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Demented versus non-demented very old inpatients: the same comorbidities but poorer functional and nutritional status

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Abstract

Background demented patients have been reported to be healthier than other old people of the same age.
Objectives to assess comorbid conditions, functional and nutritional status in medically ill hospitalised patients with normal cognition or affected by dementia of various causes and severities, or mild cognitive impairment (MCI).
Design and Setting a prospective study was carried out, between January and December 2004, in the Rehabilitation and Geriatric Hospital (HOGER).
Methods activities of daily living (ADL), instrumental activities of daily living (IADL) and mini nutritional assessment (MNA) scores were assessed as a function of the status of the patient two weeks before admission to hospital. On admission, cognitive status was assessed by a systematic battery of neuropsychological tests, comorbid conditions were assessed with the Charlson comorbidity index (CCI), and body mass index (BMI) and functional independence measure (FIM) were determined. BMI and FIM were also determined on discharge.
Results we studied 349 patients (mean age 85.2 ± 6.7; 76% women): 161 (46.1%) cognitively normal, 37 (10.6%) with MCI and 151 (43.3%) demented (61 Alzheimer's disease (AD), 62 mixed dementia (MD) and 17 vascular dementia (VaD)). ADL, IADL, FIM and MNA scores on admission decreased with cognitive status, regardless of the type of dementia. Functionality at discharge remained significantly lower in demented patients than in other patients. CCI was high and similar in all three groups (mean 4.6 ± 2.7). Patients with VaD had poorer health than other demented patients, with a higher average comorbidity score, more frequent hypertension, stroke and hyperlipidaemia. Comorbidity did not increase with severity levels of dementia.
Conclusions in this cohort of very old inpatients, demented patients, non-demented patients and patients with MCI had similar levels of comorbidity, but demented patients had a poorer functional and nutritional status.

Keywords: *comorbidity, dementia, Alzheimer's disease, aged, elderly*

Introduction

Demented patients have been reported to be healthier than other old people [1–5]. Comparisons of the various subtypes of dementia have shown that patients with Alzheimer's disease (AD) are the healthiest [2, 4, 6]. However, these findings could be a consequence of inaccurate symptom reporting, delaying diagnosis, or may reflect a failure on the part of screening strategies to investigate thoroughly and to diagnose disease in these patients [1, 7]. This would suggest that demented patients may present more medical illnesses than generally thought, but that these diseases remain undetected [5, 8]. A few series of autopsies have confirmed this hypothesis, showing that demented patients often have a number of comorbid conditions that are frequently underestimated by clinicians [9, 10]. The studies investigating these issues were carried out retrospectively [1–3, 5, 6, 11]; cognitive assessment was based only on the Mini Mental State Examination (MMSE) [1, 2, 8, 12] and/or populations of community-dwelling subjects at least 10 years younger than patients from geriatric wards [7, 8, 11]. We carried out a prospective study in the Geriatric Hospital (HOGER), including the systematic assessment of comorbid conditions and cognitive, functional and nutritional status. We compared these correlates in cognitively normal and demented patients.

Methods

Study population

A prospective study was carried out in the Geriatric Hospital (HOGER) of the Geneva University. Patients were recruited by clinically trained staff. The sampling frame consisted of consecutive admissions of patients over 75 years of age, on selected days during 2004. A random sample of patients was selected each day, using a computer-generated randomisation table. The exclusion criteria were disorders interfering with psychometric assessment, terminal illness and residence outside the canton of Geneva. The local ethics committees approved the study protocol, and signed written informed consent was obtained from all patients or their families or legal representatives. We checked that the study sample was representative of the hospital population as a whole, by comparing demographic data for the included sample with data for all admitted patients, and for those who refused to participate. We checked for selection bias based on cognitive screening for patients who refused to participate.

The study protocol included a planned 4-year follow-up period, with an annual visit carried out by the same geriatrician and nurse team.

Measures

Socio-demographic data and pre-morbid functional status.

The data recorded included age, sex, native language, education level, marital status, living conditions, alcohol and nicotine consumption. Basic and instrumental activities of daily living (IADL/ADL) [13, 14] were determined by the same nursing team on the admission day of the patient (please see Appendix 1 in the supplementary data on the journal website (http://www.ageing.oupjournals.org/)). The information regarding the previous 2 weeks was supplied by the patient when he was capable of answering and by an informal and/or formal caregiver.

Cognitive assessment

The same neuropsychologist assessed all subjects at least one week after patient inclusion. The following neuropsychological battery was applied: the MMSE [12] and the short cognitive evaluation [15, 16] (Appendix 2). The short version of the geriatric scale was used to screen for depression [17]. Based on this screening, a comprehensive standardised neuropsychological battery used in our routine clinical practice was carried out by the same neuropsychologist, with formal clinical criteria used to determine the aetiology and severity of clinical dementia (Appendix 3). Cerebral imaging was also carried out. Thereafter, patients were assigned to three groups: (i) cognitively normal, (ii) patients with mild cognitive impairment (MCI) [18] and (iii) patients with various types of dementia.

Comorbidity

The Charlson Comorbidity Index (CCI) was determined by extensive review of the patient's medical records for diagnoses established at/or before enrolment in this study [19], higher scores indicating greater comorbidity. The various classes of medication taken before admission were also listed.

Functionality

The functional independence measure (FIM) scores range from 18 (completely dependent) to 126 (completely independent) (Appendix 4) [20]. The FIM was determined in the first three days after admission and at discharge.

Nutritional assessment

Body mass index (BMI) was estimated (kg/m^2) on admission and at discharge. The short version of the mini nutritional assessment (MNA) (MNA-15, score ranging from 0 to 14, $\geq 12 =$ normal) was evaluated on admission of the patient [21]. The reference period for the MNA was 2 weeks before admission.

Statistical methods

We checked the normality of the data distribution with skewness and kurtosis tests, and carried out standard transformations to normalise non-Gaussian variables. Data for continuous variables are presented as means ± 1 standard deviation (SD).

Mann–Whitney U tests were used to compare data between groups: the studied sample versus all hospitalised patients, or the studied sample versus patients who refused to participate.

Analysis of variance (ANOVA) or Kruskal–Wallis tests were performed to compare data between the following groups: (i) the studied sample, patients refusing to participate and patients excluded from the study; (ii) cognitively normal patients, patients with MCI and demented patients; (iii) patients affected with dementia of various aetiologies. Statistical analyses were performed with Stata version 9.2.1 [22].

Results

Of the 459 patients randomised, 49 were not eligible (10.7%): 20 had major behavioural problems (psychotic, suicidal), nine were unable to communicate, eight were terminally ill, seven lived outside the canton of Geneva, and no family or legal representative could be contacted for five patients. Of the 410 patients who met the eligibility criteria, 61 (14.9%) refused to participate (the patient in 58 cases and the family in 3 cases). Our analysis was therefore based on a cohort of 349 patients.

No differences in demographic characteristics were found between the study sample and the entire population of patients admitted to the HOGER during 2004, or between the study sample and excluded patients or patients who

refused to participate (Table 1). Functionality scores were similar in the study cohort and in the patients who refused to participate. The functionality scores of both these groups were slightly higher than those for the entire population of patients admitted to the hospital, but were significantly lower for the excluded group.

In total, 151 of the 349 patients (43.3%) were diagnosed as demented and 37 (10.6%) were found to have MCI. Table 2 summarises the demographic and pre-admission characteristics of the patients, and assessment data on admission and discharge as a function of cognitive status. The groups compared were similar in age, sex, education level, smoking habits and alcohol intake. However, they differed in terms of living conditions, with non-demented patients more likely to live alone, and demented patients more likely to live in a nursing home ($P = 0.005$). Pre-morbid ADL and IADL scores, and FIM and MNA scores on admission decreased with cognitive status. At discharge, functionality scores remained lower for demented patients than for the other two groups. A similar trend was observed for BMI, which was lower at admission in demented patients, although this trend was not statistically significant at discharge. Patients with MCI had better scores than demented patients but worse scores than non-demented patients, except for FIM at discharge, which was highest for the MCI group. The number of different classes of medication taken was significantly higher in demented patients than in the other two groups, with non-demented and MCI patients taking similar numbers of drugs. CCI was similar in all three groups, with demented patients having levels of comorbidity similar to those for the non-demented and MCI groups. The CCI assesses several different diseases. For these diseases, demented patients were found to be significantly more likely than the patients in the other two groups to suffer from cerebrovascular disease and stroke. For diseases not assessed in the CCI, hypertension was found to be more prevalent in non-demented than in demented patients.

We determined the type of dementia for the 151 patients diagnosed as demented: 61 were classified as having AD, 17 as having vascular dementia (VaD), 62 as having mixed dementia (MD), and 11 as having other types of dementia (3 cases of dementia with Lewy bodies, two of Parkinson's disease with dementia, one case of Creutzfeld–Jacob disease, one case of cortico-basal dementia, one of fronto-temporal dementia, one of hydrocephaly with normal pressure, one case of glioblastoma and one case of cerebral metastasis). The 'other types of dementia' group was excluded from the analysis due to its heterogeneity and small size.

For most of the factors considered, no significant differences were found between patients with the various types of dementia (Table 3). Patients in the VaD group tended to be younger and to be taking larger numbers of different classes of medication. They were more likely to be male ($P = 0.002$) and had the highest average Charlson comorbidity score ($P = <0.0001$). The prevalence of hypertension, peripheral vascular disease, stroke, cerebrovascular disease and hyperlipidaemia ($P = 0.033$; 0.043; <0.0001; <0.0001; <0.0001, respectively) were higher in this group of patients, in which BMI was also higher on admission ($P = 0.026$). The prevalence of comorbid medical conditions did not differ significantly ($P = 0.173$) between patients with mild (mean 4.37 ± 2.4), moderate (mean 5.3 ± 3.0) and severe (mean 4.55 ± 2.1) dementia.

Discussion

This series of elderly inpatients (mean age of 85 years) was found to be representative of the overall population hospitalised in a geriatric ward. The prevalence of dementia (44%) was very high. The reported prevalence of dementia in elderly inpatients (geriatric acute wards) varies between 20 and 30%. A previous study in the same hospital 6 years ago reported a prevalence of 30%. This difference is statistically significant ($P = 0.000$) [24]. These findings probably reflect the systematic and complete assessment of cognitive impairment in the random sample used to determine dementia prevalence. The rate of refusal to participate in this study was very low (15%). The homogeneity

Table 1. Demographic data and clinical features of the patients included in this study, excluded patients and patients who refused to participate in the study. Demographic data and functionality scores for the included patients and for all patients admitted to the HOGER during 2004

	Study cohort	Excluded	Refused	All patients admitted	*P*-value[c]	*P*-value[b]
Number of patients	349	49	61	1,473		
Age[a]						
Total	85.2 ± 6.7	84.0 ± 8.7	85.5 ± 7.2	84.5 ± 7.1	0.075	0.413
Female	85.6 ± 6.4	85.6 ± 8.1	86.6 ± 5.7	85.0 ± 7.1	0.206	0.648
Male	84.1 ± 7.6	80.4 ± 5.1	82.5 ± 6.6	83.2 ± 7.1	0.265	0.276
Female[b]	265 (76)	34 (69)	44 (72)	1,071 (72)	0.221	0.542
Length of stay [days][a]	48.8(31) ± 53.1(38)	65.6 (41) ±74.4 (62)	40.1 (27) ±38.5 (39)	40.6 ± 39.4	0.482	0.152
FIM[a]	86.0(88) ± 26.1(41)	65.7 (64) ±26.3 (37)	86.1 (91) ±27.1 (42)	82.2 ± 27.6	0.006	0.000

[a] Data are expressed as means ± SD (median–IQR), [b] number of cases (%).

[b] *P*-value for Mann–Whitney U test comparing two groups (study cohort versus all patients admitted).

[c] *P*-value for Kruskal–Wallis test comparing three groups (study cohort versus excluded and refused patients).

FIM, Functional independence measure at admission.

Table 2. Socio-demographic data, clinical features, hospitalisation correlates and outcomes as a function of cognitive impairment diagnosis

Characteristics	Demented $n = 151$		MCI $n = 37$		Non-demented $n = 161$		p-value[c]
Demographics and pre-admission characteristics							
Age[a]	85.60	6.47	85.90	6.42	84.80	7.03	0.498
Female[b]	111	73.5%	33	89.2%	121	75.2%	0.129
Education (years)[b]							
Level 1	86	57.0%	24	66.7%	101	63.1%	0.568
Level 2	51	33.8%	8	22.2%	48	30.0%	
Level 3	14	9.3%	4	11.1%	11	6.9%	
Living conditions[b]							
Alone	74	49.7%	19	52.8%	104	65.0%	0.005
With family	12	8.1%	4	11.1%	10	6.3%	
With spouse	39	26.2%	7	19.4%	35	21.9%	
Nursing home	16	10.7%	1	2.8%	2	1.3%	
In protected housing	8	5.4%	5	13.9%	9	5.6%	
Cigarette smoking[b]	43	28.5%	15	40.5%	52	32.3%	0.352
Cigarette smoking[a] [packs/year]	18.37	21.97	16.65	25.69	18.97	25.35	0.977
Alcohol intake[b]	64	42.4%	12	32.4%	77	47.8%	0.210
Alcohol intake[a] [glasses/day]	1.23	1.12	1.38	1.54	1.78	2.75	0.950
Functional status[a]							
Pre-morbid ADL	4.43	1.34	5.06	1.12	5.23	0.90	<0.0001
Pre-morbid IADL	3.27	2.23	4.83	1.90	5.30	2.00	<0.0001
Number of different classes of medication[a]	2.58	1.30	2.19	1.02	2.20	1.15	0.009
Comorbid conditions							
CCI[a]	4.87	2.56	3.97	2.70	4.50	2.79	0.154
Diseases assessed in the CCI							
Ischaemic cardiopathy[b]	41	27.2%	13	35.1%	50	31.1%	0.568
Heart failure[b]	80	53.0%	24	64.9%	86	53.4%	0.403
Peripheral vascular disease[b]	53	35.1%	9	24.3%	67	41.6%	0.119
Cerebrovascular disease[b]	73	48.3%	7	18.9%	39	24.2%	0.000
Chronic pulmonary disease[b]	25	16.6%	8	21.6%	36	22.4%	0.418
Connective tissue disease[b]	15	9.9%	4	10.8%	21	13.0%	0.684
Ulcer disease[b]	23	15.2%	9	24.3%	35	21.7%	0.243
Diabetes mellitus[b]	29	19.2%	6	16.2%	35	21.7%	0.707
Chronic renal failure[b]	48	31.8%	10	27.0%	59	36.7%	0.447
Diabetes (end organ damage)[b]	6	4.0%	3	8.1%	10	6.2%	0.515
Any tumour[b]	44	29.1%	13	35.1%	53	32.9%	0.682
Cirrhosis[b]	5	3.3%	1	2.7%	6	3.7%	0.947
Other diseases not assessed in the CCI							
Hypertension[b]	101	66.9%	19	51.4%	117	72.7%	0.041
Atrial fibrillation[b]	40	26.5%	10	27.0%	37	23.0%	0.737
Stroke	33	21.9%	4	10.8%	20	12.4%	0.050
Hypercholesterolaemia[b]	24	15.9%	6	16.2%	26	16.2%	0.998
Assessment at admission							
FIM[a]	77.32	25.89	86.69	24.72	93.48	24.98	0.000
BMI[a]	23.30	4.81	24.12	5.07	24.76	5.10	0.026
MNA[a]	8.51	2.85	8.89	3.09	9.70	2.86	0.001
Assessment at discharge							
FIM[a]	84.87	27.88	107.40	16.62	99.56	28.81	<0.0001
BMI[a]	22.83	5.04	24.13	4.91	24.06	5.38	0.069

[a] Data are expressed as means ± SD.

[b] Number of cases (%).

[c] *P*-value of Kruskal–Wallis test or ANOVA comparing three groups.

Education level: (level 1 = ≤ 11; level 2 = 12–14; level 3 ≥15 years of schooling). ADL = Activities of Daily Living [14], IADL, Lawton's Instrumental Activities of Daily Living [15]; CCI, The Charlson Comorbidity Index [19]; FIM, Functional independence measure [20]; BMI, body mass index; MNA, Mini Nutritional Assessment [21].

Table 3. Socio-demographic data, clinical features, hospitalisation correlates and outcomes as a function of dementia aetiology (11 cases with other types of dementia are not shown)

Characteristics	Alzheimer's disease $n = 61$		Mixed dementia $n = 62$		Vascular dementia $n = 17$		P-value[c]
Demographics and pre-admission characteristics							
Age[a]	86.1	6.0	86.4	5.4	84.3	7.5	0.452
Female[b]	51	83.6%	45	72.6%	7	41.2%	0.002
Education (years)[b]							
Level 1	39	63.9%	32	51.6%	10	58.8%	0.435
Level 2	15	24.6%	25	40.3%	6	35.3%	
Level 3	7	11.5%	5	8.1%	1	5.9%	
Living conditions[b]							
Alone	33	54.1%	32	52.5%	6	37.5%	0.888
With family	3	4.9%	6	9.8%	1	6.3%	
With spouse	15	24.6%	14	23.0%	6	37.5%	
Nursing home	6	9.8%	7	11.5%	2	12.5%	
In protected housing	4	6.6%	2	3.3%	1	6.3%	
Cigarette smoking[b]	17	27.9%	19	30.7%	7	41.2%	0.575
Cigarette smoking[a] [packs/year]	17.77	21.27	20.09	24.36	23.36	18.96	0.554
Alcohol intake[b]	27	44.3%	30	48.4%	4	23.5%	0.185
Alcohol intake[a] [glasses/day]	1.16	1.03	1.53	1.25	1.00	1.00	0.337
Functional status[a]							
Pre-morbid ADL	4.70	1.26	4.47	1.20	4.00	1.62	0.218
Pre-morbid IADL	3.66	2.30	3.29	2.17	2.53	2.27	0.195
MMSE[a]	16.3	4.7	15.6	4.9	17.5	6.7	0.3656
CDR 0.5[b]	1	1.6%	1	1.6%	1	5.9%	0.612
CDR 1[b]	27	44.3%	25	40.3%	9	52.9%	
CDR 2[b]	26	42.6%	28	45.2%	4	23.5%	
CDR 3[b]	7	11.5%	8	12.9%	3	17.7%	
Number of different classes of medication[a]	2.28	1.27	2.73	1.24	3.00	1.17	0.067
Comorbid conditions							
CCI[a]	4.18	2.49	5.11	2.33	6.35	2.55	<0.0001
Diseases assessed in the CCI							
Ischaemic cardiopathy[b]	14	23.0%	20	32.3%	7	41.2%	0.272
Heart failure[b]	28	45.9%	37	59.7%	12	70.6%	0.119
Peripheral vascular disease[b]	20	32.8%	21	33.9%	11	64.7%	0.043
Cerebrovascular disease[b]	14	23.0%	36	58.1%	16	94.1%	<0.0001
Chronic pulmonary disease[b]	10	16.4%	9	14.5%	5	29.4%	0.345
Connective tissue disease[b]	10	16.4%	5	8.1%	0	0.0%	0.103
Ulcer disease[b]	10	16.4%	12	19.4%	1	5.9%	0.414
Diabetes mellitus[b]	8	13.1%	13	21.0%	4	23.5%	0.424
Chronic renal failure[b]	8	13.1%	13	21.0%	4	23.5%	0.424
Diabetes (end organ damage)[b]	3	4.9%	1	1.6%	1	5.9%	0.529
Any tumour[b]	16	26.2%	21	33.9%	3	17.8%	0.366
Cirrhosis[b]	2	3.3%	2	3.2%	0	0.0%	0.752
Other diseases not assessed in the CCI							
Hypertension[b]	37	60.7%	41	66.1%	16	94.1%	0.033
Atrial fibrillation[b]	12	19.7%	21	33.9%	4	23.5%	0.195
Stroke[b]	4	6.6%	16	25.8%	11	64.7%	<0.0001
Hypercholesterolaemia[b]	5	8.2%	8	12.9%	9	52.9%	<0.0001
Assessment at admission							
FIM[a]	78.83	25.51	76.24	26.20	78.13	27.11	0.887
BMI[a]	23.24	4.40	22.50	4.62	26.05	6.15	0.026
MNA[a]	8.64	2.42	8.29	3.14	9.06	3.43	0.521
Assessment at discharge							
FIM[a]	89.56	24.19	80.34	31.02	88.60	22.66	0.498
BMI[a]	22.17	5.30	22.66	4.46	25.81	6.05	0.081

[a]Data are expressed as means ± SD.

[b]Number of cases (%).

[c]P-value for Kruskal–Wallis test, or ANOVA, comparing three groups.

ADL, Activities of Daily Living [14], IADL, Lawton's Instrumental Activities of Daily Living [15], MMSE, The Mini Mental State Examination (scores 0–30) [12]; CDR, The Clinical Dementia Rating Scale [23] (score 0.5 for MCI, score 1 for mild, score 2 for moderate and score 3 for severe dementia); CCI, The Charlson Comorbidity Index [19]; FIM, Functional independence measure [20]; BMI, body mass index; MNA, Mini Nutritional Assessment [21].

of the group of patients studied and the group consisting of all the patients admitted to the HOGER in the same year shows that our sample was representative of the total population of patients admitted and highlights the quality of randomisation in this study. The principal strength of this study is its clinically rich prospective data collection from a large group of very ill hospitalised elderly patients. The comorbidity index was much higher (mean 4.6 ± 2.7) than reported in other studies [7, 11]. The second major strength of this study is that the same neuropsychologist carried out a systematic, complete neuropsychological assessment of all the included patients, increasing the accuracy of cognitive diagnosis. This is the first study of its type to consider a group of patients with MCI in addition to demented and non-demented patients.

In line with increasing numbers of reports, the functional and nutritional status of demented patients was significantly worse than that of the other patients at both admission and discharge, regardless of the type of dementia. In a cohort of 830 Italian patients aged 65 years or older consecutively admitted to an acute care geriatric ward, and in a cohort of 1,358 Japanese subjects aged 61 years or older living in the community, poor cognitive status was independently associated with functional disability at all ages [25, 26].

In our series, the prevalence of comorbid medical conditions was similar in demented patients, patients with MCI and patients of the same age with no cognitive impairment, but demented patients took larger amounts of medication. Some studies have reported the occurrence of larger numbers of comorbid medical conditions in cognitively normal old subjects [1–5]. One study of elderly subjects living in their own homes showed that patients with AD had fewer medical diagnoses—three in this cohort—than subjects without cognitive impairment [1]. Similar results were obtained in a French geriatric hospital that also showed, in contrast to our results, that patients with dementia took fewer drugs than non-demented subjects, and that they took different kinds of drugs, with more psychotropes and fewer cardiovascular drugs than non-demented patients [2]. Most of these studies were retrospective [1, 2, 4]. More recent population-based prospective studies have shown, as in this study, that missed diagnoses are more common in patients with dementia and that these patients complain almost exclusively of cognitive impairment. One such study showed that 66% of the 112 demented patients included had at least one undiagnosed disease, versus only 48% of the non-demented patients [8]. The demented patients were more likely than the controls to have undiagnosed hyperlipidaemia or hypothyroidism. In another study of patients in the early stages of AD, identical CCI values were obtained for demented and non-demented subjects but, over the two years of follow-up, patients with dementia complained almost exclusively of cognitive impairment whereas the controls also complained of joint pains, gastrointestinal problems and vision loss [7]. A large retrospective study of 3,934 patients with dementia and 19,300 control subjects matched for sex and age enrolled in a large Medicare-managed care organisation showed that demented patients had significantly larger numbers of comorbid conditions (mean CCI = 1.9) than patients without dementia (mean CCI = 1.0). For congestive heart failure and cerebrovascular disease, major differences have been reported [11]. This cohort was younger (mean age = 78 years) and the percentage of women (60%) was much closer to that of men.

According to the most recent studies, the number of comorbid conditions seems to be similar in demented and non-demented subjects, but some studies have shown differences in the prevalence of particular diseases. For example, cancer has been reported to be more prevalent in non-demented subjects than in demented subjects in clinical and autopsy series [1, 2, 27, 28].

There may also be differences in the prevalence of co-existing medical conditions between the various types of dementia and between different levels of severity of dementia. We found that health was poorest in the VaD group: highest average comorbidity score, higher frequency of hypertension, peripheral vascular disease, stroke, cerebrovascular disease, hyperlipidaemia and a higher BMI on admission, probably associated with these patients being overweight. These findings are consistent with previous studies [2, 6, 29]. In contrast, Doraiswamy *et al.* showed in a cross-sectional study including 679 AD patients from the community and nursing homes that medical comorbidity increased with severity of dementia [30]. However, most of the patients with mild dementia were living at home, whereas those with severe dementia were up to 10 years older and lived in nursing homes.

Our results show that hospitalised demented patients have a poorer functional and nutritional status than cognitively normal patients of the same age. They also seem to have more other illnesses than generally thought, but these illnesses are more likely to remain undiagnosed and thus untreated. Special efforts should be made to investigate existing comorbidities and to detect unreported problems in demented patients, with the development of screening strategies for detecting comorbid conditions in demented patients. Improving the detection and treatment of comorbid diseases represents a challenge for health professionals caring for patients with dementia. Greater attention to these complex issues on the part of families, carers and clinicians should improve outcomes for these patients.

Key points

- In this prospective cohort of very old inpatients, demented patients, non-demented patients and patients with MCI had similar levels of comorbidity. However, demented patients had poorer functional and nutritional status. Health was poorest in patients with VaD.

- Special efforts should be made to deal with existing comorbidities and to detect unreported problems in demented patients. Improvements in the detection and treatment of comorbid diseases should improve outcomes for these patients.

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Supplementary data

Supplementary data for this article is available online at http://ageing.oxfordjournals.org.

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