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Association of Hearing Loss and Health Care Expenditures in Older Adults

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To the Editor: Hearing loss (HL), a chronic condition that affects nearly two-thirds of older adults in the United States,¹ has been independently associated with cognitive decline,² greater number of hospitalizations,³ depression,⁴ and poorer quality of life.⁵ Whether hearing loss is also independently associated with higher medical care expenditures is unclear. We estimated the economic burden of HL in a nationally representative sample of adults aged 65 years or older.

Methods

Pooled data for this study were derived from years 2000-2010 of the Medical Expenditure Panel Survey Household Component (MEPS-HC), a nationally representative overlapping panel survey of the US civilian non-institutionalized population.⁶ Detailed data on demographics, health conditions, and medical expenditures were collected through computer-assisted personal interviews. Health-related quality of life (HRQOL) was measured through the SF-12v2 component. Hearing loss was based on self-report and summarized as a binary variable (“No hearing loss” vs “Any hearing loss” [excluding deafness]). Individuals were classified as having hearing loss if they reported having: “Some difficulty hearing, can hear most things people say”; “Some difficulty hearing, cannot hear most things people say, can hear some”; or “Some difficulty hearing, cannot hear most things people say, cannot hear some things people say but is not deaf.”

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Conflict of interest: Danielle Foley: works for the Lewin Group, a healthcare consulting firm. The firm had no role in the development or sponsorship of this article.

Frank Lin: serves as a consultant to Cochlear Americas, is on the scientific advisory board of Pfizer and Autifony, and has been a speaker for Med El and Amplifon.

Author Contributions: Ms. Foley and Dr. Lin had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: Frick, Lin.

Acquisition of data: Foley.

Statistical analysis: Foley, Lin.

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Monetary outcomes were measured as total health care expenditures and components of care adjusted to 2012 US dollars, disregarding payment source. Non-monetary outcomes included total informal care days provided by unpaid, independent caregivers and HRQOL scores following AHRQ' salgorithm of response coding.⁶

We adjusted for demographic and health factors that could potentially confound the association of self-reported hearing loss and expenditures. The probability of any positive expenditures (informal care days) was analyzed using logistic regression. Excess expenditures were estimated from a generalized linear model with log link and gamma (Poisson) family. HRQOL scores were mapped as a continuous outcome to allow for linear regression. Analyses accounted for the complex sampling design. Missing values due to non-responses, refusals, and the survey skip pattern were excluded. All analyses were performed with STATA 12.0 (StataCorp).

Results

In an analytic sample of 34,981 individuals in the 2000-2010 Medical Expenditure Panel Survey aged 65 years and older, 23.7% of individuals self-reported having HL. Compared to those with no HL, individuals with self-reported HL were significantly more likely to be older, male, of lower socio-economic status, and to have cardiovascular conditions and diabetes. They were also more likely to self-report poor overall health status, where 79% of those without HL reported excellent or good health compared to 71% of those with some HL ($P<0.001$).

In a fully adjusted model, individuals with HL had significantly higher odds of having non-zero total medical expenditures (odds ratio [OR]:1.39,95% CI 1.12-1.71) and, on average, had \$392 in excess medical expenditures (95% CI: \$277-\$513) (Table 1). Within individual components of care, respondents with HL had significantly higher odds of non-zero expenditures on office-based, outpatient, and emergency room visits. Further, their physical and mental health summary scores averaged 1.7 points lower (95% CI: 1.35-1.99) and 0.9 points lower (95% CI: 0.61-1.23) than scores of individuals with no HL, respectively.

Discussion

Our results demonstrate that self-reported HL is independently associated with higher total medical expenditures. Applying these results to the population of individuals with self-reported HL in the U.S. population 65 years or older in 2010 (7.91 million) indicates that HL is associated with approximately \$3.10 billion in excess total medical expenditures in the U.S. Importantly, HL was associated with increased odds of office-based, outpatient, and emergency room visits and not only costs that would be directly attributable to HL treatment (e.g., medical equipment expense). Potential mechanisms to explain these findings include the association of hearing loss with health-related oral literacy, falls, cognitive decline, depression, and social isolation. Alternatively, a common pathologic cause (e.g., chronic ear disease) or residual confounding by unmeasured factors could plausibly underlie the observed associations.

A key limitation of our study is the use of self-reported, rather than objectively-measured, hearing status. However, this potential limitation may in fact underestimate excess medical expenditures associated with HL as many individuals with significant audiometric HL often do not self-report HL.⁷

Future work should investigate the mechanistic basis of the observed association and whether public health strategies focused on hearing rehabilitative treatment could potentially mitigate excess medical expenditures associated with hearing loss.

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Table 1
Odds of nonzero medical care expenditure and total excess medical expenditure associated with hearing loss components, by hearing status^a expenditure component

	Any Hearing Loss ^b			
	Positive expenditures		Excess expenditures	
	Odds Ratio	95% CI	Excess expenditures ^c	95% CI
<i>Total medical expenditures</i>				
Total expense	1.39**	(1.12, 1.71)	\$392	(\$277, \$513)
Total out-of-pocket	1.33**	(1.13, 1.57)	\$122	(\$87, \$158)
<i>Office-based visits</i>				
Total expense	1.23**	(1.08, 1.41)	\$169	(\$78, \$267)
<i>Outpatient visits</i>				
Facility expense	1.28***	(1.19, 1.36)	\$406	(-\$20, \$893)
Provider expense	1.24***	(1.15, 1.34)	\$145	(\$35, \$268)
<i>Emergency room visits</i>				
Facility expense	1.17***	(1.08, 1.28)	-\$0.26	(-\$7, \$7)
Provider expense	1.15**	(1.05, 1.26)	\$2	(\$1, \$4)
<i>Inpatient stays</i>				
Facility expense	1.06	(0.97, 1.15)	\$12	(-\$3, \$29)
Provider expense	1.03	(0.94, 1.12)	-\$2	(-\$6, \$2)
<i>Home health care</i>				
Agency-sponsored expense	1.16*	(1.04, 1.30)	\$0.03	(\$0.01, \$0.05)
Paid independent provider expense	0.96	(0.74, 1.24)	\$0	(\$0, \$0) ^d
<i>Other medical expenditures</i>				
Medical supplies and equipment expense	1.51***	(1.38, 1.64)	\$2	(\$1, \$2)
Prescription drug expense	1.16*	(1.10, 1.33)	\$137	(\$92, \$185)

Abbreviation: CI = confidence interval

* Significant at the 0.05 level,

** significant at the 0.01 level,

*** significant at the 0.001 level

^aFully-adjusted model controlling for education, insurance coverage, sex, marital status, age, family size, self-rated health, smoking status, and medical conditions (diabetes, hypertension, stroke, heart disease, angina pectoris, and myocardial infarction).

^bCompares individuals with any hearing loss to those with normal hearing.

^cDollar amounts were reported in USD and adjusted for inflation to the year 2012 using the Consumer Price Index Medical Care Inflation Index.

^dRounded to nearest dollar.