

Predictors of a new depression diagnosis among older adults admitted to complex continuing care: implications for the depression rating scale (DRS)

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Abstract

Background depression is a major disabling condition among older adults, where it may be under-diagnosed for a number of reasons, including a different presentation for younger people with depression. The Minimum Data Set 2.0 (MDS 2.0) assessment system provides a measurement scale for depression, the Depression Rating Scale (DRS), in addition to other items that may represent depressive phenomenology.

Objective the ability of the DRS to predict the presence of new depression diagnoses at follow-up, among hospitalised older adults admitted without depression, is examined.

Methods the study sample consists of all persons aged 65 years or more admitted between 1996 and 2003 to a complex continuing care (CCC) bed in Ontario without a recorded depression diagnosis. The sample was restricted to those who remained in hospital for about 3 months ($n = 7,818$) in order to obtain follow-up assessment information. Logistic regression was used to explore the relationship between admission characteristics (i.e. DRS scale items, other MDS 2.0 items related to DSM-IV criteria for depression) and receipt of a depression diagnosis on the follow-up assessment.

Results a new depression diagnosis at follow-up was present in 7.5% of the individuals. The multivariate model predicting depression diagnosis included only the DRS scale, sadness over past roles, and withdrawal from activities.

Conclusions the DRS score at admission was predictive of receiving a depression diagnosis on a follow-up assessment among older adults admitted to the CCC. Further, the predictive ability of the DRS is only modestly improved by the addition of other items related to DSM-IV criteria.

Keywords: depression, geriatric assessment, interRAI, DSM-IV, elderly

Background

Depression has been identified as the leading cause of disability in developed nations [1], and it affects as many as 2 to 5% older adults [2]. However, prevalence estimates differ by residential setting, ranging from 10 to 15% in community settings [3] and over 20% in nursing homes [4, 5]. Under-detection of depression is an important problem resulting from a variety of possible causes at the patient-level (e.g. communication and cognitive impairment), physician-level (e.g. focus on medical conditions, normalisation of depression in later life), and system-level (e.g. availability of mental health professionals in non-psychiatric hospitals).

Depression is even more common among older adults with physical illness [6], with prevalence rates as high as 50% reported in hospital settings [7]. Comorbid medical conditions further complicate the detection of depression in this population [8] due to the misattribution of symptoms to a physical problem rather than a depressive disorder. In addition to the obvious implications for quality of life, depression has been linked to medical burden [9], morbidity [10], mortality [11, 12], length of stay in hospital [13], physician visits, hospitalisation, and nursing home placement [14]. Although early detection and treatment of depression in this population is vital, current approaches to care too often leave depression undiagnosed.

The definition of depression itself poses a problem that contributes to under-detection in older adults. The DSM-IV provides a standard set of criteria upon which a formal diagnosis of major depression is based. Older adults may be less likely to satisfy the formal criteria for DSM-IV major depression because, even with similar levels of underlying depressive syndrome severity, they are less likely to endorse one of the DSM-IV required symptoms—depressed mood [15]. The notion of ‘depression without sadness’ refers to the tendency of older adults to show anhedonic and somatic rather than dysphoric symptoms [16]. The differential presentation of depressive symptomology by older adults and the tendency of care providers to under-detect and under-treat depression in older adults points to the need for systematic screening in long-term care and hospital settings.

Measurement of depression

Among the instruments developed to screen for depression, the Hamilton Rating Scale for Depression (HAM-D) is the most widely used [17, 18]. However, it is not routinely used with all older adults in all care settings.

In many jurisdictions the use of the Resident Assessment Instrument or Minimum Data Set (MDS) represents an important opportunity to conduct census level screening on persons in long-term care and hospital settings [19]. Large-scale implementation of the MDS as the standard assessment approach in these settings has occurred in many countries, including the United States, Canada, Iceland, Finland and Italy. Several clinical scales are embedded within the MDS, including a measure of depression (Depression Rating Scale, or the DRS). The developers of this scale found it to be highly correlated to the HAM-D ($r = 0.70$), where a cut-off score of 3 or more maximised sensitivity (94%) with minimal loss of specificity (72%) in a sample of nursing home residents [20]. They also found sensitivity of 91% and specificity of 69% for the DRS when tested against psychiatrists’ diagnoses of depression. Kohler and colleagues [21] found that the DRS and the Geriatric Depression Scale (GDS) are weakly correlated with each other, because they measure depression in different ways. However, both were associated with the presence of a depression diagnosis and, unlike the GDS, the DRS was unaffected by item non-response. In addition, research on a general adult sample provided evidence of the validity of the DRS in psychiatric hospital settings [22]. Nonetheless, some researchers have argued that further work is required to improve the sensitivity of the DRS for identifying older adults with depression [23].

Objectives

The focus of the current study is on new admissions to complex continuing care (CCC) hospitals where no prior depression diagnosis has been made. The specific objectives are: (i) to examine the ability of the DRS to predict the presence of new depression diagnoses 3 months post

admission; and (ii) to determine whether the sensitivity of the DRS in predicting future depression diagnoses could be enhanced with the use of other MDS 2.0 items.

Methodology

Participants

In 1996, the Ministry of Health and Long-Term Care in Ontario, Canada mandated the use of the MDS in all beds of freestanding CCC hospitals or CCC units of acute hospitals.

MDS assessments are completed for all patients admitted to all designated CCC beds for 14 days or longer, and the data are submitted on a quarterly basis to the Canadian Institute for Health Information (CIHI). CIHI’s Continuing Care Reporting System (CCRS)—www.cihi.ca/ccrs is a national data warehouse supporting the implementation of the MDS in eight provinces/territories. Given that it was the first province to mandate the use of the instrument in Canada, Ontario’s CCC population represents the largest sub-group in the CCRS dataset. Reassessment typically occurs every quarter for as long as the patient remains in hospital, so that patients may have multiple assessments.

This study examines factors associated with the transition to a new diagnosis of depression among CCC patients who did not have a diagnosis of depression at admission. The analyses excluded admissions: (i) under 65 years of age (12,255 cases); (ii) with an existing depression diagnosis (11,048 additional cases); (iii) already taking anti-depressant medication (9,107 additional cases); (iv) with very severe cognitive impairment (6,858 additional cases); (v) with no follow-up assessment, usually due to discharge before 90 days (38,608 additional cases); and (vi) with reassessments less than 14 days or more than 120 days later (755 additional cases). A final sample of 7,818 patients fit all of the study criteria.

Measures

Depression diagnosis

As part of the MDS assessment, assessors record the presence of a known diagnosis of depression (e.g. documented in patient record, communication from other clinicians); however, they do not differentiate between major depression, minor depression or dysthymia. Previous research has shown that facility MDS assessors record the presence of a depression diagnosis with good reliability ($\kappa = 0.65$) [24], a level of precision that compares favourably with estimates for other tools used in psychiatric epidemiology [25].

Depression rating scale (DRS)

The DRS is an observer-rated scale that assesses depressive symptoms based on the presence of mood disturbance indicators available in the MDS 2.0. Ignoring the context or assumed cause, each indicator is coded from 0 to 2, based on its observed frequency (not in the last 30 days, up to 5 days per week, and on 6 or 7 days per week, respectively).

Burrows and colleagues [20] conducted a series of analyses to identify which MDS items were most powerfully correlated with both the Hamilton Depression Rating Scale (HADS) and the Cornell Scale for Depression in Dementia. Factor analysis was conducted using those indicators, and five distinct concepts emerged (disturbed mood, anxiety, fear, loss of meaning and affect). Each of the factors was then modelled individually to find the ideal combination of items to predict HADS and Cornell scale scores. The resulting DRS is a seven-item summated scale where scores range between 0 and 14. A cut-off score of 3 best identifies persons experiencing at least mild depression [20]. Acceptable levels of internal consistency have been reported in samples of nursing home residents (Cronbach's $\alpha = 0.69\text{--}0.85$) [20, 21] and inpatient mental health patients (Cronbach's $\alpha = 0.77$) [22].

DSM-IV related items

The MDS 2.0 does not have items to address all DSM-IV related criteria for depression. However, several items are available to measure anhedonia, change in weight and appetite, sleep problems, psychomotor activity and concentration.

Results

Sample characteristics

Table 1 shows selected characteristics of the study sample at admission. The average age of patients was about 81 years, with most of them being admitted from an acute care hospital, the slight majority was female, and about half were widowed. Common health conditions included hypertension (28.4%), CVA (27.4%), dementia (26.6%), diabetes (22.3%), arthritis (21.6%) and cancer (20.2%).

The reliability of the DRS was consistent with previous reports, with a Cronbach's α value of 0.74. In this subgroup of persons with no existing diagnosis of depression, 47.4% had a DRS score of 1 or more and 20.8% reached the conventional threshold of 3 or more.

Table 2 shows the baseline prevalence for items in the DRS, the range of DRS scores, as well as for other items related to DSM-IV criteria for depression. Though fewer patients had experienced weight gain (2.8%), made self-deprecating remarks (5.8%) or negative statements (7.7%), or showed signs of unrealistic fears (9.5%), the remaining depressive symptoms were exhibited by more than 10% of patients. Many had exhibited impairment in decision-making (74.4%), been easily distracted (35.2%) or restless (32.0%), exhibited sad, pained or worried facial expressions (32.0%), and expressed sadness over past roles (30.1%).

At follow-up, a new diagnosis depression was recorded for 7.5% of the study sample ($n = 584$). Table 2 shows that, controlling for age and sex, all seven DRS items were significantly associated with increased odds of having a new depression diagnosis at follow-up (OR = 1.25–1.60) for each point increase in the two-point response set. For

Table 1. Patient characteristics

	Study sample ($n = 7,818$)
Age (years): mean (SD)	81.0 (7.5)
Days between admission and follow-up assessment: mean (SD)	87.3 (12.2)
Female (%)	54.5
Marital status:	
Never married (%)	8.5
Married (%)	36.6
Widowed (%)	46.2
Admitted from:	
Acute care (%)	80.5
Private home (%)	8.5
Medical diagnoses:	
Hypertension (%)	28.4
CVA (%)	27.4
Dementia (Alzheimer's and other) (%)	26.6
Diabetes (%)	22.3
Arthritis (%)	21.6
Cancer (%)	20.2
Emphysema/COPD (%)	16.8
Congestive heart failure (%)	16.0
Arteriosclerotic heart disease (%)	14.3
Hip fracture (%)	12.5
Hemiplegia/hemiparesis (%)	12.2
Ontario hospital association regions	
Region 1–North (%)	14.8
Region 2–East (%)	11.4
Region 3–Greater Toronto Area (%)	30.5
Region 4–Central West (%)	30.2
Region 5–South West (%)	13.1

example, compared with patients who had no repetitive health complaints or concerns at baseline, the odds of a new depression diagnosis at follow-up was 1.60 and 2.56 (i.e. 1.60^2) times greater for those manifesting with these complaints on a lesser than daily basis or a daily basis in the last week, respectively. For each single point increment in its fourteen point range, the full DRS was associated with a 1.14 increase in the odds of having a new depression diagnosis at follow-up, (e.g. those with baseline scores of 3 and 6 on the DRS have ORs of 1.48 and 2.19, respectively). The κ statistic for the model containing the DRS algorithm was 0.60.

In order to evaluate their predictive ability above and beyond that of the DRS, analyses were also done for additional MDS 2.0 items related to DSM-IV diagnostic criteria and the transition to a new depression diagnosis after adjusting with age, sex and DRS. Only sadness over past roles (OR = 1.70), reduced social interaction (OR = 1.18), poor appetite (OR = 1.29) and withdrawal from activities (OR = 1.25) were significant at the 0.05 level.

A full model was developed that considered all significant covariates in the bivariate regression models (Table 3). In this case, the DRS collapsed on four groups with values of: (i) zero indicating the presence of no symptoms as the reference group; (ii) 1–2 representing a group manifesting some mood indicators but not at the threshold level advocated by the

Table 2. Prevalence and individual ORs predicting new depression diagnosis at follow-up

Bivariate models	Study sample (<i>n</i> = 7,818)	
	Prevalence (%)	OR (95% CI) ^a
DRS items:		
Sad, pained, worried facial expression	32.0	1.43 (1.28, 1.60)
Persistent anger with self or others	18.6	1.25 (1.09, 1.43)
Repetitive anxious complaints or concerns	15.6	1.45 (1.27, 1.65)
Repetitive health complaints or concerns	12.5	1.60 (1.40, 1.83)
Crying, tearfulness	10.8	1.52 (1.28, 1.81)
Unrealistic fears	9.5	1.57 (1.34, 1.85)
Negative statements	7.7%	1.49 (1.23, 1.83)
DRS total score (0–14) ^b	—	1.14 (1.11, 1.18)
Other MDS items related to DSM-IV depression criteria:		
Impaired cognitive skills for daily decision-making	74.4	n.s.
Easily distracted	35.2	n.s.
Restlessness	32.0	n.s.
Sadness over past roles	30.1	1.70 (1.41, 2.05)
Reduced social interaction	27.1	1.18 (1.04, 1.33)
Poor appetite (leaves 25% + of food uneaten)	25.3	1.29 (1.07, 1.55)
Withdrawal from activities of interest	20.6	1.25 (1.10, 1.41)
Repetitive physical movements	18.9	n.s.
Insomnia	18.2	n.s.
Weight loss	16.3	n.s.
Unpleasant mood in the morning	10.3	n.s.
Self-deprecation	5.8	n.s.
Weight gain	2.8	n.s.

^a Bivariate models for the DRS items and total score adjust for age and sex; models for the MDS 2.0 items related to DSM-IV criteria also adjust for the DRS total score.

^b The Cronbach's alpha value for the DRS scale reliability was 0.74.

scale developers [22]; (iii) 3–5 reaching the conventional DRS cut-point for depression; and (iv) six or more, in which preliminary research in mental health settings has been found as a useful cut-point for more severe depression. All three DRS subgroups had significantly higher odds of a subsequent new diagnosis of depression compared with the asymptomatic reference group. The patients with a DRS of 1–2 have historically not been considered as requiring attention for depression; however, these results indicate that they are significantly more likely to be diagnosed with depression at follow-up than the reference group. It was also notable that there was no additional gain in predictive power when the higher DRS threshold of 6+ was used as a cut-point. While controlling for the DRS, patients who expressed sadness over lost roles or who withdrew from activities at baseline had associated ORs of 1.41 and 1.24, respectively.

Table 3. Multivariate model predicting a new depression diagnosis at follow-up

Variables (and possible scores)	OR (95% CI)
Age (reference = 65–74)	
75–84	0.96 (0.77, 1.20)
85+	0.89 (0.70, 1.15)
Sex (female)	0.95 (0.79, 1.14)
OHA Region (reference = North)	
East	1.56 (1.10, 2.20)
Greater Toronto Area	1.30 (0.97, 1.74)
Central West	1.15 (0.85, 1.55)
South West	0.97 (0.67, 1.40)
Depression Rating Scale score	
0 (reference group)	
1–2	1.45 (1.16–1.80)
3–5	2.08 (1.63–2.67)
6+	2.07 (1.47–2.92)
Sadness over lost roles (0–1)	1.41 (1.17, 1.69)
Withdrawal from activities (0–2)	1.24 (1.08, 1.42)

The *c* statistic for the full model was 0.62, slightly higher than what was reported for the DRS alone.

Discussion

Both the DRS scale and its individual items were significant predictors of the presence of a new depression diagnosis at follow-up among older adults in CCC hospitals. However, two additional MDS 2.0 items that are related to DSM-IV criteria (i.e. sadness over past roles and anhedonia) were significant predictors of that transition after adjusting the DRS. The contribution of these items was not unexpected [26].

The present findings have some important implications for clinical practice and future research. First, the results confirm that there is a substantial subpopulation of older adults who enter CCC with undetected depression. Second, the DRS is a useful tool during admission time which can assist in identifying persons who, at follow-up, would be considered to have an active diagnosis present. For these individuals, the care plan should include specific actions to clarify the nature of and respond to any underlying mood problems affecting the individual. That said, not all persons who had a new diagnosis present at follow-up were detected by the DRS, and there is evidence that a lower threshold score should be used for preliminary screening purposes. While this would improve the sensitivity of the DRS, it would also reduce its specificity. Third, at least two additional MDS items appear to have value in identifying persons with previously undetected depression—sadness over lost roles and withdrawal from activities. These items should be explored further as potential candidates for use in an expanded version of the DRS.

Although the reported ORs of 2.00 or more for values above the conventional cut-off for the DRS are not insubstantial, it is worth noting that the results of

this research are probably attenuated by continued under-diagnosis at follow-up. Had the study design be based on prediction of gold-standard detailed diagnostic evaluations aimed specifically at seeking out depression, the associations reported here would likely have been stronger. Rather, the present research models a normal clinical practice over time, and normal clinical practice has not been particularly effective in identifying depression.

This study has some notable limitations. While a variety of DSM-IV symptoms were available within the MDS instrument, some were not (i.e. hypersomnia, psychomotor retardation, fatigue, loss of energy, indecisiveness, suicidal ideation, recurrent thoughts of death or suicide attempt). The availability of some or all of these measures might alter the performance of the DRS and additional DSM-related covariates in the prediction of depression diagnosis. However, some of these criteria, for example suicide attempt, are very rare in institutionalised/hospitalised seniors.

The study design also creates certain inherent limitations. First, the expected follow-up assessment interval of 3 months limits the intervention period in which suspected diagnoses can be identified by nurses or physicians, and may result in under-diagnosis of depression in the study population. Second, the sequence of symptom presentation, intervention, medication and diagnosis is unclear over the 3-months assessment interval. For example, a patient may exhibit symptoms in the 14-day admission period, receive effective treatment, and subsequently have no requirement for further mental health evaluation. As a result the person would be identified as having neither symptoms nor diagnosis at follow-up. On the other hand, a patient exhibiting no symptoms in the 14-day admission period, but developing them subsequent to the MDS assessment, may have a diagnosis at follow-up. Because of the study's design, the latter case cannot contribute to the predictive model. Given enough follow-up assessments, it might be possible to identify whether there is an 'admission effect' or whether symptoms persist throughout longer stays. However, in this study population, episodes yielding three or more reassessments are rare [27].

It would also be useful to replicate this research in other care settings and with other populations. For example, the province of Ontario has also mandated compatible assessment instruments that include the DRS for all long-stay home care clients and for all adults in inpatient psychiatry [28]. It would also be useful to employ longitudinal data with multiple waves of follow-up over multiple years to examine the incidence, sequencing and etiology of physical and mental illness and their relationship to diagnostic decision-making. Such research would provide further insights to the applicability of the DRS in different clinical environments and with different populations.

Conclusions

The DRS is a useful screener for potentially undetected depression that can be used to inform care planning in

any long-term care or hospital setting that uses the MDS routinely. The present results suggest that persons with a DRS of 1–2 also warrant further review for potential depression. Two items related to anhedonia improved the predictive ability of the DRS, suggesting that there would be value in updating the DRS.

Key points

- Depression is an important quality of life problem that may be under-diagnosed among the frail elderly.
- The DRS can be obtained from the MDS 2.0, a comprehensive assessment instrument that is used widely in nursing homes and continuing care settings.
- The DRS is predictive of future depression diagnoses among CCC patients who did not have a depression diagnosis at admission.

Conflicts of interest

No financial competing interests. JPH, BEF and TR are fellows of interRAI, a non-profit group dedicated to improving the health care for persons who are elderly, frail or disabled. interRAI owns the copyright to the MDS for nursing homes and many other care settings. For more information please visit <http://www.interrai.org>.

Funding

Financial support for this work is drawn in part from Canada's Primary Health Care Transition Fund and is gratefully acknowledged. JPH's participation was supported by an Investigator Award from the Canadian Institutes for Health Research.

Ethics clearance

Access to these dataset was provided through a data-sharing agreement between the Canadian Institute of Health Information (CIHI) and interRAI. Ethics approval for secondary analyses of these anonymised data was provided by the University of Waterloo, Office of Research.

References

1. Murray CJ, Lopez AD. Global mortality, disability, and the contribution of risk factors: Global burden of disease study. *Lancet* 1997; 349: 1436–42.
2. Mottram P, Wilson K, Strobl J. Antidepressants for depressed elderly. *Cochrane Database Syst Rev* 2006; Art. No.: CD003491, DOI: 10.1002/14651858.CD003491.pub2.
3. Alexopoulos GS, Buckwalter K, Olin J *et al.* Comorbidity of late life depression: an opportunity for research on mechanisms and treatment. *Biol Psychiatry* 2002; 52: 543–58.
4. Alexopoulos GS, Vrontu C, Kakuma T *et al.* Disability in geriatric depression. *Am J Psychiatry* 1996; 153: 877–85.

5. Duff S. Comorbid Depression and Anxiety in Canadian Nursing Homes. Waterloo, ON: University of Waterloo, 2003.
6. Murphy E. Social origins of depression in old age. *Br J Psychiatry* 1982; 141: 135–42.
7. Koenig HG. Differences in psychosocial and health correlates of major and minor depression in medically ill older adults. *J Am Geriatr Soc* 1997; 45: 1487–95.
8. Hooyman NR, Kiyak HA. *Social Gerontology: A Multidisciplinary Perspective*. Needham Heights, MA: Allyn and Bacon, 1999.
9. Luber MP, Meyers BS, Williams-Russo PG *et al.* Depression and service utilization in elderly primary care patients. *Am J Geriatr Psychiatry* 2001; 9: 169–76.
10. Meeks S, Murrell SA, Mehl RC. Longitudinal relationships between depressive symptoms and health in normal older and middle-aged adults. *Psychol Aging* 2000; 15: 100–9.
11. Bula CJ, Wietlisbach V, Burnand B *et al.* Depressive symptoms as a predictor of 6-month outcomes and service utilization in elderly medical inpatients. *Arch Intern Med* 2001; 161: 2609–15.
12. Covinsky KE, Kahana E, Chin MH *et al.* Depressive symptoms and 3-year mortality in older hospitalized medical patients. *Ann Intern Med* 1999; 130: 563–9.
13. Verbosky LA, Franco KN, Zrull JP. The relationship between depression and length of stay in the general hospital patient. *J Clin Psychiatry* 1993; 54: 177–81.
14. Koenig HG, Kuchibhatla M. Use of health services by hospitalized medically ill depressed elderly patients. *Am J Psychiatry* 1998; 155: 871–7.
15. Gallo JJ, Rabins PV. Depression without sadness: alternative presentations of depression in late life. *Am Family Physician* 1999; 60: 820–6.
16. Gallo JJ, Rabins PV, Lyketsos CG *et al.* Depression without sadness: functional outcomes of nondysphoric depression in later life. *J Am Geriatr Soc* 1997; 45: 570–8.
17. Kapfhammer HP. Somatic symptoms in depression. *Dialogues Clin Neurosci* 2006; 8: 227–39.
18. Sajatovic M, Ramirez LF. *Rating Scales in Mental Health*, 2nd edition. Cleveland, OH: Lexi-Comp Inc., 2003.
19. Hawes C, Morris JN, Phillips CD *et al.* Development of the nursing home resident assessment instrument in the USA. *Age Ageing* 1997; 26: 19–25.
20. Burrows AB, Morris JN, Simon SE *et al.* Development of a minimum data set-based depression rating scale for use in nursing homes. *Age Ageing* 2000; 29: 165–72.
21. Koehler M, Rabinowitz T, Hirdes J *et al.* Measuring depression in nursing home residents with the MDS and GDS: an observational psychometric study. *BioMed Central Geriatr* 2005; 5: 1.
22. Hirdes JP, Smith TF, Rabinowitz T *et al.* The Resident Assessment Instrument-Mental Health (RAI-MH): Inter-rater reliability and convergent validity. *J Behav Health Serv Res* 2002; 13: 419–32.
23. Anderson RL, Buckwalter KC, Buchanan RJ *et al.* Validity and reliability of the Minimum Data Set Depression Rating Scale (MDSDRS) for older adults in nursing homes. *Age Ageing* 2003; 32: 435–8.
24. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics* 1977; 33: 159–74.
25. Eaton WW, Neufeld K, Chen LS *et al.* A comparison of self-report and clinical diagnostic interviews for depression diagnosis interview schedule and schedules for clinical assessment in neuropsychiatry in the Baltimore epidemiologic catchment area follow-up. *Arch Gen Psychiatry* 2000; 57: 217–22.
26. Reker GT. Personal meaning, optimism, and choice: existential predictors of depression in community and institutional elderly. *Gerontologist* 1997; 37: 709–16.
27. Hospital Report Research Collaborative. *Hospital Report, 2001 Complex Continuing Care*. <http://www.hospitalreport.ca/pdf/FINALCCCRptDec202001.pdf> 2001.
28. Hirdes JP. Addressing the health needs of frail elderly people: Ontario's experience with an integrated health information system. *Age Ageing* 2006; 35: 329–31.

Received 7 November 2006; accepted in revised form 19 June 2007