

ORIGINAL ARTICLE

Can patients with dementia be assessed at a distance? The use of Telehealth and standardised assessments

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Abstract

Background: Telehealth could be a medium for the provision of cognitive assessments to distant sites.

Aims: The aims of the present study were to determine the interrater reliability of the Standardized Mini Mental State Exam (SMMSE) and the Geriatric Depression Scale (GDS) through Telehealth as compared to face-to-face administration.

Methods: Duplicate interviews of subjects with cross-over of interview modality were carried out. Twenty patients were interviewed between two sites 11 km apart. Subjects were persons older than 65 years (mean age 82 years) who consented to Telehealth assessments. The outcome measures were the differences in assessment scores between the two media.

Results: The average SMMSE score by remote assessment was 24.0 (range 11.0–30.0) and by direct assessment was 24.3 (range 9.0–30.0). The correlation between direct and remote SMMSE scores was 0.90.

The mean difference between direct and remote SMMSE scores was -0.3 (95% confidence interval (CI): -4.6 to 4.0). In 8 of 20 participants (40%) the difference between Telehealth and direct assessments was two points or more on the SMMSE. The average GDS by remote assessment was 6.1 (range 1.0–14.0) and by direct assessment was 5.8 (range 2.0–13.0). The correlation between direct and remote GDS scores was 0.78. The mean difference between direct and remote GDS assessment was 0.3 (95% CI: -3.8 to 4.4).

Conclusion: Remote assessments with SMMSE and GDS using Telehealth methods yielded similar results to direct assessments. However, there was a moderate difference between face-to-face and Telehealth assessments in some subjects, which could influence clinical decision-making. (Intern Med J 2004; 34: 239–242)

Key words: Telehealth, cognitive impairment, Mini Mental State Exam, Geriatric Depression Scale.

INTRODUCTION

Telehealth allows the remote provision of medical services using videoconferencing technologies.¹ Telehealth involves the transmission of images, voice and data between two or more sites using telecommunications to provide health services such as clinical advice, consultation, education and training.² It relies on an extensive Telehealth network, which currently exists in Western Australia (WA; Fig. 1).

WA's extensive network, initiated in 1996, currently has approximately 70 sites. The WA Telehealth Project

is committed to trialling and establishing a variety of other clinical applications of Telehealth.

Health-related data on patient care, hospital management and health services delivery can be easily transmitted by a digital Telehealth network. Diagnostic services currently use this medium extensively. For example X-rays, computed tomography scans and other radiological imaging can be transmitted from remote locations to tertiary hospitals. Similarly, other diagnostic imaging, such as echocardiography, electrocardiography, funduscopy and otoscopy, can also be transmitted.

The Royal Perth Hospital (RPH) Department of Geriatric Medicine provides support services to three health services in rural Western Australia, including weekly physician visits to Northam, a country town 100 km east of Perth and 6-monthly services to the Kimberley and Pilbara regions. Telehealth could potentially substitute for many face-to-face assessments.

The general aim of assessment is to determine the client's medical diagnosis and their resultant level of care requirements. Management frequently involves providing medical advice, social support services and, if necessary, facilitating entry into residential care. Telehealth can also

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Conflicts of interest: None



Figure 1 Map of the 70 Telehealth sites in Western Australia developed since 1996. (From <http://www.telehealth.health.wa.gov.au/map/index.cfm>)²

assist in the following roles: assessment of testamentary capacity, family conferences, education and support for carers.

There are still several impediments to the increased use of Telehealth. These include medico-legal issues, such as malpractice, medical defence and duty of care, and they are by no means resolved.³ Other logistic impediments are high cost, lack of reimbursement, lack of clinical standards, scheduling difficulties and time limitations. The Federal Government has yet to provide avenues for reimbursement for Telehealth consultations.³ The coverage by health-insurance agencies for private sector consultations has yet to be ascertained.

METHODS

The trials in the present study were conducted in early 2001. Assessments were performed on patients with a

mixture of common clinical problems presenting to geriatricians, including dementia, delirium and depression. The Health Department of Western Australia provided equipment for trials at RPH.

The aim was to determine the interrater reliability of the Standardized Mini Mental State Exam (SMMSE)⁴ and the Geriatric Depression Scale (GDS)⁵ using Telehealth. The hypotheses were that Telehealth assessments, using SMMSE and GDS, were reliable tools compared to the gold standard of face-to-face assessments of patients with suspected Alzheimer's disease.

Twenty inpatients who consented to Telehealth assessments were interviewed between two campuses of RPH. All subjects were 65 years or older. Patients were selected, if they consented to Telehealth assessment, from a postoperative rehabilitation unit for the fractured-neck-of-femur unit (Shenton Park campus (SPC)) and

an acute aged care medical unit at an inner city teaching hospital (Wellington Street Campus (WSC)). Two advanced trainees in Geriatric Medicine assessed the patients using the SMMSE and GDS face-to-face (direct) and through a Telehealth link (remote). For example, an SPC patient would have a face-to-face assessment at SPC and a similar assessment from WSC using Telehealth videoconferencing. The interviews were randomised such that each trainee saw half the face-to-face subjects first and half the subjects by Telehealth first to minimise learning and rater effects.

Identical equipment was used at both hospitals (VCON cruiser, version 4.0, videoconferencing unit (VCON; Israel) with Sony D31 PTZ camera (Sony; Tokyo)). A range of transmission bandwidths (128 kb/s, 256 kb/s and 384 kb/s) was trialled. Problems with the equipment, accents, language, vision and hearing were noted.

Data comparing the two methodologies were analysed using the methods described by Bland and Altman.⁶ Correlations between scores were also determined by Pearson correlation coefficients.

RESULTS

Twenty patients were interviewed. Sixteen of the 20 (80%) were women. The participants' average age was 82 years (range 72–95 years). The diagnoses of these participants based on International Classification of Diseases, 10th revision (ICD-10) were as follows: eight subjects had normal cognition; six subjects had dementia as a result of probable Alzheimer's disease; two subjects had depression; and four subjects had probable delirium.⁷

Eleven of the 20 subjects (55%) had remote interviews and nine had direct interviews first. The mean \pm standard deviation (SD) MMSE score by remote assessment was 24.0 ± 4.9 (range 11.0–30.0) and by direct assessment was 24.3 ± 4.9 (range 9.0–30.0). The correlation between direct and remote SMMSE scores was 0.90. The mean GDS by remote assessment was 6.1 ± 3.2 (range 1.0–14.0) and by direct assessment was 5.8 ± 3.0 (range 2.0–13.0). The correlation between direct and remote GDS scores was 0.78.

Using the Bland–Altman method, the mean difference (\pm SD; 95% limits of agreement) between direct and remote SMMSE scores was -0.3 ± 2.2 (-4.6 to 4.0).⁶ The mean difference (\pm SD; 95% limits of agreement) between direct and remote GDS was 0.3 ± 2.1 (-3.9 to 4.5). Visual inspection of the data showed that remote GDS scores were scored higher than direct assessments (Figs 2,3).

When the four patients with suspected delirium (i.e. fluctuating conscious states or poor attention spans) were removed from the analysis, the mean difference (\pm SD; 95% limits of agreement) between the two media were 0.20 ± 1.50 (-3.20 to 2.80) for the SMMSE and 0.25 ± 2.20 (-4.00 to 4.50) for the GDS.

Problems with general audio quality, hearing difficulties and difficulty understanding accents were apparent at lower bandwidths (i.e. 128 kb/s). These were mostly

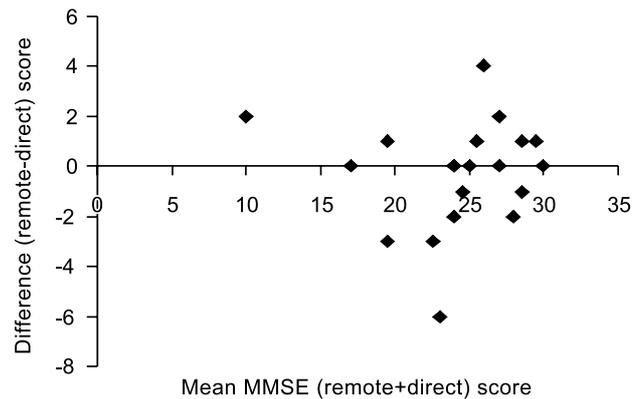


Figure 2 The difference in scores on the Mini Mental State Exam (MMSE) for each subject as performed by direct and remote assessments is plotted against the mean of the MMSE performed using the two assessments as per the method described by Bland and Altman.⁶

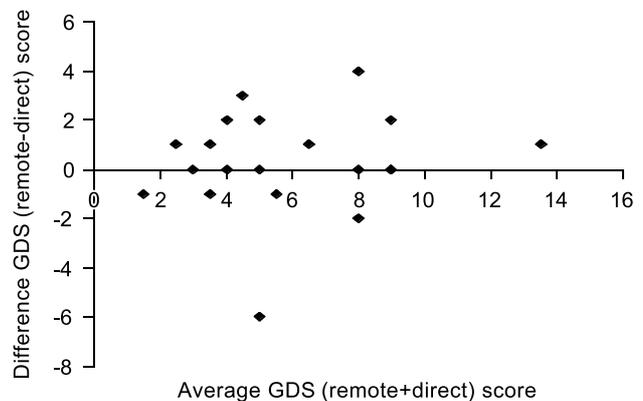


Figure 3 The difference in scores on the Geriatric Depression Scale (GDS) for each subject as performed by direct and remote assessments is plotted against the mean of the GDS performed using the two assessments as per the method described by Bland and Altman.⁶

improved by using the higher bandwidth of (384 kb/s) for 19 patients during the trial.

DISCUSSION

The present study demonstrates a moderate difference between face-to-face and Telehealth scores. There does not seem to be systematic bias between the two methods of performing the assessments. The 95% confidence limit of agreement for the difference between remote and direct scores was of sufficient magnitude to raise concerns for the interchangeability of these results in routine clinical use. Examples of this might include the prescription of pharmaceutical treatments, such as the use of cholinesterase inhibitors for Alzheimer's disease and antidepressants for depressive illness.

There are several possible reasons for these observed differences. First, true differences could be a result of fluctuation of the patient's clinical state. Others have

shown the repeated use of the MMSE performed within the same day had correlations of 0.85 for cognitively intact patients, 0.9 for patients with dementia and 0.56 for patients with delirium.⁸ A major part of the fluctuation in the subjects in the Telehealth assessments, was most likely a result of delirium. Thus, the reliability improved when patients with probable delirium were removed. There is considerable day-to-day fluctuation in the cognitive performance of stable patients with dementia. It is possible that if the testing were repeated over a shorter time interval there would have been less apparent difference between the two methods. In another face-to-face study of the reliability of MMSE scores over 1, 3 and 6 weeks in patients with probable Alzheimer's disease, correlations of 0.84, 0.79 and 0.80 were observed, respectively.⁹ These correlations appear to be fairly similar to each other despite an increasing time interval between assessments.

Second, there could be bias because of the methods of administration, with some subjects performing better on face-to-face administration and others on Telehealth. This could be because of reluctance to admit symptoms of depression or greater patient motivation with an alternative medium of assessment.

Other studies of MMSE testing by way of videoconferencing in non-cognitively impaired patients and patients with dementia have found high correlations to face-to-face interviews.¹⁰⁻¹² However, the data were not analysed using the methods described by Bland and Altman.⁶ Videoconferenced cognitive assessments in older patients by a psychiatrist using more comprehensive assessments have found high correlations to direct assessments in orientation of 0.83, language 0.72, memory 0.84, praxis 0.75 and attention 0.64.¹³ These assessments were performed with a more comprehensive assessment instrument, the Cambridge Examination for Mental Disorders of the Elderly (CAMDEX).¹⁴ Unfortunately, the data were not subject to the more appropriate analyses used in the present study. However, the correlations from the subsections of the CAMDEX are consistent with the level of agreement for the SMMSE found in the present study.

Many of the differences between face-to-face interview and Telehealth are a result of the presence of delirium in older patients who are in hospital. In this condition, the conscious level of the subjects varies from moment to moment, resulting in impaired attention and cognitive function. The clinical utility of administering these measures by Telehealth is probably limited and these patients could possibly be screened more appropriately for delirium using instruments such as the Confusion Assessment Method diagnostic algorithm.¹⁵

Overall, the present study demonstrates that standardised instruments that aid in the diagnosis of depression and dementia can be administered using Telehealth. However, enough differences were found between face-to-face assessments and Telehealth that the use of Telehealth might be limited in common clinical situations. Further studies are required to elucidate the possible

mechanisms for these differences before Telehealth consultations for these types of patients are routinely provided in rural areas in Australia.

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