

RESEARCH LETTERS

HEALTH CARE REFORM

Growth in Dementia-Associated Hospitalizations Among the Oldest Old in the United States: Implications for Ethical Health Services Planning

As the world population ages, an epidemic of neurologic diseases, such as Alzheimer-type dementia and Parkinson disease, is predicted. The most rapid population growth has been observed in the 85 years and older group, and, while it currently represents less than 2% of the US population, by year 2050 it will exceed 4%.¹ Concurrent with this population growth, we have witnessed a vast expansion of health care utilization and expenditures, with the consequent close scrutiny and attempts to rein in this supply-driven juggernaut.

See also page 1851
See Invited Commentary
on page 1852

Hospitalization, though lifesaving under many circumstances, is a strong driver of health care spending.² Evidence indicates that at the nexus of extreme aging and advanced dementia, overutilization of health care does not result in improved quality of life, is often not consistent with patients' goals of care, and indeed may be harmful.³⁻⁵ Thus appropriateness and desirability of aggressive care, such as acute care hospitalizations, for these patients may need to be re-examined.

We conducted this analysis to gain a better understanding of the current trends in dementia-associated hospitalizations among the 85 years and older population in the United States and its implications for future health care policy planning.

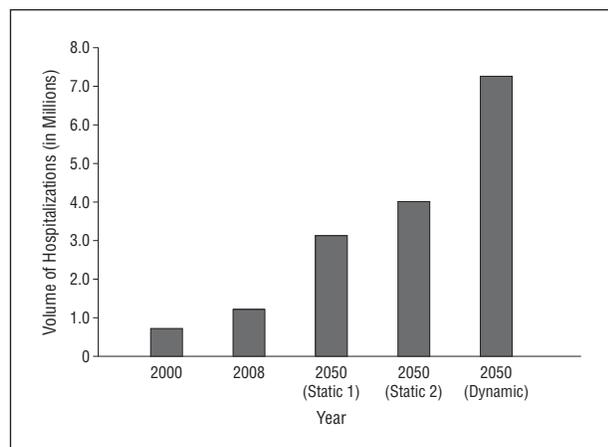


Figure. The 2000 and 2008 points represent the actual reported volumes, while the 2050 points represent projected estimates. "Static 1" is computed using the 2000 incidence; "static 2" is computed using 2008 incidence; and "dynamic" is computed based on the linear regression of historic growth.

Methods. We obtained data on all hospitalizations involving a dementia diagnosis for the 85 years and older group between years 2000 and 2008 from the nationally representative Nationwide Inpatient Sample database, a part of the Agency for Healthcare Research and Quality Healthcare Costs and Utilization Project (dementia codes are listed in the eAppendix; <http://www.archinternmed.com>). The aggregate data used are publicly available.⁶ To arrive at the annual hospitalization incidence, we obtained censal and intercensal population estimates and projections from the US Census Bureau.¹ We projected the future volume of hospitalizations involving a dementia diagnosis in the 85 years and older group using 2 distinct methods. The first method did not allow for longitudinal growth of the dementia hospitalizations incidence (static). Meant to compute the absolute minimum level of the potential growth due only to underlying population shifts, the first method projected future volumes based on years 2000 and 2008 incidences. The second method (dynamic), in addition to taking into account the overall population growth, also considered the observed historic increase in the age-adjusted incidence of dementia hospitalizations between years 2000 and 2008. For this estimate, according to previously published methodology,⁷ we constructed a linear regression model based on the historic data and applied this calculation forward (eTables 1-3).

Results. Between 2000 and 2008, although the 85 years and older population comprised less than 2% of the total US population, they represented more than 40% of all annual hospitalizations associated with dementia. The actual absolute volume growth from 700 000 to 1.2 million hospitalizations for the oldest old with a dementia diagnosis between 2000 and 2008 (**Figure**) equated to population incidence increase from 16 398 to 21 088 cases per 100 000 population. According to static projections, the estimated 2050 volume of dementia hospitalizations in the 85 years and older group may be between 3 and 4 million cases, while the dynamic model predicted a rise to over 7 million dementia-associated hospitalizations (Figure and eTable 3). This represents a 10-fold growth in the volume of these hospitalizations from the year 2000 baseline.

Comment. Even at its minimum, the absolute growth in hospitalizations involving a dementia diagnosis is alarming in that without planning, the growth in hospitalizations may well overwhelm a health care system already under strain. In addition, humanistic considerations dictate that this degree of aggressive care may be inappropriate for many patients with dementia. For example, it has been reported that patients with advanced-stage disease have a prognosis comparable to metastatic breast cancer or stage IV heart failure.⁸ Although our data are unable to convey the severity of the observed dementia diagnoses, a recent study noted that 18.7% of nursing home residents with advanced dementia were hospitalized near the end of life, even though the most frequently stated goal of care was comfort.⁸ For such patients, hospitalizations represent more of an intrusive burden than a desirable intervention. These

data, in conjunction with the emerging evidence on potential futility and even harm of aggressive care,^{3,5} emphasize the need for developing models of caring for elderly patients with advanced dementia, with the intention of building ethically congruent infrastructures for this predicted explosion of neurologic disease.

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Online-Only Material: The eAppendix and eTables are available at <http://www.archinternmed.com>.

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HEALTH CARE REFORM

Hearing Loss Prevalence in the United States

The prevalence of hearing loss in the US population has been estimated from self-reported data¹ or in age-restricted cohorts.² These estimates may not accurately reflect the true burden of hearing loss in the United States. We estimated the overall prevalence of audiometric hearing loss among all individuals (age \geq 12 years) in the United States using data from a nationally representative data set and with a definition of hearing loss recommended by the World Health Organization (WHO).

Methods. We analyzed data from the 2001 through 2008 cycles of the National Health and Nutritional Examination Surveys (NHANES), an ongoing epidemiological survey designed to assess the health and functional status of the civilian, noninstitutionalized US population.³ Air conduction pure-tone audiometry was administered to all participants aged 12 to 19 years from 2005 through 2008 (n=3143), a half sample of all participants aged 20 to 69 years from 2001 through 2004 (n=3630), and all participants 70 years and older from 2005 through 2006 (n=717). Audiometry was performed in a sound-attenuating booth according to established NHANES protocols. A speech-frequency pure-tone average (average of hearing thresholds at 0.5, 1, 2, and 4 kHz) of 25 dB HL (hearing level) or greater in both ears was defined as hearing loss per WHO criteria,⁴ and this is the level at which hearing loss begins to impair communication in daily life. Hearing loss prevalence was estimated by age decade, sex, and the 3 largest categories of race/ethnicity (non-Hispanic white [white], non-Hispanic black [black], and Mexican American or other Hispanic [Hispanic]). There were insufficient individuals from other racial/ethnic groups to derive reliable age-stratified estimates. However, individuals from all racial and ethnic categories were included in estimates of overall prevalence. US population counts were estimated using the midpoint of population totals in each cycle and averaged across combined cycles when appropriate. We accounted for the complex sampling design in all analyses by using sample weights according to National Center for Health Statistics (NCHS) guidelines.

Results. We estimate that 30.0 million or 12.7% of Americans 12 years and older had bilateral hearing loss from 2001 through 2008, and this estimate increases to 48.1 million or 20.3% when also including individuals with unilateral hearing loss (**Table**). Overall, the prevalence of hearing loss increases with every age decade. The prevalence of hearing loss is lower in women than in men and black vs white individuals across nearly all age decades.

See also page 1850

See Invited Commentary
on page 1852

Comment. For individuals 12 years and older in the United States, nearly 1 in 8 has bilateral hearing loss, and nearly 1 in 5 has a unilateral or bilateral hearing loss. These are the first national estimates of hearing loss in the US population based on audiometric data and a large, well-characterized representative sample. Previous national estimates based on self-reported data¹ and age-restricted cohorts² have been lower, in a range of 21 to 29 million. Other estimates of hearing loss prevalence have come from population-based cohorts³ that are not representative of the US population. While the overall risk of hearing loss may be decreasing over time,^{6,7} the prevalence of hearing loss is expected to rise because of the aging of the population. Research is needed to understand the impact of hearing loss on cognition⁸ and other functional