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ADCS Prevention Instrument Project: Pharmacoeconomics: Assessing Health-related Resource Use Among Healthy Elderly

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Abstract

Background—The Prevention Instrument project of the Alzheimer's Disease Cooperative Study (ADCS) seeks to develop instruments to assess treatment efficacy including potential economic benefit. The Resource Use Inventory (RUI) is an instrument that has been used to capture resource utilization and costs in populations with Alzheimer disease (AD). However, resource utilization and costs for healthy, cognitively intact elderly as they begin to demonstrate cognitive deterioration are not well understood. In addition, the loss that relates to the subjects' own time as they transition through cognitive impairment is not well documented.

Objectives—To evaluate the utility of the RUI in a sample of cognitively intact elderly individuals living in the community and enrolled in AD prevention trials.

Methods—The RUI was administered to 644 subjects and their study partners either at home or in the clinic. For half of each sample, 3-month retesting was carried out. The RUI consisted of 9 questions. The first part of the RUI captured subjects' use of direct medical care (eg, hospitalizations) and nonmedical care (eg, home health aides). The second part of the RUI captured the time caregivers spend providing care to the subjects. The third part of the RUI captured subjects' participation in volunteer work and employment. The assessment interval for each question was the past 3 months.

Results—The percentage of RUI forms returned incomplete or inaccurate for both in-clinic and at-home groups was extremely low. There were no differences in utilization rates between in-clinic and at-home group for all items in the RUI. Except for use of outpatient procedures, tests, or treatments, there were no differences in utilization rates between subjects who filled out the RUI with the help of their study partners or by themselves. Items in the RUI were sensitive to subjects' cognitive and functional status and demographic characteristics.

Conclusions—Home-based completion of the RUI by participants in an AD prevention study is feasible, and seems to provide data that are reliable and valid. The instrument will be useful for tracking resource and time use through transition from healthy to cognitive impairment.

Keywords

Alzheimer disease; primary prevention; assessment measure; resource use; health care utilization; clinical trials

Disease prevention is obviously a desirable goal of pharmacologic trials in Alzheimer disease (AD) and based on health economic research this should be the most cost effective treatment approach. Yet there is little known about methods and instruments to assess the pharmacoeconomic benefit of AD prevention. To obtain information on resource utilization specifically for patients with AD, instruments such as the Resource Utilization in Dementia questionnaire have been developed as a first step in determining the cost of the disease.¹ This type of instrument has been used in several clinical trials to attempt to document the economic benefit of treatments for AD and for MCI.^{2,3} Additionally, it has been used to assess the cost of AD in both cross-sectional and longitudinal studies.⁴ However, resource utilization for healthy, cognitively intact elderly as they begin to demonstrate cognitive deterioration is not well understood. The few studies that retrospectively examined resource utilization before the onset of AD have reported inconsistent results. One study using the Mayo Clinic (Rochester, MN) database found no differences in utilization of inpatient and outpatient care between AD patients and matched control subjects in both prediagnosis and postdiagnosis period.⁵ Another study using data from the Washington Heights-Inwood Columbia Aging Project (WHICAP, New York, NY) found that compared with individuals who did not develop AD, those who developed AD were more likely to use Medicare outpatient care 1 to 2 years before their AD diagnosis and had costs almost three times higher.⁶

Most AD studies have focused on caregivers' time and showed it to be sensitive to changes in patients' function.⁷⁻¹⁰ Clinical trials of symptomatic treatments of AD also have examined this outcome and found that clinically effective treatments were associated with savings in caregiver time compared with placebo.¹¹⁻¹⁵ However, none of these studies examined resource utilization and caregivers' time before the onset of AD.

There is ongoing debate about the effect of caregiving time on caregivers' labor force participation and work hours lost because of caregiving.¹⁶⁻¹⁸ The focus on caregiving time is not surprising given that most patients with AD are treated in the community and this informal care cost constitutes 60% to 70% of all dementia-related health care expenses. Given that careful testing can identify loss of instrumental activities of daily living (ADL) in milder forms of cognitive loss, which do not meet criteria for dementia, it would not be surprising that informal costs increased as friends and family members begin to fulfill a supportive role.

Another domain of health care cost is that associated with loss of work. While not typically part of the economic assessment in diseases of the elderly, healthy elders may be employed in either paid or volunteer activities. As they begin to demonstrate cognitive deterioration, this subtle issue of economic importance must be captured. The loss of paid or volunteer employment of the patients is not well documented. For example, we do not yet know how participation in volunteer work and paid employment among healthy elderly relate to subtle changes in cognitive or functional deterioration. Therefore, we do not yet know the opportunity costs of loss of employment as elders transition from healthy to cognitive impairment.

There are 2 components of estimating health care costs: assessing the resources used and opportunities lost and converting these into costs. As part of the Alzheimer's Disease

Cooperative Study (ADCS) Prevention Instrument (PI) Project¹⁹ which assesses elders as they transition from cognitively normal to mild cognitive impairment to dementia, we proposed to develop and validate an instrument to assess costs. To this end, we developed the Resource Use Instrument (RUI) to capture utilization of formal (paid) and informal (unpaid) care and loss of paid and volunteer employment in healthy elderly.

The goal of this initial report is to examine the properties of the RUI at baseline and at retesting 3 months later in nondemented elderly individuals living in the community. Specifically, we aimed to examine: (1) the feasibility of administering the RUI in the clinic and at home by assessing completeness of the RUI and study staff time needed to assist the subject in completing the instrument; (2) the interrelationship between items and the test-retest reliability of the RUI by comparing reports of each item at baseline and at three months; and (3) sensitivity of the RUI to subjects' demographic characteristics (eg, age, education, sex) and baseline severity measures (eg, mental status scores, functional performance measures). These analyses will be used to determine if the RUI is able to capture resources used that may be associated with the outcome measures in dementia primary prevention trials and allow us to assess the validity of the concept that with increased disease severity, participation in volunteer and paid work decreases and resource use increases. These data also will identify important baseline covariates for analyses of changes in costs over time. In future studies, changes in resource use, converted to costs, will be compared between drug and placebo groups.

METHODS

Subjects

Subjects include 644 healthy, nondemented individuals age 75 and older living in the community who participated in the ADCS PI Project and their study partners. Study partners were defined as relatives or friends of the subjects who were cognitively normal and had at least 2 contacts per week with the subject (including via telephone). Details of the cohort are described elsewhere.¹⁹

Instrument

Data on subjects' health service utilization were collected on a self-administered Resource Use Instrument (RUI). The instrument was designed to collect maximum information with little assistance from site staff. As such, we encouraged the subject and study partner to complete the survey instrument together. However, there was no limitation to provide staff support as needed. If a subject or study partner requested clarification, study site staff were encouraged to provide it.

The RUI consisted of 9 questions, with subcategories for some of the questions. The questions in the RUI were selected to reflect the most important aspect of direct medical and nonmedical care that healthy elderly subjects may use. We also selected items that reflect the unpaid, informal care that are provided to the subjects and involvement in paid and volunteer work to ascertain aspects of subjects' time use. Table 1 summarizes the description of the items. The first part of the RUI (questions 1 to 4) was designed to capture subjects' use of direct medical care (eg, hospitalizations, ambulatory care, and medical equipment). The first 4 questions assessed utilization and costs of direct medical care (eg, hospitalization). Specifically, for hospitalizations, the RUI asked the number of times the subject was admitted to the hospital, reasons for admission (eg, tonsillectomy), and the number of overnight hospital stays. For medical examinations, the subject was asked to report separately the number of times he or she was examined by a doctor or a nurse. Purchase of durable medical equipment was asked from a list of 25 items. Earlier iterations

of the RUI used open-ended format to elicit subjects' use of durable medical equipment. These items were chosen for the current version of the RUI because they captured the main sources of durable medical equipment. These items included eye glasses, contact lenses, hearing aids, dentures, joint (ankle/wrist/knee) brace, elastic stockings, cane/walking stick, crutches, restraints, wheel chair, electric lift chair, safety bars, toilet bars, toilet seat/chair, tub transfer bench, shower bench/chair/stool/transfer seat, handrail for shower, hospital bed, bed pads, bed alarm, urinary catheter, door alarm, and diapers/pads/briefs. For outpatient treatment and procedures, the subject was asked to report any outpatient medical tests, procedures, or treatment such as therapy, oxygen, or social services. The assessment (questions 5 and 6) also captured direct nonmedical care (eg, home health aides, attendants, companions). For use of paid care, the subject was asked to report number of days home health aides, attendants, companions, or other paid individuals looked after the individual, and hours per day on days visited.

The second part of the RUI was designed to capture the time caregivers spend providing care to the subjects. Questions 7a to c assessed informal resource uses (ie, services delivered without formal compensation). For this nonpaid care question, the subject was asked to report number of hours family members, friends, volunteers, or other nonpaid helpers spent (1) assisting with things such as getting the phone or the door, getting around, or fetching things, (2) helping with basic tasks such as eating, dressing, or personal care (bathing, using the toilet, or brushing hair), and (3) helping with instrumental activities such as shopping, chores, personal business, transportation, or social activities. For each task, the subject also was asked to report the relationship of the helper (eg, spouse, child, relative, friend, volunteer, or other).

Finally, the RUI captured a more subtle issue of time use of the subject, by assessing patterns of participation in paid and volunteer work. The last question was designed to assess loss of employment potential. Question 9 in the RUI asked whether the subject engaged in any volunteer work or paid employment. For those who were engaged, the RUI asked whether the subject lost any time in volunteer work or paid employment because of health reasons, and if so average hours per week lost.

The form was prepared to include check boxes or fill-in values to ease administration. Items 1 to 4 have brief text fields; examples of how to complete them were provided. Item 1 also requires coding by the study site staff and examples of the codes were provided in the study procedures manual. The assessment interval for each question was the past 3 months.

Procedures

Details of the study design can be found in Ferris et al.¹⁹ Briefly, the study is being conducted at 39 sites over 4 years. Subjects completed the RUI questionnaire either in the clinic or at home. To obtain as much information as possible, the subjects and study partners were encouraged to participate in answering the questions in the RUI and participation was recorded via check box as subject alone, study partner alone, or both subject and study partner. Half of the subjects in each condition were randomly assigned to retesting at 3 months. After baseline all subjects are evaluated at 12-month intervals. As part of the overall protocol, subjects received annual in-person assessment with established outcome measures to determine cognitive status. On the basis of this evaluation, subjects who demonstrated deterioration on either of 2 specific cognitive measures [modified Mini-mental State Examination (mMMSE) and word list learning] were categorized as possible decliners who required a complete diagnostic evaluation.

Analysis

We compared the completeness and accuracy of responses with the RUI by condition (at home vs. in clinic). Forms were considered incomplete if they contained any unanswered or inaccurate questions. For this analysis, we summarized data collected at baseline and 3 months. For each question, we compared percentage of completed and accurate forms returned at each time point by in-clinic and at-home group. If the form was not returned complete and accurate, we compared the average number of unanswered questions and the number of questions with errors. For the forms returned incomplete or inaccurate, we also compared the number of telephone conversations (for at-home group) or subject interactions (for in-clinic group) that were needed to collect data for missing and inaccurate questions, and the number of minutes these telephone conversations or subject interactions took.

Although much of the information reported in the RUI involved number of items used, number of events occurred, or hours of care provided, responses for many of the resource utilization items were heavily concentrated at 0. Therefore, we constructed dichotomous variables indicating “use” versus “nonuse” of each resource item. We first compared resource utilization between at-home and in-clinic groups. Then we compared resource utilization by subjects’ demographic characteristics and clinical and functional status. Fisher exact test was used to compare proportions of use versus nonuse for all categories. To check the test-retest reliability of resource utilization, Spearman correlations were computed between resources used reported at baseline and at the 3-month retest for a randomly selected subsample of the subjects. *P* values less than 0.05 were considered statistically significant.

RESULTS

Condition, Completion Rates, and Study Partner Participation

The RUI was completed by 644 subjects during the baseline visit. 329 of the subjects completing the form belonged to the at-home group and 315 belonged to the in-clinic group. There was no difference in utilization rates between in-clinic and at-home group for all items in the RUI. Patterns of missing values for each item in the RUI were not statistically significantly different between the 2 groups. We, therefore, combined the subjects in the at-home and the in-clinic groups in our analysis.

In terms of study partner contribution, most of the RUI forms (82.6%) were filled out by the subjects themselves without the help of their study partners, 17.0% were filled out together by subjects and their study partners, and less than 1% were filled out by the study partners only. We combined the latter 2 groups together. Study partner contribution was significantly higher for the in-clinic group compared with the at-home group (24.5% vs. 13.8%) and for men compared to women (29.3% vs. 15.8%). Rates of utilization were similar across the 2 groups (subject alone vs. study partner) participation except for one resource use item (outpatient procedures, tests, or treatments) where subjects who filled out the RUI with the help of their study partners reported higher rates of utilization than those filled out the form by themselves (62.5% vs. 51.5%, *P* = 0.022). We, therefore, did not distinguish subjects by study partner contribution in our analysis.

The percentage of RUI forms returned incomplete or inaccurate for both groups were extremely low (<0.9%). For both groups and at each time point, median number of unanswered questions was 2 or fewer and median number of questions with errors was fewer than 1. If the form was returned incomplete, the study staff had an average of one telephone conversation or in-person interaction with the subject to complete data collection. Staff time spent on tracking down incomplete data was higher for the at-home group. However, at each time point, the average time study staff spent on tracking down incomplete

data was less than 5 minutes (max = 30 min). Therefore, the magnitude of the difference was very small.

Item Description, Internal Consistency, and Reliability

Descriptive statistics of each item in the RUI are reported in Table 2. In this sample of healthy, cognitively intact individuals age 75 and older living in the community, utilization of resources varied widely by resource type: a large majority of subjects have been examined at least once by a doctor (76.6%), purchased durable medical equipment (61.0%), and had an outpatient procedure, test, or treatment (53.6%). Few subjects (4.1%) had been hospitalized during the past 3 months. About 10% of the subjects received some nonpaid care, mostly in helping with activities such as shopping, chores, personal business, transportation, or social activities. Only 13 subjects (2%) reported receiving any paid care, and only 3 subjects reported any overnight care other than during hospitalization. More than half of the subjects (51.6%) were engaged in volunteer work and 14% were engaged in paid employment.

Table 3 presents Spearman correlations between baseline and month 3 measurements to test reliability for each RUI item. At baseline, 301 subjects who answered the RUI were selected at random for month 3 reliability visit. To date, 233 subjects (149 in the at-home group and 84 in the in-clinic group) have undergone a month 3 visit. Results show that Spearman correlations between baseline and month 3 measurements varied by RUI items, ranging from 0.025 for hospitalizations to 0.721 for weekly paid care and 0.812 for engagement in volunteer work and paid employment. There were no differences in utilization rate between in-clinic and at-home group for any items in the RUI for this group of subjects.

In addition to examining associations between baseline and month 3 resource utilization rates, we also examined interrelationships between each item of RUI at baseline. Results showed that hospital admissions and use of unpaid care were significantly associated with utilization of other resources.

Subject (Demographic and Clinical) Variables and Resource Use (Formal and Informal)

Sensitivity of items in the RUI to subjects' demographic variables, cognition, and functional ability are shown in Table 4. Following ADCS PI Project guidelines, variables on demographics, cognition, and functional abilities were dichotomized as follows: (1) age $\geq$ 80 years versus age $<$ 80 years, (2) men versus women, (3) education $>$ 15 versus education $\leq$ 15 years, (4) white versus non-white, (5) Clinical Dementia Rating (CDR) = 0 versus CDR = 0.5, (6) mMMSE $\geq$ median versus mMMSE $<$ median (high and low cognition), (7) lowest quartile of ADCS-ADL versus other (high and low function), and (8) decliners versus nondecliners.

Resource utilization differed by demographic variables in a number of ways. Older subjects were slightly more likely to receive unpaid care than younger subjects (11.3% vs. 7.4%, $P = 0.008$). Men were more likely to have outpatient procedures, tests, or treatments than women (58.4% vs. 50.0%, $P = 0.045$) but less likely to receive unpaid care (4.8% vs. 12.0%, $P = 0.001$). Compared with non-whites, whites were more likely to receive medical examinations by physicians (78% vs. 71%, $P = 0.0087$), purchase medical equipment (63.6% vs. 52.4%, $P = 0.016$), and have any outpatient procedures, tests, or treatments (57.5% vs. 40.0%, $P < 0.0001$). Subjects with higher levels of education also were more likely than those with lower levels of education to purchase medical equipment (66.5% vs. 55.4%, $P = 0.005$), and have any outpatient procedures, tests, or treatments (59.1% vs. 47.8%, $P < 0.004$).

Resource utilization differed by subjects' cognitive status. Compared with those with lower mMMSE, subjects with higher mMMSE were more likely to have purchased medical equipment (63.3% vs. 58.2%, $P = 0.046$), and more likely to have had an outpatient procedure, test, or treatment (59.9% vs. 45.4%, $P < 0.001$). At the same time, there is a trend for subjects with higher mMMSE score to be less likely to be hospitalized (3.6% vs. 4.7%, $P = 0.10$) and less likely to have been examined by a physician (74.6% vs. 79.3%, $P = 0.08$). Similar patterns also were observed for patients with CDR = 0 compared with those with CDR = 0.5, although the differences were not as pronounced.

Medical care utilization did not differ by subjects' ADL status. However, use of informal, nonpaid care was significantly higher among subjects with low ADL function than those with high ADL function (16.8% vs. 7.0%, $P < 0.001$).

There were large differences in resource utilization between decliners compared with nondecliners. For example, compared with nondecliners, resource utilization rates were higher among decliners for hospitalizations (8.8% vs. 3.8%), medical examinations (82.4% vs. 76.3%), outpatient procedures, tests, or treatments (58.8% vs. 53.3%); use of nonpaid care (17.6% vs. 8.6%). Possibly because only 34 subjects declined over time, despite the sometimes-large differences, none of the differences in resource utilization was statistically significant.

Subject (Demographic and Clinical) Variables and Work (Paid and Volunteer)

Results show that older subjects were slightly more likely to be engaged in volunteer or paid work (60.8% vs. 47.6%, $P = 0.013$). Compared with non-whites, whites were more likely to be engaged in volunteer or paid work (60.8% vs. 47.6%, $P = 0.013$). Subjects with higher levels of education were also more likely than those with lower levels of education to be engaged in volunteer or paid work (65.9% vs. 49.0%, $P < 0.0001$).

Compared with those with lower mMMSE, subjects with higher mMMSE were more likely to be engaged in volunteer or paid work (64.7% vs. 48.2%, $P < 0.0001$). A similar pattern was also observed for patients with CDR = 0 compared with those with CDR = 0.5, although the difference were not as pronounced.

Subjects with lower ADL function also were marginally less likely to participate in any volunteer or paid work (49.7% vs. 59.9%, $P = 0.09$). However, compared with nondecliners, decliners were significantly less likely to be engaged in volunteer or paid work (26.5% vs. 59.4%, $P < 0.0001$).

DISCUSSION

In this study, we examined resource utilization and time use in a sample of healthy, cognitively intact elderly using the Resource Use Inventory (RUI). Overall, the RUI showed promise for use in AD prevention trials. The RUI captured variations in resource use and was sensitive to subjects' demographic and clinical measures. It can be effectively administered either in the clinic or at home. Interrelationships between items of RUI were reasonable. The only resource use item that did not differ by any demographic characteristics or measures of cognitive and functional status was weekly paid care. However, this is likely due to the fact that only healthy subjects were recruited in the study and utilization rates of paid care were extremely low.

Patterns of utilization of formal and informal care are differently associated with subjects' cognitive and ADL status. Compared with subjects with worse cognitive status, those with better cognitive status had lower rates of hospitalization but higher utilization rates of

medical equipment and outpatient procedures. But utilization rates of informal care did not differ by subjects' cognitive status. Compared with subjects with higher ADL function, those with lower ADL function were more than twice as likely to use informal care. But utilization rates of formal medical and nonmedical care did not differ by subjects' ADL status. Although the finding that subjects with better cognitive status have higher utilization rates of medical equipment and outpatient procedures may be counter intuitive, it is consistent with a study on resource utilization from a sample of AD patients in Germany that found diagnostic procedures were significantly higher among patients with less severe dementia than patients with more severe dementia.

Resource use also differed by subjects' demographic characteristics. Specifically, whites had higher utilization rates of doctor visits, medical equipment, and outpatient procedures than those of other race/ethnic groups. Men were more likely to have outpatient procedures, tests, or treatments but less likely to receive unpaid care than women. Subjects with higher education also had higher utilization rates of medical equipments and outpatient procedures than those with lower education. Possibly because education is a proxy to income, subjects with higher education also were more likely to receive informal care as well.

We found subjects' own time use was sensitive to a number of demographic and clinical measures. Subjects who were white or had higher education were more likely to be engaged in volunteer or paid work than subjects of other race/ethnic groups or those with lower levels of education. Moreover, subjects with higher cognitive and ADL status also were more likely to be engaged in volunteer or paid work than those with lower cognitive and ADL status. Differences in engagement in volunteer or paid work were most pronounced between decliners and nondecliners. At baseline, although only a quarter of the subjects who declined at study end were engaged in volunteer or paid work, almost two-thirds of the subjects who did not decline were engaged in volunteer or paid work. While these results are not surprising, they suggest that even before use of medical, nonmedical, or informal care change, subtle changes in subjects' time use may be related to cognitive and functional decline.

We assessed study partner participation and compared resources utilization between subjects who reported on their own and those who reported with the help of a study partner. Not surprisingly, in this sample of healthy, cognitively intact elderly individuals, reports of utilization rates of most resource use items were similar across the 2 groups. These results suggest that evaluation of resource use for detecting change in normal aging can be self-administered and do not require substantial staff involvement and data monitoring. However, although subject participation in assessing resource utilization is feasible among healthy adults, it will be increasingly difficult among those who later develop AD. A comparison of self-reported utilization with Medicare claims data is needed to validate the self-report methodology. This validation will help inform the association and differences between self-reported use and costs and those that actually incurred with changes in cognitive impairment.

In this study, we compared resource use reported at baseline and at the 3-month retest for a randomly selected subsample of the subjects. Although correlations between baseline and month 3 serve well as reliability tests for clinical measures, they do not do so for resource utilization. The magnitudes of the correlations we found in this study, however, were reasonable. For example, correlations are highest for measures in which we expect utilization to be more continuous (eg, weekly paid care, volunteer work, or paid employment) and lowest for measures in which we expect utilization to be more sporadic (eg, hospitalizations). Results on the interrelationship between items of RUI at baseline also are reasonable, providing us with more confidence in the data.

It should be noted that resource utilization data in this study were self-reported and are subject to difficulties of recall. Recall of uncommon events may be more difficult and may lead to underestimates of resource utilization. However, whether or not services were used, as used in this study, is less likely to be problematic. Possible biases resulting from our analysis therefore may be minimal. Future studies will verify self-reported formal services utilization against provider or Medicare data and use other methods to collect data on informal services utilization and subjects' time use (eg, time diaries).

In summary, results of this study were encouraging. Clearly, home-based completion of the RUI by participants in an AD prevention study is feasible, and seems to provide data that are reliable and valid. We will continue to assess the validity of the instrument over the course of the study. Data collected in the RUI will help determine if this brief instrument is useful in AD primary prevention trials.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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TABLE 1

Description of Items in Resource Use Instrument (RUI)

Domain	Item	Description
Direct medical care	1	Hospitalizations, days in hospital and reason
	2	Outpatient clinician visits
	3	Durable medical equipment
	4	Outpatient medical tests and procedures
Direct nonmedical care	5	Overnight respite care
	6	Home health aid
Informal care	7a–c	Amount of unpaid hours of companionship, assistance with basic and instrumental ADLs
	8	Source of informal care
Subjects' time use	9a–c	Employment status, volunteer time status, and loss of employment or volunteer time due to health reasons

TABLE 2

Proportion Endorsing Each Item of Resource Utilization Inventory at Baseline

	N	%
Hospital admissions	26	4.1
Medical examinations by a doctor	492	76.6
Medical equipments	393	61.0
Outpatient procedures, tests, or treatments	344	53.6
Weekly paid care	13	2.0
Weekly nonpaid care	61	9.5
Running errands	17	2.7
Basic tasks	12	1.9
Activities	51	8.0
Any volunteer work or paid employment	370	57.6
Volunteer work	331	51.6
Paid employment	89	13.9

Note: Only 3 subjects reported any overnight care other than a hospital, analyses omitted.

TABLE 3

Reliability Tests Between Baseline and Month 3 Measurements (n = 233)

	Spearman ρ
Hospital admissions	0.025
Medical examinations by a doctor	0.444
Medical equipments	—
Outpatient procedures, tests, or treatments	0.342
Weekly paid care	0.721
Weekly nonpaid care	0.459
Any volunteer work or paid employment	0.812

TABLE 4

Resource Utilization by Demographic, Cognition, and Functional Abilities

	Age (y)		Sex		Ethnicity		Education		CDR		mMMSE		Decliner		Sex	
	≥ 80	< 80	Male	Female	Non-white	White	High	Low	0	0.5	High	Low	Yes	No	Male	Female
Sample size	274	367	269	375	147	497	328	314	496	145	360	280	34	608	269	375
Hospital admissions																
N with no admission	263	352	254	361	138	477	315	300	478	137	349	266	31	584	254	361
N with 1+ admissions	11	15	14	12	6	20	12	14	18	8	13	13	3	23	14	12
Any hospitalization (%)	4	4.1	5.2	3.2	4.2	4	3.7	4.5	3.6	5.5	3.6	4.7	8.8	3.8	5.2	3.2
Medical examinations																
(MD and RN visits)																
N with no medical examination by MDs	63	87	56	94	42	108	74	76	118	32	92	58	6	144	56	94
N with 1+ examinations	211	281	213	279	103	389	254	238	378	114	270	222	28	464	213	279
Any doctor visit (%)	77	76.4	79.2	74.4	71	78.3	77.4	75.8	76.2	78.1	74.6	79.3	82.4	76.3	79.2	74.4
Medical equipments																
N with none	110	141	114	137	70	181	110	141	187	64	133	118	16	235	114	137
N with 1+	164	229	155	238	77	316	218	175	310	83	229	164	18	375	155	238
Any use or purchases (%)	59.9	61.9	57.6	63.5	52.4	63.6	66.5	55.4	62.4	56.5	63.3	58.2	52.9	61.5	57.6	63.5
Outpatient procedures, tests, or treatments																
N with none	129	169	112	186	87	211	134	164	236	62	145	153	14	284	112	186
N with 1+	145	199	157	187	58	286	194	150	260	84	217	127	20	324	157	187
Any procedures, tests, or treatments (%)	52.9	54.1	58.4	50	40	57.5	59.1	47.8	52.4	57.5	59.9	45.4	58.8	53.3	58.4	50
Weekly paid care																
N with none	268	361	267	362	142	487	321	308	486	143	356	273	33	596	267	352
N with 1+	6	7	2	11	3	10	7	6	10	3	6	7	1	12	2	11
Any use (%)	2.2	1.6	1	2.9	3.4	2	2.1	1.9	2	1.4	1.1	2.5	2.9	2	1	2.9
Weekly nonpaid care																
N with no help	243	340	256	327	129	454	291	292	452	131	331	252	28	555	256	327
N with help	31	27	13	45	16	42	36	22	43	15	30	28	6	52	13	45
Any use (%)	11.3	7.4	4.8	12	12.2	8.7	11.3	7	8.9	9.7	8.1	10	17.6	8.6	4.8	12
Volunteer or paid work																

	Age (y)		Sex		Ethnicity		Education		CDR		mMMSE		Decliner		Sex	
	≥ 80	< 80	Male	Female	Non-white	White	High	Low	0	0.5	High	Low	Yes	No	Male	Female
N did not work	122	150	118	154	77	195	112	160	188	84	127	145	25	247	118	154
N worked	152	218	151	219	68	302	216	154	308	62	235	135	9	361	151	219
Any volunteer or paid work (%)	55.5	59.1	56.1	58.4	47.6	60.8	65.9	49	62.1	42.1	64.7	48.2	26.5	59.4	56.1	58.4