Validation of the Abbreviated Mental Test (Hong Kong version) in the elderly medical patient

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The Abbreviated Mental Test is a useful screening test for abnormal cognitive function in the elderly patient. It is widely used in UK geriatrics practice. A modified local version of the Abbreviated Mental Test is also commonly used in Hong Kong. In the present study, the local version of the 10-question Abbreviated Mental Test was validated against clinical diagnoses of normal/abnormal cognitive function (DSM-III-R criteria). Sixty-nine patients (aged 65 years and older) referred to the Acute Geriatric Assessment Team at the Queen Mary Hospital were assessed. Nine patients (13%) were excluded because of a language barrier, deafness, dysphasia, aphasia, and/or severe dysarthria. Sixty patients completed the test and the clinical assessment. An incorrect answer in each of the test items was found to be significantly associated with abnormal cognitive function (P<0.005). For the Abbreviated Mental Test score, the best cut-off point was found to be six (below six was considered abnormal); this yielded a sensitivity of 96% and a specificity of 94%.

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Introduction

The Abbreviated Mental Test (AMT) was derived from the modified Roth-Hopkins Test in 1972.[1] The AMT is a useful screening test for abnormal cognitive function in the elderly patient. It is widely used in geriatrics practice in the United Kingdom, and is the recommended cognitive function screening test by the British Geriatrics Society. The recommended cut-off score is eight (below eight is considered abnormal).[2] However, it is uncertain whether or not this cut-off score is valid for our local elderly medical patient. The purpose of this study was to validate the local version of the 10-question AMT (Appendix) for use in local elderly medical patients.

Subjects and methods

The study was conducted from August to December 1994, in the Department of Medicine, Queen Mary Hospital. Sixty-nine patients (aged 65 years and older) referred to the Acute Geriatric Assessment Team of the Department of Medicine were assessed. The AMT was administered to each patient by the geriatric registrar. Patients who could not complete the AMT, due to a language barrier, deafness, dysphasia, aphasia, severe dysarthria or poor cooperation were excluded. Sixty patients completed the AMT. They were then each assessed clinically by the geriatrician.

Patients were classified as having either normal or abnormal (e.g. delirium, dementia) cognitive function according to the DSM-III-R criteria.[3] The AMT administration and the clinical assessment were performed independently by the geriatric registrar and the geriatrician. The geriatric registrars did not know the geriatrician's assessment result before performing the AMT. However, the registrars may not have been completely unaware of the diagnosis in all the study subjects, as abnormalities in cognitive function were quite florid and apparent in some of the patients with delirium or severe dementia.

Age and AMT score versus cognitive function were analysed using the Mann-Whitney *U* test. Sex and the individual AMT test item versus cognitive function were analysed using the χ^2 test. Each AMT item was then analysed using the sensitivity-specificity analy-

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sis. Finally, the AMT score was also analysed using the sensitivity-specificity analysis.

Results

Nine of the 69 patients could not complete the AMT. Reasons included language problems in two, poor cooperation in one, severe dysarthria in three, and dysphasia/aphasia in three patients.

Sixty patients were included in the study; 28 men and 32 women. Thirty-three were cognitively normal; 27 had abnormal cognitive function (8 delirium; 19 dementia). There was no statistically significant difference according to sex between the normal and abnormal cognitive function groups (Table 1).

The mean age was 79.9 years (range, 65 to 94 years). Age and AMT score analyses showed a statistically significant difference between the abnormal cognitive function group and the normal cognitive function group. Patients with abnormal cognitive function were older (mean age, 83.1 vs 77.2 years) and achieved lower scores in the AMT test (mean score, 2.0 vs 7.8) compared with the normal cognitive function group (Table 1).

For each of the 10 questions, an incorrect answer (i.e. score=0) was significantly associated with abnormal cognitive function. The sensitivity and specificity of each question for detecting abnormal cognition varied widely. The question on the date of the mid-Autumn Festival yielded the best combination of sensitivity (81%) and specificity (88%). The questions on age, time of day, and recognition of two persons were not sensitive question items (Table 2).

For the AMT score, the best cut-off point was found to be six (below six was considered abnormal), with a sensitivity of 96% and a specificity of 94% (Table 3).

Table 1. Sex, age, AMT score and cognitive function assessment

	Cognitive function	
	Normal	Abnormal
Sex*		
Men (n=28)	15	13
Women (n=32)	18	14
Age (y)†		
Mean	77.2	83.1
SD	5.9	7.0
AMT score‡		
Mean	7.8	2.0
SD	1.7	1.9

*ns (χ^2)

†P=0.0015 (2-tailed), Mann-Whitney *U* test

‡P<0.0001 (2-tailed), Mann-Whitney *U* test

Discussion

The AMT is a useful test for detecting abnormal cognitive function in the elderly patient. This test has been validated[4-6] and is widely used in UK geriatrics practice. The present study showed that the AMT was also valid in differentiating normal versus abnormal cognitive function in our local elderly medical patients.

It should be noted that not all elderly medical patients could finish the AMT test. In nine of 69 elderly medical patients (i.e. 13%), the AMT could not be completed. The reasons were either a language barrier (speaking a different dialect), deafness, dysphasia, aphasia, severe dysarthria, or poor cooperation. The figure of 13% was higher than the 8.7% reported by Jitapunkul et al.[6] However, there was a difference between our patients and the patients of that study. Language problems were not encountered in the UK study.

There were wide differences in terms of sensitivity and specificity of the various question items in the AMT. The question on the date of the mid-Autumn Festival-which basically measured the remote memory of the person-yielded the best combination of sensitivity and specificity. The question on the name of the present Governor of Hong Kong or a Chinese leader (general knowledge and memory), although it had a very high sensitvity (100%), yielded an unsatisfactorily low specificity of 33%. This meant that the majority of our cognitively normal elderly patients (21 of 33) did not know the name of the Governor or the name of a Chinese leader. This was in marked contrast with the results obtained in the study reported by Jitapunkul et al. The corresponding question (Monarch) yielded a satisfactory sensitivity and specificity of 72% and 82%, respectively.

For the AMT score, the British Geriatrics Society recommended a cut-off score of eight. In our study, the AMT cut-off score of six gave the best combination of sensitivity (96%) and specificity (94%). Rocca et al also reported that for their population, this score

Table 2. Each AMT question item versus cognitive function groups and sensitivity/specificity of each AMT question

	Number of patients with incorrect answer				
AMT question	Normal cognitive function (n=33)	Abnormal cognitive function (n=27)	P value (χ^2)	Sensitivity (%)	Specificity (%)
1. Age	1	16	0.00001	59	97
2. Time	5	16	0.001	59	85
3. Address for recall	13	23	<0.001	85	61
4. Current year	14	26	<0.00005	96	58
5. Place	0	19	<0.00001	70	100
6. Recognition of two persons	1	19	<0.00001	25	97
7. Date of birth	7	23	<0.00001	85	79
8. Date of mid-Autumn festival	4	22	<0.00001	81	88
9. Name of present Governor or Chinese leader	21	27	<0.005	100	36
10. Count from 20 to 1 backwards	8	26	<0.00001	96	76

yielded the best combination of sensitivity (90%) and specificity (89%).[7] One possible explanation for the difference in cut-off scores between the two populations may be the difference in educational levels. In general, the majority of our elderly patients received no formal education. In one local study, 65.2% of the elderly persons surveyed (aged 65 years and older) did not receive any formal education.[8] In a published survey which employed another standardised mental test [Mini-Mental State Examination (MMSE)] in Shanghainese Chinese (aged 55 to 75 years), the 'no education group' had the lowest mean score. Subgroup analysis by age also showed that the 'no formal education group' had the lowest mean score in each of the three age groups (55 to 64, 65 to 74, and 75 years and older).[9] Therefore, if the educational levels were documented in our study population, a similar subgroup analysis could be performed.

In Hong Kong, Fan[10] and Chiu et al[11] have published studies which attempted to validate two

Table 3. Sensitivity and specificity of the AMT score

AMT cut-off score	Sensitivity (%)	Specificity (%)
1	26	100
2	44	100
3	67	100
4	85	100
5	93	94
6	96	94
7	96	79
8	96	58
9	100	30
10	100	21

different Cantonese versions of the MMSE. Both versions were reported to be valid. High sensitivity (97.5%) and specificity (97.3%) were reported in Chiu's version of the MMSE. In this report, 46.3% of the study population (n=190) were found to be illiterate. The mean educational level of all subjects was 3.5 years, with very few tertiary-educated subjects. Because of this problem, the author commented that subgroup analysis by educational level was difficult to perform.

In our clinical practice, we have been using Fan's version of the MMSE in both our inpatient and outpatient settings. We have no experience in the use of Chiu's version of the MMSE, which was only recently published. Compared with the MMSE, the AMT was simpler and quicker to use. The MMSE was more comprehensive, but more time-consuming. In addition, the reading and copying parts of the MMSE posed additional difficulties for those elderly medical patients who had visual impairment or motor weakness/ataxia. For screening purposes in the acute medical ward, we found the AMT to be a more practical tool.

Elderly patients (65 years and older) constituted a significant proportion of the case load in the general medical ward of our public hospital. In our department, approximately 50% of unplanned admissions belonged to this group (source: computerised database, July to October, 1994, Department of Medicine, The University of Hong Kong). Dementia and delirium have been reported as two of the three most common psychiatric conditions encountered in general medical wards in Hong Kong.[12] In elderly medical patients, the reported prevalence of delirium ranges from 9.5% to 22%.[12-14] Delirious patients, compared with non-delirious patients, have been found to have higher in-hospital mortality rates[14,15] and more frequent hospital readmissions (four times or more).[14] Performing the AMT on every elderly medical patient on admission would help in the early detection of potentially treatable cognitive problems such as delirium.

Conclusion

The local version of the AMT is valid in differentiating between normal and abnormal cognitive functions. The best cut-off point for the Hong Kong geriatric patient is six. The AMT's simplicity and validity suits the busy setting of general medical wards in Hong Kong hospitals. It should be used as a routine screening assessment tool for cognitive impairment in all elderly medical patients.

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Appendix

Abbreviated Mental Test (Hong Kong version)

	Scores
1. Age (+/- 5 years)	0 / 1
2. Time (nearest hour, or a, p, n)	0 / 1
3. Address for recall at the end of the test: 42 Shanghai Street	0 / 1
4. Year (+/- 1 year)	0 / 1
5. Place name	0 / 1
6. Recognition of two persons (doctor, nurse)	0 / 1
7. Date of birth (day and month)	0 / 1
8. Date of mid-Autumn festival	0 / 1
9. Name of present Governor or Chinese leader	0 / 1
10. Count 20 - 1 backwards	0 / 1
Total Scores	_____

Communication barriers present at the time of the test:—Y / N

Deafness _____ Depression ____ Dysphasia _____
Language barriers _____

(Others: _____)