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Research Paper

Comparison of predictive value of activity limitation staging systems based on dichotomous versus trichotomous responses in the Medicare Current Beneficiary Survey

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Abstract

Background: Traditional ways of measuring disability include summary indices, binary expressions, or counts of limitations. However, counts of activity of daily living (ADL) or instrumental activity of daily living (IADL) limitations do not specify which activities are limited. Activity limitation staging systems within the ADL and IADL domains depict both the severity and types of limitations experienced and specify clinically meaningful patterns of increasing difficulty with self-care.

Objective: To compare the predictive value and utility of ADL and IADL stages based on dichotomous versus trichotomous responses to ADL and IADL questions based on ‘‘difficulty’’ and ‘‘receive help’’ responses.

Methods: Data were analyzed from the 2005, 2006, and 2007 Medicare Current Beneficiary Survey (MCBS) entry panels on 11,706 beneficiaries. This was a prospective cohort study that examined time to inpatient admission, all-cause mortality, skilled nursing facility (SNF) admission, and long-term care (LTC) facility admission based on dichotomous versus trichotomous stages.

Results: For both ADLs and IADLs, Akaike information criteria for most outcomes were lower (indicating better-performing models) for the trichotomous staging systems than the dichotomous staging systems. The hazard ratios (HRs) and 95% confidence intervals (CIs) of the dichotomous ADL staging system increased as disability increased, whereas the HRs of the other staging systems fluctuated.

Conclusions: Both staging systems have strong associations with each outcome. The dichotomous staging system is more clinically relevant while the trichotomous staging system may provide utility for clinicians, health care organizations, and policy makers seeking to predict death or admission to a hospital, SNF, or LTC facility.

Keywords: Staging; Disability; Medicare Current Beneficiary Survey; Activities of daily living

According to the United States Census Bureau, approximately 37.5 million US adults had a disability in 2011[1] and these disabilities were associated with almost $400 billion in related health care costs. Persons with disabilities have higher rates of social isolation, poverty, and other social factors that challenge them in obtaining health services.[2] Although people today appear to be living longer, disability does not need to be part of the aging process. Disability rates have declined due to a number of reasons, including higher education levels leading to improvements in socioeconomic status, behavioral changes, and improved medical technology.[3] However, people who have a disability may struggle completing even the most trivial task. Thus, it is important to have a mechanism to measure disability.

Traditional ways of measuring disability include summary indices, binary expressions, or counts of limitations.

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However, counts of activity of daily living (ADL) or instrumental activity of daily living (IADL) limitations do not specify which activities are limited.[4–6] For example, person A may be limited in two items, while person B may only be limited in one item. Not knowing which item(s) the person is limited in makes it difficult to project specific service needs. People with different levels of disability will probably have very different care needs and clinical trajectories. To address this shortcoming of existing disability measures, separate systems were derived for staging ADL and IADL limitations such that each stage was defined by the activities older persons are able to do without difficulty based on the International Classification of Functioning, Disability and Health (ICF) concepts of activity and participation.[7–9] Stineman et al used data from the Medicare Current Beneficiary Survey (MCBS) to derive activity limitation staging systems within the ADL and IADL domains that depict both the severity and types of limitations experienced, and specified clinically meaningful patterns of increasing difficulty with self-care.[8] By distinguishing activities that older people are still able to do without difficulty from those that they find difficult, these systems enable a more fine-grained description of disability at the patient and population levels, and can thus serve as a foundation for developing specific strategies to reduce disparities in the care and support of older adults with disabilities. Each domain (ADL and IADL) includes six activities. The ADLs are eating, toileting, dressing, bathing/showering, getting in or out of bed/chairs, and walking. The IADLs are using the telephone, managing money, preparing meals, doing light housework, shopping for personal items, and doing heavy housework. Stineman et al originally derived activity limitation stages based on the level of difficulty a person experiences when performing each of the six activities in a given domain.[8] The relevant question in the MCBS asks, ''Because of a health or physical problem, (do you/does sample person) have any difficulty with the following?'' Each respondent (or her/his proxy) indicates that the person either has ''no difficulty'' or ''difficulty'' performing each activity.[10]

However, assessment of activity limitations can be based not only on ''difficulty experienced'' but also on ''help received,'' as reflected in the MCBS question, ''You said that (ADL/IADL) is something that (you have difficulty doing/you don't do/sample person has difficulty doing/sample person doesn't do). (Do you/Does sample person) receive help from another person with (ADL/IADL)?'' However, receiving help from a second person to carry out ADLs or IADLs may or may not indicate severe activity limitation in the respondent.[11] In general, *receiving* help may or may not reflect a *need* for help. This makes it important to determine whether the predictive value or utility of stages can be improved by asking people if, in addition to having difficulty doing the activity, the respondent receives help from a second person to accomplish the ADL or IADL. The objectives of this paper are 1) to describe the derivation of a new staging system that incorporates the response to survey questions about receiving help; and 2) to compare ADL and IADL staging systems based on dichotomous responses (''no difficulty'' or ''difficulty'') to trichotomous responses (''no difficulty,'' ''difficulty,'' or ''receive help'') in terms of their capacity to predict each of four events or outcomes: inpatient admission, all-cause mortality, skilled nursing facility admission, and long-term care facility admission. We hypothesized that the predictive capacity of the dichotomous versus trichotomous staging systems will be similar. To our knowledge, no published research to date has compared the association of MCBS-derived dichotomous and trichotomous ADL and IADL staging systems with clinical events or outcomes.

Methods

This study was approved by the Institutional Review Board of the University of Pennsylvania.

Data source

Data for this study were from the MCBS which is conducted by the Centers for Medicare and Medicaid Services (CMS). The sample is representative of the national Medicare population and is drawn from the Medicare enrollment file.[10,12,13] Survey data are combined with information from Medicare administrative files and other sources of data such as the Minimum Data Set for beneficiaries in nursing facilities. The MCBS uses survey weights to account for non-response and oversampling of people under 65 years of age and those 80 years and older.[13] Sample persons or their proxies are interviewed about their health status and functioning in the autumn of their entry year and each subsequent autumn, and about their health care utilization starting January 1st following their autumn interview. Each respondent is interviewed for a maximum of four years. The MCBS is released as two data sets: Access to Care and Cost and Use. The Access to Care files contains the baseline health status and functioning interview. The Cost and Use files contain health care utilization information from Medicare claims. These two files are directly linkable.

Study cohort

The baseline sample was defined as the entry panels of the 2005, 2006, and 2007 MCBS Access to Care files (n = 11,713). Seven people were missing baseline IADL information. Thus, 11,706 beneficiaries were included in all the analyses.

Primary exposure

Baseline ADL and IADL stages (i.e., those measured from the first survey for each respondent) were the primary exposures and were derived separately. Stages were defined