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The Dementia Services Mini-Screen: A Simple Method to Identify Patients and Caregivers Needing Enhanced Dementia Care Services

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Abstract

Objective—The National Alzheimer’s Plan calls for targeted health system change to improve outcomes for persons with dementia and their family caregivers. We explored whether dementia-specific service needs and gaps could be predicted from simple information that can be readily acquired in routine medical care settings.

Method—Primary family caregivers for cognitively impaired older adults (n=215) were asked about current stress, challenging patient behaviors, and prior-year needs and gaps in 16 medical and psychosocial services. Demographic data, caregiver stress, and patient clinical features were evaluated in regression analyses to identify unique predictors of service needs and gaps.

Results—Caregiver stress and patient behavior problems together accounted for an average of 24% of the whole-sample variance in total needs and gaps. Across all analyses, including total, medical, and psychosocial services needs and gaps, all other variables combined (comorbid chronic disease, dementia severity, age, caregiver relationship, and residence) accounted for an average of 3%, with no variable yielding more than 4% in any equation. We combined stress and behavior problem indicators into a simple screen. In early/mild dementia dyads (n=111) typical in primary care settings, the screen identified gaps in total and psychosocial care in 84% and 77%, respectively, of those with high stress/high behavior problems vs. 25% and

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23%, respectively, of those with low stress/low behavior problems. Medical care gaps were dramatically higher in high stress/high behavior problem dyads (66%) than all others (12%).

Conclusion—A simple tool (likely completed in 1–2 minutes) which combines caregiver stress and patient behavior problems, the Dementia Services Mini-Screen, could help clinicians rapidly identify high need, high gap dyads. Health care systems could use it to estimate population needs for targeted dementia services and facilitate their development.

Keywords

dementia; health services; screening; chronic care

INTRODUCTION

Nearly 5 million Americans have Alzheimer's disease and prevalence will double by 2050 (1). Annual Medicare costs alone currently account for \$11 billion in healthcare spending for patients with dementia (2), yet the quality of their medical care is suboptimal (3), and outcomes, measured in high-cost acute care use, are cause for concern. In our recent study, persons with incident dementia had nearly 80% higher rates of potentially preventable hospitalizations than cognitively normal older adults (4). Moreover, the psychosocial aspects of dementia care, acknowledged by specialists as integral to the delivery of high quality care (5), are not typically assessed in general medical settings; for example, family caregivers rarely spontaneously disclose disruptive behavior and the associated stress to the patient's primary care physician (6). These findings strongly suggest a need for strategic changes in our overall approach to the ambulatory care of dementia patients, including targeted improvements in medical management and systematic integration of psychosocial and behavioral assessments and interventions into routine outpatient care (7).

Primary care clinicians find dementia more difficult to manage than other common chronic conditions of late-life (8), with its unpredictable time demands (9–11), clinical complexity (12), and need to actively engage third parties – typically family caregivers –over long periods of time in both assessment and treatment of cognitive, neuropsychiatric, and co-morbid chronic medical conditions (13). Many dementia-specific services are 'non-medical', supportive in nature, and focused on assisting the caregiver (14). As such, they are outside the scope of usual primary care (15, 16) and are inconsistently if at all reimbursed. These services, together with informed, attentive general medical care, nevertheless are the backbone of successful long-range home care of persons with dementia (7), but this principle is not yet widely operationalized: a recent study found that primary care clinicians are much less likely to initiate referrals for psychosocial care than to provide services generally accepted as part of the physician's role, such as writing orders for nursing home admission or home health care. (9)

The National Alzheimer's Plan (17), created through federal legislation in 2011, calls for systemic upgrades in the quality and coordination of care for persons with dementia and their family caregivers, and recognizes the need to focus care on the dyad. Health care models that aim to unify medical and psychosocial care management show promise (18–21), and, while the Center for Medicare and Medicaid Services has promoted Patient-Centered

Medical Homes and organizational accountability for patient experience, health care quality, and costs under Accountable Care Organizations, most health systems have yet to embrace the necessary system redesign or apply these concepts to health care for dementia patients and caregivers. A simple, brief way to identify high-needs dyads who are most likely to show early benefit from integrated dementia care management would be a useful step toward broader implementation.

Several informative studies have used extensive questionnaires and surveys to describe health-related and psychosocial service needs of patients with dementia and their caregivers (22–26), but their findings are too complex to translate well into front-line medical settings where most patients receive their care. We postulated that dyads with unmet needs for dementia-related services could be identified without recourse to time-intensive, highly detailed questionnaires that are impractical in primary care. To address this, we tested candidate predictors from an experimental protocol developed by the Consortium to Establish a Registry for Alzheimer's Disease (CERAD). CERAD investigators proposed a single-item stress index for caregivers and an inventory of patient and caregiver service needs (27). We combined these two elements with CERAD's short list of high-impact behavioral problems and patient and caregiver variables that are easily captured in primary care settings. Our goal was to create a useful tool that would enable primary care providers to quickly identify – preferably in 1–2 minutes – patient and caregiver pairs in need of specialized dementia care interventions. Such information could help both providers and health systems target the highest-needs dyads first for care quality improvements.

METHODS

Overview and study sample

Participants were older adults identified in a community aging sample of over 600 persons as having both clinically significant cognitive impairment and a family caregiver. Subjects were identified through multimodal recruitment methods (community referrals, posted flyers, and 'snowball' referrals from other enrollees) assessed at home as part of a community-based outreach program of the University of Washington's Alzheimer's Disease Research Center Satellite. Of a total of 231 cognitively impaired individuals, 215 had complete data for all variables needed for this analysis and comprise the study sample. The majority (189, 88%) clearly met dementia criteria (CDR 1+) (28) and 26 (12%) had mild cognitive impairment (MCI)/very mild dementia (CDR 0.5). Written informed consent (assent, where appropriate) was obtained as approved by the University of Washington Institutional Review Board. Though not required for study participation, all care recipients had some form of health insurance (usually Medicare A/B, with or without a supplemental plan) and an identified primary care physician, but few had a formal diagnosis of any cognitive impairment documented in their medical records (29) and none was receiving care from a dementia specialist (geriatric psychiatrist, geriatrician, or neurologist) at the time of enrollment. Diagnoses were made as part of the overall research program using uniform methods previously described in detail (29, 30). Although all care recipients were systematically diagnosed using research criteria for dementia subtypes, etiology is not

included as a variable in the present study because primary care providers may not confidently classify subtypes on their own (11).

Variables

Patient variables included demographic descriptors, a defined set of 5 behavioral problems (27) reported by caregivers and/or observed during interview (anger/hostility, visual/auditory hallucinations, irritability, suspiciousness/paranoia, severe social withdrawal), dementia stage (Clinical Dementia Rating [CDR]) (28), and burden of chronic disease (Cumulative Illness Rating Scale, 13 item modification for medical conditions comorbid with cognitive disorders [CIRS-G-13]) (31). Caregiver variables included relationship to the care recipient (spouse or other relative); living situation (together or apart) and the caregiver's current level of perceived stress using a single question ("Overall, how stressful is your caregiving situation at this time?" scored 1 [not at all] to 5 [extremely]). Service needs and use were defined (yes/no) by an interviewer-administered checklist of 16 specified dementia- and care-related health and psychosocial services (27) with a free-response option for services not included in the inventory. Caregivers stated whether they had needed each service over the prior year, and, if needed, whether they had or had not used it.

Service variable grouping

Two expert clinicians (SB, TS) assigned each of the 16 services to either 'medical' or 'psychosocial' categories based on whether a physician or other medical provider or an individual with knowledge of community resources and support services, usually a social worker, would typically provide those services. The 8 services designated as medical included 3 aimed at caregivers (initial education and counseling about dementia, prescription of medication for caregiver stress or depression, and caregiver hospitalization; these components might require participation of two different primary care providers – the patient's and the caregiver's) and 5 focused on the patient (prescription of medication for mood or behavioral problems, patient hospitalization, enrollment in home health care, admission to hospice, and admission to a nursing home). The 8 psychosocial services included direct caregiver support and/or referral, companion care, overnight respite care, adult day health or activities, personal care for the care recipient at home, meal preparation, chore help, and legal advice.

Scoring service needs, use, and gaps

For each provider type, total service need, use, and gap scores could each range from 0–8. For example, a caregiver might indicate a need for medication to help with stress but no other medical service needs, yielding a medical service need score of 1; if a medication were prescribed, the medical service use score would be 1 and the gap score would be 0 (1 need – 1 use = 0 gap) and if not the gap score would be 1 (1 need – 0 use = 1 gap). The number of services for which caregivers reported a need were summed for each caregiver-patient dyad, and a mean score was derived for the whole sample and for subgroups as described below and in Results. Total services needed but not used are similarly reported, as gaps.

Analytic overview and approach

All analyses were done (SPSS 18 for Windows) to accomplish 5 sequential goals: 1) to determine which caregiver and care recipient factors are most strongly related to total, medical care-specific, and psychosocial care-specific service needs and gaps; 2) to simplify screening of patient/caregiver dyads by locating critical cut points on essential service predictor variables; 3) to create a simple tool to screen for dyads with high service needs and gaps; 4) to test its utility in the total sample (with a broad range of severity of cognitive impairment); and 5) to retest it in the subset of dyads most typical of those encountered in primary care (MCI and very mild dementia). **Goal 1** was evaluated using stepwise multiple regression. Dependent variables were total needs and gaps, medical care needs and gaps, and psychosocial care needs and gaps. Independent (predictor) variables for all equations were caregiver stress, number of patient behavioral problems, CDR stage, relationship status (spouse vs other), residence (lives with caregiver or apart), age and comorbid chronic disease. Data for service needs had symmetric distributions; data for service gaps had minor negative skews. However, skews were less than 1, and the relatively large number of participants relative to predictors (40) minimizes deleterious effects on the regression analyses. **Goal 2**, to estimate the thresholds of caregiver and care-recipient variables useful for predicting service needs and gaps, was addressed by ANOVA with post-hoc least significant difference (LSD) comparisons, examining the strongest predictors identified in Goal 1 analyses. **Goal 3**, to create a screening tool for unmet service needs, was done by combining the variables found to be most predictive (Goal 1) in their simplest form (Goal 2) to form a dementia services mini-screen. **Goal 4** was addressed by applying the groupings created in Goal 3 to the entire sample (ANOVA with LSD post-hoc comparisons). **Goal 5** was accomplished by replicating analyses for Goal 4 using a subset of participants with MCI and mild dementia (CDR=.5 and 1.0, N=111). Finally, we applied an additional test of the mini-screen's ability to detect gaps in medical and psychosocial services by calculating its sensitivity and specificity in this early/mild stage group.

RESULTS

Demographic data and clinical variables (Table 1)

About two thirds of cognitively impaired participants lived with their family caregivers, the rest alone, and the majority had worked in business or service professions or as homemakers (data not shown). Overall burden of chronic disease was moderate and about two thirds had 2 or more of the 5 behavior problems assessed.

Identifying predictors of service needs and gaps (Goal 1, Table 2)

Caregiver stress and patient behavior problems were the primary predictors of needs and gaps. Together, they explained 15–33% of the variance (mean=24%) across 6 regressions, stress being the first predictor in 5 of 6, and behavioral problems being the first predictor for psychosocial needs. Dementia stage contributed significantly to medical and psychosocial service needs and to total and medical care gaps, but explained much less variance (mean 2%) in both needs and gaps than did caregiver stress and patient behavior problems. In support of our *a priori* classification of services as medical and psychosocial, chronic disease burden contributed significantly to total and medical but not psychosocial needs.

Living with the care recipient was modestly related to psychosocial gap (2% of variance), and being spouse was related to higher needs and gaps in univariate analyses, it was not significant in any regression.

Defining practical stress and behavior cut points (Goal 2)

One way ANOVA with post-hoc LSD tests (with $p < .05$ as the criterion of significance) was performed on needs and gaps (dependent measures) using all levels of caregiver stress (1–5) and patient behavioral problems (0–5) as grouping variables (not tabulated). For stress, effects on service needs and gaps suggested natural cut points between low (1–2), moderate (3), and high (4–5) stress: for all service needs (overall $F=14.8$, $df=4,210$, $p<.001$) and gaps (overall $F=20.9$, $df=4,210$, $p<.001$), “not stressed” (a score of 1 on the 5-point scale) did not differ from “a little stressed” (a score of 2), and “very stressed” (score of 4) and “extremely stressed” (score of 5) differed in only a few cases. Merging the two highest and two lowest categories created three groups (low, moderate, and high stress) for further analyses.

The number of patient behavioral problems (0–5) was examined similarly, identifying a threshold of challenging behaviors that was strongly related both to total service needs (overall $F=14.0$, $df=5,209$, $p<.001$) and gaps (overall $F=14.0$, $df=5,209$, $p<.001$). Patients with 0 vs 1, or 2 vs 5 behavior problems, did not differ consistently from each other. Mean numbers of service needs and gaps for high (2–5) behavior problem dyads differed significantly from those with 0–1 problem behaviors (all post-hoc LSDs $p<.01$). Therefore, a cutoff of 2+ behavior problems was chosen as the threshold for identifying patient-caregiver dyads with high service needs and gaps. Combining these 2 behavior problem levels and 3 stress levels yielded 6 possible groups for analysis (not tabulated).

Further group reductions and creation of a simple screen (Goal 3)

Analyses with these six groups showed differential patterns for medical and psychosocial needs and gaps, permitting additional group reductions. The low and moderate stress caregivers with patients having 0 or 1 behavior problems did not differ in medical and psychosocial needs and gaps, so were merged into a single group (low-moderate stress/low behavior problems). Our data also indicated that the low and moderate stress/high behavior problem groups differed from the low-low group but not consistently from each other, so could also be merged as an intermediate group. The high stress/high behavior problem group differed from all others in medical needs and gaps, and because the high stress group had almost complete (88%) overlap with the high behavior problem group, we elected to treat all dyads with high caregiver stress as a single group (high stress/high behavior), yielding three final groups in which to test the performance of the proposed dementia services mini-screen: low-moderate stress/low behavior problems (group 1); low-moderate stress/high behavior problems (group 2), and high stress/high behavior problems (group 3).

Application of the model screen to the whole sample (Goal 4, Table 3)

Table 3 shows the 3-group comparisons, for all dyads ($n=215$), of mean numbers of service needs and gaps (ANOVA with post-hoc LSD tests) and percentages of each group having any needs and gaps. While the three group solution is much simpler than the factorial

combination of all possible stress and behavior problem levels (5 stress levels $\times$ 6 levels of behavioral problems = 30 possible groups), the overall F tests are highly significant for all dependent outcomes, suggesting that these divisions reasonably capture the relationships originally seen in multiple regressions (Table 2). Nonetheless, post-hoc group comparisons suggested further simplifications. For psychosocial needs, only group 1 (low-moderate stress/ low behavior problems) differed from groups 2 and 3, which did not differ significantly from each other. For medical needs and gaps, only the high stress group differed from the other two. By forming two groups (high stress vs all others for medical gap; low-moderate stress/low behavior problems vs all others for psychosocial gap) we were able to calculate sensitivity and specificity for the Dementia Services Mini-Screen. Across all dyads, sensitivity and specificity were 69% for medical gaps; and sensitivity was 88% and specificity 47% for psychosocial gaps.

Relative to the patients typically seen in primary care, our total sample over-represents the very impaired (CDR 2+). The true test of an early needs/gaps-detection screen should be in the population for which it is primarily intended – dyads more typical of those seen in primary care, where mild cognitive impairment and mild dementia (CDR= .5 and 1.0) are prevalent (32).

Retesting the dementia services mini-screen in MCI/mild dementia (Goal 5, Table 4)

In analyses restricted to the less-impaired subset ($n=111$, CDR 0.5–1), we replicated all ANOVAs shown in Table 3 with functionally identical results. The contrasts for medical gaps and psychosocial gaps were particularly striking and are illustrated in the Figure. Sensitivity/specificity analyses, classic benchmarks for screen performance, were applied to detection of medical and psychosocial gaps, using the empirical decision rules established in prior analyses: ‘high stress’ screens for gaps in dementia-specific medical care, and ‘high behavior problems’ screens for gaps in psychosocial care. Using these criteria, the mini-screen’s sensitivity was 88% and specificity 78% for medical care gaps, while sensitivity for was 84% and specificity 60% for psychosocial care gaps.

DISCUSSION

In this study, we show that caregiver stress and patient behavioral problems have powerful relationships with need for both medical and psychosocial care services, and with gaps in provision of those services. These factors are more important in predicting service needs and gaps than dementia severity, relationship between patient and caregiver, living situation, and patients’ age and chronic disease burden. Caregivers were able to clearly identify needs and gaps in medical and psychosocial services, and, by the needs and gaps they endorsed, to indicate that *both* types of clinicians are important for *both* members of the dyad. The full range of dementia care services evaluated in this study is not typically provided in the primary care setting and will require the collaborative expertise of specialized dementia care clinicians and care managers who link primary and psychosocial care services into a coherent framework for both patient and caregiver.

We found notable differences between perceived needs and gaps for medical care and psychosocial care services. When the care recipient had 2 or more behavior problems, nearly

all caregivers reported need for psychosocial care, even when they reported their stress as low, and the majority reported gaps in those services. In contrast, for medical care, major gaps were found only when high caregiver stress was coupled with high patient behavior problems, and these gaps were specifically related to dementia care interventions (counseling, medications to manage patient behavior problems and/or caregiver stress, data not shown). By using a new empirically derived tool, the Dementia Services Mini-Screen (DSM-S), we successfully identified dyad characteristics associated with high medical and psychosocial needs and gaps. The DSM-S could be a viable first step in identifying high needs dyads in general health care settings. It offers a pragmatic approach to quantifying needs for developing dementia-specific medical and psychosocial services at the health system level. It is simple enough to be used by clinical support staff, easily incorporated into electronic medical records, and readily tracked over time to assist clinicians in making appropriate care decisions and help health systems develop a parsimonious but essential menu of services for delivering optimal health care to dementia dyads, once dementia is recognized and diagnosed.

Extensive prior research has shown that the causes of perceived stress in dementia caregivers are complex, but partly related to patient behavior problems, and that both are associated with caregivers' expressed needs for services (25). Asking caregivers about services needs is well suited to the person-centered approach to care (33) which is receiving new emphasis in chronic disease management, and which is inherent in collaborative care models that link specialized medical and psychosocial dementia-related services to primary care (34). Guidance has been lacking to help primary care providers and health care systems quickly and systematically identify patient/caregiver dyads who need enhanced dementia services embedded in a collaborative or integrated service model. Based on data examined in the present pilot study, we propose a pragmatic method that uses two very simple caregiver self-report elements to achieve this goal. The DSM-S may help to promote patient-centered care by translating the large but highly specialized and complex literature on caregivers, patients, and service needs into a practical algorithm for primary care use.

We anticipate that the time required to administer the Dementia Services Mini-Screen will be brief (~1 minute), though this and administration by support staff remain to be empirically field tested. Knowledge of the patient's dementia history and stage and comorbid illness history are important for comprehensive health care but not required for validity or application of the screen, nor is its performance strongly influenced by patient age, residence, or caregiver relationship. It also showed very strong contrasts and good sensitivity and specificity in dyads in the earlier stages of dementia that are most often encountered in primary care settings. It was in this group that the combination of caregiver stress and patient behavior problems most clearly separated dyads who have service gaps from those who do not. If combined with a very brief, well-established screen designed to detect clinically important cognitive impairment in primary care, such as the Mini-Cog (29), a primary care provider could rapidly obtain useful indices of patient cognitive status and behavioral problems, a rough index of caregiver stress, and predictors of medical and psychosocial service gaps in five minutes or less. With growing elderly populations, overburdened physicians, and increasing health costs, this would seem a very efficient use of time and resources.

There are some limitations in the present work. Study participants were recruited through community outreach, so the sample cannot be considered representative of the older population in general or of older adults in primary care. Sociodemographic factors that could have important influences on caregiver stress, patient behaviors, and service needs and gaps were either insufficiently variable for analysis (e.g. race, ethnicity) or not obtained (e.g. family support and involvement, income) in this study. The empirical cut points for stress and behavior indicators proposed for targeting dyads with high service needs require additional validation in representative samples, and not all patient behavior problems and neuropsychiatric symptoms that affect needs for care were included in the brief behavior scale, and the single-item CERAD caregiver stress question has not been independently validated. It was chosen for its promise as a practical tool for use in health care settings, where longer, more detailed scales could not practically be used to screen large numbers of individuals. However, a single-item measure of *distress* has been shown to perform well when compared with longer standard distress scales in cancer patients (35).

There is broad agreement among dementia specialists that high quality care for patients with dementia requires both medical and psychosocial components, attention to both patient and caregiver, and continuity of relationship between providers and patient/caregiver dyads (36). However, there is currently no fully evidence-based consensus as to how best to organize this care at the practice or health system level. Though integrated or collaborative care approaches that offer both medical and psychosocial services to dyads have inherent appeal, conform to geriatric care principles, and are supported by results of early randomized trials (18, 19, 37) and clinical demonstrations (20, 21), comprehensive, intensive services are not needed by all patients and caregivers or at all points along the course of dementia. Randomized trials of comprehensive dementia care tested thus far have provided the same package of services to all patient/caregiver dyads and treated them as a uniform group. These studies have found some positive but relatively modest effects on target outcomes (including caregiver stress and patient behavioral problems). Such small effects could discourage adoption of effective interventions that may be necessary for only a subset of patient/caregiver dyads. The DSM-S is designed to identify those dyads most likely to benefit from comprehensive dementia care interventions at a particular point in time. Use of this screen could be attractive to third party payers and health care organizations faced with rising demands to provide high quality and cost effective care for dementia, whether what's needed is routine primary care or specialized, intensive, team-based intervention for high-needs dyads seen in the same practices.

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FIGURE.

Gaps in care for early/mild dementia dyads: Relationship to caregiver stress and dementia-related behavioral problems

Table 1**CHARACTERISTICS OF COGNITIVELY IMPAIRED PARTICIPANTS (n=215)**

DEMOGRAPHIC DATA	
Age, mean (sd)	78 (8.4)
Education, mean years (sd)	8.5 (5.7)
Gender, % female	65%
Caregiver relationship (n, %)	
- Lives with spouse	69 (32%)
- Lives with adult child or other relative	77 (36%)
- Lives apart from caregiver	69 (32%)
COGNITIVE IMPAIRMENT STAGE/TYPE	
CDR 0.5 (very mild)	26 (12%)
CDR 1+ (mild, moderate, severe dementia)	189 (88%)
- Probable Alzheimer's disease	124 (58%)
- Vascular and mixed	46 (21%)
- Other [†]	19 (9%)
Mean (sd) CDR [§]	1.7 (0.8)
BEHAVIORAL PROBLEMS (n, %)	183 (85%)
- Anger, hostility	114 (53%)
- Auditory and/or visual hallucinations	55 (26%)
- Irritability	127 (59%)
- Paranoia, suspiciousness	121 (56%)
- Social withdrawal	102 (47%)
Number of problems (mean, sd)	2.4 (1.6)
- 0–1 (n, %)	65 (34%)
- 2–5 (n, %)	150 (66%)
CHRONIC DISEASE BURDEN, modified CIRS-G (mean, sd) ^{§§}	11.1 (4.6)

[†] Includes Parkinson dementia, other Lewy body dementia, progressive supranuclear palsy, alcoholic dementia, depression with dementia, dementia of etiology not yet specifiable)

[§] CDR = Clinical Dementia Rating (28)

^{§§} Modified CIRS-G = 13 item version (31)

Table 2

PREDICTORS OF CARE NEEDS AND GAPS

Outcome	Predictor	R ² Change	Beta	p value	Overall F and df
TOTAL CARE NEED	Stress	21	0.31	0.001	F (3, 211)=31.9***
	Behavior	8	0.32	0.001	
	Comorbidity	2	0.13	0.05	
TOTAL CARE GAP	Stress	27	0.36	0.001	F (3, 211)=38.5***
	Behavior	6	0.23	0.001	
	CDR Stage	2	0.16	0.01	
MEDICAL NEED	Stress	15	0.27	0.001	F (4, 210)=23.1***
	CDR Stage	7	0.29	0.001	
	Age	4	-0.24	0.001	
	Comorbidity	2	3	0.01	
	Stress	18	0.29	0.001	
	Behavior	4	0.17	0.02	
MEDICAL GAP	Age	2	-0.17	0.01	F (4, 210)=17.9***
	CDR Stage	2	0.14	0.05	
	Behavior	17	0.25	0.001	
	Stress	4	0.22	0.001	
	CDR Stage	2	0.16	0.02	
	Stress	19	0.28	0.001	
PSYCHOSOCIAL GAP	Behavior	5	0.25	0.001	F (3, 211)=23.3***
	Lives with	2	0.14	0.05	

Needs = number of services needed in the past year (total = 16, 8 medical, 8 psychosocial)

Gaps = number of services needed but not used

Stress = caregiver self-rating (1–5, low – high)

Behavior = number of problems (of 5)

CDR = Clinical Dementia Rating

Comorbidity = Cumulative Illness Rating Scale, 13 item version

Lives with = co-resides with spouse or other relative yes/no

Table 3

Service Needs and Gaps, All Dyads (N=215)

Variables (Mean #, SD, % of sample)		Group 1 (n=52)		Group 2 (n=62)		Group 3 (n=101)		ANOVA		LSD post-hoc comparisons	
		Low-mod stress, 0-1 beh		Low-mod stress, 2+ beh		High stress, 2+ beh		F	df	p less than	
Total Need	$\bar{x}$	2.34		4.5		5.85		34.5	2, 212	0.001	1 diff 2 & 3, all diff at p<.001
	SD	(2.02)		(2.76)		(2.5)					
	%	67		94		97					
Total Gap	$\bar{x}$	.83		1.76		3.11		22.9	2, 212	0.001	1 diff 2 & 3, all diff at p<.001
	SD	(1.23)		(1.68)		(2.09)					
	%	37		71		85					
Medical Need	$\bar{x}$	.71		1.08		1.75		21.9	2, 212	0.001	3 diff 1&2 at p<.001, 1 & 2 not
	SD	(1.01)		(1.36)		(1.18)					
	%	42		48		85					
Medical Gap	$\bar{x}$	.36		.42		1.05		15.1	2, 212	0.001	3 diff 1&2 at p<.001, 1 & 2 not
	SD	(.65)		(.80)		(1.05)					
	%	25		24		61					
Psychosocial Need	$\bar{x}$	1.63		3.37		4.02		28.5	2, 212	0.001	1 diff 2 & 3 at p<.001, 2&3 not
	SD	(1.57)		(1.89)		(1.98)					
	%	63		92		96					
Psychosocial Gap	$\bar{x}$	.50		1.35		2.07		23	2, 212	0.001	1 diff 2 & 3, all diff at p<.001
	SD	(.83)		(1.35)		(1.58)					
	%	35		69		80					

Needs and gaps are reported as numbers of services (of 8 medical and 8 psychosocial) needed and not used, respectively. Groups are created from the whole sample based on optimal cut scores for caregiver stress (low to moderate, 1-3/5) combined with patient behavioral problems (low, 0-1/5; high, 2-5/5). See text for additional details.

Table 4

Service Needs and Gaps, Mild Impairment Group (CDR .5-1, N=111)

Variables (Mean #, SD, % of sample)	Group 1 (n=40)		Group 2 (n=27)		Group 3 (n=44)		ANOVA		LSD post-hoc comparisons
	Low-mod stress, 0-1 beh		Low-mod stress, 2+ beh		High stress, 2+ beh		F	df	p less than
Total Need									
$\bar{x}$	1.68		3.81		5.3		30.5	2, 108	0.001
SD	(1.59)		(2.37)		(2.38)				
%	60		93		98				
Total Gap									
$\bar{x}$	.48		1.18		2.81		26.8	2, 108	0.001
SD	(.93)		(1.44)		(1.90)				
%	25		60		84				
Medical Need									
$\bar{x}$	.45		.59		1.56		16.1	2, 108	0.001
SD	(.75)		(1.01)		(1.11)				
%	33		33		84				
Medical Gap									
$\bar{x}$	.20		.15		.98		16.7	2, 108	0.001
SD	(.61)		(.46)		(.90)				
%	13		11		66				
Psychosocial Need									
$\bar{x}$	1.25		3.22		3.61		19.6	2, 108	0.001
SD	(1.50)		(1.97)		(1.97)				
%	53		89		95				
Psychosocial Gap									
$\bar{x}$	.30		1.07		1.82		15.8	2, 108	0.001
SD	(.61)		(1.30)		(1.57)				
%	23		59		77				

Needs and gaps are reported as numbers of services (of 8 medical and 8 psychosocial) needed and not used, respectively. Groups are created from the very mildly/mildly impaired subsample based on optimal cut scores for caregiver stress (low to moderate, 1-3/5) combined with patient behavioral problems (low, 0-1/5; high, 2-5/5). See text for additional details.