

A Systematic Review of Intervention Studies to Prevent Hospitalizations of Community-dwelling Older Adults With Dementia

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Objectives: To conduct a systematic literature review to determine if there were any intervention strategies that had any measurable effect on acute-care hospitalizations among community-dwelling adults with dementia.

Design: Studies were identified by a professional research librarian and content experts.

Setting: Community dwelling.

Participants: Participants were diagnosed with dementia, severity ranging from mild to severe, and were recruited from health care and community agencies.

Measurements: A study met the inclusion criteria if it: (a) was published in English; (b) included a control or comparison group; (c) published outcome data from the intervention under study; (d) reported hospitalization as one of the outcomes; (e) included community-dwelling older adults; and (f) enrolled participants with dementia. Ten studies met all inclusion criteria.

Results: Of the 10 studies included, most assessed health services use (ie, hospitalizations) as a secondary outcome. Participants were recruited from a range of health care and community agencies, and most were diagnosed with dementia with severity ratings ranging

from mild to severe. Most intervention strategies consisted of face-to-face assessments of the persons living with dementia, their caregivers, and the development and implementation of a care plan. A significant reduction in hospital admissions was not found in any of the included studies, although 1 study did observe a reduction in hospital days.

Conclusions: The majority of studies included hospitalizations as a secondary outcome. Only 1 intervention was found to have an effect on hospitalizations. Future work would benefit from strategies specifically designed to reduce and prevent acute hospitalizations in persons with dementia.

Key Words: older adults, hospitalizations, systematic review, intervention studies, patient care management, case management, dementia, Alzheimer disease

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Rates of hospitalization of persons with dementia are rising and are projected to continue to increase over the 21st century.¹ Hospitalization rates appear to be consistently higher for persons with dementia compared to those free of dementia,^{2–4} both for all-cause^{2,4} as well as potentially preventable hospitalizations.^{2–4} Studies consistently show hospitalization has negative effects on the individual living with dementia, their family and the healthcare system. The associated costs of hospitalization, which are consistently higher in individuals with diagnosed dementia,³ place increased pressure on policymakers as they seek to stem rising health care costs. At the individual level, hospitalization of a person with dementia may have unintended, deleterious health consequences such as delirium,⁵ falls,⁶ and procedure-related complications⁷ and may also increase the risk of discharge to a higher level of care.⁸ Persons with dementia may also experience a greater risk of unmet needs, such as treatment of pain⁹ and relief of thirst,¹⁰ and suffer increased psychological distress while hospitalized.¹¹ Thus, avoiding hospitalizations of persons with dementia is a reasonable quality-of-care goal. For this reason, Healthy People 2020 has as one of its key dementia-related objectives “to reduce the proportion of preventable hospitalizations in persons with Alzheimer disease and other dementias.”^{12,13}

As dementia becomes more prevalent due to the increase in the number of people surviving to late life, increasing attention is likely to be paid to optimizing care for

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persons with this condition. With prevention of hospitalization as our particular focus, we searched but located no systematic review addressing this issue. The aim of our study was thus to conduct a review of the published literature to identify interventions designed to improve care for persons with dementia living in the community and to determine whether any measurable effect on acute-care hospitalizations was observed. We were specifically interested in studies with an explicit focus on keeping persons with dementia out of the hospital and in dementia that was not severe or end stage. A few reviews of intervention studies involving persons with dementia have focused on care/case management interventions.^{14–16} We sought to expand on previous reviews by including studies of any type of intervention and by looking specifically at whether the intervention reduced acute-care hospitalizations.

METHODS

This study was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) format for reporting systematic reviews and thus occurred in 3 stages: (a) development of criteria for inclusion and literature search; (b) extraction and coding of study characteristics and findings; and (c) data analysis and aggregation of findings.

Inclusion Criteria and Literature Search

Our search was restricted to published intervention studies. We selected a study for inclusion if it: (a) was published in English; (b) included a control or comparison group; (c) published outcome data from the intervention under study; (d) reported hospitalization as one of the outcomes; (e) included community-dwelling older adults; and (f) enrolled participants with dementia. We excluded studies that involved people under the age of 50 (to avoid a priori omission of any studies that enrolled persons with early-onset dementia), older adults living in nursing homes, interventions solely targeting caregiver outcomes, purely lifestyle interventions, and pharmaceutical trials.

A professional research librarian obtained articles from database searches (from 1990 through December 2013) of PubMed, CINAHL, Cochrane, Embase, PsycINFO, Wholis, Proquest, EBSCO, and WOS (see Fig. 1 for PRISMA-formatted chart with search strategy and details). Additional sources included reference lists from published studies and representatives of organizations who have published work in the area of dementia (eg, Institute of Medicine; University of California at Los Angeles). Four hundred thirty-four references were identified in this initial search. Then, through an iterative process, all authors systematically identified articles that met the inclusion criteria. See Figure 1 for details of the steps included in the systematic review, including MESH terms. This process resulted in 10 articles for analysis.^{17–26}

Data Extraction

A list of data to be extracted was compiled by the group, and 2 authors (K.J.D. and E.A.P.) extracted data independently and thereafter resolved any discrepancies via discussion. Data were extracted on the study design, participant characteristics, features of the interventions, and outcomes of the inter-

ventions. Intervention descriptions were categorized by the format in which they were delivered, the content and intensity (number of contacts with intervention participants and intervention period duration) of the intervention, and the target (ie, patient, physician, or caregiver) of the intervention content. When provided in the article, quantitative outcome data were also extracted, including statistical test results. All data extracted are provided in Tables 1 to 3.

Data Analysis

As the focus of this review was to identify promising interventions for the prevention of hospitalizations among community-dwelling older adults, data analysis concentrated on the features of the interventions. Specifically, the authors examined characteristics of the interventions that might influence findings related to hospitalization. In the Results section, tables provide intervention details including the mechanisms that might underlie any observed intervention effects.

RESULTS

Description of Included Studies

As shown in Table 1, of the 10 included studies, 6 were conducted in the United States. Study participants were recruited from a range of settings, including health care organizations, assisted living facilities, and community-based agencies; 1 study²⁴ used newspaper announcements and a health insurance registry of Alzheimer disease drug users. Half of the studies randomized the participant with dementia along with their caregiver. Sample sizes ranged from 43 to 408. The mean age of dementia participants across studies was 70.4 years. Dementia severity ranged from mild to severe; 4 studies focused on moderate-severity dementia, and in 1 study, dementia severity was not provided. The dementia type where specified was most often Alzheimer; in 5 studies, the dementia type was not characterized. Table 2 summarizes features of interventions in the included studies.

Outcomes and Related Features of Interventions

Although all included studies examined hospitalization as an outcome, hospitalization was a primary outcome in just half (Table 3). Most studies did not describe if health care utilization was tracked in real-time, such that that information would be known to the study interventionist and thereby permit him/her to take preemptive actions, either in the time period immediately leading up to admission (to prevent the admission) or at/shortly after the time of discharge (to prevent readmission). A significant reduction in hospital admissions was not found in any of the included studies, although 1 study did observe a reduction in hospital days.²⁴

DISCUSSION

With this review, we sought to summarize current evidence about interventions that reduce the risk of hospitalization of persons with dementia, an important outcome for both those with dementia and their families. None of the included studies demonstrated a significant effect on hospital

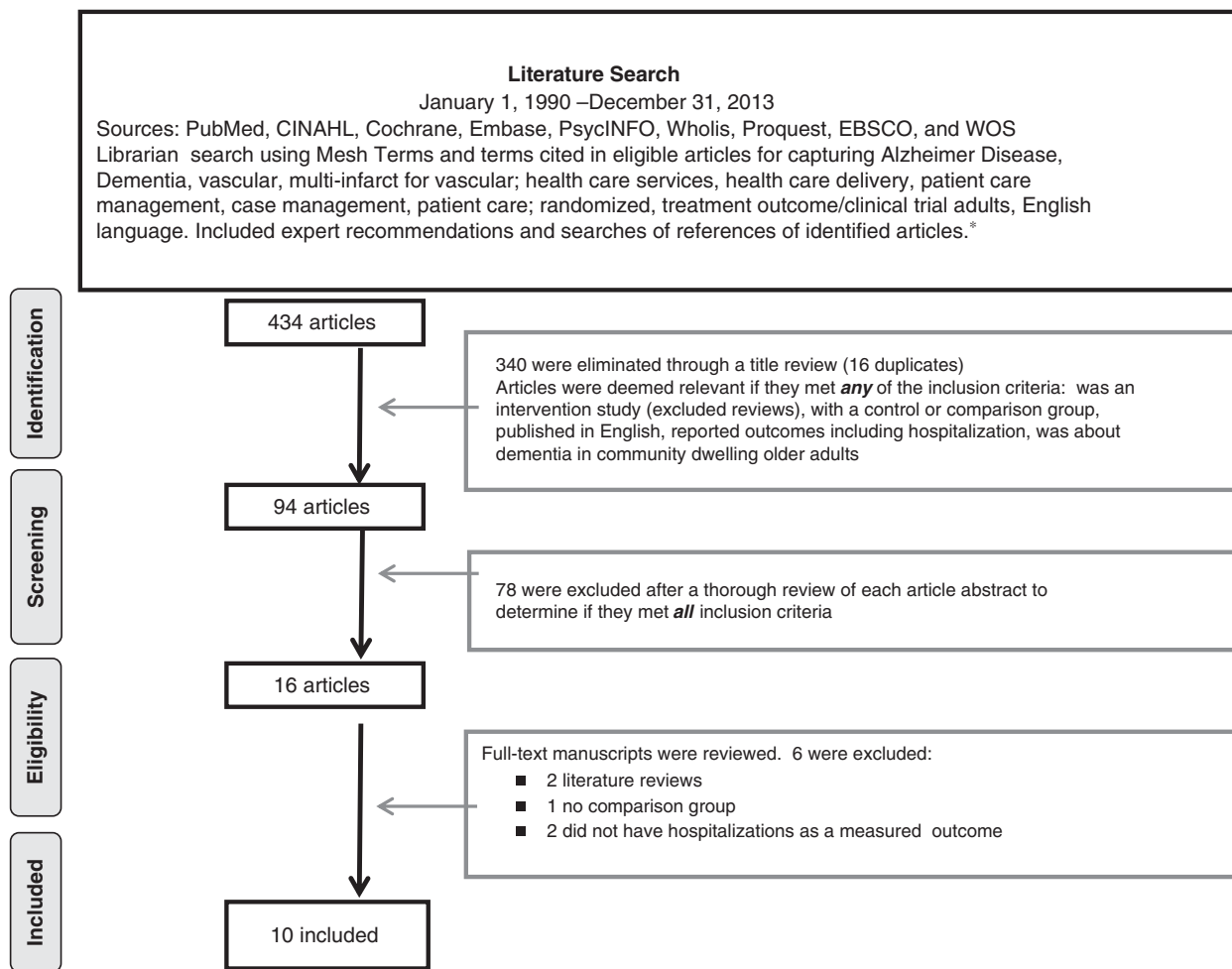


FIGURE 1. Steps of systematic review. *An Endnote file of excluded articles is available from the authors upon request.

admission, although in 2 studies^{18,19} the effect was in the desired direction.

Why Were These Interventions Not Effective in Reducing Hospitalizations?

In interpreting this main finding of our review, methodology as well as intervention content and delivery merit consideration. Of the 2 studies with nonsignificant effects on hospital admission, one did not use a randomized design (which tends to overestimate intervention effects),¹⁹ and the other was likely underpowered to detect a significant between-group difference in hospitalization.¹⁸ The study that measured a reduction in hospital days did not report hospitalization frequency by study group.²⁴ In the studies that used the most rigorous (randomized, controlled trial) design, an effect on risk of hospital admission was either not observed or another measure of hospitalizations (hospital days) was reported.^{18,20,23,24,26,27}

Apart from methodologic limitations of included studies, the majority of interventions did not explicitly target either control of common chronic conditions (eg, congestive heart failure) or prevention of unintentional injuries (eg, falls, burns), both of which are common reasons for hospitalization in this age group and in persons with dementia.^{3,4,28} Other common reasons for hospitalization include acute infections (eg, urinary tract infection, pneumonia) and dehydration^{4,29}; none of the interventions appeared to address these issues via caregiver education/training or other methods. Overall, a medical focus was lacking in most interventions tested.

Recommendations for future work on this topic are several. First, in light of the risks of hospitalization for persons with dementia, greater emphasis on this outcome in intervention studies is warranted. The advent of a Healthy People 2020 objective¹³ specific to this issue—namely to “reduce the proportion of preventable hospitalizations in persons with diagnosed Alzheimer disease and other dementias”—may increase the focus on this as an outcome in future intervention research with this population.

Second, future studies should design and test interventions aimed at preventing avoidable acute health care utilization. In other words, interventions should have an explicit focus on keeping persons with dementia out of the hospital, whenever possible. In our effort to be comprehensive with this review, we chose not to exclude studies

TABLE 1. Study Characteristics, Recruitment, and Participant Characteristics in Eligible Studies

References	Country	Recruitment	Inclusion Criteria	Unit of Randomization	Sample Size and Participant Demographics*	Dementia Type(s)	Dementia Severity†
Bass et al ¹⁷ Clark et al ²²	USA	Patients of a health maintenance organization whose medical records indicated a diagnosis of dementia or symptom code for memory loss	≥ 55 y Live in community (not a facility); reside in Cleveland catchment area of Alzheimer's Association	Person living with dementia	N=210 Mean age: 76.4 40% men	Not given	Not given
Bellantoni et al ¹⁸	USA	Patients with dementia moving into dementia-specific assisted living facilities in Connecticut	Residents with dementia	Person living with dementia	N=100 Mean age: 82.2 37% men	Not given	Moderate
Boustani et al ¹⁹	USA	Patients at the Healthy Aging Brain Center	Patients referred to the Healthy Aging Brain Center for evaluation of memory or behavioral problems	N/A	N=208 (176 caregivers) Mean age: 73.8 33% men	Alzheimer type (78%); vascular (40%); mixed (27%)	Mild
Callahan et al ²⁰	USA	Patients at 2 university-affiliated health care systems Physician referral after written prompt from research team of potential eligibility based on screening chart or patient	Possible or probable Alzheimer disease by DSM-3 criteria; not a skilled nursing facility resident Understood English Access to telephone Caregiver willing to participate	Dyad (person living with dementia and caregiver)	N=153 Mean age: 77.5 57% men	Alzheimer type	Moderate
Challis et al ²¹	UK	Patients at community mental health agency	Diagnosis of dementia, new referrals or cases "with a major change in circumstances," significant needs unmet by existing services, and risk of institutionalization	Dyad (person living with dementia and caregiver)	N=43 Mean age: 80.1 30% men	Not given	Severe
Duru et al ²³	USA	Patients from primary care clinics in 3 health care organizations in San Diego CA, plus 3 community agencies (Alzheimer's Association, Meals on Wheels, Southern Caregiver Resource Center)	Dementia diagnosis code or cholinesterase inhibitor prescription ≥ 65 Enrolled in Medicare Caregiver aged ≥ 18 y Minimum score of 1.0 on CDR and MMSE	Clinical practice	N=408 Mean age: 79.5 44% men	Alzheimer type (76%); vascular (8.3%); other (15.7%)	Mild
Eloniemi-Sulkava et al ²⁴	Finland	Newspaper announcements; Alzheimer disease drug users' register of the Social Insurance Institution of Finland	Imaging and specialist examination consistent with dementia Living in catchment area of Helsinki Mild to moderate dementia (by DSM-4 criteria) ≥ 65 y Living in community Care provision ≥ 1/week	Dyad (person living with dementia and spouse caregiver)	N=125 Mean age: 77.5 62% men	Alzheimer type (85.6%); vascular (8.1%); other (6.3%)	Moderate
Graff et al ²⁵	The Netherlands	Patients at memory clinic and a day clinic of a department of geriatrics	Mild to moderate dementia (by DSM-4 criteria) ≥ 65 y Living in community Care provision ≥ 1/week	Dyad (person living with dementia and caregiver)	N=135 Mean age: 78.1 40% men	Not given	Moderate
Wray et al ²⁶	USA	Patients at Veterans Administration in Upstate New York with encounter coded for a dementia diagnosis Referred from clinician or self or family referral in response to study publicity	Dementia diagnosis in medical record (at least moderate level) or ≥ 1 activities of daily living and ≥ 3 instrumental activities of daily living dependencies Residing in community Spouse or partner living with them for at least 1 y, serving as primary caregiver and moderate or greater caregiver strain	Dyad (person living with dementia and caregiver)	N=158 Mean age: 78.5 100% men	Not given	Moderate to severe

*Participant refers to the person with dementia enrolled in the study.
 †Dementia severity assessed in most studies via the Mini-Mental State Examination (MMSE),^{18-20,24,25} MMSE score 21-24 = mild; MMSE score 10-20 = moderate; MMSE score <10 = severe. CDR indicates Clinical Dementia Rating Scale; DSM, Diagnostic and Statistical Manual of Mental Disorders; MMSE, Mini-Mental State Examination; N/A, no randomization occurred.

TABLE 2. Features of Interventions in Included Studies, Grouped by Intervention Type

Intervention Type References	Intervention Components*	Mode of Contact	Duration of Intervention (mo)	No. Contacts With Intervention Participants	Collaboration With Primary Care
Case management/care coordination					
Bass et al ¹⁷	Empowerment framework designed to enhance competence and self-efficacy, accessing community services	Telephone	12	12 (Bass)	Not specified
Clark et al ²²	Case managers maintain structured care plans completed at regular intervals	In-person	12	10 (Clark)	Not specified
Challis et al ²¹	Structured home assessment and economic assessment of coordinated care management	In-person and telephone	> 12	Not specified	No
Duru et al ^{23†}					
	Exercise				
	Safety				
	Caregiver Support Groups				
Multidisciplinary assessment and management					
Bellantonio et al ¹⁸	X	In-person and telephone	9	4	No
Boustani et al ¹⁹	X	In-person and telephone	12	3	Yes
Callahan et al ²⁰	X	In-person	12	14	Yes
Eloniemi-Sulkava et al ²⁴	X	In-person	24	5	Yes
Other					
Graff et al ²⁵	Home-based occupational therapy sessions with dyad	In-person	3	10	Not specified
Wray et al ²⁶	Group support for caregivers	Telephone	12	10	Not specified

*For interventions that were multicomponent or other single-component interventions.

†Intervention included a component of home/environmental safety.

where the conceptual link between the focus of the intervention (eg, self-care or coping strategies for caregivers) and our outcome of interest was not obvious/apparent. In the future, studies could test directed approaches that might include: counseling family caregivers about the risks of hospitalization, the most common reasons for hospitalization, and clinical signs of acute deterioration; educating caregivers about chronic condition control and simplifying medication regimens to optimize adherence; providing 24-hour access to nurse telephone care consultation for advice on concerns related to acute changes in the person with dementia; completion of advance directives with explicit statement of preferences regarding hospitalization; and notification of study interventionists if a patient with dementia presents to an emergency department for care. Although attention has been paid to potentially preventable hospitalizations among persons with dementia,^{2-4,13} research is needed on all-cause hospitalizations. A wide range of outcomes related to hospitalization for persons with dementia, including complications and adverse events, is also relevant. And, for the person admitted to hospital who has dementia, hospitalization due to any cause is just as relevant an outcome, as the risk of an adverse consequence of hospitalization is presumably no different regardless of the reason for hospitalization.

Third, based on observational studies examining reasons for hospitalization of persons with dementia,^{3,4,28} future intervention studies should test approaches to managing chronic conditions and preventing injuries in persons living in the community with dementia. Current work in the area of dementia and multiple chronic conditions may help shape this understanding.^{30,31} Effective interventions for the prevention of falls in community-dwelling elders with dementia are lacking; this is another worthy—albeit challenging—avenue of investigation.

Limitations of our review should be noted. The review includes only those articles written in English and published studies. However, the review did benefit from using multiple sources to search for eligible studies, including a professional research librarian search of online databases and interviews with professionals with expertise in dementia and healthcare utilization. Data for this review were abstracted from descriptions available in the article. Thus, the characterizations of the intervention and outcomes were not verified through potential secondary published sources that may have described the study design or interventions and no input was sought from the authors. This review intentionally included studies that examined any measure of hospitalization as an outcome. As a consequence, the heterogeneity of outcomes and assessment methods precluded performing a formal meta-analysis. Despite these limitations, this review provides an important summary of the state of the evidence regarding interventions and their effect on hospitalizations of persons living with dementia.

We support the prevailing belief among many in the field that dementia is not “just another diagnosis” on a patient’s problem list. Dementia impairs an individual’s ability to manage his/her other chronic conditions, to recognize and articulate the onset of new physical or emotional symptoms, and to seek assistance/care in the face of alterations in one’s overall condition. Dementia implies that self-management support must be available, and due to its progressive nature,

TABLE 3. Outcomes and Related Features of Interventions of Eligible Studies

References	Was Hospitalization a Primary or Secondary Outcome?	Real-Time Tracking of Health Care Use	Effect on Hospital Admissions?	Putative Mechanism of Intervention Effects on Outcomes
Bass et al ¹⁷	Primary: Service utilization Traditional medical services [Emergency Department use, hospitalizations, physician visits] Case management visits Community services	Not reported	No; findings for traditional medical services, including emergency department visits, hospital admissions, and physician visits, did not show any significant intervention ($M=0.18$) control ($M=0.26$) group differences ($\beta=-0.02$)	Minimizing crisis-driven episodes of care caused by dementia/memory loss will reduce service use
Clark et al ²²	Primary: Service utilization Traditional medical services Case management Community services	Not reported	No, no significant intervention ($M=0.09$) control ($M=0.11$) group differences ($b=-0.76$; OR=0.47)	“The more severe the impairment, the greater likelihood services will be used and benefits of intervention realized”
Bellantonio et al ¹⁸	Primary: time to any unanticipated transition out of assisted living (first ED visit, first hospitalization, or permanent SNF placement)	Not reported	No, no significant differences; 34 subjects were hospitalized. The intervention reduced the risk of all transition types, ED visits were lowered 12% ($P=0.80$) and hospital admission was lowered 45%, ($P=0.13$).	Proactive attention to medical, functional, and behavioral issues will delay transitions
Boustani et al ¹⁹	Primary: Acute utilization	Not reported	Uncertain (no statistical significance testing); 14% of intervention vs. 26% controls were hospitalized at least once*	Enhanced care, communication and self-management support will result in better outcomes (clinical and utilization)
Callahan et al ²⁰	Secondary: resource use	Not reported	No; no difference in cumulative hospitalization rates between augmented usual care and intervention patients at 12 mo (18.8% vs. 22.6%, respectively; $P=0.69$) or at 18 mo (24.6% vs. 29.8%; $P=0.59$) or in mean hospital days at 12 mo (1.0 vs. 1.7; $P=0.34$) or at 18 mo (1.5 vs. 2.6; $P=0.28$).	Intervening on behavioral symptoms will improve those symptoms
Challis et al ²¹	Primary: service utilization Costs	Yes (service utilization and cost data were tracked through time over a 12-mo period)	No (49% of intervention group vs. 37% of controls used inpatient medical care)*	Responding to needs of caregivers will prevent/reduce stress and keep persons with dementia in community
Duru et al ²³	Secondary: costs of intervention	Not reported	No; no significant differences in inpatient ($P=0.78$) utilization between the 2 study groups at baseline or at follow-up. At baseline, <20% of patients in either group had been hospitalized. During follow-up, approximately 30% in each group were hospitalized.	Education and support of caregivers will improve care and reduce need for costly health services
Eloniemi-Sulkava et al ²⁴	Secondary: use of services (community, hospital, and long-term care)	Yes (ie, during the study...all ...services... were examined)	Uncertain effect on hospital admissions (not reported); reduced hospital days in primary care and specialty care hospitals*	“Flexible and immediate actions in problematic situations may explain differences in hospital days” (crisis aversion)
Graff et al ²⁵	Secondary: costs and cost-effectiveness	No (ie, at 6 and 12 wk the researchers received the diary...filled out... in the previous 6 wk...)	Uncertain, as no statistical significance testing performed (mean hospital days 1.6 in intervention group vs. 2.1 in control group)*	Goal setting and treatment planning targeting daily functioning, social participation, and well-being of people with dementia and improving caregiver competence and well-being will reduce costs of care
Wray et al ²⁶	Primary: costs and utilization	Not reported	No; no significant findings related to number ($F_{1,321}=0.00$) or days ($F_{1,321}=0.09$) of acute utilization or ICU number ($F_{1,321}=0.08$) or days ($F_{1,321}=0.33$) of utilization	Ongoing support of caregivers will result in decreased utilization and therefore costs of care in the care recipient

*Additional data were not available in published article.

changing care needs over time.^{32,33} Thus, a diagnosis of dementia should shape the focus and the approach to management of all other health issues in the context of routine outpatient care. The next generation of intervention research must identify the elements of high-quality outpatient care for persons with established dementia.

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