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New Diagnoses of Dementia Among Older Patients Admitted to Postacute Care

THESE

préparée sous la direction du Professeur Christophe J.Büla

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par

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New diagnoses of dementia among older patients admitted to postacute care

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Rapport de synthèse

Introduction : bien que la prévalence des syndromes démentiels soit élevée chez les personnes âgées hospitalisées et qu'une proportion non négligeable échappe au diagnostic, la littérature ne fournit que peu de données chez les patients admis en milieu de réadaptation post-aigu. L'objectif principal de ce travail était de déterminer la prévalence des démences, ainsi que la proportion de démences non diagnostiquées dans une population admise dans un centre de réadaptation gériatrique. Ensuite, nous nous sommes intéressés à identifier les caractéristiques des patients associées à une démence non-détectée.

Méthode : nous avons utilisé les données de tous les patients âgés de 70 ans et plus admis durant 3 ans dans l'unité de réadaptation du service de gériatrie et réadaptation gériatrique, Centre Hospitalier Universitaire Vaudois, en excluant les patients décédés pendant l'hospitalisation. Lors de l'admission, des données sociodémographiques, médicales, ainsi que des données concernant le status fonctionnel et mental sont récoltées systématiquement. Par ailleurs, les dossiers des patients ont été examinés pour en extraire les informations quant aux performances cognitives (mini-Mental State Exam, MMSE) et au diagnostic de sortie.

Résultats : un diagnostic de démence figurait dans la lettre de sortie de 425 des 1764 patients (24.1%), plus de la moitié présentant une démence de type Alzheimer. Pour 301 de ces 425 patients (70.8%), la démence avait été diagnostiquée durant le séjour de réadaptation. La proportion de démences non-détectées auparavant était plus élevée chez les patients provenant des services de chirurgie/orthopédie que de médecine interne (74.8% vs 65.8%, p=.42). Les patients non diagnostiqués comme déments étaient plus âgés, vivaient plus souvent seuls et avaient de meilleures performances fonctionnelles et cognitives que ceux chez qui le diagnostic avait été posé auparavant. Notamment, un tiers d'entre eux avait un score normal au MMSE. Une analyse multi-variée a mis en évidence deux facteurs prédisposant à la non-détection : l'âge (Odds Ratio (OR) : 2.4 pour le groupe d'âge 85 ans et plus par rapport aux plus jeunes, 96%CI : 1.5-4.0, p=.001) et le score au MMSE (OR : 5.9 lors d'un MMSE normal à l'admission, 96%CI : 2.7-12.7, p<.001)

Conclusion et perspectives : cette étude montre qu'environ un quart des patients admis en réadaptation gériatrique souffre de démence, et que cette pathologie n'est pas reconnue chez les trois-quarts d'entre eux. Ces résultats soulignent la nécessité d'un dépistage systématique des troubles cognitifs chez les patients âgés. En effet, en l'absence de détection, ces patients ne peuvent bénéficier d'une prise en charge approprié, incluant non seulement des mesures médicales et pharmacologiques, mais surtout l'information du patient et des proches, dans le but de maintenir une qualité de vie acceptable du patient ainsi que de prévenir l'épuisement des proches et des soignants. Cette étude incite aussi à être attentif aux signes évocateurs de troubles cognitifs lors de l'interprétation du test MMSE, car un score dans les limites de la norme ne permet pas d'exclure une démence.

New Diagnoses of Dementia Among Older Patients Admitted to Postacute Care

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Objectives: To determine the prevalence of dementia and the proportion of undiagnosed dementia in elderly patients admitted to postacute care, and to identify patients' characteristics associated with undiagnosed dementia.

Design: Cross-sectional study.

Setting: Academic postacute rehabilitation facility in Lausanne, Switzerland.

Participants: Patients (N = 1764) aged 70 years and older.

Measurements: Data on socio-demographic, medical, functional, and affective status were collected upon admission. Data on cognitive performance (Mini-Mental State Exam [MMSE]), and cognition-related discharge diagnoses were abstracted through a structured review of discharge summaries.

Results: Overall, 24.1% (425/1764) patients had a diagnosis of dementia, most frequently secondary to Alzheimer's disease (260/425, 61.2%). Among dementia cases, 70.8% (301/425) were newly diagnosed during

postacute stay. This proportion was lower among patients referred from internal medicine than from orthopedic/surgery services (65.8% versus 74.8%, P = .042). Compared to patients with already diagnosed dementia, those newly diagnosed were older, lived alone more frequently, and had better functional status and MMSE score at admission (all P < .05). In multivariate analysis, previously undetected dementia remained associated with older age (OR = 2.4 for age 85 years and older, 95% CI 1.5–4.0, P = .001) and normal MMSE at admission (OR = 5.9, 95% CI 2.7–12.7, P < .001).

Conclusion: Dementia was present in almost a fourth of elderly patients referred to postacute care, but was diagnosed in less than a third before admission. Oldest old patients appear especially at risk for underrecognition. These results emphasize the high diagnostic yield of systematic cognitive assessment in the postacute care setting to improve these patients' management and quality of life. **(J Am Med Dir Assoc 2010; 11: 371–376)**

Keywords: Elderly; postacute care; dementia; detection

Dementia is frequent among older persons, with a prevalence varying according to age and care setting. In this regard, highest prevalence (up to 70%) has been observed in studies conducted in the assisted living and long-term care population,[1–5] but surprisingly few data are available in patients undergoing postacute care. One study reported that 40% of older

patients admitted to postacute rehabilitation had dementia,[6] whereas around 60% of patients admitted to geriatric continuation care units were found to be cognitively impaired in another study.[7] Similarly, little is known about dementia detection rate in the postacute care setting, as well as about characteristics of patients admitted to this setting with unrecognized dementia. Studies conducted among outpatient populations report that 30% to 70% of dementia cases are not recognized.[8–12] The proportion of undetected dementia is also high in other settings, reaching 63% in a study of older medical inpatients,[13] and 58% in residents of assisted living facilities, a setting closer to postacute care.[3] Several barriers concur to poor detection of dementia by health professionals, including insufficient clinical training, time constraints, absence of routine screening procedures, and the still widely spread assumption that cognitive decline is part of normal aging. Although these barriers might be less prevalent among professionals specifically dedicated to geriatric care, this has not been widely investigated. In particular, the diagnostic

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The authors have no conflicts of interest.

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yield of a systematic cognitive assessment in postacute care remains unknown.

Early recognition of cognitive impairment and diagnosis of dementia are critical steps necessary to initiate appropriate management, including patient and proxy counseling, medication review, prescription of specific pharmacological treatment, as well as caregiver supportive measures. These measures, aiming at preserving patient function and quality of life, preventing caregiver depression and burn-out, and delaying or avoiding institutionalization,[14–18] are especially relevant for older patients admitted to postacute care and rehabilitation, most of whom are likely to return to previous living conditions.

The aims of the study were to determine the prevalence of dementia and the proportion of patients diagnosed with dementia during postacute care stay. An additional objective was to investigate patients' characteristics associated with previously undetected dementia.

POPULATION AND METHODS

Eligible participants were patients aged 70 years and older consecutively admitted from an acute hospital ward to postacute care in an academic medical center over a 3-year period (N = 2130). Patients who died during their stay (N = 77) were excluded. In case of multiple admissions during the study period (N = 289), only the first stay was considered, leaving a final sample of 1764 patients.

Sociodemographic and medical data were systematically collected for each patient at admission. Performance in basic Activities of Daily Living (ADL) were systematically evaluated by nursing staff within 48 hours of admission using Katz basic ADL scale.[19] Cognitive and affective status were assessed by the physician in charge of the patient using Folstein's Mini-Mental State Examination (MMSE),[20] and Yesavage's Geriatric Depression Scale (GDS) short-form,[21] respectively. Referring service was identified from the administrative hospital database.

Data about cognition-related diagnosis were abstracted by a physician through a systematic structured review of discharge summaries. Discharge summary is mandatory for each hospital stay and should contain all information relevant for the primary care physician to ensure the continuity of care. Diagnoses were based on the National Institute of Neurological and Communicative Disorders and Stroke and Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA) criteria for Alzheimer disease,[22] the State of California Alzheimer's Disease Diagnostic and Treatment Centers (ADDTC) criteria for vascular dementia,[23] and Newcastle's criteria for Lewy bodies dementia.[24] Quality of data abstraction was assessed through test-retest of a random sample (N = 50) of discharge summaries by a second independent physician, blinded to the first reviewer assessment. Interrater agreement on dementia diagnosis was 92% (kappa 0.88, P < .001). The study was approved by the university review board and patients provided oral informed consent.

For the statistical analyses, the sample was divided into 2 groups according to whether a diagnosis of dementia was listed in the discharge summary or not. The group of patients with dementia included patients diagnosed with dementia attributable to Alzheimer's disease, vascular or mixed dementia, dementia with Lewy bodies, fronto-temporal dementia, as well as toxic (eg, alcohol-related) and unspecified dementia. Patients presenting with delirium were classified as nondemented, unless there was a clear history from proxies and/or the primary care physician of previous cognitive decline with memory impairment highly suggestive of incipient, undiagnosed dementia. This occurred in 47 cases, who were classified as having unspecified dementia. All other patients, including those with cognitive impairment not fulfilling dementia criteria (mild cognitive impairment, pure delirium, cognitive impairment related to depression) were considered as patients without dementia.

Characteristics of patients with and without dementia were compared using the Pearson chi-squared test for categorical variables and the Student t test for continuous variables. Then, a multivariate model examined which of these characteristics were independently associated with dementia. The following covariates were entered in the model, based on a priori hypotheses: age, gender, formal home care before admission, living alone, basic ADL performance at admission, and MMSE score of 24 or higher.

Similar bivariate and multivariate analyses were performed in the subgroup of subjects with dementia, to compare characteristics of subjects diagnosed during their stay with those of subjects already diagnosed before their stay. The same set of covariates previously mentioned was used for adjustment in the multivariate analysis.

Statistical analyses were performed on Stata 10.0 (STATA Corp., College Station, TX) software.

RESULTS

Characteristics of the study population and their comparisons in patients with and without dementia are displayed in Table 1. Overall, 24.1% of the patients were discharged with a diagnosis of dementia. The most frequent diagnosis was dementia attributable to Alzheimer's disease (61.2%), whereas mixed, vascular, and Lewy bodies dementias represented each less than 10% of the cases (Figure 1).

Compared with patients without dementia, those with dementia were older, more frequently received formal home care before their admission, and had lower performance in basic ADLs at admission. These patients were less frequently admitted after a hip fracture and more frequently after respiratory and cerebrovascular events. Finally, although the average MMSE score was significantly lower among patients with dementia, 25.4% still had a score in the range considered as normal in most older persons (≥24). In multivariate analysis, abnormal MMSE (adjusted odds ratio [adjOR]: 16.6, 95% confidence interval [CI] 12.5–22.1, P < .001 for an MMSE score <24), age 85 years and older (adjOR: 1.4, 95% CI 1.1–1.9, P = .014), lower functional status (adjOR: 0.9 per each additional point at Katz's basic ADL scale, 95% CI: 0.8–0.9, P = .001), and male gender (adjOR:1.4, 95% CI 1.0–1.9, P = .041) remained significantly associated with dementia (data not shown).

Table 1. *Baseline Characteristics of the Total Population and Comparison of Study Groups*

Characteristics	Total (N = 1764)	Dementia		P*
		Yes (N = 425)	No (N = 1339)	
Age, y, mean±SD	82.3 ± 6.7	84.4 ± 6.2	81.6 ± 6.7	<.001
Women, %	69.6	66.1	70.7	.072
Living alone, %	60.2	57.6	61.1	.200
Formal home care before admission, %	53.9	67.5	48.4	<.001
BADL score at admission,† mean±SD	2.9 ± 1.7	2.2 ± 1.6	3.19 ± 1.7	<.001
Main acute diagnosis, %				
- hip fracture	24.0	22.3	24.6	.376
- osteoarticular conditions‡	21.4	13.7	24.0	<.001
- cardiovascular disease	12.9	9.7	14.0	.038
- respiratory disease	6.5	9.1	5.6	.019
- cerebrovascular disease	5.6	8.6	4.6	.006
- gastrointestinal disease	4.9	5.1	4.8	.814
- miscellaneous	19.6	25.9	17.6	<.001
Depressive symptoms,§ %	16.5	16.0	16.8	.700
MMSE score,‖ mean±SD	24.6 ± 5.1	19.1 ± 5.5	26.3 ± 3.5	<.001
Abnormal MMSE,¶ %	28.0	74.6	13.3	<.001

MMSE score ≥ 24 is considered as within normal range.
* Chi-square test (categorical variables) or Student t test (continuous variables).
† Basic Activities of Daily Living.[19] Include bathing, dressing, using the toilet, transferring between bed and chair, maintaining continence, feeding. Scores range from 0 to 6, with higher scores indicating higher function.
‡ Osteoarticular conditions include medical and surgical diseases excluding hip fracture.
§ Defined as a score of 6 or more at the Geriatric Depression Scale, short form[21] (15 items).
‖ Folstein's Mini Mental Status Examination. Scores range from 0 to 30, with higher score indicating higher cognitive function.[20]
¶ Defined as a score < 24 on Folstein's Mini-Mental State Examination.[20]

Among the 425 patients diagnosed with dementia, 70.8% (301/425) had not been diagnosed before the postacute stay. Table 2 compares their characteristics with those of patients (N = 124) whose dementia was previously diagnosed. Patients diagnosed during postacute stay were older, lived alone more frequently, and had better functional as well as mental performances at admission. Interestingly, almost a third (32.5%) of patients diagnosed during postacute care had an MMSE score of 24 or higher at admission to postacute rehabilitation. Finally, the proportion of demented patients whose diagnosis was made during rehabilitation was somewhat lower among patients referred from internal medicine than surgical services (Figure 2).

Fig. 1. *Etiology of dementia (N = 425). Miscellaneous category includes fronto-temporal dementias, toxic dementia, and unspecified dementias.*

61.2%

20.0%

3.5%   5.6%   9.6%

□ Alzheimer's Disease (N=260)   ⊞ Mixed (N=41)
⊡ Vascular (N=24)   ⊞ Lewy bodies (N=15)
□ Miscellaneous (N=85)

In multivariate analysis (Table 3), age 85 years and older (adjOR: 2.4, 95% CI 1.5–4.0, P = .001), and an MMSE score of 24 or higher at admission to postacute rehabilitation (adjOR: 5.9, 95% CI 2.7–12.7, P < .001) remained independently associated with a previously undetected dementia. A variable defining the referring service was also included in a stepwise regression analysis, but did not remain in the model.

A stratified analysis showed that, among patients with MMSE score lower than 24 at admission, the proportion who remained undiagnosed until their admission to postacute rehabilitation reached 75% in patients aged 85 years and older, compared with 52% in those younger than 85 years (P < .001). However, interaction between MMSE and age did not reach statistical significance when tested in the multivariate model.

DISCUSSION

This study found that a fourth of older patients admitted to postacute care had a diagnosis of dementia, two thirds of which were previously unknown. To our knowledge, this is the first study to document the magnitude of the current gap in dementia diagnosis among older patients admitted to postacute-care rehabilitation. These observations have several implications.

First, these results emphasize the need to implement a systematic cognitive screening in this setting when caring for similar populations. Ironically, the highest levels of undetected dementia have been found in populations with very high prevalence of dementia. For example, it has been documented that about two thirds of cognitively impaired residents of assisted living facilities had not been properly diagnosed.[3,5] Missing a dementia diagnosis is likely to delay
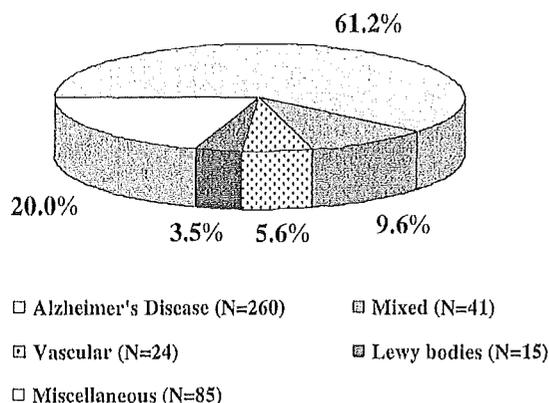
Table 2. *Comparison between Patients with Previously Diagnosed Dementia and Those Diagnosed with Dementia during Postacute Care Stay*

Characteristics	Dementia diagnosed before the postacute stay?		
	Yes (N = 124)	No (N = 301)	P*
Age, y, mean±SD	83.3 ± 6.6	84.9 ± 6.1	.015
Woman, %	60.5	68.4	.115
Formal home care before admission, %	71.1	66.0	.315
Living alone, %	49.6	60.9	.033
BADL at admission,† mean±SD	1.8 ± 1.5	2.3 ± 1.7	.004
Depressive symptoms,‡ %	20.0	14.4	.195
MMSE score,§ mean±SD	16.3 ± 5.7	20.2 ± 5.0	<.001
MMSE score≥24,‖ %	9.6	32.5	<.001

MMSE score≥24 is considered as within normal range.
 * Chi-square test (categorical variables) or Student *t* test (continuous variables).
 † Basic Activities of Daily Living.[19] Include bathing, dressing, using the toilet, transferring between bed and chair, maintaining continence, feeding. Scores range from 0 to 6, with higher scores indicating higher function.
 ‡ Defined as a score of 6 or more at the Geriatric Depression Scale, short form[21] (15 items).
 § Folstein's Mini Mental Status Examination. Scores range from 0 to 30, with higher score indicating higher cognitive function.[20]

interventions aimed at improving patients' and caregivers' quality of life. Second, these results also highlight the potential for better cognitive assessment upstream the admission to postacute care. These findings add to previous observations[13] showing the low detection rate of cognitive problems in the acute setting.[25] Improving the diagnostic process during the acute stay could certainly benefit the patient, for instance in decreasing the risk of subsequent delirium occurrence in the postacute setting.[26] Finally, these results are important because they contribute to better delineate the adequate diagnostic competencies (including formal cognitive assessment) and resources that must be available in postacute care setting to better address the multiple needs of these patients.

This study also extends previous knowledge in showing that the oldest-old patients are particularly at risk of remaining undiagnosed. The association between older age and underrecognition of dementia has not been previously described in the postacute care setting. Interestingly, this association was not found in a study in assisted living facilities[4] and has been inconsistently observed in studies conducted among community-dwelling and primary care older popula-

tions,[8,11,12,27] but has also been reported in a study among acute medical inpatients.[28] Most likely, underrecognition in the oldest-old patients relates to the still widespread belief of a normal age-related decline in mental performances.[29] In addition, these patients might also be at increased risk for underrecognition because the usual barriers to diagnosis might seem especially relevant to physicians caring for these frail patients. Physicians' skepticism about the benefits of dementia interventions and pharmacological treatments[30] or their perceived lack of time and/or skills to diagnose dementia[31] are likely to make them even more reluctant to add further diagnostic burden in these already complex patients. Systematic screening could help to address the influence of age on dementia underdiagnosis.

A relatively surprising finding is the significant association between male gender and prevalent dementia in this population. Possibly, this finding results from a selection bias that makes older men less likely to be discharged from acute to postacute care because they more frequently benefit from a spouse caregiver than women of similar age. In this sample, however, men remained significantly less likely to live alone and to receive in-home care services than women, even though they were younger (data not shown). Although multivariate analysis adjusted for these differences, one cannot exclude residual confounding. An alternative explanation is that a dementia diagnosis was more frequently made in men because the additional information necessary to assess this diagnosis (eg, repercussion of cognitive impairment on ADLs)

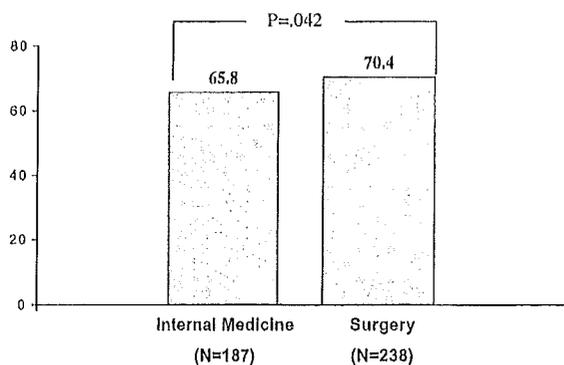**Proportion of demented patients with unknown diagnosis (%)**

Fig. 2. *Proportion of demented patients with unknown diagnosis before postacute rehabilitation stay, by type of referring service. "Surgery" category includes general surgery, traumatology, orthopedics, vascular surgery, and so forth.*

Table 3. *Characteristics of Demented Patients Associated with a New Diagnosis of Dementia*

Characteristic	Adjusted OR*	95% CI	P value
Age>85 years	2.4	1.5–4.0	.001
MMSE score≥24†	5.9	2.7–12.7	<.001

CI, confidence interval.
 * OR: Odds ratio from stepwise multivariate analysis adjusted for age, gender, formal home care before admission, living alone, depressive symptoms, basic ADL performance at admission, and MMSE score≥24.
 † MMSE: Mini Mental State Exam. Scores range from 0 to 30 with higher scores indicating better cognitive function.[20]

was more frequently available from a proxy living with the patient. This hypothesis is supported by the observation of a higher proportion of women among patients who were diagnosed with cognitive impairment but no dementia (data not shown). Future studies in the postacute care setting should further investigate this issue.

Finally, this study emphasizes the limitation of the MMSE as a screening tool in this population: almost a fourth of previously undiagnosed subjects scored above the traditional cut-off used to define the presence of significant cognitive impairment, corresponding to a sensitivity of 74%, lower than the expected 80% to 90%.[2] These results highlight the importance to keep a low threshold for suspecting cognitive problems and dementia in older subjects undergoing postacute rehabilitation, even when MMSE performance might be considered as within the normal range. Interestingly, our results show that of 100 patients with a diagnosis of dementia and a normal MMSE score, 65 scored 24 or 25 points at MMSE.

A main strength of this study lies in its large sample and the inclusion of consecutive patients resulting in a decreased risk of selection bias, as well as the completeness of data. For instance, MMSE information was missing in only 57 patients (2.8%), principally because of a patient's refusal or impossibility to execute several items (poststroke status, deafness, foreign language, or illiteracy).

This study has some limitations: information about cognitive diagnosis is based on discharge summary. In particular, no additional follow-up was performed with proxies or primary care physicians to collect information on subsequent diagnoses in patients with delirium. Only 6.4% of the patients were considered to have delirium, alone or superimposed on dementia, a significantly lower figure than those reported in studies that specifically evaluated the prevalence of delirium in similar populations.[26,32] Systematic screening for delirium would likely have resulted in higher figures.[25] However, potential misclassification of these subjects in the nondemented group likely resulted in underestimating the rate of both dementia diagnosis and detection.

An additional limitation is the reliance on discharge summary to categorize patients with diagnosed and undiagnosed dementia. Although unlikely, it remains possible that detected dementia was not documented in some patients. Highlighting this gap is nevertheless important, as discharge summaries should include all information that is necessary for the primary care physician to ensure appropriate follow-up. The absence of such important information will surely preclude further appropriate management of the patient.

CONCLUSION

This study highlights the gap in dementia detection in postacute care and underlines the particular risk of underrecognition in the oldest-old. Furthermore, results provide important information in showing poor dementia detection in patients with a normal screening test. Overall, these findings emphasize the high diagnostic yield of systematic cognitive screening in elderly patients admitted to a postacute setting.

Increasing dementia recognition is an essential step toward the overall goal of improving the management of affected patients and increasing support to their caregiver. Earlier interventions could not only contribute to better prevent or delay nursing home admission and decrease related health care costs, but are likely to improve quality of life in both patients and caregivers.

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