



Original Research—CME

Disability Stage is an Independent Risk Factor for Mortality in Medicare Beneficiaries Aged 65 Years and Older

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Abstract

Background: Stages of activity limitation based on activities of daily living (ADLs) and instrumental activities of daily living (IADLs) have been found to predict mortality in persons aged 70 years and older but have not been examined in Medicare beneficiaries aged 65 years and older using data that are routinely collected.

Objective: To examine the association between functional stages based on items of ADLs and IADLs with 3-year mortality in Medicare beneficiaries aged 65 years and older, accounting for baseline sociodemographics, health status, smoking, subjective health, and psychological well-being.

Design: A cohort study using the Medicare Current Beneficiary Survey (MCBS) and associated health care utilization data.

Setting: Community administered survey.

Participants: The study included 9698 Medicare beneficiaries aged 65 years and older who participated in the MCBS in 2005-2007.

Main Outcome Measures: Death within 3 years of cohort entry.

Results: The overall mortality rate was 3.6 per 100 person years, and 3-year cumulative mortality was 10.3%. Unadjusted 3-year mortality was monotonically associated with both ADL stage and IADL stage. Adjusted 3-year mortality was associated with ADL and IADL stages, except that in some models the hazard ratio for stage III (which includes persons with atypical activity limitation patterns) was numerically lower than that for stage II.

Conclusion: We found nearly monotonic relationships between ADL and IADL stage and adjusted 3-year mortality. These findings could aid in the development of population health approaches and metrics for evaluating the success of alternative economic, social, or health policies on the longevity of older adults with activity limitations.

Introduction

More than 56 million Americans (19% of the U.S. population) had at least one disability in 2010 according to the Survey of Income and Program Participation [1]. This number is expected to grow substantially as the Baby Boom generation ages. Approximately 25% of people aged 65 years and older have difficulty with at least one basic activity of daily living (ADL), and an additional 14% have difficulty performing at least one higher level instrumental activity of daily living (IADL) [2] as defined by the International Classification of Functioning, Disability and Health (ICF) [3]. This high prevalence of activity limitation, along with the growing number of elderly persons in the United States, will present a challenge to the Medicare program. Sox [4]

has asserted that approaching each patient strictly as an individual is an obsolete organizing principal for U.S. health care today and that population health approaches are the best alternative for improving and maintaining the health of people in the community. In response to this assertion and to a 2007 Institute of Medicine report calling for the creation of comprehensive disability monitoring systems based on ICF terminology and concepts, Stineman et al [5] developed ICF-based staging systems for ADLs and IADLs, which are summarized in Table 1. Disability staging systems that are based on regularly collected survey data and that predict mortality can be used to advance the goal of using population-based approaches to monitor and improve health. The 5 ADL and 5 IADL stages represent meaningful population-level measures of activity

Table 1
Disability staging system based on activities of daily living and instrumental activities of daily living derived from the Medicare Current Beneficiary Survey

Stage	ADL Domain	IADL Domain
Stage 0: no disability	Can eat, toilet, dress, bathe/shower, get in/out of bed or chairs, and walk without difficulty	Can use the telephone, manage money, prepare meals, do light housework, shop for personal items, and do heavy housework without difficulty
Stage I: mild disability	Eating, toileting, dressing, and bathing/showering are not difficult; may have difficulty getting in/out of bed or chairs and/or walking	Using the telephone, managing money, preparing meals, and doing light housework are not difficult; may have difficulty shopping for personal items and/or doing heavy housework
Stage II: moderate disability	Eating and toileting are not difficult; may have difficulty dressing, bathing/showering, getting in/out of bed or chairs, and/or walking	Using the telephone and managing money are not difficult; may have difficulty preparing meals, doing light housework, shopping for personal items, and/or doing heavy housework
Stage III: severe disability	Difficulty with eating and/or toileting but not with all ADLs	Has difficulty using the telephone and/or managing money but not all IADLs are difficult
Stage IV: complete disability	All ADLs are difficult	All IADLs are difficult

ADL = activity of daily living; IADL = instrumental activity of daily living.

limitation that could be used by the Centers for Medicare and Medicaid Services (CMS) to monitor the prevalence of activity limitations in the Medicare population and assess the effects of efforts to promote the health, function, and survival of persons with defined types and severities of activity limitation. Such monitoring can be performed using data already routinely collected as part of the Medicare Current Beneficiary Survey (MCBS) [6].

The staging systems that we examined (Table 1) are based on the ADL and IADL domains such that stage 0 represents “no” limitation; stage I, “mild” limitation; stage II, “moderate” limitation; stage III, “severe” limitation; and stage IV, “complete” limitation within those domains. These hierarchical staging systems reflect the most common patterns of functional loss and recovery and specify clinically meaningful patterns of increasing difficulty with self-care and more complex instrumental skills. At mild stages of limitation, people are able to perform all but the typically hardest activities without difficulty, whereas at more advanced stages, even the easiest activities (ie, those least frequently reported as difficult) become limited. Stage III in the ADL and IADL systems was designed as a “nonfitting” stage to accommodate people with atypical patterns of disability.

ADL and IADL stages have shown expected associations with age and comorbidity [7] and were found to be associated with mortality using data from 1994 National Health Interview Survey linked to data from the Second Longitudinal Study of Aging [8,9]. However, to our knowledge, the association between MCBS-derived ADL and IADL stages and mortality is unknown, and yet this information is important if stages are to be used to perform risk stratification for persons on the basis of disability in population health approaches. If these stages are independently associated with mortality, they might be useful for identifying Medicare beneficiaries who might benefit from interventions to

ameliorate activity limitation or for evaluating the success of policies to help the disabled elderly. We therefore sought to assess whether the MCBS-derived ADL and IADL stages predict 3-year mortality after adjusting for medical comorbidity in a nationally representative sample of Medicare beneficiaries aged 65 years and older. We hypothesized that increasing ADL and IADL stages would be independently associated with increasing 3-year mortality, with the possible exception of the nonfitting stage III.

Methods

Study Cohort

We studied MCBS participants [6,10]. The MCBS is a systematic sample of Medicare beneficiaries who are interviewed (or whose proxies are interviewed) and whose subsequent health care utilization is recorded. Each beneficiary or proxy is interviewed for a total of 4 years: the entry year plus 3 years of follow-up. The resulting data consist of 2 linkable data sets: (1) Access to Care (which records baseline health status and the results of an interview ascertaining functional ability) and (2) Cost and Use (which includes respondents' Medicare claims data). Each respondent is assigned a survey weight that reflects the number of Medicare beneficiaries for whom that individual stands for in the survey results [10].

Our study cohort consisted of members of the 2005, 2006, and 2007 entry panels who had reached their 65th birthday by the date of panel entry ($n = 9700$). We restricted our study to beneficiaries aged 65 years and older because we anticipated that associations between disability stages and death might differ between elderly and nonelderly Medicare beneficiaries and because of the small number of deaths in persons younger than 65 years. We excluded 2 beneficiaries for whom key ADL

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