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Research Article

Unmet Need for ADL Assistance Is Associated With Mortality Among Older Adults With Mild Disability

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Abstract

Background. Unmet need for assistance with activities of daily living (ADLs) disability is associated with increased risk for future hospitalization. To further explore the association between unmet ADL need and future health outcomes, we examined the association between unmet need for ADL assistance and 1-year mortality.

Methods. A prospective study of 6,730 community-living Medicare recipients was conducted among respondents to the 1994, 1999, and/or 2004 National Long Term Care Survey. Only those who reported having one or more ADL disabilities were included. Time to death within 1 year after the community survey was determined from Centers for Medicare and Medicaid Services vital statistics records. The community interviews provided demographic, health, and ADL information.

Results. Unadjusted 1-year death rates were 8.7%, 10.6%, 11.4%, 19.2%, and 27.3%, respectively, for respondents with disabilities in 1, 2, 3, 4, and 5 ADLs. Overall, 21.3% reported unmet need for assistance for one or more ADL disabilities. After controlling for demographic and health characteristics, we found a significant interaction between unmet ADL need and level of ADL disability ($p = .018$). Post hoc analyses revealed that unmet ADL need was associated with increased risk for mortality only for those with one (hazard ratio = 1.96; 95% CI = 1.29–2.87) or two ADL disabilities (hazard ratio = 1.37; 95% CI = 1.07–1.75), but not for those with three or more ADL disabilities.

Conclusion. Future studies are needed to determine whether these findings are replicable and, if so, whether physiologic or process of care variables explain why ADL is associated with mortality only for those with mild disability.

Key Words: Activities of daily living—Mortality—Unmet need.

One in six older adults have disability in at least one activity of daily living (ADL) (1). ADLs are basic tasks of everyday life that are needed for maintaining health (2), such as bathing, dressing, eating, toileting, and getting around inside. Greater dependency in ADL significantly increases older adults' risk for mortality (3–5). Hospitalized patients with one to three ADL dependencies are 40% more likely to die within a year and those dependent in all five ADLs were four times more likely to die within a year than those with no ADL disabilities (6). ADL disability implies equal or greater risk for mortality as specific comorbidities (7) and indices of severity of illness (6). Collectively, prior studies provide compelling evidence that functional status is one of the most important predictors of mortality.

ADL disabled older adults typically require the help of others to successfully complete those ADL tasks for which they are disabled, but nearly 20% of disabled adults report unmet need for ADL assistance (8–10). Self-reported health consequences of unmet ADL need include skin breakdown, weight loss, dehydration, and falls (8). Recent studies reveal that self-reports of unmet need for ADL assistance are associated with future health outcomes including hospital admission (11) and readmission (12). To further investigate the association between unmet ADL need and future health outcomes, we examined whether self-reports of unmet need for ADL assistance are associated with higher risk for 1-year mortality.

Methods

Study Design and Sample

Data are from the 1994, 1999, and 2004 community surveys from the National Long Term Care Survey and linked vital statistics data from the Centers for Medicare and Medicaid Services. Respondents were randomly selected Medicare enrollees and surveys were conducted by trained U.S. Census Bureau interviewers. Response rates were above 90% for all three waves. Respondents were included in the analytic sample if they reported one or more ADL disabilities because, in principle, unmet need for assistance with ADL disabilities is relevant only to those with ADL disability. Purdue University granted human participants approval.

Measures

Time to death

Time to death was defined as the number of days from the date of the community interview until the date of death with right censoring occurring at 366 days after the interview.

Unmet need for ADL assistance

Similar to prior studies (8,13), respondents were designated as having unmet ADL need if for any ADL task for which they reported disability they stated, they needed more human help or had to wait to complete an ADL task because of lack of human help.

Covariates

Respondents' age, gender, race (white or other), education (eighth grade or less, high school, or college), living alone, and presence of proxy (who responded to the survey when the participant was unable to respond due to illness, physical, or cognitive disability) were determined from the community interviews. Comorbidities present 12 months prior to the interview date, including arthritis, diabetes, cancer, emphysema, stroke, heart disease (eg, heart attack or other heart problems), and dementia, were determined from the community interviews. ADL disability for bathing, dressing, eating,

toileting, and getting out of bed or around inside was defined as receiving human help, using equipment, or needing (but not receiving) human help to complete the task.

Statistical Analyses

Death rates were calculated as the total number of people who died within 366 days of their interview date divided by the total number of respondents in the analytic sample. Associations between time to death and each predictor variable were investigated using the Cox proportional hazards model with robust sandwich variance estimators due to the complex sampling design (data not shown) (14). Variables that had an association with mortality at a significance level of .20 or less were included in subsequent analyses including the calculation of descriptive statistics of predictor variables stratified by met versus unmet ADL need. A multivariable piecewise Cox proportional hazard model was computed to assess the association between time to death and unmet ADL need for different levels of ADL disability. Sampling weights were included in the computation of all estimates and SAS 9.2 was used for all analyses.

Results

Of the 15,437 observations from the 1994, 1999, and 2004 community survey data, 7,228 had at least one ADL disability, among which, 992 (13.72%) died within 1 year after the community interviews. Sample sizes and death rates were similar across the three waves (data not shown). Bivariate analyses revealed that several candidate predictor variables were not associated with survival time and consequently were not included in subsequent analyses; they were race ($p = .24$), diabetes ($p = .21$), education (eighth grade or less $p = .34$, college or higher $p = .57$), and dementia ($p = .36$). Among the remaining predictor variables (see Table 1), 498 observations had missing values for one or more variables that led to an analytic sample size of 6,730 with 900 (13.37%) death events within 12 months after the interview. Unmet need for ADL assistance was reported by 7.8%, 16.2%, 24.7%, 44.0%, and 33.6% for those with disabilities in 1, 2, 3, 4, and 5 ADLs. Death rates were 8.7%, 10.6%, 11.4%, 19.2%, and 27.3%, respectively, for respondents with disabilities in 1, 2, 3, 4, and 5 ADLs.

At the time of the community interview, most of the respondents were female, living with others, and one fourth of them used a proxy to assist in the interview (Table 1). The percentage of participants with a proxy respondent, heart disease, and emphysema was higher for those with unmet ADL need than those with met ADL need (Table 1). In contrast, the percentage of persons living alone and with one or two ADL disabilities was lower for those with unmet ADL need compared with those with met ADL need.

The multivariable piecewise Cox proportional hazards model revealed a significant interaction between unmet ADL need and level of ADL disability ($p = .018$). Table 2 provides the resulting hazards ratios for the predictor variables in the multivariable model. Male respondents and those who were older, had a proxy, cancer, heart disease, emphysema, but not arthritis, were at higher risk of death (Table 2). Table 3 explicates the interaction between unmet ADL need and level of ADL disability. It shows p values, adjusted hazard ratios, and 95% confidence intervals for mortality for those with met versus unmet need for ADL assistance across levels of ADL disability. Unmet ADL need was associated with a twofold increase in risk for mortality for those with one ADL disability (hazard ratio = 1.96; 95%

Table 1. Sample Size and Weighted Column Percents Stratified by the Status of ADL Need at the Time of the Community Interview Among NLTCS Respondents With ADL Disability

Covariate	Total	Met ADL Need	Unmet ADL Need
Total sample (N, row %)	6,730 (100.00)	5,341 (78.65)	1,389 (21.34)
Age	Mean = 81.5 SD = 8.5	Mean = 81.2 SD = 8.1	Mean = 82.2 SD = 9.1
Gender			
Female	4,836 (70.25)	3,839 (71.88)	997 (68.42)
Living alone			
Yes	2,767 (38.74)	2,352 (42.13)	415 (26.22)
Proxy			
Yes	1,803 (25.21)	1,236 (21.56)	567 (38.67)
Arthritis			
Yes	4,929 (73.46)	3,937 (74.26)	992 (70.48)
Cancer			
Yes	556 (8.38)	416 (7.90)	140 (10.13)
Heart disease			
Yes	3,918 (58.62)	2,348 (54.63)	1,570 (64.56)
Emphysema			
Yes	522 (8.41)	391 (7.96)	131 (16.56)
Stroke			
Yes	702 (10.96)	480 (9.44)	222 (10.13)
ADL disability			
1	2,186 (33.28)	2,015 (38.67)	171 (13.40)
2	1,621 (23.77)	1,358 (25.11)	263 (18.86)
3	1,229 (18.34)	925 (17.58)	304 (21.13)
4	781 (11.57)	437 (8.03)	344 (24.62)
5	913 (13.04)	606 (10.61)	307 (21.99)

Notes: ADL = activity of daily living; NLTCS = National Long Term Care Survey; SD = standard deviation.

Table 2. Associations With Time to Death Within 12 Mo After the Community Interviews Among NLTCS Community Respondents With ADL Disability

Covariate	Number of Deaths (Death Rate %)	<i>p</i> Value	Hazard Ratio (95% CI)
Age	900 (13.37)	<.001	1.032 (1.022–1.043)
Gender			
Female	551 (11.39)		1.000
Male	349 (18.43)	<.001	1.631 (1.374–1.936)
Living alone			
No	591 (14.91)		1.000
Yes	309 (11.17)	.486	0.941 (0.792–1.117)
Proxy			
No	488 (9.90)		1.000
Yes	412 (22.85)	<.001	1.522 (1.267–1.828)
Arthritis			
No	314 (17.43)		1.000
Yes	586 (11.89)	.007	0.791 (0.667–0.939)
Cancer			
No	757 (12.26)		1.000
Yes	143 (25.72)	<.001	2.206 (1.775–2.742)
Heart disease			
No	311 (11.06)		1.000
Yes	589 (15.03)	.011	1.242 (1.051–1.467)
Emphysema			
No	777 (12.52)		1.000
Yes	123 (23.56)	<.001	2.128 (1.692–2.677)
Stroke			
No	774 (12.84)		1.000
Yes	126 (17.95)	.643	0.948 (0.758–1.187)
Interaction of unmet ADL need by ADL level	See Table 3	.018	See Table 3

Notes: ADL = activity of daily living; CI = confidence interval; NLTCS = National Long Term Care Survey.

Table 3. Hazard Ratios for Met Versus Unmet ADL Need for Each Level of ADL Disability*

ADL Disability	Unmet ADL Need	Number of Deaths (Death Rate)	p Value	Hazard Ratio (95% CI)
1	No	162 (8.04)	.001	1.000
	Yes	28 (16.37)		1.960 (1.292–2.869)
2	No	134 (9.87)	.011	1.000
	Yes	37 (14.07)		1.369 (1.073–1.747)
3	No	103 (11.14)	.882	1.000
	Yes	37 (12.17)		0.974 (0.690–1.375)
4	No	90 (20.59)	.738	1.000
	Yes	60 (17.44)		0.964 (0.780–1.192)
5	No	166 (27.39)	.764	1.000
	Yes	83 (27.04)		0.955 (0.705–1.292)

Notes: ADL = activity of daily living; CI = confidence interval.

*Reported hazard ratios are adjusted for the covariates shown in Table 2.

CI = 1.29–2.87) and a 37% increase in risk for mortality for those with two ADL disabilities. Unmet ADL need was not associated with risk for mortality for those with three or more ADL disabilities.

Discussion

Among older adults with one to two ADL disabilities, unmet need for ADL assistance is associated with increased risk for mortality that is not explained by common clinical indicators of mortality. The finding that unmet ADL need is associated with greater risk for mortality only among those with mild disability was unexpected. Data for this study do not allow exploration of mechanisms underlying this finding. For example, we cannot determine whether those who received ADL care earlier in the disablement process had better health outcomes than those who did not; nor do we have physiologic data that would allow us to determine whether unmet ADL need reflects physiologic vulnerability that is not captured by ADL status.

A study by Gaugler and colleagues of persons with dementia revealed that unmet need for ADL assistance is associated with increased risk for mortality. Data for that study were reported by proxy respondents for patients enrolled in the Medicare Alzheimer's Disease Demonstration Evaluation (15). Dementia is associated with continual caregiving needs, so reasons for reports of unmet ADL likely differed between the two studies. Nearly 60% of the participants in that study were reported to have unmet ADL need compared with only 21% of the participants in this study. Further, that study did not report that the relationship varied across levels of ADL disability. Despite important differences between that study and this, together they provide preliminary evidence that unmet ADL need has an association with mortality.

Strengths of this study include its nationally representative sample and high quality assessments of participants' health, functional, and ADL support status (16). A major limitation of the study is that we cannot describe why unmet ADL need is associated with increased risk for mortality only for those with mild disability. Although the statistical model included risks for mortality identified in earlier research, it is possible that unmeasured confounding factors may have affected results.

Self-reports of unmet need for ADL assistance are common among community-living older adults, but evidence that these self-reports are associated with future health outcomes is just emerging (11,12). Future studies are needed to determine if unmet need is associated with mortality across all levels of ADL as described in the above Gaugler and colleagues study or only for those with mild disability as reported in this study. Replication of findings from either

study would warrant investigation into whether there are modifiable factors that reduce risk for mortality among older adults with unmet ADL need.

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