

Implementation of discharge management for geriatric patients at risk of readmission or institutionalization

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Abstract

Objective. To evaluate whether implementation of discharge management by trained social workers or nurses reduces hospital readmissions and institutionalizations of geriatric patients in a real-world setting.

Design. Quasi-experimental design.

Setting. Six general hospitals in Belgium.

Participants. A representative sample of 824 patients, 355 of whom were assigned to the experimental group receiving comprehensive discharge management and 469 to the control group receiving usual care. Inclusion criteria were patients admitted to a geriatric, rehabilitation, or internal medicine ward, not residing in a nursing home, and showing risk of readmission or institutionalization on admission in the hospital.

Intervention. In-hospital discharge planning according to a case management protocol allowing for adjustment to participating hospitals' case mix and patients' and families' specific needs.

Main outcome measures. Hospital readmission within 15 and 90 days post discharge; institutionalization at discharge and within 15 and 90 days post discharge.

Results. Discharge management resulted in fewer institutionalizations ($n = 53$; 14.9%) compared with usual care ($n = 130$; 23.7%) (adjusted odds ratio = 0.47; CI 95% = 0.31–0.70). Readmission rates between the intervention and usual care group were not significantly different.

Conclusions. This implementation project showed that a discharge planning intervention can reduce institutionalization rates of elderly patients in real-life settings.

Keywords: case management, elderly, geriatric nursing, patient discharge

Geriatric patients with complex and chronic care needs are at risk of early hospital readmission and premature institutionalization in the absence of discharge management after hospitalization [1–3]. Driven by a proportional increase of the aging care-dependent population, poorly coordinated and fragmented health care, and discontinuity between hospital and home care, new care models have been developed. Case management is a useful model for discharge management. It entails a phased and structured guidance of the care process, in which care is individually tailored, planned, and implemented in an interdisciplinary team, coordinated by a case manager [4].

The effectiveness of hospital case management for discharge of persons aged 60 years and over from hospital has been demonstrated in many randomized controlled trials [5–9]. The effectiveness of case management in view of prevention of institutionalization in long-term care facilities has been demonstrated by a meta-analysis [10]. Results are, however, not always consistent, as suggested by a recent Cochrane review [11]. Moreover, these studies have been focused on (geographically) concentrated patient populations and used an experimental study design. Implementing these discharge management programs at the level of national health care delivery system and thus translating them into everyday practice requires

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alternate research designs that allow regional variation and adjustment to regional health care systems.

As the Belgian Ministry of Social Affairs, Public Health and Environment was concerned about the impact of older patients on future health care and social security, as well as the quality of care for this population, case management was initiated and evaluated in a series of projects. More specifically, a nationwide implementation of case management as a tool for supporting discharge has been investigated. This article reports the findings of this case management translational research project in view of impact on rehospitalization and institutionalization.

Methods

Design and sample

This study was part of a nationwide program including 6066 geriatric patients at risk of readmission or institutionalization from 94 Belgian hospitals. By means of a quasi-experimental design, the implementation of in-hospital discharge management was evaluated in a subsample of 824 patients from six hospitals (spread over eight hospital sites). The selection of participating hospitals was such that control and experimental hospitals were comparable in view of geographic location and proportion of public and private hospitals. Hence, the availability of nursing home beds or the supply of home care services was equal in both groups. Three hospitals served uniquely as intervention sites, two hospitals functioned as recruitment sites for the usual care group, and in the remaining three sites both intervention and usual care subjects were recruited. Assignment in these hospitals was based on the caseload of the case manager. In other words, assignment to the care groups was at hospital level and not based on randomization. Table 1 describes the characteristics of the participating hospitals.

Patients were eligible for inclusion if they were admitted to a geriatric, rehabilitation, or internal medicine ward, 60 years

or older, not residing in a nursing home, and if they showed risk of readmission or institutionalization. A risk-screening tool to identify elderly at risk of readmission or institutionalization was developed based on risk factors present at admission. These risk factors were selected from extensive literature review and were categorized into physical and mental factors, environmental factors, and psycho-medical-social disorders. Risk of readmission or institutionalization was determined by having risk factors present in at least two of the groups of risk factors. These criteria were dichotomized to make them clinically more practical to use. Demographic characteristics and risk profiles of both groups are presented in Table 2.

Variables and measurement

Primary outcomes assessed were readmission and institutionalization within 15 and 90 days after discharge (Table 3). Fifteen days post discharge was chosen as this represents the transition period between hospital and home environment, requiring adjustment of the patient and his family [7,12,13]. Ninety days post discharge represents the official period to determine readmission in hospital statistics in Belgium. Information on readmission and institutionalization was obtained during a telephone interview with the patient at 15 days and 90 days. If the patient presented with cognitive dysfunction, the central caregiver was contacted to obtain this information. Hence, all readmissions were reliably recorded. Also those in hospitals other than the discharge hospital were included. Data collection in the discharge management group was performed by the case manager. In the control group, data were collected by a nurse.

Intervention

In-hospital discharge planning was undertaken by trained social workers or nurses, using the methods of case management. Case management combines an episode-based approach,

Table 1 Characteristics of participating hospitals

				Number of units (beds) participating in the study	Number of patients (%) included in the study
<i>Region A</i>					
Hospital 1					
Site 1	Public	Urban	DM + UC	6 (174)	56 (6.8)
Site 2	Public	Urban	DM + UC	7 (221)	122 (14.8)
Hospital 2					
Site 3	Private	Urban	UC	4 (138)	92 (11.2)
Site 4	Private	Suburban	DM	2 (61)	77 (9.4)
<i>Region B</i>					
Hospital 3	Private	Suburban	UC	1 (24)	51 (6.2)
Hospital 4	Public/Private	Urban	DM + UC	3 (84)	249 (30.2)
Hospital 5	Private	Suburban	DM	1 (28)	124 (15.0)
Hospital 6	Public	Suburban	DM	1 (30)	53 (6.4)

DM, discharge management; UC, usual care.

Table 2 Patient characteristics of elderly receiving either discharge management or usual care

	Discharge management (<i>n</i> = 355)	Usual care (<i>n</i> = 469)	<i>P</i> -value
<i>Demographic data</i>			
Gender (<i>n</i> [%])			
Male	111 (31.3)	162 (34.5)	0.48
Female	233 (65.6)	306 (65.2)	
Age (mean age in years [\pm SD])	82.06 (\pm 7.42)	81.73 (\pm 7.74)	0.54
<i>Risk factors for readmission or institutionalization, present at admission</i>			
Physical and mental factors (<i>n</i> [%])			
Age \geq 85 years	144 (40.6)	182 (38.8)	0.53
Diagnosis of dementia or presumed cognitive disorders	110 (31.0)	173 (36.9)	0.11
Diagnosis of depression or presumed mood disorders	100 (28.2)	149 (31.8)	0.38
Home nursing \geq 3 days/week	109 (30.7)	130 (27.7)	0.38
Profile of dependence ¹ (<i>n</i> [%])			
Class 0	69 (19.4)	86 (18.3)	0.8
Class A	77 (21.7)	93 (19.8)	
Class B	117 (33.0)	159 (33.9)	
Class C	80 (22.5)	117 (24.9)	
Environmental factors (<i>n</i> [%])			
Living alone	197 (55.5)	255 (54.4)	0.72
Absence of primary caregiver	94 (26.5)	126 (26.9)	0.98
Risk for caregiver burden	213 (60.0)	252 (53.7)	0.015
Psycho-medical-social disorders (<i>n</i> [%])			
Presence of psycho-medical-social problems (elder abuse or neglect, abuse of alcohol or medication, disruptive behavior, and so on)	134 (37.7)	250 (53.3)	<0.001
<i>Admission on</i>			
Geriatric ward (<i>n</i> [%])	298 (83.9)	355 (75.7)	<0.001
Internal medicine ward (<i>n</i> [%])	24 (6.8)	77 (16.4)	
Rehabilitation ward (<i>n</i> [%])	6 (1.7)	33 (7.0)	
<i>Length of stay</i>			
Median length of stay in days (Q1–Q3)	29 (18–48)	28 (16–45)	0.07
<i>Number of drop-outs during follow-up</i>			
Reason for drop-out			
Transfer (%)	32 (37.6)	32 (25.8)	0.029
Refusal (%)	7 (8.2)	4 (3.2)	
Death (%)	46 (54.1)	88 (71.0)	

¹For financing reasons (reimbursement), the level of independency is assessed in every patient, using the adapted version of the Katz index [21] in which six items are assessed with a 4-point Likert scale. Patients are classified into four categories (class 0, A, B, or C), corresponding to the Katz index [22].

Class 0, physically independent; class A, physically dependent in bathing and dressing, and dependent in transfer or going to the toilet; class B, physically dependent in bathing and dressing, and dependent in transfer and/or eating and/or being incontinent; class C, physically dependent in bathing and dressing, and dependent in transfer and going to the toilet, and being incontinent and/or dependent in eating.

continuity of care, use of the client–case manager relationship, a client-centered approach, titration of provision and structure, and promotion of self-care and holistic care [4], with the purpose to facilitate discharge from hospital to home. Case managers received a 7-day training focusing on these core principles and had 8–10 peer review sessions. A supervising committee of representatives of hospital and home care was established to improve the collaboration between hospital and home care and to facilitate implementation of discharge management both on the local and national level. Home visits by the case managers were unfeasible

because hospital care in Belgium is organized and financed at the federal level and home care at the regional level, hindering successful collaboration and integration, admittedly limiting the full implementation of comprehensive discharge planning across hospital boundaries in the home health care setting.

All patients admitted to a geriatric, internal medicine, or rehabilitation unit in the discharge management group were screened for risk factors of readmission and institutionalization. Patients at risk were included in the project. After inclusion, and within 72 hours after admission, a systematic, extensive, and standardized assessment of the patient's physical, cognitive,

Table 3 Variables and data collection points in time

Admission of patient (geriatric/internal medicine/rehabilitation ward) (T0)
Risk factors for readmission and institutionalization
Within 72 hours after admission
Hospitalizations and/or institutionalizations within 90 days pre-admission (number and length of stay)
Within 72 hours before discharge (T1)
Number of days admitted in hospital
Discharge to home, nursing home, convalescent home or other
Ward of discharge (geriatric/internal medicine/rehabilitation ward)
Use of health care services as planned at discharge (discipline and number of visits/week)
At 15 days post discharge (T2)
Use of health care services (discipline and number of visits/week)
Hospital readmission within 14 days (number and length of stay)
Institutionalization in nursing or rest home or elsewhere
At 90 days post discharge (T3)
Hospital readmission within 90 days (number and length of stay)
Institutionalization in nursing or rest home or elsewhere

affective, and social functioning as well as characteristics of the patient's physical and social environment was performed. Using standardized instruments to obtain certain types of clinical data, we performed this comprehensive multidisciplinary assessment to determine the health care needs and resources of patients and their primary caregiver. The focus was on evaluation of the situation at home before admission in comparison with the situation on admission and on how hospital stay could be used at best to prepare the elderly person and his primary caregiver to return home. On the basis of this assessment, a care plan was developed and implemented. Although assessment and care planning was an ongoing process, a standard reassessment was planned within 72 hours before discharge, to make necessary adjustments to the care plan. The objective of this care plan was to avoid fragmentation or duplication of care and to guarantee continuity of care across institutional boundaries. The interdisciplinary team consisted of both intramural and extramural caregivers who were or would be involved in the care of the patient and his primary caregiver. Variability in the discharge management protocol was allowed as long as the core principles of case management [4] were preserved, allowing procedures to be adapted to hospitals' regional variation and to patients and their families.

Participants in the usual care group received usual discharge planning. Participating hospitals varied substantially in view of strategies used for discharge preparation with some hospitals already having included some elements inherent to case management. Yet, none of the hospitals in the usual care group used systematic screening for patients at risk and an active involvement of family and primary health care professionals in the planning process of this discharge preparation.

Statistical analyses

For group comparisons of two independent samples, *t*-test was used in case of continuous, normally distributed variables

and the Mann–Whitney *U*-test in case of continuous not normally distributed variables. For nominal data, Pearson's chi-square test was applied. If the assumptions were not satisfied, Fisher's exact test was adopted. Multivariate binary logistic regression analyses were performed to assess the effect of discharge management on institutionalization and readmission, adjusted for confounding factors. Factors included in the multivariate analyses were those for which a significant difference in baseline characteristics was observed between the two groups: presence of risk for caregiver burden, presence of psycho-medical-social problems, and ward of admission. Statistical Package for the Social Sciences (SPSS™) 9.0.1 was used as standard computer program. The significance level was set at $P < 0.05$. Of the 824 selected cases, 282 (34.2%) were rejected because of missing data. A missing value analysis only demonstrated a difference between the remaining group and the group that dropped out regarding dependence on the Katz index [107/532 (20.1%) versus 90/266 (33.7%); $P < 0.001$].

Results

Only one risk factor were significantly different between the entire sample ($n = 6066$) and the subsample for the quasi-experimental study ($n = 824$). For the entire sample, the proportion that used home nursing ≥ 3 days/week was significantly higher than for the subsample [2424/5790 (41.9%) versus 239/798 (29.9%); $P < 0.001$].

Three hundred and fifty-five patients (43.1%) were included in the experimental group receiving comprehensive discharge management and 469 patients (56.9%) in the control group receiving usual care. In the discharge management group, significantly more patients were discharged to their home and fewer patients were discharged to a nursing home compared with the usual care group ($P = 0.016$) (Table 4). The difference in risk of institutionalization between the discharge management and usual care group persisted within 15 days ($P = 0.001$)

Table 4 Discharge, institutionalization, and readmission in elderly receiving either discharge management or usual care

	Discharge management (<i>n</i> = 355) (<i>n</i> [%])	Usual care (<i>n</i> = 469) (<i>n</i> [%])	<i>P</i> -value
Discharge to			
Home	216 (60.8)	232 (49.5)	0.016
Nursing home	63 (17.7)	118 (25.2)	
Convalescent home	5 (1.4)	9 (1.9)	
Other	8 (2.3)	14 (3.0)	
Missing	63 (17.7)	96 (20.5)	
Institutionalization at			
15 days post discharge			0.001
Yes	61 (17.2)	120 (25.6)	
No	226 (63.7)	238 (50.7)	
Missing	68 (19.2)	111 (23.7)	
90 days post discharge			<0.001
Yes	53 (14.9)	130 (27.7)	
No	176 (49.6)	215 (45.8)	
Missing	126 (35.5)	124 (26.4)	
Readmission at			
15 days post discharge			0.07
Yes	10 (2.8)	24 (5.1)	
No	270 (76.1)	334 (71.2)	
Missing	75 (21.1)	111 (23.7)	
90 days post discharge			0.66
Yes	47 (13.2)	76 (16.2)	
No	179 (50.4)	264 (56.3)	
Missing	129 (36.3)	129 (27.5)	

and 90 days ($P < 0.001$) after discharge. Multiple logistic regression analysis, adjusting for differences between both groups (Table 2), revealed that discharge management significantly contributed to the prevention of institutionalization. Compared with usual care, discharge management resulted in a reduction of the risk of institutionalization (adjusted odds ratio = 0.47; 95% confidence interval = 0.31–0.70). Hospital readmission rates within 15 and 90 days of patients discharged to their home or to a convalescent home were not statistically significant in both univariate ($P = 0.07$ and $P = 0.66$) and multivariate analyses (adjusted odds ratio = 0.58; 95% confidence interval = 0.26–1.25 and adjusted odds ratio = 0.90; 95% confidence interval = 0.58–1.40).

Discussion

In this large-scale translational research project, the effectiveness of comprehensive discharge management on institutionalization and hospital readmission was evaluated. The number of institutionalizations was significantly lower in patients receiving discharge management.

A potential explanation for the reduced institutionalization rate is a shift in mindset of the discharge managers. When a patient is admitted to the hospital with the request to transfer that patient to a nursing home after treatment of the acute health problems, social workers and nurses traditionally

explore available nursing home beds and place patients on the waiting lists. However, an in-depth data collection with respect to the patients' physical, psychological, and social health is undertaken as part of the intervention. This data collection—which is not systematically undertaken in non-discharge management patients—helped the multidisciplinary team to explore the underlying problems. By doing this, it frequently appeared that, with the appropriate preparation and support, home care was still an option instead of admission in a nursing home. This is predominantly the case when caregiver burden was the main trigger for hospital admission. In other words, being trained and acting as a discharge manager incited them to look for alternatives in home care, instead of immediately placing patients on the waiting lists of nursing homes.

Although the patients of the usual care group had almost double as many readmissions at 15 days post discharge compared with the discharge management group, the number of readmissions within 15 and 90 days post discharge was not significantly different between groups. Our findings contrast with previous studies that showed a positive effect of comprehensive discharge planning on hospital readmission [5–9]. Several explanations may apply. Firstly, in contrast to other studies, we targeted geriatric patients at risk of readmission or institutionalization with no selection for specific pathologies. Therefore, we did not use a disease-specific intervention. Secondly, most of the subjects had cognitive impairments

(e.g. dementia and/or depression) as cognitive impairment is a risk factor for rehospitalization and institutionalization [14–17]. Yet, most studies only included patients who were mentally alert [5–9]. Thirdly, our intervention was purely hospital-based, an important limitation given the evidence of the effectiveness of transitional care models with home interventions [7–9]. Fourthly, although the screening tool was developed based on risk factors derived from literature, post-hoc analyses revealed that the tool did not serve its purpose for predicting risk of readmission (low positive predictive value of 16.7%). Fifthly, most discharge managers were social workers or nurses working at the social service of the hospital. By nature of their roles, they focus primarily on social risk factors in discharge preparation. Because only a few discharge managers were geriatric nurse specialists, it is possible that clinical, psychosocial, and behavioral risk factors were less addressed than they should be. The effectiveness of advanced nurse practitioners in discharge management has been established in other studies [5–10,12]. These health care practitioners are better trained to address the issues of an at-risk elderly population. The nature of the implementation model did not allow work with this kind of specialist.

Some methodological issues are inherent to large-scale implementation projects. For instance, in this project, patients were not randomly assigned to the discharge management or usual care group, which could have introduced a selection bias. By undertaking multiple regression analysis, we have controlled for differences in baseline characteristics. Because of the relatively high number of patients with missing values on the outcome variables, 282 patients were however removed from these analyses. Because we observed that the patients who were dropped from the analyses were more dependent, this might have impacted on our findings.

Furthermore, the national implementation of discharge management on such a large scale implies variability. Although this may confound or dilute the effects, adjustment to the specific organization of the hospital is required to promote long-term implementation.

Because three hospital sites included both intervention and control subjects, contamination could occur because of usual practice staff becoming aware of the intervention discharge planning practices. Contamination was avoided as much as possible by having social workers who have not had training in discharge management, preparing the discharge of control patients. Hence, they used their traditional skills and methods to prepare patients for discharge. Admittedly, it is unlikely that contamination was fully avoided.

Notwithstanding these methodological issues, the reduction in the number of institutionalizations is considered a successful outcome in an important target population. Discharge management contributed to (i) a more systematic and thorough as well as ad-hoc understanding of the problems with continuity of geriatric care, (ii) a shift in care paradigm more tuned toward a thorough evaluation based on the patients' care needs instead of care based on rituals and habits, and (iii) a positive influence on teamwork. The structured approach, in which a thorough assessment of the needs of the patients and their central caregivers is combined with a systematic

implementation of care plans, is argued to be the success factor [18,19]. Moreover, the results of this project triggered policy as today discharge management is structurally implemented and financed by law in the geriatric departments of Belgian hospitals [20].

Future large-scale implementation projects for geriatric patients should include disease-specific interventions as well as a higher involvement of the clinical nurse and possibly advanced nurse practitioners in patient education and follow-up. In addition, it may be useful to assess not only the traditional outcome measures, such as hospital readmission or institutionalization, but also to evaluate the process of care (e.g. patient-centeredness, improvement of communication, multidisciplinary teamwork, continuity of care, and family outcomes).

Conclusions

This study demonstrated the feasibility of a nationwide policy focusing on the implementation of comprehensive in-hospital discharge planning for high-risk geriatric patients. Despite the variability inherent to (nationwide) policy implementation, comprehensive discharge planning for high-risk geriatric patients is effective in view of reduced institutionalizations. Reduced rehospitalization could not be achieved, in contrast with findings of published randomized controlled trials.

Acknowledgements

We are grateful to the participants, their families and carers, staff of the participating hospitals, and home care, who actively participated in this project, the case managers for their assistance with data collection, research student Karolien Smets for her assistance with data collection and data processing, research associates Bert Wouters, Stijn Bollen, and Solange Indenkleef for their assistance with training, intervention, and data processing, and Mrs Simoens-Desmet for her continuous support on behalf of the Belgian Ministry of Social Affairs, Public Health and Environment. University Hospitals of Leuven and the Intercommunale des Personnes Agées de Liège et environs (IPAL) are thanked for facilitating the research staff. Funding was provided by Belgian Ministry of Social Affairs, Public Health and Environment.

References

1. Creditor MC. Hazards of hospitalization of the elderly. *Ann Intern Med* 1993; **118**: 219–223.
2. Gorbien MJ, Bishop J, Beers MH, Norman D, Osterweil D, Rubenstein LZ. Iatrogenic illness in hospitalized elderly people. *J Am Geriatr Soc* 1992; **40**: 1031–1042.
3. Lessler DS, Wickizer TM. The impact of utilization management on readmissions among patients with cardiovascular disease. *Health Serv Res* 2000; **34**: 1315–1329.

4. Borgermans LA, Abraham IL, Milisen K, DeJace AM, Gosset C, Rondal PM. Nursing case management for psychogeriatric patients and their families: description of a clinical model. *Nurs Clin North Am* 1998; **33**: 529–542.
5. Evans RL, Hendricks RD. Evaluating hospital discharge planning: a randomized clinical trial. *Med Care* 1993; **31**: 358–370.
6. Haddock KS. Collaborative discharge planning: nursing and social services. *Clin Nurse Spec* 1994; **8** (248–252): 288.
7. Naylor M, Brooten D, Jones R, Lavizzo-Mourey R, Mezey M, Pauly M. Comprehensive discharge planning for the hospitalized elderly. A randomized clinical trial. *Ann Intern Med* 1994; **120**: 999–1006.
8. Naylor MD, Brooten D, Campbell R et al. Comprehensive discharge planning and home follow-up of hospitalized elders: a randomized clinical trial. *JAMA* 1999; **281**: 613–620.
9. Rich MW, Beckham V, Wittenberg C, Leven CL, Freedland KE, Carney RM. A multidisciplinary intervention to prevent the readmission of elderly patients with congestive heart failure. *N Engl J Med* 1995; **333**: 1190–1195.
10. Hyde CJ, Robert IE, Sinclair AJ. The effects of supporting discharge from hospital to home in older people. *Age Ageing* 2000; **29**: 271–279.
11. Shepperd S, Parkes J, McClaren J, Phillips C. Discharge planning from hospital to home. *Cochrane Database Syst Rev* 2004: CD000313.
12. Hansen FR, Poulsen H, Sorensen KH. A model of regular geriatric follow-up by home visits to selected patients discharged from a geriatric ward: a randomized controlled trial. *Ageing* 1995; **7**: 202–206.
13. Victor CR, Vetter NJ. Preparing the elderly for discharge from hospital: a neglected aspect of patient care? *Age Ageing* 1988; **17**: 155–163.
14. Brodaty H, McGilchrist C, Harris L, Peters KE. Time until institutionalization and death in patients with dementia. Role of caregiver training and risk factors. *Arch Neurol* 1993; **50**: 643–650.
15. Shapiro E, Tate R. Who is really at risk of institutionalization? *Gerontologist* 1988; **28**: 237–245.
16. Sullivan DH. Risk factors for early hospital readmission in a select population of geriatric rehabilitation patients: the significance of nutritional status. *J Am Geriatr Soc* 1992; **40**: 792–798.
17. Wimo A, Gustafsson L, Mattson B. Predictive validity of factors influencing the institutionalization of elderly people with psycho-geriatric disorders. *Scand J Prim Health Care* 1992; **10**: 185–191.
18. Richards S, Coast J. Interventions to improve access to health and social care after discharge from hospital: a systematic review. *J Health Serv Res Policy* 2003; **8**: 171–179.
19. Evans C, Drennan V, Roberts J. Practice nurses and older people: a case management approach to care. *J Adv Nurs* 2005; **51**: 343–352.
20. Moons P, Cnuts R, Decat W et al. Performantiemaatstaven voor ontslagmanagement: een aanzet tot kwaliteitsmeting. *Acta Hosp* 2005; **45**: 51–64.
21. Delesie L, Sermeus W, Vanden Boer G. *Syllabus for the formation with regard to medical activities, king's decision 14/08/1987, activities of daily living*. Ministry of Public Health and Ministry of Social Affairs, Brussels, and Centre for Health Services and Nursing Research, Leuven, 1987.
22. Katz S, Downs TD, Cash HR, Grotz RC. Progress in development of the index of ADL. *Gerontologist* 1970; **10**: 20–30.

Accepted for publication 18 June 2006