ARTICLE IN PRESS

JAMDA xxx (2016) 1–6

JAMDA

journal homepage: www.jamda.com

Original Study

Combinations of Service Use Types of People With Early Cognitive Disorders

Niels Janssen MSc[a], Ron L.H. Handels PhD[a], Sebastian Koehler PhD[a], Inez H.G.B. Ramakers PhD[a], Renske E.G. Hamel PhD[a], Marcel G.M. Olde Rikkert MD, PhD[b], Philip Scheltens MD, PhD[c], Femke H. Bouwman MD, PhD[c], Wiesje M. van der Flier PhD[c,d], Claire A.G. Wolfs PhD[a], Marjolein E. de Vugt PhD[a], Silvia M.A.A. Evers PhD[e], Frans R.J. Verhey MD, PhD[a,*]

[a] *Alzheimer Center Limburg, School for Mental Health and Neuroscience, Maastricht University Medical Center, Maastricht, The Netherlands*
[b] *Department of Geriatrics and Radboud Alzheimer Center, Radboud University Medical Center, Nijmegen, The Netherlands*
[c] *Alzheimer Center, Department of Neurology, VU University Medical Center, Amsterdam, The Netherlands*
[d] *Department of Epidemiology and Biostatistics, VU University Medical Center, Amsterdam, The Netherlands*
[e] *Department of Health Services Research, School for Public Health and Primary Care, Maastricht University, The Netherlands*

Keywords:
Early diagnosis
service use
dementia
mild cognitive impairment
latent class analysis

ABSTRACT

Objectives: Understanding which persons most likely use particular combinations of service types is important as this could lead to a better understanding of care pathways. The aim of this study is to identify combinations of service use within a sample of community-dwelling people with mild cognitive impairment (MCI) and dementia and identify factors related to these service use combinations.

Methods: A latent class analysis performed at baseline on a merged dataset ($n = 530$) was used to classify care recipients based on following service use types: general practitioner visits, physiotherapist visits, hospital outpatient specialist visits, emergency room visits, hospital inpatient visits with stay over, day care visits, use of domestic homecare, use of personal homecare, and informal care on (instrumental) activities of daily living. Multinomial logistic regression was performed to identify factors associated with service use combinations using clinical characteristics of the care recipient and demographic characteristics of the care recipient and caregiver.

Results: Three service use classes were identified; a formal homecare class (10% of participants), an informal care class (46% of participants), and a low user class (44% of participants). Factors increasing the likelihood of being in the formal homecare class compared with the low service use class included a diagnosis of MCI or dementia, activities of daily living impairment, older age of the care recipient, and care recipient not living together with the caregiver.

Conclusions: Besides a diagnosis of MCI or dementia, other factors (activities of daily living impairment, age, and living situation) were associated with service use. We recommend using these factors alongside the diagnostic label for care indication.

Alzheimer disease (AD) and associated dementia disorders have a great impact on people with dementia and their families. With a worldwide prevalence of 36 million[1] and related cost of $604 billion,[2] dementia places a substantial burden on societies. Because of the progressive nature of the disease, people with dementia often require increasing amounts of support on their cognitive abilities and activities of daily living (ADL) at home and often eventually in an institution.[3,4] Early diagnosis of dementia is considered important for access to treatment, support, and future care and life planning for persons with dementia and their caregivers.[1,5]

It is unclear what types of services are being used after a formal early diagnosis has been made. Understanding how clinical and demographic characteristics influence the use of care services is important to plan timely access to these types of care. Furthermore, because many different care providers are involved in the diagnostic process and care provision, insight in factors related to service use

---

The authors declare no conflicts of interest.

[*] Address correspondence to Frans R.J. Verhey, MD, PhD, Alzheimer Center Limburg, School for Mental Health and Neuroscience, Maastricht University Medical Center, P.O. Box 5800, Maastricht AZ 6202, The Netherlands.

E-mail address: f.verhey@maastrichtuniversity.nl (F.R.J. Verhey).

http://dx.doi.org/10.1016/j.jamda.2016.02.034

types could lead to better coordination of care between providers and informal caregivers.

Several studies examined service use of people with dementia and their caregivers. Overall, a diagnosis of dementia has been found to be a major determinant of service use[6] with increasing service use in more severe disease stages.[6–8] People with dementia use healthcare services (eg, specialist visits) more often than community services (eg, day care).[9–11] Factors associated with higher levels of service use have been found to be impaired ADL,[6,7,12] neuropsychiatric symptoms,[4] comorbidities,[8] not having a spousal caregiver,[8,13] caregiver and person with dementia not living together,[13,14] knowledge of available services,[15–17] caregiver's positive attitude toward service use,[18] higher caregiver burden,[17] higher number of skilled nursing facilities,[19] availability of public and private transportation,[13] higher educational level,[8,13] higher age, and not being married.[6] Factors for non-utilization of services have been found to be severity of cognition and a negative attitude of the person with dementia toward service use.[17] Furthermore, Beeber et al[19] showed that people with dementia and their caregivers tend to use a combination of different types (eg, using home health and home aide) rather than a single service type.

Studies on service use of people with mild cognitive impairment (MCI), often preceding dementia[20] are scarce. Although MCI according to the criteria is not severe enough to interfere with activities of daily living,[21] people with MCI showed to have higher medical costs and receive more informal care compared to people without MCI.[22] This finding suggests that informal care already starts before a person develops dementia.

Current evidence mainly focuses on associations with single types of service use. Only Beeber et al[19] focused on combinations of service types, although limited to community services. More research is needed to identify combinations of service types when incorporating a broader range of service types.

A better understanding of combinations and associated factors is important for timely access and coordination of care for people with MCI and dementia. This cross-sectional study, therefore, aims to identify subgroups of community-dwelling patients with MCI and dementia who share similar combinations of service use at their initial visit to a memory clinic using latent class analysis (LCA), and examine which clinical and demographic factors are related to these subgroups.

Methods

Design

A cross-sectional secondary data analysis was carried out on a merged dataset with data of 4 Dutch longitudinal studies with overlapping protocols: (1) the Leiden Alzheimer Research Netherlands (LEARN) study,[23] (2) the Clinical Course of Cognition and Comorbidity (4C) MCI study (Liao W, Hamel RE, Olde Rikkert MG, et al. Cohort profile: The Clinical Course of Cognition and Comorbidity in Mild Cognitive Impairment and Dementia [the 4C study]: Two complementary longitudinal, clinical cohorts in The Netherlands, unpublished data), (3) the 4C Dementia study[24] (data from Maastricht location only), and (4) the Dutch Flutemetamol study.[25] In all studies, patients were referred to the memory clinic of 1 of 4 academic hospitals (Maastricht, Leiden, Nijmegen, or Amsterdam) for evaluation of their cognitive complaints. They received an extensive clinical examination and the informal caregiver was asked to fill out a booklet with questions about service use, informal care, working situation and quality of life of themselves and the person with the memory disorder.

Study Population

Inclusion criteria of the Clinical Course of Cognition and Comorbidity in Mild Cognitive Impairment (4C-MCI) and Clinical Course of Cognition and Comorbidity in Dementia (4C-Dementia), LEARN, and the Dutch Flutemetamol study consisted of (1) a Clinical Dementia Rating score of 0–2; (2) a Mini-Mental State Examination (MMSE) score of $\geq$10; and (3) the availability of having a reliable proxy, further referred to as the informal caregiver.

Exclusion criteria were other neurologic diseases (ie, normal pressure hydrocephalus, Parkinson disease, Huntington disease, cognitive problems because of alcohol use, a cerebral vascular accident or transient ischemic attack less than 2 years ago, brain tumor, epilepsy, encephalitis); a psychiatric history less than 12 months ago (ie, major depression according to the Statistical Manual of Mental Disorders, 4th Edition); and suspicion of the participants not being able to have at least 1 follow-up.

In total, 1033 people participated in 4 studies: 304 in the LEARN study, 315 in the 4C MCI study, 329 in the 4C Dementia study, and 211 in the Dutch Flutemetamol study (some people participated in more than 1 study, $n = 126$). Of all 1033 participants, 178 participated solely in 4C Dementia study in Amsterdam or Nijmegen of whom service use data was not obtained. Participants were excluded because of a diagnosis of subjective memory complaints ($n = 199$), being institutionalized ($n = 55$), having all clinical data or the syndrome diagnosis missing ($n = 2$), or having all service use data missing ($n = 104$). The final sample eligible for analyses comprised 530 community-dwelling people with MCI or dementia, further referred to as care recipients.

Measures

Demographic characteristics of the care recipients included gender, age, and years of formal education. Demographic characteristics of the informal caregivers included gender, age, years of formal education, living situation, and working situation. Clinical measures of the care recipients included a diagnosis of MCI or dementia (because of AD or other cause), cognitive functioning measured by the MMSE, with lower scores representing more severe cognitive problems,[26] behavioral problems measured by the neuropsychiatric inventory (NPI), with higher scores indicating increased severity[27]; and functional abilities of ADL measured by the disability assessment for dementia (DAD), with lower scores indicating increased disabilities on performing ADL.[28]

Measures of service use were derived through a comprised questionnaire filled out by the informal caregiver.[23] This questionnaire consisted of the Resource Utilization in Dementia Lite[29] and additional questions, which measured service use on general practitioner (GP) visits, physiotherapy visits, psychologist visits, community mental health team visits, emergency room visits, hours of personal or nursing homecare, hours of domestic homecare, days of day care at nursing home, care home or community center, being admitted to a nursing home or care home, hospital outpatient specialist visits (any-type eg, geriatrician, urologist), hospital inpatient visits with stay overnight, hospital inpatient visits without stay overnight, hours of informal care of activities in daily living (ADL; eg, dressing), and hours of informal care of instrumental ADL (IADL; eg, cooking). In the questionnaire it was asked if and how often the care recipient, or the informal caregiver because of the problems of the patient, used these services within a recall period of 3 months. A copy of the booklet can be provided upon request.

The following service use variables were included for further analyses: GP visits, physiotherapy visits, emergency room visits, personal homecare, domestic homecare, day care visit, hospital outpatient specialist visits, hospital inpatient visits with overnight stay and informal care ADL, and informal care IADL. Psychologist visits, community mental health team visits, and hospital inpatient visits without stay-over were excluded because data were only obtained in a subsample.