

Cognitive & Behavioral Assessment

Severity of memory impairment in the elderly: Association with health care resource use and functional limitations in the United States

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Abstract

Introduction: Dementia is a prevalent condition in older adults associated with decline in cognitive and functional abilities and substantial burden. This study assessed the prevalence and impact of subjective memory impairment in the United States.

Methods: The 2011 to 2014 National Health and Nutrition Examination Survey, a population-based, nationally representative survey, was analyzed. Data included medical examinations, self-reported cognitive and functional limitations, and health care utilization over 1 year. Participants were aged ≥ 65 years and completed both interview and medical examination components. Descriptive analyses of patient characteristics were performed, and complex survey regression models were used to test associations.

Results: Of 2431 survey participants included, 53.1% had no memory impairment, 40.1% had early-stage memory impairment, and 6.6% had late-stage memory impairment. In adjusted analyses, late-stage versus no impairment was associated with more functional limitations (odds ratio [OR] = 7.26, $P < .001$), greater health care utilization (OR = 2.46, $P < .001$), and higher likelihood of seeing a mental health specialist (OR = 3.06, $P = .001$).

Discussion: Consistent with previous research, individuals with late-stage memory impairment had significantly greater functional limitations and higher health care utilization versus individuals with early-stage or no memory impairment.

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Keywords:

Dementia; Memory impairment; Functional limitation; Health care resource utilization; Population health

1. Introduction

Dementia is a collection of symptoms including memory loss, personality change, and impaired intellectual functions resulting from disease or trauma to the brain. In 2016, an estimated 47 million people worldwide were living with dementia [1]. Alzheimer's disease (AD) is the most common cause of dementia, affecting approximately 5.4 million individuals in 2016 in the United States, of which an estimated 5.2 million are aged ≥ 65 years [2,3]. AD is a disease characterized by

memory loss and degeneration of mental abilities that are serious enough to interfere with daily activities [2].

AD is the sixth-leading cause of death in the United States, and most patients live an average of 8 years after their symptoms become noticeable; however, the range in survival is between 4 and 20 years due to the influence of age, genetics, and lifestyle [2]. Because of the costs of health care, long-term care, and hospice for individuals with AD and other dementias, the economic burden of AD/dementia is substantial. In 2016, total direct costs for all individuals with AD/dementia in the United States are estimated at \$236 billion; Medicare and Medicaid will cover an estimated at \$160 billion (68%) of these costs [2]. Among Medicare beneficiaries (aged ≥ 65 years) with AD/dementia, 2015

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per-person total Medicare health care payments (\$49,126) were over three times higher than Medicare spending for Medicare beneficiaries without AD/dementia (\$15,550) [2].

In patients with AD, the progression of symptoms from mild to moderate to severe varies from person to person; however, disease progression is associated with a decline in cognitive and functional abilities. In the more advanced stages of dementia, patients are reported to need help with basic activities of daily living (ADLs), such as bathing, dressing, eating, and using the bathroom. Patients with advanced disease also lose their ability to communicate, fail to recognize loved ones, and often become confined to bed and reliant on full-time caregiving [2].

Studies indicate that many individuals report mild cognitive impairment (MCI), subjective memory impairment, and functional complaints years before the development of dementia and AD [4,5]. MCI, which entails mild but measurable changes in cognitive function and is thought to be an intermediate stage in the trajectory from normal cognition to dementia, affects approximately 15% to 20% of individuals aged ≥ 65 years [2,6]. Individuals with MCI, particularly those with MCI that involves memory impairment, progress to dementia at a higher rate than individuals with normal cognition [6]. In addition, self-reported cognitive and functional disabilities have been linked to poor outcomes in healthy adults [7]. Therefore, it is important to have knowledge about the prevalence and magnitude of memory impairment, as early diagnosis might delay further memory loss and disease progression. However, there is a paucity of published data describing population-based, nationally representative prevalence of memory impairment and associated functional limitations in US adults aged ≥ 65 years.

In 2011, the National Health and Nutrition Examination Survey (NHANES), a population-based health survey of noninstitutionalized US residents, introduced a new question to capture difficulty in memory or confusion. With the inclusion of this question in NHANES, the severity of impairment, which has often been difficult to assess, can now be evaluated at a population level. To our knowledge, studies evaluating the prevalence and magnitude of memory impairment using the NHANES data have not been published. To support broader understanding of dementia severity using nationally representative, self-reported data, this study aimed to estimate the prevalence of memory impairment and functional limitations by severity and to investigate the associated risk with health care resource utilization (HRU) in the US population.

2. Methods

2.1. Study design and data source

A retrospective analysis using cross-sectional survey data was conducted to assess the prevalence and impact of memory impairment and functional limitations by

severity. NHANES, a program of studies conducted by the National Center for Health Statistics (NCHS), evaluates the health and nutritional status of a representative sample of about 5000 US adults and children each year. The NHANES program began in the early 1960s as a series of surveys focusing on different population groups or health topics, and in 1999, the survey became a continuous program [8]. NHANES data are used by federal agencies, research organizations, universities, health care providers, and educators for a variety of purposes (e.g., research across a wide variety of diseases, tracking trends related to policies, prevention programs, education programs, and developing national standards for such measurements as height, weight, and blood pressure) [8].

NHANES participants are selected by a complex, multi-stage probability design that combines interviews at the participant's home followed by physical examinations at a mobile examination center. The NHANES interview includes demographic, socioeconomic, dietary, and health-related questions. The examination component consists of medical, dental, and physiological measurements and laboratory tests administered by medical personnel. NHANES was approved by the NCHS Research Ethical Review Board, and this analysis was conducted using deidentified, publicly available data.

2.2. Participant selection

For the purposes of this study, NHANES participants aged ≥ 65 years who completed both interview and medical examination components for the 2011 to 2014 survey years were selected.

2.3. Outcome measures

2.3.1. Identification of memory impairment and severity

Participants with a positive response to the question "During the past 7 days, how often have you had trouble remembering where you put things like keys or wallet?" were considered to have memory impairment. Possible responses to this question included "never," "about once," "2 or 3 times," "nearly everyday," "several times a day," "refused," and "don't know." With medical expert opinion, based on response, participants were grouped into impairment severity categories as displayed in Table 1.

2.3.2. Functional limitations

Self-reported functional limitations in NHANES were evaluated similarly to previous research [9]. Functional abilities were assessed using standardized questions in multiple functional domains, including ADLs (eating/dressing), instrumental activities of daily living (IADLs) (managing money/doing chores around the house/preparing meals), and social interaction activities (participating in social activities such as meetings or visiting friends). Possible responses for all functional domain questions included "no difficulty,"

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