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Difficulty Managing Medications and Finances in Older Adults: A 10 year Cohort Study

Bleijenberg Nienke, RN, PhD[*], **Smith Alexander K, MD, MS, MPH**[**], **Lee Sei J, MD, MAS**[**], **Stijacic Cenzer Irena, MSc**[**], **Boscardin W John, PhD**[**], and **Covinsky Kenneth E, MD, PhD, MPH**[**]

[*]Julius Center for Health Sciences and Primary Care, University Medical Center Utrecht, the Netherlands. Department of General Practice. University of Applied Sciences Utrecht, the Netherlands. School of Nursing, research group Care for Older People

[**]University of California, San Francisco, CA, Division of Geriatrics; San Francisco, and Veterans Affairs Medical Center, San Francisco, California

Abstract

BACKGROUND—Difficulty managing medicines and finances becomes increasingly common with advanced age, and compromises the ability to live safely and independently. Remarkably little is known how often this occurs.

OBJECTIVES—To provide population based estimates of the risk of developing incident difficulty managing medications and finances in older adults.

DESIGN—A prospective cohort study.

SETTING—The Health and Retirement Study (HRS), a nationally representative study of older adults.

PARTICIPANTS—Nine thousand four hundred thirty-four participants aged 65 and older who did not need help in managing medications or managing finances in 2002. Follow-up assessments occurred every two years until 2012.

MEASUREMENTS—The primary outcomes were time to difficulty managing medications and time to difficulty managing finances. Risk factors such as demographics, comorbidities, functional status, and cognitive status were assessed at baseline. Hazard models that considered the competing risk of death were used to estimate both the cumulative incidence of developing difficulty managing medications and finances and to identify potential risk factors. Analyses were adjusted for age, gender, race, marital status, wealth and education.

Corresponding author: Nienke Bleijenberg, RN, PhD, University Medical Center Utrecht, the Netherlands, Address: Heidelberglaan 100, Str 6.131, PO Box 3500 GA Utrecht, the Netherlands, Phone: +31 (0) 88 7567094, n.bleijenberg@umcutrecht.nl. **Alternate corresponding author:** Alexander Smith, MD, PhD, aksmith@ucsf.edu.

Conflict of Interest

The authors have declared no conflict of interest.

Author Contributions

NB, AKS, and KEC, designed the study. NB, ISC and JWB conducted the analysis. All authors contributed to the interpretation of the findings and preparation of the manuscript and approved the final version.

RESULTS—The 10 year incidence of difficulty increased markedly with age, ranging from 10.3% (95% CI 9.3–11.6) for managing medications and 23.1% (95% CI 21.6–24.7) for managing finances in those aged 65–69, to 38.2% (95% CI 33.4–43.5) for medicines and 69% (95% CI 63.7–74.3) for finances in those over age 85. Women had a higher probability of developing difficulty managing medications and managing finances than men.

CONCLUSION—This study highlights the importance of preparing older adults for the likelihood they will need assistance with managing their medicines and finances as the risk for having difficulty with these activities over time is substantial.

Keywords

Incidence difficulty; finances; medications; risk factors; community-dwelling older people

INTRODUCTION

Managing medications and managing finances are complex integrative measures of functioning that are crucial to safe independent living in older persons, but frequently become impaired with advancing age. [1] These two functional measures are often included in scales of instrumental activities of daily living (IADL), but are distinct from other IADLs in that they are highly dependent on cognitive functioning while the other IADL are dependent at least in part on physical functioning. The implications of having difficulty managing medications and finances are serious, and have substantial impact on the individual and their relatives.[1–3]

Living independently and being engaged in the community are valued goals of the majority of older adults. When older people lose the ability to manage medications and finances it seriously hinders these goals and has adverse effects on their quality of life, as well as families and society. [2, 3] Difficulty managing medications can lead to medication errors, which increase the risk for adherence events, hospitalization, and mortality. [4, 5] Difficulty managing finances, also known as impaired financial capacity, is defined as “the inability to independently manage money and financial assets in a manner consistent with personal self-interest” [6]. People who are unable to safely manage their finances are at increased risk for elder neglect, financial abuse, [7, 8] as well as loss of their savings, which may cause substantial changes in quality of life.

Despite the importance of these domains of functioning, very little is known about how often persons of various ages develop problems managing medicines and finances over time. [9] Further, we know remarkably little about which risk factors might help us identify elders at greatest risk. Clear quantification of risk is a crucial first step before preventive and protective efforts can start among those who are vulnerable to these impairments. Therefore, the aim of this study was to examine the incidence of developing difficulty in managing medications and in managing finances, and to determine long-term risk factors for developing difficulty with these two outcomes.

METHODS

Design, Setting, and Participants

We used data from the US Health and Retirement Study (HRS). [10] The HRS is an ongoing nationally representative longitudinal study. Participants aged 50 and older are interviewed every two years with the goal of examining changes in disability, health and wealth as people transition from work to retirement.

This analysis included subjects who were interviewed in the 2002 wave of the HRS and were followed every two years for up to 10 years. 10470 participants aged 65 years and older, and not living in a nursing home were interviewed in 2002. Because our focus was on incident difficulty, we excluded 936 participants who had reported difficulty in either managing medications or managing finances, leaving an analytic cohort of 9534. We excluded 100 participants because no follow-up data were available. Therefore, the final sample size consisted of 9434 eligible participants.

Outcome Measurements

The two primary outcomes were time to developing difficulty with managing medications and time to developing difficulty with managing finances. Participants were asked every two years “Do you have any difficulty managing medications” and “Do you have any difficulty managing your money - such as paying your bills and keeping track of expenses.” For both outcomes, death prior to reporting the outcome was considered as competing risk. If participants were not able to complete the survey themselves, a proxy respondent provided the information.

Other measures

We considered four domains of potential risk factors for disability: demographic, health, cognitive, and functional status. [11, 12] Demographics such as age, race, education, living situation, and marital status were obtained by self-report. Measures of socioeconomic status included net worth (assets minus debts) and years of education (less versus more than high school).

Health related factors, including comorbidities such as hypertension, diabetes, cancer, chronic lung disease, heart condition, and stroke were assessed by asking participants if a physician had ever told them that they had the condition. Prior research with the HRS has shown that these conditions are strong predictors for mortality. [13] Depressive symptoms were measured using the 8-item Center for Epidemiologic Studies Depression scale[14], with depression defined as 3 or more symptomatic items. Self-rated health was measured on a five-point scale from poor to excellent. Pain was measured by asking participants if they often had trouble with pain. Those who responded positively were then asked to classify the level of pain: mild, moderate, or severe. Participants who reported ‘moderate’ or ‘severe pain’ were defined as having significant pain. [3] Smoking, a health behavior, was assessed as never, former, and current smoker. If participants reported ever smoking they were classified as smokers.

Cognitive status was assessed with the following items: (1) A test of immediate, and delayed recall of 10 common nouns. A list of 10 words was presented orally to participants, who were then asked to recall as many words as possible immediately after the list was read and again after a five minute delay; (3) Participants were asked to count backwards 10 digits from 86 as quick as possible; (4) In the Serial 7s test, the interviewer asked the respondent to subtract 7 from 100, and continue subtracting 7 from each subsequent number for a total of five trials, dichotomized into all correct versus one or more incorrect; (5) Orientation was assessed by asking the day, month, and year at the time of the interview; Orientation to date was classified as correct if all items were correct, and as incorrect if one or more items were incorrect. (6) Self-rated memory was assessed by asking participants to rate their self-reported memory at the present time on a five-point scale from poor to excellent.

Functional status included ADL function, assessed by asking participants whether they experienced difficulty in bathing, dressing, transferring from a bed to a chair or out of a chair, using a toilet, eating, and walking across a room. If a difficulty was reported, the subject was asked whether help was needed when performing the activity. Frequent physical activity was defined as engaging in light or vigorous exercise three or more times per week. Sensory function was assessed by asking participants to rate their vision and hearing on a 5-point scale, from poor to excellent.

Analysis

Descriptive statistics were used to describe the baseline characteristics of the participants. We used sampling weights provided by the HRS to account for the unequal probability of subject selection and complex survey design. Competing risks hazard models by Fine & Gray (1999) were used to estimate time to developing difficulty in either managing medications or finances. [15] Competing risks is a superior approach to survival analysis when subjects are exposed to more than one cause of failure (outcome) [15, 16] In this study, participants who died during follow-up experienced a competing risk, i.e. not the event of interest. [17] Participants were censored if they were alive and lost to follow up prior to 2012, or had not experienced the outcome at 10 years (by 2012). For these participants, their last observed follow-up time is less than their time to event, which can occur due to drop out before the study ends or when a participant is event free at the end of the observation period. In ideal study, in which an outcome is time dependent (i.e. time to difficulty managing finances), all participants would be followed until the outcome occurs, or the competing outcome of death occurs. This is rarely possible in most studies. Censoring is the statistical approach used to include participants who not followed until one of these. Participants in the current study could be censored either because they were lost to follow-up prior to 2012, or had not experienced the outcome prior to the end of follow-up in 2012.

We calculated the risk to develop either difficulty in managing medications and finances during 10 years of follow-up for different age groups: 65–69, 70–74, 75–79, 80–84, and 85+. We used Cumulative Incidence Functions (CIF) to describe the unadjusted and adjusted probability of developing difficulty on managing medications or finances for surviving subjects. Next, using competing risks regression, we estimated subhazard ratios (sHR) to determine the unadjusted and adjusted association between each potential risk factor and

difficulty with either managing medications or managing finances. Crude estimates were calculated in the first model, and in the second model we adjusted for age, gender, race, marital status, wealth and education. The proportional assumption was confirmed for all predictors of interest based on graphs of scaled Schoenfeld residuals. Statistical analyses were conducted using SAS version 9.3 (SAS Institute, Cary, NC) and Stata software, version 13 (StatCorp, College Station, TX).

RESULTS

Baseline Characteristics

The mean age of the participants was 74.1 (SD 7.0), and 56.6% were female (Table 1). At baseline, 85.3% had no ADL difficulty. A total of 1427 (15.2%) participants developed difficulty with managing medications, and 3155 (33.4%) died before developing difficulty managing medications. For managing finances, 2824 (29.9%) participants developed difficulty, and 2576 (27.3%) died before developing difficulty with managing finances (Supplementary Appendix S1).

Age and gender were strong predictors for both difficulty managing medications and managing finances (Table 2). The adjusted 10-year incidence of difficulty managing medications increased markedly with age, ranging from 10.3% (95% CI 9.3–11.6) in those aged 65–69 to 38.2% (95% CI 33.4–43.5) in those over age 85 (Figure 1a). Similarly, the adjusted incidence of difficulty managing finances increased substantial with age, ranging from 23.1% (95% CI 21.6–24.7) in those age 65–69 to 69% (95% CI 63.7–74.3) in those over age 85 (Figure 1b).

Women had a higher probability of developing difficulty with managing medications and managing finances compared to men (sHR= 1.39; 95%CI 1.21–1.61, sHR= 1.20 95% CI 1.09–1.31, adjusted). The adjusted cumulative incidence (risk) for difficulty with medications for men was 15.6% (95% CI 14.4–17.0) and for women 20.6% (95% CI 19.4–21.8) (Figure 2a). Stratified by age groups, the risk for men and women age 65–69 after 10 years was 10.1% (95% CI 8.6–12.0) and 10.5% (95%CI 9.1–12.2) and for those over 85 was 28.4% (95% CI 21.1–37.5) and 43.4% (95%CI 37.4–49.8). After 10-year follow-up, the adjusted cumulative incidence (risk) for difficulty with finances for men and women was 33.7% (95% CI 32.1–35.4), and 35.9% (95%CI 34.5–37.3) (Figure 2b). Table 2A in the appendix shows the likelihood and confidence intervals for each measurement and outcome.

Predictors of developing difficulty managing medications and finances

Besides older age and female sex, the strongest adjusted risk factors were in the health, cognitive, and functioning domains: stroke, low self-reported memory, low cognitive functioning, and ADL difficulty were independently associated with difficulty managing medications (Table 2). Stroke was an independent predictor for developing difficulty in both managing medications and managing finances (adjusted sHR 1.42; 95% CI 1.18–1.71; adjusted sHR 1.38; 95% CI 1.21–1.59) (Table 2). Participants with reduced cognitive functioning, regardless of the cognitive measure, were at greater risk for developing difficulty managing medications or finances (Table 2). Those with ADL difficulty also had a

higher risk for developing difficulty managing medications and managing finances (adjusted sHR1.24; 95% CI 1.06–1.45, and adjusted sHR1.27; 95% CI 1.13–1.42).

DISCUSSION

In this study, we assessed the risk of developing difficulty managing medications and finances in older persons. Managing medications and finances are domains of function that are heavily dependent on cognitive functioning and important for independent living. This study highlights the importance of preparing older persons for the likelihood that they will need assistance with managing their medications and finances as the risk for having difficulty with these activities over time is substantial. Among 85 year olds with no difficulty, over 10 years, nearly half (40%) will develop difficulty with managing medicines and most (70%) will develop difficulty managing their finances. Women have a higher risk than men, especially with advancing age. Additional risk factors across multiple domains, such as history of stroke, low cognitive functioning and ADL difficulty, were associated with an increased risk for both outcomes.

Our findings provide guidance for physicians and health care professionals counseling patients and families about planning for future needs. While advanced planning in late life often focuses on health care and end of life preferences[18], our results highlight the need to counsel patients about preparing for the possibility of losing the ability to safely manage their medications and finances. This may be particularly the case for women. While it is well known that women have higher rates of physical disability[3, 19] this study shows that women are also at higher risk of developing these more cognitively driven components of disability.

The results of this study suggest that developing difficulty managing medications and finances are multifactorial problems and not solely age-associated. [9] While age is a strong risk factor, we observed that multiple other risk factors in several domains are associated with these outcomes. We extend prior studies that have shown that stroke, depression and cognitive limitations are associated with physical disability by also showing that they are associated with a higher risk of developing difficulty managing medications and finances. [20–22] These findings are in line with the recently proposed concept of age-associated financial vulnerability (AAFV) suggesting that multiple risk factors contribute to financial vulnerability. [9] Our findings highlight the need for clinicians to expand their focus beyond biomedical health, incorporating components of comprehensive geriatric assessment (CGA). Taking care of older people requires a biopsychosocial-integrated view of wellbeing and health status. [23] Asking patients and families about integrated measures of functioning such as their experiences with managing medications and finances is crucial in assessing their ability to independently function in the society. Physicians and other health care professionals should therefore be adequately trained to assess patients' capacity in these areas and have knowledge regarding evidence-based interventions when a patient is at risk. For example, interprofessional teams have been described as effective strategies to address the complex and multidimensional needs and problems and these teams can be valuable for physicians.[24]

This study underscores the need for early identification of those at risk for these impairments using validated tools followed by an adequate intervention. This is especially the case in the oldest old as IADL deterioration can be an early marker of dementia. [2525] Increasing awareness among clinicians and other health care workers regarding the risk factors and consequences for older adults and their families should be a first step. With regard to managing medications, physicians are well positioned to ask older adults simple questions such as ‘tell me how you take your medication’ or ‘do you experience difficulty when taking your medication. [5] Validated comprehensive medication review and adherence assessments are available, but rarely performed due to the time pressures of office-based practice. [5]

Although families caregivers periodically note concerns about a patient’s difficulty with managing finances to primary care physicians[1] it is not routinely assessed during primary care visits. It can be overlooked because often medical problems may receive attention during a short visit.[1] Financial capacity might therefore be routinely assessed by other health care workers such as social workers using comprehensive instruments for financial capacity. [25, 26] Also single questions such as ‘do you experience difficulty managing finances’ or ‘who manages your money day to day’ should be considered in geriatric assessments. [28]

Some methodological limitations should be considered when interpreting our results. First, we measured incident difficulty every two years. Among those who died during follow-up, incident limitations that occurred between the last interview and death could not be identified. Second, the findings are based on self-report. It is likely that some elders did not report problems despite having difficulties. For example, it is likely that many of those with low cognitive functioning who did not report difficulty actually had difficulty. Consequently, the incidence observed in this study is probably underestimated. Third, although we included multiple risk factors in various health domains, relatively few psychosocial factors such as social isolation, loneliness, or anxiety were incorporated, as they were not assessed in the HRS 2002 wave. These are known risk factors for IADL difficulty[20], and risk factors for elder abuse, as well as consequences of financial vulnerability. [27, 28] To our knowledge, this study is unique because it provides the most detailed estimates of the incidence of developing difficulties managing and finances that have yet been reported.

Given the high incidence of impairments in these activities, interventions to prevent the adverse consequences of these impairments are highly needed, both from a clinical and a societal perspective. Multidisciplinary teams of physicians, nurses, pharmacists, and social workers may be well positioned to provide tailored recommendations, education, and practical advice to individuals at risk for difficulty managing medications and finances. Management of medications and finances should be addressed in advance care planning interventions to lower the risk and prevent serious problems that arise with advancing age. [18]

Regarding financial impairment, governmental efforts may protect elders from financial vulnerability. [9] The high incidence observed in this study raises the question whether an age-based threshold for routinely assessing difficulty managing medications and finances should be considered. However, balancing between protection and autonomy should be considered carefully. [9]

In conclusion, community dwelling older people with advanced age are at high risk of developing difficulty managing medications and finances. Among 85 year olds with no difficulty, over 10 years, nearly half 40% will develop difficulty managing medications and almost 70% will develop difficulty managing finances. Long-term risk factors were found in multiple health domains, and the risk is considerably greater among women, those with stroke, low cognitive functioning and ADL difficulty. Protective efforts, such as early identification, awareness, and preventive interventions are needed, as well as policy, research and funding initiatives to reduce the consequences and burden of these serious impairments.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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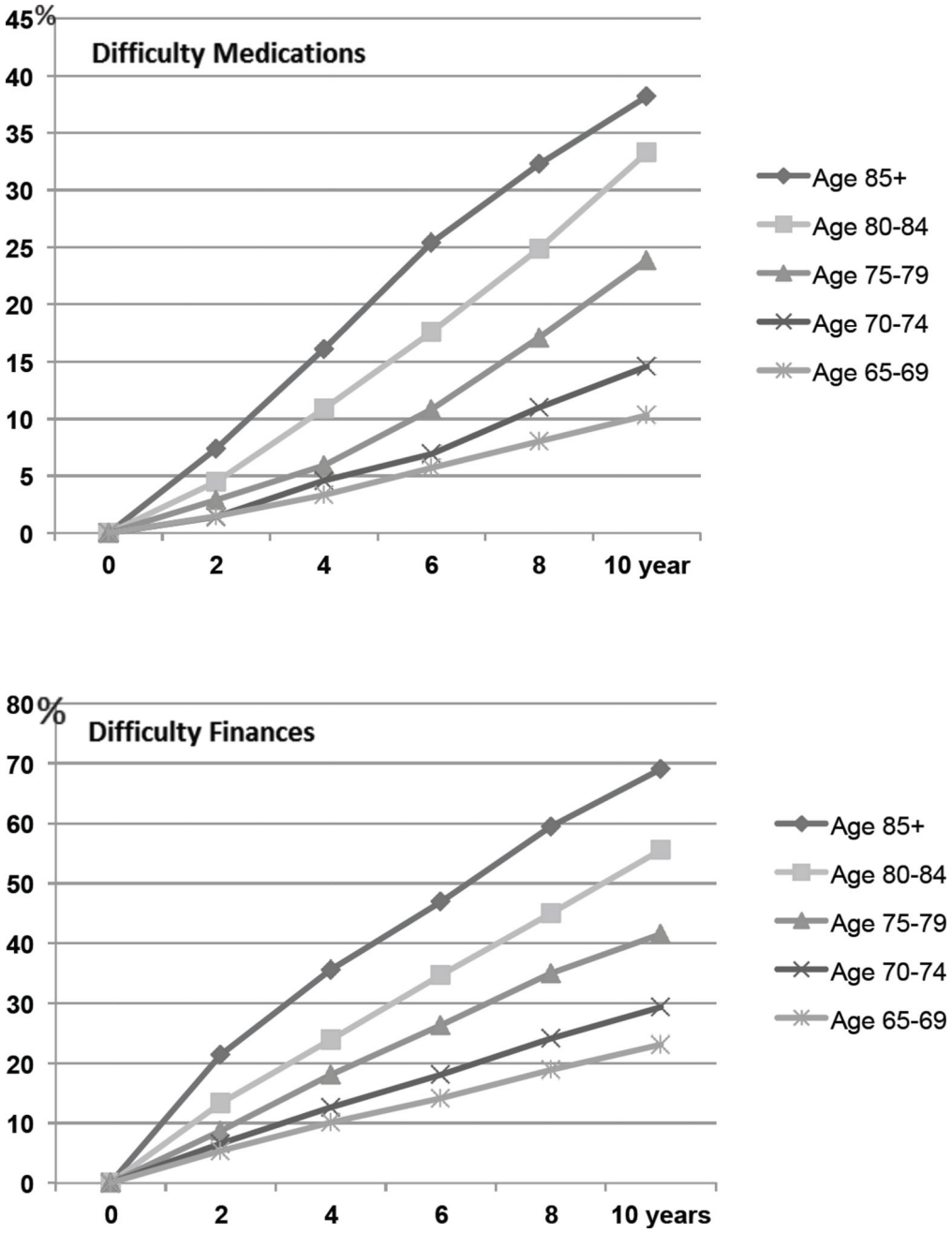

Figure 1.

A Probability of Difficulty Managing Medications by age groups (at baseline).

B Probability of Difficulty Managing Finances by age groups (at baseline).

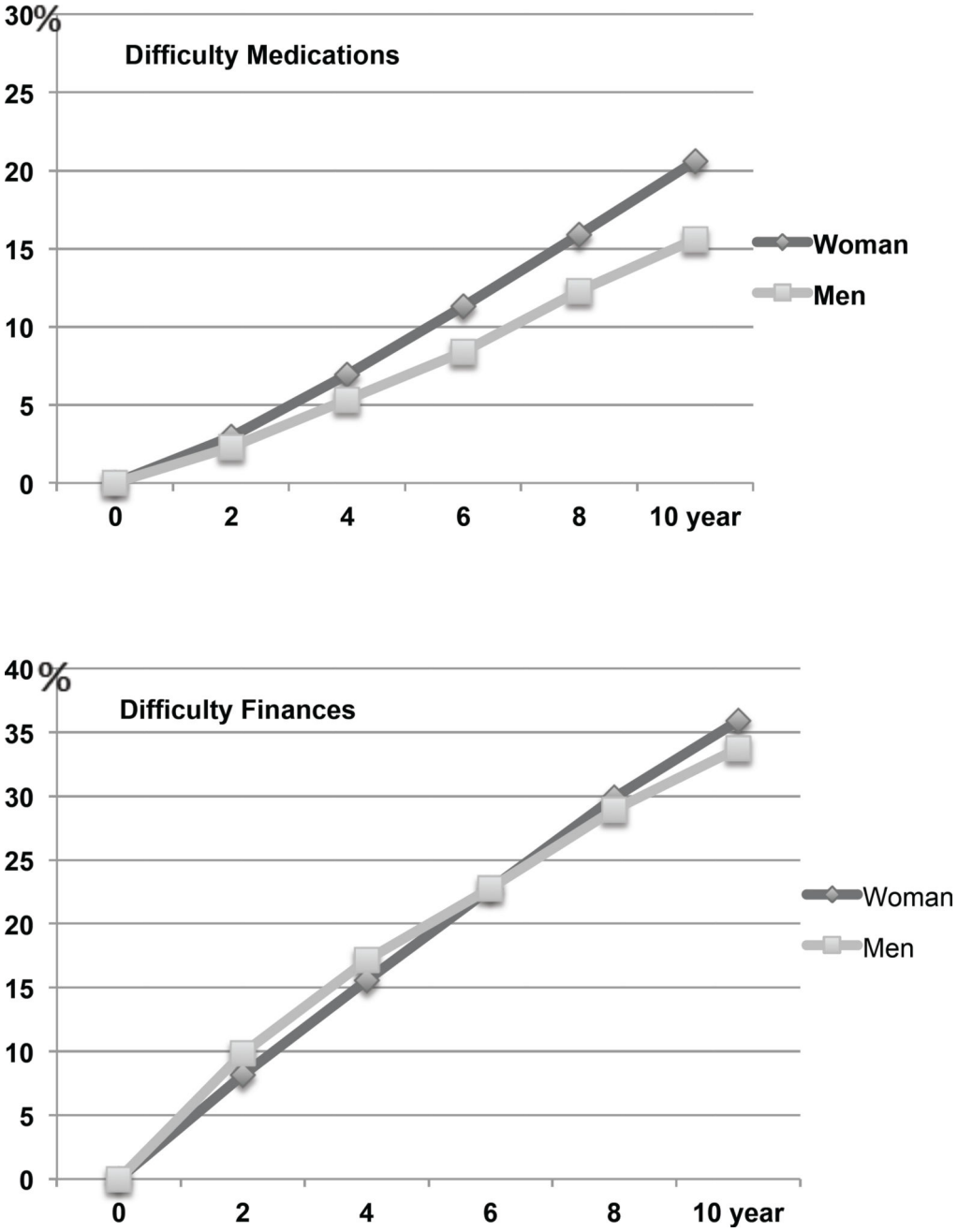

Figure 2.

A Probability of Difficulty Managing Medications by gender.

B Probability of Difficulty Managing Finances by gender.

Table 1

Baseline Characteristics Participants

Characteristics	**N= 9434**
Age, mean (SD)	74.3 (6.7)
65–74, n (%)	5850 (62)
75–84, n (%)	2763 (29.3)
85+, n (%)	821 (8.7)
Female, N (%)	5335 (57.4)
Living alone	2652 (28.1)
Race, N (%)	
White	7492 (85.1)
African American	1133 (7.9)
Latino	638 (5.0)
Other	171 (2.0)
Married, N (%)	5546 (58.8)
Socioeconomic status	
Net worth, median (IQR)	171K (53.5K–418K)
Education less than high school	2582 (25.6)
Comorbidities, N (%)	
Diabetes	1632 (16.5)
Hypertension	5141 (54.1)
Chronic lung disease	846 (9.1)
Heart condition	2583 (27.5)
Stroke	778 (8.3)
Cancer	1497 (16.3)
Health status, N (%)	
Self-rated health, excellent or good	2642 (28.0)
Self-rated health, poor	6787 (72)
Self-rated memory, excellent or good	2318 (26.6)
Self-rated memory, poor	6383 (73.4)
Smoking (ever)	5390 (57.2)
Alcohol use (ever)	4092 (44.8)
Lack of vigorous activity	3791 (40.6)
Significant pain	1989 (21.3)
Vision, poor or fair	1962 (21.1)
Hearing, poor or fair	2246 (23.7)
Depression	1256 (14.0)
ADL, N (%)*	
Independent	7905 (84.1)
Getting in-or out of bed	381 (4.1)
Difficulty eating	141 (1.5)
Difficulty bathing	482 (5.1)

Characteristics	**N= 9434**
Difficulty dressing	727 (7.7)
Difficulty walking across a room	523 (5.4)
Difficulty toileting	405 (4.3)
Cognitive functioning, N (%)	
Incorrect date[¶]	1492 (17.1)
Unable to count backwards from 86	1166 (12.6)
Serial 7 incorrect	5023 (56.5)
Delayed word recall[¥]	4906 (55.6)

Note:

[*] ADL included bathing, dressing, eating, walking across a room getting out of bed.

[¶] Incorrect day, month or year.

[¥] Unable to recall 4 or more words out of 10.

Table 2

Association between Predictors and Time to Developing Difficulty in Managing Medications and Finances.

	Medications				Finances			
	Unadjusted		Adjusted		Unadjusted		Adjusted	
	sHR	95% CI	sHR	95% CI	sHR	95% CI	sHR	95% CI
Age 65–69	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
70–74	1.47	1.23–1.75	1.39	1.15–1.67	1.29	1.15–1.45	1.26	1.11–1.42
75–79	2.1	1.78–2.49	1.88	1.57–2.26	1.73	1.54–1.94	1.62	1.43–1.84
80–84	2.89	2.44–3.41	2.36	1.93–2.87	2.26	2.01–2.54	2.04	1.79–2.33
85+	3.11	2.56–3.78	2.18	1.72–2.76	2.71	2.37–3.10	2.35	1.99–2.77
Men	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Woman	1.45	1.30–1.63	1.39	1.21–1.61	1.1	1.02–1.19	1.2	1.09–1.31
Single, widowed	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Married	0.72	0.64–0.80	1.07	0.93–1.22	0.97	0.90–1.05	1.34	1.22–1.48
High school or more	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Less than high school	1.64	1.46–1.83	1.04	0.90–1.21	1.6	1.48–1.74	1.16	1.04–1.28
White	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Non white	1.48	1.31–1.67	1.14	0.98–1.33	1.03	1.00–1.07	1	0.89–1.12
Net wealth above median	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Net wealth below median	1.51	1.35–1.69	1.06	0.92–1.22	1.38	1.28–1.49	1.12	1.02–1.24
No pain	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Pain	1.3	1.14–1.47	0.98	0.84–1.14	1.25	1.14–1.37	1.03	0.92–1.14
Never or ever smoked	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Smoking - current	0.75	0.61–0.93	0.82	0.65–1.03	0.78	0.68–0.90	0.84	0.72–0.99
No diabetes	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Diabetes	1.21	1.05–1.01	1.01	0.86–1.18	1.25	1.13–1.37	1.13	1.01–1.26
No cancer	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Cancer	0.96	0.83–1.12	0.96	0.82–1.13	0.92	0.82–1.02	0.88	0.79–0.99
No stroke	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Stroke	1.79	1.53–2.11	1.42	1.18–1.71	1.65	1.46–1.86	1.38	1.21–1.59
No lung disease	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Lung disease	1.01	0.83–1.22	0.9	0.73–1.12	0.96	0.83–1.10	0.87	0.74–1.01

	Medications				Finances			
	Unadjusted		Adjusted		Unadjusted		Adjusted	
	sHR	95% CI	sHR	95% CI	sHR	95% CI	sHR	95% CI
No heart disease	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Heart disease	1.23	1.09–1.38	0.96	0.83–1.10	1.1	1.01–1.20	0.88	0.80–0.98
No depression	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Depression	1.67	1.45–1.92	1.19	1.01–1.40	1.39	1.26–1.55	1.07	0.95–1.20
No visual impairment	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Visual impairment	1.64	1.45–1.85	1.17	1.01–1.35	1.5	1.37–1.63	1.12	1.01–1.25
No hearing impairment	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Hearing impairment	1.35	1.20–1.53	0.99	0.86–1.14	1.37	1.26–1.49	1.01	0.91–1.12
No ADL difficulty	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
ADL Difficulty*	1.83	1.61–2.08	1.24	1.06–1.45	1.64	1.50–1.80	1.27	1.13–1.42
Good self-rated health	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Poor self-rated health	*1.66*	*1.48–1.86*	*1.03*	*0.88–1.20*	*1.48*	*1.36–1.60*	*1.04*	*0.93–1.16*
No lack of vigorous activity	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Lack of vigorous activity	1.5	1.33–1.69	1.06	0.92–1.21	1.33	1.23–1.44	1.04	0.95–1.14
Good or excellent self-rated memory	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Poor self-rated memory**	1.65	1.47–1.87	1.31	1.14–1.50	1.55	1.43–1.69	1.26	1.14–1.39
Correct date	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Incorrect date¶	2.6	1.60–4.22	1.66	0.99–2.78	2.26	1.51–3.39	1.55	1.04–2.33
Correct counting backwards	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Incorrect Counting Backwards^	1.77	1.53–2.03	1.21	1.04–1.42	1.53	1.38–1.71	1.11	0.99–1.25
Correct serial 7	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Incorrect Serial 7^	1.67	1.47–1.89	1.2	1.04–1.37	1.55	1.42–1.69	1.21	1.10–1.33
Delayed recall (4 or more words)	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*	*1*	*[Reference]*
Delayed recall (0–3 words)¥	1.96	1.73–2.23	1.41	1.22–1.62	1.81	1.66–1.98	1.35	1.23–1.49

Notes: Estimates were calculated using competing risks using Fine & Gray method (In the multivariate model we adjusted for age, gender, race, marital status, wealth and education. Sensory functioning was assessed whether people experienced difficulty vision and hearing.

*ADL included bathing, dressing, eating, walking across a room, transferring, and toileting.

¶Incorrect date included incorrect day, month and or year.

^All correct is reference.

¥Unable to recall 4 or more words out of 10.