabilities, respectively.

The IADL subscale of the OARS[17] assesses patients' level of independence on seven instrumental activities. The questionnaire used three levels of scoring (0 = fully dependent; 1 = requiring some help; 2 = fully independent) for a total score ranging from 0–14 points. Scores < 10 points indicated functional disability.

The GDS-SF[18] is modified from the original GDS and used to screen patient depression levels. As a 15-item scale with a "yes/no" format, 10 items suggest probable depression for negative responses (negative items); the remaining 5 items suggest probable depression when answered positively (positive items). The scores ranged from 0–15, whereby 1 point was given for each response suggestive of probable depression. Points ≥ 5 were indicative of the risk of depression.

Along with MNA-SF, SF-36, GDS-SF, ADL, and IADL assessment, the questionnaire also integrated variables on socio-demographic characteristics, medical conditions, and health and nutritional risk factors. Patients' medical records were reviewed for other related information besides the interview.

Statistical analysis

Data entry and analysis were performed using SPSS Statistics for Windows, version 18.0 (SPSS Inc., Chicago, IL, USA). This study assessed the reliability of the CGA questionnaire based on the internal consistency from the item-total correlation (ITC) and Cronbach's alpha coefficient for each of the screening tools (MNA-SF, SF-36, ADL, IADL, and GDS-15).

The corrected ITC consisted of the Pearson correlation coefficient between the score for the individual item and the sum of the scores on the remaining items, which was computed to assess the extent to which an individual item was related to the remainder of its scale. Values > 0.30 indicated item appropriateness.

We performed Principal Component Analysis (PCA; exploratory factor analysis) followed by a varimax rotation to identify whether the items in the questionnaire were structured comparably to the original questionnaires. We first used Bartlett's test of sphericity ($p < 0.05$) and Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (with values > 0.60 considered acceptable) to measure the appropriateness of the factor analysis. The number of factors was determined by examining the eigenvalues (recommended value ≥ 1.0) and via a scree plot (recommended to determine the cutoff point at which the slope appeared to change into minor decrement). The ability of the factors to represent the data was expressed by the percentage of explained variance (recommended range, at least 50%–60%). We also examined the factor loading of the items (recommended value > 0.4).

RESULTS

General Participant Characteristics

A total of 166 older adult patients (110 and 56 patients from MOPD and the wards, respectively) met the inclusion criteria and agreed to participate in this study with written consent. Table 1 shows the general characteristics of the participants. Their mean age was 70.92 ± 4.64 years (range, 65–92 years). Most respondents were male (73.5%), Malay (98.2%), married (77.1%), literate (had formal education, 74.7%), living with family (93.4%), retired (73.5%), non-smoker/ex-smoker (90.4%), and did not depend on others economically (61.4%).

Table 1. General participant characteristics (n=166)

Characteristic	Value
Type of patient	
Outpatient (MOPD)	110 (66.3)
Inpatient (ward)	56 (33.7)
Age (y)	70.92 ± 4.64
65–74	138 (83.1)
≥ 75	28 (16.9)
Sex	
Male	122 (73.5)
Female	44 (26.5)
Ethnicity	
Malay	163 (98.2)
Chinese	3 (1.8)
Marital status	
Married	128 (77.1)
Widowed	38 (22.9)
Education level	
Literate	124 (74.7)
Illiterate	42 (25.3)
Living arrangement	
With family	155 (93.4)
Alone	11 (6.6)
Occupation	
Retired	122 (73.5)
Housewife	17 (10.2)
Working	27 (16.3)
Smoking status	
Non-smoker/ex-smoker	150 (90.4)
Current smoker	16 (9.6)
Economic dependency	
No	102 (61.4)
Yes	64 (38.6)

Values are presented as frequency (%) or mean±standard deviation.
MOPD, Medical Outpatients Department.

Validity and Reliability

MNA-SF

The Cronbach's alpha coefficient was 0.62. Regarding item internal consistency, the corrected ITC of the 6 items in the scale ranged from 0.18 to 0.60, with 2 items not achieving the accepted value. Their corrected ITC values were 0.21 and 0.18 (Table 2).

A PCA of MNA-SF was feasible in this study, as indicated by the significant Bartlett's test of sphericity ($p < 0.001$) and the KMO measure of 0.63. Factor analysis with no structural restrictions revealed a two-factor solution, which explained 62.0% of the total variance. Four items were grouped under the first factor, the item contents of which were more related to the modifiable nutritional and functional risk factors. Two items were grouped under the second factor, the item contents of which were more related to patient diseases and comorbidities. All factor loadings were above 0.40 and ranged from 0.58 to 0.87 (Table 3).

SF-36 Health Survey v2

All correlation coefficients between the items and the remainders of their own scales were > 0.30, except for one item within the GH ("I expect my health to get worse", corrected ITC = 0.23). For all eight subscales of the SF-36 health survey, the Cronbach's alpha coefficients achieved the minimum criterion of 0.70, ranging from 0.70 to 0.98 (Table 2).

PCA with varimax rotation was performed with 35 items of the SF-36 Health Survey. An item on HT ("Compared to one year ago, how would you rate your health in general now?") was excluded from the factor analysis as it was not included in the eight scales scores. The Bartlett's test of sphericity was highly significant ($p < 0.001$), while the KMO measure was high (0.92). An 8-factor solution explaining 76.5% of the observed variance was generated. Table 4 shows the rotated component matrix and total variance explained by factors 1–8 in the whole group. The 10 items of the subscale PF were shared between factors 1 and 6. Factor 2 included all 3 items of the RE subscale and 4 items the MH subscale that explored aspects such as sadness/happiness. Items exploring RP loaded on factor 3, while those exploring BP and SF loaded on factor 5. All 4 items of the VT subscale were distributed between factors 4 and 7, with those positive items being differentiated from the negative items. Besides the items of the VT subscale, factor 2 also loaded with 4 items of the GH subscale and one item of the MH subscale. Factor loading of all items within the eight subscales was satisfactory (above 0.40), ranging from 0.49 to 0.86 (Table 4).

ADL-Barthel Index and IADL-OARS

Both showed good internal consistency reliability, as indicated by

Table 2. Internal consistency reliability of the questionnaires used for CGA

Questionnaire	Number of items	Corrected ITC	Cronbach's alpha
MNA-SF	6	0.18–0.60	0.62
SF-36 Health Survey			
Subscale – Physical functioning	10	0.46–0.89	0.94
Subscale – Role limitations – physical	4	0.93–0.97	0.98
Subscale – Bodily pain	2	0.86	0.92
Subscale – General health[a)]	5	0.23–0.64	0.70
Subscale – Vitality[a)]	4	0.63–0.74	0.85
Subscale – Role limitations – emotional	3	0.92–0.94	0.97
Subscale – Social functioning[a)]	2	0.86	0.93
Subscale – Mental health[a)]	5	0.59–0.76	0.85
ADL-Barthel Index	10	0.52–0.88	0.89
IADL-OARS	7	0.31–0.69	0.78
GDS-SF	15	0.12–0.56	0.75

CGA, comprehensive geriatric assessment; ITC, item total correlation; MNA-SF, Mini Nutritional Assessment-Short Form; ADL, activities of daily living; IADL, instrumental activities of daily living; OARS, Older Americans Resources and Services; GDS-SF, Geriatric Depression Scale-Short Form.
[a)]For SF-36 Health Survey, the subscale included items scored with reverse coding.

Table 3. Factor analysis of MNA-SF in the study population

	MNA-SF item#	Factor 1	Factor 2
A	Has your food intake declined over the past 3 months due to a loss of appetite, digestive problems, or chewing or swallowing difficulties?	**0.858**	-
B	Weight loss during the last 3 months	**0.780**	-
C	Mobility	**0.717**	**0.849**
D	Have you suffered psychological stress or acute disease in the past 3 months?	0.105	-
E	Neuropsychological problems	-	**0.865**
F2	Calf circumference (cm)	**0.575**	-
Eigenvalues before rotation		2.334	1.384
Percentage of variance (%)		38.9	23.1

Extraction method: Principal Component Analysis. Rotation method: varimax with Kaiser normalization. The greatest loading is reported in boldface to show the relationship with the principal components.
MNA-SF, Mini Nutritional Assessment-Short Form.

their corrected ITC (> 0.3) and Cronbach's alpha coefficient (> 0.70) (Table 2).

Table 5 shows the results of the factor analysis. For ADL-Barthel Index, the result of Bartlett's test of sphericity was significant ($p < 0.001$) and the KMO measure was acceptable (0.85). A two-factor solution explaining 74.0% of the observed variance was generated. Eight items grouped under the first factor, the item contents of which were more related to patient's self-care functioning. Next, two items grouped under the second factor, the item contents of which were more related to patient physiological needs. All factor loadings were above 0.40, ranging from 0.64 to 0.90 (Table 5).

For IADL-OARS, the result of Bartlett's test of sphericity was significant ($p < 0.001$) and the KMO measure was acceptable (0.76). A two-factor solution explaining 67.7% of the observed variance was generated. Five items grouped under the first factor, while two items related to domestic chores grouped under the second factor. All factor loadings were above 0.40, ranging from 0.52 to 0.87 (Table 5).

GDS-SF

The Cronbach's alpha coefficient was 0.75. Regarding item internal consistency, the corrected ITC ranged between 0.12 and 0.56 and three items did not achieve an acceptable value (> 0.30) (Table 2).

We performed PCA with varimax rotation. The result of Bartlett's test of sphericity was significant ($p < 0.001$) and the KMO measure was acceptable (0.72). A five-factor solution explaining 60.9% of the total variance was generated. The loadings of factors on the items did not reflect an easily interpretable pattern of psy-

Table 4. Factor analysis of the SF-36 Health Survey in the study population

Subscales of SF-36	Factor							
	1	2	3	4	5	6	7	8
Physical functioning (PF)								
PF 1 – Vigorous activities	**0.709**	0.127	0.272	0.134	0.150	-0.168	-	0.202
PF 2 – Moderate activities	**0.807**	0.149	0.271	0.181	-	-	-	
PF 3 – Lifting or carrying groceries	**0.755**	0.148	0.279	-	0.129	0.274	-	0.128
PF 4 – Climbing several flights of stairs	**0.831**	0.211	-	0.141	0.103	-	0.100	-
PF 5 – Climbing one flight of stair	**0.816**	0.120	0.188	0.109	-	0.282	-	-
PF 6 – Bending, kneeling, stooping	0.374	0.228	0.265	-	0.235	**0.584**	-	-
PF 7 – Walking more than 2 miles	**0.771**	0.133	-	0.258	0.126		0.139	-
PF 8 – Walking several hundred yards	**0.818**	0.150	0.180	0.160	0.138	0.263	-	-
PF 9 – Walking 100 yards	0.517	0.220	0.244	0.196	0.258	**0.519**	-	-
PF 10 – Bathing or dressing	0.228	-	0.130	0.108	-	**0.814**	-	-
Role limitation – physical (RP)								
RP 1 – Reduced time spent on work/activities	0.333	0.228	**0.816**	0.240	0.190	0.139	0.124	-
RP 2 – Accomplished less than would like	0.340	0.228	**0.822**	0.203	0.160	0.154	0.117	-
RP 3 – Limited in kinds of work/activities	0.251	0.246	**0.823**	0.209	0.165	0.145	0.126	-
RP 4 – Difficulty performing work/activities	0.312	0.237	**0.824**	0.201	0.172	0.161	0.118	-
Bodily pain (BP)								
BP 1 – Intensity of bodily pain[a)]	0.225	0.177	0.131	0.264	**0.781**	-	0.154	0.105
BP 2 – Extent pain interferes with work[a)]	0.254	0.200	0.217	0.194	**0.772**	-	0.125	0.169
General health (GH)								
GH 1 – Rating of general health[a)]	0.271	0.259	-	**0.54**	0.149	0.118	-	-0.306
GH 2 – Seem to get sick easier than others	0.151	0.123	-	**0.641**	0.109	-	0.189	0.213
GH 3 – As healthy as anybody know[a)]	0.108	-	0.175	**0.693**	-	0.161	0.179	0.326
GH 4 – Expect health to get worse	-	-	-	0.152	-	-	-	**0.806**
GH 5 – Health is excellent[a)]	0.302	0.270	0.208	**0.681**	-	-	0.163	-
Vitality (VT)								
VT 1 – Feel full of life[a)]	0.245	0.191	0.285	**0.659**	0.248	-	0.238	-
VT 2 – Have a lot of energy[a)]	0.195	0.203	0.323	**0.509**	0.348	0.213	0.144	-
VT 3 – Feel worn out	0.202	0.205	0.143	0.237	0.180	-	**0.836**	-
VT 4 – Feel tired	0.195	0.245	0.203	0.238	0.114	-	**0.814**	-
Role limitations – emotional (RE)								
RE 1 – Reduced time spent on work/activities	0.154	**0.845**	0.156	0.222	-	0.126	-	-
RE 2 – Accomplished less than would like	0.189	**0.864**	0.148	0.184	-	-	-	-
RE 3 – Performed work/activities less carefully	0.195	**0.829**	0.196	0.196	0.105	-	0.103	0.112
Social functioning (SF)								
SF 1 – Extent to which health problems interfered[a)]	0.166	0.344	0.255	0.172	**0.520**	0.343	0.156	-0.135
SF 2 – Frequency with which health problems interfered	0.148	0.453	0.258	0.200	**0.494**	0.322	-	-
Mental health (MH)								
MH 1 – Felt very nervous	0.211	**0.629**	0.169	0.332	0.131	0.135	0.105	0.177
MH 2 – Felt discouraged	-	**0.776**	-	0.120	0.200	-	-	-
MH 3 – Felt calm and peaceful[a)]	-	0.342	0.176	**0.606**	0.361	-	-0.109	0.200
MH 4 – Felt downhearted and depressed	0.155	**0.793**	0.123	-	0.184	-	0.211	-
MH 5 – Felt happy[a)]	0.106	**0.489**	0.192	0.431	0.356	-	-	-0.106
Eigenvalues before rotation	15.538	3.095	1.943	1.617	1.343	1.203	1.021	1.001
Percentage of variance (%)	44.4	8.8	5.6	4.6	3.8	3.4	2.9	2.9

Extraction method: Principal Component Analysis. Rotation method: varimax with Kaiser normalization. The greatest loading is reported in boldface to show the relationship with the principal components. Item #2 of the SF-36 Health Survey was not considered in the analysis because it is a summary item and is not included in the eight scale scores.

a)Item scores were reverse-coded.

Table 5. Factor analysis of ADL-Barthel Index and IADL-OARS in the study population

	Item#	Factor 1	Factor 2
ADL-Barthel Index	1. Bowels	0.202	**0.901**
	2. Bladder	0.229	**0.899**
	3. Grooming	**0.639**	0.512
	4. Toilet use	**0.751**	0.490
	5. Feeding	**0.533**	0.388
	6. Transfer	**0.855**	0.352
	7. Mobility	**0.824**	0.328
	8. Dressing	**0.745**	0.496
	9. Stairs	**0.760**	-
	10. Bathing	**0.746**	0.435
	Eigenvalues before rotation	6.300	1.097
	Percentage of variance (%)	63.0	11.0
IADL-OARS	1. Can you use the telephone?	**0.724**	-0.151
	2. Can you get to places out of walking distance?	**0.868**	0.166
	3. Can you go shopping for groceries or clothes?	**0.727**	0.421
	4. Can you prepare your own meals?	-	**0.872**
	5. Can you do your housework?	0.178	**0.856**
	6. Can you take your own medicine?	**0.519**	0.421
	7. Can you handle your own money?	**0.850**	0.105
	Eigenvalues before rotation	3.272	1.467
	Percentage of variance (%)	46.7	21.0

Extraction method: Principal Component Analysis. Rotation method: varimax with Kaiser normalization. The greatest loading is reported in boldface to show the relationship with the principal components.
ADL, activities of daily living; IADL, instrumental activities of daily living; OARS, Older Americans Resources and Services.

chological dimensions. All factor loadings were above 0.40, ranging from 0.45 to 0.89 (Table 6).

DISCUSSION

The translation, cultural adaptation, and validation of questionnaires are time-consuming and demanding tasks. However, these tasks are necessary to be able to compare results from studies performed in different countries and cultures. The results of this study provide preliminary evidence of the psychometric properties behind the Malay translation version of the CGA questionnaire in Malaysia. Due to the good reliability and validity of their original English versions, the current version selected and implemented the MNA-SF, SF-36 Health Survey, Barthel Index, IADL subscales of OARS, and GDS-SF for the comprehensive screening and assessment among geriatric patients. Most of our results suggested that the CGA questionnaire attained good psychometric characteristics in the study population of 166 Malay medical geriatric patients.

The MNA-SF showed moderate reliability, as measured by internal consistency, with a Cronbach's alpha coefficient of 0.62. Two items of MNA-SF had low corrected ITC, which indicated their poor correlation with the overall scale. This finding is probably due to the item variability of the MNA-SF, which consists of a number of items associated with malnutrition (i.e., food intake, weight loss, mobility, comorbidities, etc.). Omitting these two items from the analysis increased the Cronbach's alpha coefficient to 0.66 from 0.62. However, the MNA-SF was developed as a comprehensive instrument reflecting a number of factors associated with malnutrition; thus, no items could be omitted from the instrument. The two latent factors solution of the MNA-SF revealed in our factor analysis further supported the results of the reliability test, as the two items mentioned above were separated into a new factor with adequate factor loadings around 0.90.

The Malay version of the SF-36 Health Survey showed satisfactory results in the study population. The reliability, as measured by the Cronbach's alpha coefficient, ranged from 0.70 for GH and 0.98 for RP. All items passed the tests for item internal consistency, except for one item in GH ("I expect my health to get worse", corrected ITC = 0.23). This finding is supported by the results of a study by Tseng et al.[19] that also reported a slightly lower corrected ITC for this item in GH, along with another three items in the PF,

Table 6. Factor analysis of GDS-SF in the study population

GDS-SF item#	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
1. Are you basically satisfied with your life?	-0.080	0.134	**0.717**	0.125	0.308
2. Have you stopped many of your activities and interests?	0.104	-0.094	-0.201	0.293	**0.663**
3. Do you feel that your life is empty?	0.232	0.100	0.358	**0.734**	0.110
4. Do you often get bored?	0.169	0.268	0.109	**0.672**	0.152
5. Are you in good spirits most of the time?	**0.555**	0.509	0.172	-0.088	0.174
6. Are you afraid that something bad is going to happen to you?	0.300	0.102	0.288	**0.509**	-0.215
7. Do you feel happy most of the time?	**0.701**	0.119	0.120	0.144	0.075
8. Do you often feel helpless?	**0.763**	-0.041	0.164	0.239	0.014
9. Do you prefer to stay at home, rather than going out and doing new things?	**0.450**	0.074	0.121	-0.426	-0.044
10. Do you feel that you have more problems with memory than most?	0.145	0.168	0.309	-0.142	**0.668**
11. Do you think it is wonderful to be alive now?	0.085	**0.887**	0.097	0.191	0.111
12. Do you feel pretty worthless the way you are now?	0.230	0.065	**0.694**	0.278	-0.140
13. Do you feel full of energy?	**0.590**	0.059	-0.116	0.131	0.104
14. Do you feel that your situation is hopeless?	0.061	**0.886**	0.155	0.121	-0.096
15. Do you think that most people are better off than you are?	0.074	0.120	**0.686**	0.053	-0.036
Eigenvalues before rotation	4.039	1.492	1.402	1.141	1.057
Percentage of variance (%)	26.9	10.0	9.4	7.6	7.0

Extraction method: Principal Component Analysis. Rotation method: varimax with Kaiser normalization. The greatest loading is reported in boldface to show the relationship with the principal components.
GDS-SF, Geriatric Depression Scale-Short Form.

RE, and MH. Similarly, another study also reported a lower corrected ITC for that particular item in GH.[20] Factor analysis of the SF-36 generally supported the eight-subscale structure of the original SF-36.

In this study, we observed good reliability for both the ADL-Barthel Index and IADL-OARS, indicating that the Malay versions maintained the original scale reliability. For the Barthel Index, the two latent factors revealed by the factor analysis were consistent with those reported previously.[21,22] As impairments to the bowels and bladder were not common in the study population, the between-individual variation of participants' ratings on these two items were small. The relatively high scores and small variances of these two items may explain the two-factor structure of the Malay version of the Barthel Index. For the IADL-OARS, two items related to domestic chores were separated into a new factor with adequate factor loadings (around 0.90). This finding is probably due to the predominance of men (73.5%) in this study, who were not involved in domestic chores.

Three GDS-SF items did not pass the tests for item internal reliability, indicated a lack of discriminatory power in differentiating cases and non-cases of depression in the study population. While the Cronbach's alpha coefficient increased to 0.78 from 0.75 if these three items were omitted from the analysis, they were not omitted from the tool as the result of this study were inconsistent with those reported in another local study conducted by Teh and Hasanah.[23] The prior work reported that only one item ("Do you prefer to stay at home, rather than going out and doing new things?", corrected ITC = 0.09) had no discriminatory power in the local context. The five-factor solution that explained 60.9% of the variance was difficult to interpret; thus, a dimensional structure similar to that in the original English version was not confirmed in the study population.

The CGA questionnaire can be used as a screening tool to identify geriatric syndrome such as medical, psychosocial, and functional issues to allow the subsequent appropriate provision of interventions to older adult patients. The CGA may be used to reduce the length of stay, morbidity, and mortality, maximize overall well-being, and improve QOL.[24] However, the present study has some limitations. First, we assessed no parameters related to cognitive and physical performance. Thus, this tool might not be able to be applied to thoroughly assess the nutritional status of older adults. Next, this study has possible issues with selection bias and generalizability as the respondents were sampled only from HSNZ, Terengganu, Malaysia. Therefore, we recommend that future studies include older adult patients from different states (north, south, and west regions) to fully assess the CGA questionnaire applicability in Malaysia.

In conclusion, the Malay version of the CGA questionnaire showed evidence of satisfactory internal consistency reliability and construct validity in the context of the study population compris-

ing 166 medically geriatric patients. Further studies should explore the structural validity and stability of this questionnaire across different diagnostic groups and populations in Malaysia.

ACKNOWLEDGMENTS

CONFLICT OF INTEREST

The researchers claim no conflicts of interest.

FUNDING

This study was financially supported by the Short-Term Research Grant (No. 304/PPSK/61310061) and Postgraduate Research Grant Scheme (No. 1001/PPSL/8145004) of Universiti Sains Malaysia (USM), Malaysia.

AUTHOR CONTRIBUTIONS

Conceptualization, SH, SLT; Data curation, SLT; Funding acquisition, SH, SLT; Investigation, SLT; Methodology, SH; Project administration, SLT; Supervision, SH; Writing original draft, SH; Review & editing, SH.

ADDITIONAL CONTRIBUTION

We express our gratitude and appreciation to all participating patients and health care providers for their cooperation, support, and contributions to this study. Furthermore, our special thanks to Miss Ying Qian Ong for her help in editing and reviewing the manuscript.

REFERENCES

1. United Nations. World Population Ageing highlight [Internet]. New York, NY: United Nations; 2017 [cited 2020 May 23]. Available from: https://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2017_Highlights.pdf.
2. United Nations. World Population Ageing 2019 Highlight [Internet]. New York, NY: United Nations; 2019 [cited 2020 May 23]. Available from: https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf.
3. Malaysia Healthy Ageing Society. Silent 'epidemic' of ageing [Internet]. NKuala Lumpur, Malaysia: Malaysia Healthy Ageing Society; 2015 [cited 2020 May 23]. Available from: http://healthyageing.org/index.php/silent-epidemic-of-ageing/.
4. Ministry of Women, Family and Community Development. Fact Sheet Malaysia Demographic Trends [Internet]. Kuala Lumpur, Malaysia: Ministry of Women, Family and Community Development; c2019 [cited 2020 May 23]. Available from: https://www.lppkn.gov.my/index.php/en/population-services/194-factsheet-malaysia-demographic-trends.
5. Kim GE, Kim S, Won CW, Choi HR, Kim BS, Cho YJ. Comprehensive geriatric assessment for elderly orthopedic inpatients consulted by geriatric medicine in a hospital. J Korean Geriatr Soc 2014;18:213-20.
6. Park MS, Cheon KS, Yoo KJ, Suh YW, Jung SH, Kim EY, et al. Role of comprehensive geriatric assessment in evaluating the efficacy of treatment in elderly patients with coronary artery disease. J Korean Geriatr Soc 2008;12:129-37.
7. Jung HW, Kim KI. Multimorbidity in Older Adults. J Korean Geriatr Soc 2014;18:65-71.
8. Lee H, Lee E, Jang IY. Frailty and comprehensive geriatric assessment. J Korean Med Sci 2020;35:e16.
9. Spirgiene L, Brent L. Comprehensive geriatric assessment from a nursing perspective. In: Hertz K, Santy-Tomlinson J, editors. Fragility fracture nursing. Springer, Cham: Springer; 2018. p. 41-52.
10. Comprehensive Geriatric Assessment [Internet]. [place unknown]: CGA Toolkit; 2019 [cited 2020 May 23]. Available from: https://www.cgakit.com/cga.
11. Mansor NR, Azmy SN, Yusoff SZ. Malay as the language of advanced knowledge: scientific review in national academia scholarship. Int J Asian Soc Sci 2018;8:694-705.
12. Mansor NR. Language, culture and community modules. Kuala Terengganu: Universiti Malaysia Terengganu Publisher; 2013.
13. Kaiser MJ, Bauer JM, Ramsch C, Uter W, Guigoz Y, Anthony P, et al. The short-form Mini Nutritional Assessment (MNA-SF): can it be improved to facilitate clinical use. J Nutr Health Aging 2009;13(Suppl 2):S16.
14. Ware JE, Kosinski M. The SF-36 Health Survey (Version 2.0): technical note. Boston, MA: Health Assessment Lab; 1996.
15. Mahoney FI, Barthel DW. Functional evaluation: the Barthel Index. Md State Med J 1965;14:61-5.
16. Collin C, Wade DT, Davies S, Horne V. The Barthel ADL Index: a reliability study. Int Disabil Stud 1988;10:61-3.
17. Fillenbaum GG. Multidimensional functional assessment of older adults: the Duke Older Americans Resources and Services procedures. Hillsdale, NJ: Lawrence Erlbaum Associates; 1988.
18. Sheikh JI, Yesavage JA. Geriatric Depression Scale (GDS): recent findings and development of a shorter version. In: Brink TL, editors. Clinical gerontology: a guide to assessment and intervention. New York, NY: The Haworth Press; 1986. p. 165-173.
19. Tseng HM, Lu JF, Gandek B. Cultural issues in using the SF-36 Health Survey in Asia: results from Taiwan. Health Qual Life Outcomes 2003;1:72.

20. Garratt AM, Stavem K. Measurement properties and normative data for the Norwegian SF-36: results from a general population survey. Health Qual Life Outcomes 2017;15:51.
21. Kucukdeveci AA, Yavuzer G, Tennant A, Suldur N, Sonel B, Arasil T. Adaptation of the modified Barthel Index for use in physical medicine and rehabilitation in Turkey. Scand J Rehabil Med 2000;32:87-92.
22. Leung SO, Chan CC, Shah S. Development of a Chinese version of the Modified Barthel Index: validity and reliability. Clin Rehabil 2007;21:912-22.
23. Teh EE, Hasanah CI. Validation of Malay version of geriatric depression scale among older adult inpatients [Internet]. Penang: Universiti Sains Malaysia; 2004 [cited 2020 May 23]. Available from: http://priory.com/psych/MalayGDS.htm.
24. Ellis G, Gardner M, Tsiachristas A, Langhorne P, Burke O, Harwood RH, et al. Comprehensive geriatric assessment for older adults admitted to hospital. Cochrane Database Syst Rev 2017;9:CD006211.