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CARE SERVICES FOR DEMENTIA PATIENTS: PREDICTORS FOR SERVICE UTILIZATION

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SUMMARY

Aim. The objective of this study was to examine service utilization figures among a representative sample of demented patients and to determine whether sociodemographic and health-related variables are associated with care utilization.

Method. The study population was derived from a population-based, two-stage cross-sectional study in The Netherlands and consisted of 102 demented subjects. Four levels of care intensity were used: level 1, no use of professional care; level 2, use of one or more types of professional care by community-dwelling subjects; level 3, residential living in homes for the aged; level 4, long-term care in specialized nursing homes. Sociodemographic variables and variables related to mental and physical health, functional dependency and severity of dementia were studied as determinants of levels of care.

Results. Eighty-two per cent of the study subjects used one or more types of formal care and 55% were institutionalized. Multivariate analysis yielded age, severity of dementia, somatic disorders, dependency in terms of ADL and marital status as predictors of higher levels of care. Sets of predictors differed across different care levels.

Conclusions. The findings point to the importance of the social network and the relevance of general medical treatment and an active approach towards decreasing the impact of ADL dependency in demented subjects.
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A substantial proportion of formal health care services are used by elderly people, including dementia patients and their families, who constitute an important target group for health care services. In The Netherlands, people age 65 and over account for about 13% of the population and use an estimated 36% of health care expenditure. Approximately 6.5% of aged subjects suffer dementing disorders; estimated costs related to dementing disorders, however, amount to almost 20% of health care expenditures for the aged. The costs of long-term care for demented patients in specialized nursing homes weigh heavily upon health care budgets and direct policy towards less expensive

alternatives (Ministry of Health, 1992, 1993; National Advisory Council for Public Health, 1994). As in most other European countries, the Dutch health policy officially aims to help older people to live in their own homes as long as possible. The level of supply of community care, including district nurses, home help and community mental health care, as well as semi-residential care (day facilities), is relatively high compared to other developed countries (Commission of the European Communities, 1993). Residential care is divided into moderately staffed homes for the aged and highly staffed specialized nursing homes. The former provide meals and home help and a limited amount of nursing care; residents may also use community mental health care and semi-residential services. In specialized nursing homes, all services are provided, including multidisciplinary diagnostics

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and rehabilitation, psychosocial support and day-structuring programmes (Ribbe, 1993).

Data regarding utilization of care services by demented patients are indispensable for health policy and planning of services for dementia. In addition to descriptive figures, it is important to have knowledge of predictors of utilization.

However, health care utilization figures regarding representative samples of dementia patients are, thus far, rather limited. In The Netherlands such figures are not available. A few Anglo-Saxon studies report on utilization of health services in relation to cognition. Campbell *et al.*'s (1983) comparison of service utilization between demented and non-demented subjects revealed important differences: 51.8% of dementia patients compared to 9.6% of non-demented elderly were institutionalized; district nurses, home help, day facilities and meals on wheels were used by respectively 68%, 20%, 32% and 12% of demented subjects; non-demented elderly used these services in only 24%, 12%, 4% and 9% of cases. Philp *et al.* (1995) studied the use of services by community-dwelling elderly known to their general practitioner (GP). Comparing the demented and the non-demented elderly, there was significantly higher use by demented patients of home help (57% vs 36%), district nurses (58% vs 34%), community mental health care (12% vs 0%), day hospital (48% vs 17%), day centre (18% vs 7%) and meals on wheels (18% vs 4%). These data illustrate the importance of cognitive impairment and dementia in health services utilization. In addition to dementia or cognitive dysfunction, other factors may predict service utilization, e.g. sociodemographic factors (age, gender, socioeconomic status, marital status, housing situation), depression and physical health status, functional status (activities of daily living (ADL) and instrumental activities of daily living (IADL)), incontinence, social network and caregiver characteristics (Bos, 1989; Harrison *et al.*, 1990; Kempen and Suurmeyer, 1991; Ganguli *et al.*, 1993; Cohen *et al.*, 1993; Chen *et al.*, 1995). In studies including sociodemographic factors as well as cognition, after adjustment for other factors, cognitive dysfunction and dementia were found to predict care utilization independently (Nygaard and Albrektsen, 1992; Jagger *et al.*, 1993; Osterweil *et al.*, 1995).

Based on these studies, it can be concluded that cognitive dysfunction or dementia is a major determinant of care utilization. However, it is not known to what extent the above variables

(sociodemographic, health status, etc) are predictive of care utilization among representative samples of demented patients. Studies among such samples may help to better forecast service needs.

The present investigation aims (1) to examine service utilization among a representative sample of demented patients age 65 and over, using a service spectrum approach; and (2) to determine whether sociodemographic and health-related variables are predictive of different levels of care among demented subjects.

METHODS

Study population and procedures

The population for the current study consisted of all identified demented patients, including institutionalized subjects, from a population-based two-stage study on dementia in a rural area of The Netherlands which is described in detail elsewhere (Eefsting *et al.*, 1996). Briefly, over a period of 1 year (March 1, 1991–March 1, 1992) all persons age 65 and over by March 1, 1991 were invited by their GP or attending physician to participate in the study. In the first stage, the Mini-Mental State Examination (MMSE) (Folstein *et al.*, 1975) was used as a screening instrument of cognitive functioning. Sociodemographic data were also recorded. Out of 2655 invited subjects, 2191 participated in the first stage (response 82.5%). In order to obtain an enriched sample with an over-representation of cases, a non-proportional stratified random sample was drawn based on MMSE scores. Subjects scoring 17 or below, together with a random two-in-three sample of those scoring between 18 and 23 and a random one-in-three sample of those scoring between 24 and 27, were invited for the second, diagnostic stage.

Out of 496 invited subjects, 421 participated in this study stage (response 84.9%). The purpose of the second-stage investigation was to reach a clinical diagnosis of dementia using the Dutch translation of the Cambridge Examination for Mental Disorders of the Elderly (CAMDEX) (Roth *et al.*, 1986; Derix *et al.*, 1991). This standardized instrument contains all necessary components for a clinical diagnosis of dementia, including an interview with an informant. This interview was extended with questions regarding activities of daily living (ADL, including feeding, bathing, dressing, transferring and toileting), instrumental activities of daily living (IADL,

including shopping, housekeeping and food preparation) and service utilization.

Diagnosis of psychiatric and somatic disorders was based on information gathered during administration of the CAMDEX. DSM-III-R (APA, 1987) as well as CAMDEX criteria were applied for diagnostic classification and staging of psychiatric disorders. For somatic disorders, the International Classification of Primary Care (Classification Committee of WONCA, 1990) was applied.

Study variables

To determine frequencies and predictors of service utilization, the following levels of care intensity were studied as dependent variables.

With regard to community-dwelling subjects:

Care level 1: no use of professional care

Care level 2: use of one or more types of professional care, including domiciliary services (formal home help, district nurse) and ambulatory and semi-residential services (community mental health service, day facilities)

With regard to institutionalized subjects:

Care level 3: residential living in home for the aged

Care level 4: long-term care in specialized nursing homes

Several sociodemographic variables, as well as variables related to mental and physical health, were used as predictors. A description of these variables and their categorization is given in Table 1.

In relation to the rural character of the study population, the variable 'supported living' was applied for situations where the demented subject lived in an apartment inside or adjacent to the relative's residence.

Analysis

The four levels of care services were used as dependent variables. Predictors were studied by contrasting adjacent levels of care. Thus, with regard to the listed independent variables, subjects at home without care were compared with subjects at home with care (level 1 vs 2), subjects at home with care were compared with residents of homes for the aged (level 2 vs 3) and residents of homes for the aged were compared with specialized nursing home residents (level 3 vs 4). In addition to contrasting adjacent levels of care intensity, subjects at home were compared with residents of homes for the aged (levels 1, 2 vs 3) and the first three levels were combined and compared with the highest level (levels 1, 2, 3 vs 4).

Initially, all analyses were conducted bivariately, with the MMSE score as a covariate in order to

Table 1. Type and categorization of variables used to predict levels of care services received by demented subjects

Variable		Range/categorization
Age	Interval	65–103 years
	Categorical	<80 (1) vs >80years (0)
Sex	Categorical	Women (1)/men (0)
Marital status	Categorical	Married (1) vs widowed, unmarried, divorced (0)
Supported living	Categorical	Yes (1)/no (0)
MMSE score	Interval	0–28
ADL score	Interval	0–10
IADL score	Interval	0–10
Dementia subtype	Categorical	Alzheimer (1), multi-infarct dementia (2), mixed dementia (3), other types (4)
Severity		
Following DSM criteria	Categorical	Mild (0) vs moderate/severe (1)
Following CAMDEX criteria	Categorical	Mild (0) vs moderate/severe (1)
Depression following CAMDEX criteria	Categorical	Present (1) vs absent (0)
Somatic disorders	Ordinal	0–5
Motor/neurological	Categorical	Present vs absent
Cardiopulmonary		
Sensory		
Endocrine		
Other		

adjust for the sampling procedure. Because the possible predictors were likely to be correlated with each other, we chose not to use multiple comparison methods. Multivariate analyses were performed by means of logistic regression, to take several variables and interactions into account simultaneously (Hosmer and Lemeshow, 1989). After entering the variable MMSE score, inclusion of variables was dependent on score tests in a forward stepwise selection procedure. Further plausible interactions between variables included in the model were tested for improved fit of the model. Analyses were performed using the software packages EGRET (Statistics and Epidemiology Research Corporation, 1988) and SPSS-PC (Norusis, 1990). A difference was considered statistically significant if $p < 0.05$.

RESULTS

Service utilization

After the diagnostic stage, a dementia syndrome was identified in 102 subjects age 65 and over. Characteristics of the study subjects by levels of care intensity are presented in Table 2.

Determinants of levels of care intensity

Level 2 versus level 1: formal care at home versus no formal care at home. Comparing community-dwelling demented subjects not receiving formal services with subjects receiving formal services, bivariate analysis using MMSE score as a covariate showed that those receiving formal help were less often married and were more dependent in ADL and IADL compared to those at home not receiving formal services.

In multivariate analysis, higher dependency in ADL and not being married were positively associated with the use of formal services (Table 3).

Moreover, a significant interaction of marital status and gender existed, indicating that with regard to the use of formal services and adjusted for other variables, the 'protective' effect of being married is higher for men than for women.

Level 3 versus level 2: care received by residents of homes for the aged versus care received at home. Age was the only significant predictor of care level 3 in bivariate analyses: higher age was positively associated with care level 3 after adjustment for MMSE score. Multivariate analyses yielded comparable results.

Level 4 versus level 3: care in specialized nursing homes versus care in homes for the aged. In bivariate analyses, severity of dementia following CAMDEX criteria was the only significant predictor of care level 4. Multivariate analysis yielded comparable results indicating that more severe stages of dementia were positively associated with institutionalization in specialized nursing homes.

Level 3 versus levels 1, 2: care in homes for the aged versus formal or no formal care at home. Bivariate analysis showed that, after adjusting for MMSE score, age was the only significant predictor of the use of care level 3. Multivariate

Table 2. Characteristics of the study subjects by levels of care intensity

Variables	Level of care intensity				Total
	1	2	3	4	
<i>N</i>	18	28	19	37	102
Mean age (yr)	78.8	81.8	85.7	84.4	82.9
Sex (<i>n</i>)					
Female	10	17	14	24	65
Male	8	9	5	13	37
Marital status (<i>n</i>)					
Married	10	6	3	11	30
Widowed/unmarried	8	22	16	26	72
Supported living (<i>n</i>)					
No	12	17	NA	NA	NA
Yes	6	11			
Mean MMSE score	16.6	14.8	13.6	5.5	11.5
Mean ADL score*	0.8	4.2	4.9	8.4	5.3
Mean IADL score*	4.4	7.6	7.6	9.0	6.5
Dementia subtype (<i>n</i>)					
Alzheimer	14	18	12	17	65
Multi-infarct dementia	2	1	4	10	18
Mixed	2	5	1	4	10
Other	0	4	2	2	9
Severity (DSM) (<i>n</i>)					
Mild	9	6	3	1	19
Moderate/severe	9	22	16	36	83
Severity (CAMDEX) (<i>n</i>)					
Mild	15	18	15	6	54
Moderate/severe	3	10	4	31	48
Depression (CAMDEX) (<i>n</i>)					
Present	1	4	2	6	13
Absent	17	24	17	31	89
Somatic disorders*					
Median	1	1	1	1	1
Range	0-3	0-4	1-4	0-4	0-4

NA, not applicable

*Missing values: ADL 2; IADL 12; somatic disorders 1.

Table 3. Logistic regression coefficients for adjacent levels of care intensity with predicting variables

Variable*	Level 2 versus level 1			Level 3 versus level 2			Level 4 versus level 3		
	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>
MMSE score	0.1261	0.104	0.225	0.0161	0.0554	0.771	0.0935	0.0645	0.709
ADL score	1.177	0.470	0.012	—	—	—	—	—	—
Marital status (married vs not married)	-6.829	3.21	0.033	—	—	—	—	—	—
Sex (women vs men)	-2.281	1.67	0.171	—	—	—	—	—	—
Marital status × sex (married × women)	7.859	3.97	0.048	—	—	—	—	—	—
Age	—	—	—	0.1202	0.0609	0.049	—	—	—
Somatic disorders	—	—	—	—	—	—	—	—	—
Severity (CAMDEX) (mod./sev. vs mild)	—	—	—	—	—	—	2.187	0.856	0.011

*Variables without significant effect: supported living, IADL score, dementia subtype and depression.

Table 4. Logistic regression coefficients for adjacent levels of care intensity with predicting variables

Variable*	Level 3 versus levels 1 + 2			Levels 4 versus levels 1 + 2 + 3		
	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>
MMSE score	-0.1196	0.170	0.481	0.2806	0.186	0.131
ADL score	1.288	0.506	0.011	1.345	0.498	0.007
Age	0.2193	0.101	0.029	—	—	—
Severity (CAMDEX) (mod./sev. vs mild)	-3.780	1.89	0.046	7.184	3.06	0.019
ADL score × MMSE score	-0.0687	0.0296	0.020	-0.04784	0.0234	0.041
ADL score × severity	—	—	—	-0.7351	0.360	0.041
Somatic disorders	-2.874	1.43	0.045	—	—	—
Somatic disorders × MMSE score	0.2089	0.0867	0.016	—	—	—

*Variables without significant effect: sex, marital status, supported living, IADL score, dementia subtype and depression.

analyses yielded significant effects of age, severity of dementia according to CAMDEX criteria, dependency in ADL, number of somatic disorders, as well as interactions between MMSE and ADL and MMSE and number of somatic disorders (Table 4). Older demented subjects were, compared with younger demented subjects, more likely to be residents of homes for the aged. However, less severe stages of dementia were positively associated with living in these residences. The interaction between MMSE and ADL means that, adjusted for other variables, the effect of ADL score decreases with increasing MMSE scores. Thus increasing ADL dependency is a less important predictor for subjects with higher MMSE scores. The interaction between MMSE and number of somatic disorders indicates that the effect of somatic disorders is dependent on MMSE scores: the number of somatic disorders predicts care level 3 negatively for subjects with relatively low MMSE scores but positively for those with relatively high MMSE scores.

Level 4 versus levels 1, 2, 3: specialized nursing home care versus other levels of care. Bivariate analyses yielded ADL score, IADL score and dementia severity according to CAMDEX as the only significant predictors of care level 4. Higher dependency in ADL and more severe stages of dementia were positively associated with care received as residents of specialized nursing homes. Multivariate analyses showed main effects of ADL score and dementia severity according to CAMDEX, as well as interaction effects of ADL score and MMSE score and ADL score and severity of dementia.

The first interaction effect indicates that, adjusted for other variables, the effect of ADL score decreases with increasing MMSE scores. The interaction between ADL score and severity of dementia similarly indicates that the effect of ADL score is smaller for subjects with more severe stages of dementia compared with mildly demented subjects.

DISCUSSION

In this study the use of formal care services by a representative sample of demented subjects was addressed. As expected, demented subjects showed high service utilization figures, especially with regard to domiciliary and residential care. More than 80% received one or more types of formal care, and less than half (45%) of the study subjects were living at home.

In order to study several sociodemographic and health-related determinants of care utilization among a representative sample of demented subjects, the concept of levels of care intensity was introduced in a way that takes into account community care services and institutional care. In all analyses, a correction for the two-stage sampling procedure was performed. For different care levels, different sets of predictors were observed. Formal care given at home was predicted by dependency in ADL, marital status and gender: being married seems to limit the use of formal care, especially for men. This can be explained by the fact that male demented patients are less frequently widowed than female demented patients. Thus, the former have more opportunities to receive intensive informal care, which will in turn decrease the necessity of professional care (Boersma and Eefsting, 1996).

The results concerning care received in homes for the aged point to the importance of age as a predictor for this type of care. Residents of these homes are not more severely demented according to CAMDEX staging as compared to subjects using other levels of care. Moreover, in the comparison between demented subjects living in homes for the aged and those living at home, ADL dependency and somatic disorders were related to the care level. Living in homes for the aged was predicted by increasing ADL dependency for those with low MMSE scores and by the presence of more somatic disorders for those with high MMSE scores. Thus it seems that the care provided in homes for the aged is less related to dementia than to age and other health-related factors. In looking at the study subjects, it can be determined that dementia in itself was not a reason for admission. This explanation is supported by the fact that the relatively high prevalence of dementia in homes for the aged (21%) can be wholly attributed to the age distribution of the residents (Boersma *et al.*, 1995).

The highest level of care provided in specialized nursing homes is predicted by the severity of

dementia. This finding reflects the fact that progression of dementing disorders induces high levels of care intensity. An effect of ADL dependency and some interactions were found in the analysis where all lower levels of care intensity were contrasted with the highest level. The interactions are, however, relatively weak compared to the main effects of severity of dementia and ADL.

Thus, several factors define whether demented patients will really use health care facilities, e.g. age, severity of dementia, somatic disorders, dependency in terms of ADL and marital status.

A few methodological limitations should be mentioned. Firstly, the two-stage study design, with non-proportional sampling based on MMSE score, will have led to some over-representation of more severe cases. It is unlikely, however, that this fact has affected the findings to a great extent, because the vast majority of study subjects scored in the lowest MMSE category, which was over-sampled. Moreover, the sampling variable MMSE did not appear to be an important predictor of care intensity. Secondly, due to the sampling method, the study is not suited to determine predictors of care among non-demented subjects or to compare predictors among demented and non-demented subjects in a valid manner. Thus, it is not possible to demonstrate the importance of dementia as a predictor of care utilization in relation to other factors. However, based on data of other studies, dementia has to be regarded as one of the major factors in the use of formal care and in transitions to higher levels of care (Campbell *et al.*, 1983; Nygaard and Albrektsen *et al.*, 1992; Philp *et al.*, 1995; Osterweil *et al.*, 1995). The question whether in other studies reported health-related determinants, e.g. depression and somatic disorders and associated dependency, are equally important predictors for care utilization as dementia cannot be answered (Bisscheroux and Frederiks, 1986; Bos, 1989). The finding of this study that in bivariate, as well as in multivariate analyses depression was not a predictor of care intensity seems to indicate that, in demented patients, dependency due to dementia is more important in relation to the use of formal care than dependency due to depression. However, in demented subjects, it is often difficult to interpret depressive symptomatology either as coexisting depression or as symptoms related primary to dementia.

Finally, some variables like incontinence and troublesome behaviours were not taken into account separately as probably important

predictors for care utilization; their effects, however, are likely to be expressed in the CAMDEX staging variables. Moreover, psychological characteristics of the informal caregiver and socioeconomic status were not included in the present study. Therefore, their importance as determinants could not be studied. Socioeconomic status was not addressed as a potential predictor because measurement of this variable is problematic, especially among elderly, women and widowed subjects (Liberatos *et al.*, 1988; Martelin, 1994). Further, the impact of socioeconomic status on service utilization is probably dependent on the sociocultural context of studies, e.g. social expectations and financial and social pressure to provide informal care for family members.

The concept of levels of care intensity was used to overcome the problems related to the diversity of available formal services delivering care, which are qualitatively, as well as quantitatively, hardly comparable. Moreover, between countries, and even regions, availability of care services differs substantially. Though the content of the care in the constructed four levels of intensity is not strictly defined, with increasing levels costs are clearly rising. The concept of care intensity appears useful in view of the findings that either increasing ADL dependency or increasing severity of dementia predicts higher levels of care. However, this does not apply fully to the Dutch homes for the aged, which at the time of the study appeared to serve more as a living facility for the oldest old than a care facility. More recently, care functions of the homes for the aged and cooperation with specialized nursing homes are being emphasized.

Preventing the conditions related to the use of higher care levels in demented subjects, e.g. higher age, somatic disorders, not being married, ADL dependency and more severe dementia, is hardly possible. The study findings point to the importance of the social network and the relevance of general medical treatment and an active approach towards decreasing the impact of ADL dependency, such as training and rehabilitation programmes or the provision of instrumental aids. Intervention programmes aimed at high-risk subgroups of demented patients can be considered in order to reduce transitions to higher care levels. The results of such programmes, often including caregiver support and information about health provisions, are thus far questionable with regard to reducing institutionalization, but they can positively influence caregivers' well-being

(Levin, 1991; O'Connor *et al.*, 1991). Effectiveness in regard to service utilization is likely to be improved if intervention programmes are integrated into the usual care, are tailor-made and well coordinated.

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