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Gaps in Receipt of Regular Eye Examinations among Medicare Beneficiaries Diagnosed with Diabetes or Chronic Eye Diseases

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Objective: To examine a wide range of factors associated with regular eye examination receipt among elderly individuals diagnosed with glaucoma, age-related macular degeneration, or diabetes mellitus (DM).

Design: Retrospective analysis of Medicare claims linked to survey data from the Health and Retirement Study (HRS).

Participants: The sample consisted of 2151 Medicare beneficiaries who responded to the HRS.

Methods: Medicare beneficiaries with $\geq$1 of the 3 study diagnoses were identified by diagnosis codes and merged with survey information. The same individuals were followed for 5 years divided into four 15-month periods. Predictors of the number of periods with an eye examination evaluated were beneficiary demographic characteristics, income, health, cognitive and physical function, health behaviors, subjective beliefs about longevity, the length of the individual's financial planning horizon, supplemental health insurance coverage, eye disease diagnoses, and low vision/blindness at baseline. We performed logit analysis of the number of 15-month periods in which beneficiaries received an eye examination.

Main Outcome Measures: The primary outcome measure was the number of 15-month periods with an eye examination.

Results: One third of beneficiaries with the study's chronic diseases saw an eye care provider in all 4 follow-up periods despite having Medicare. One quarter only obtained an eye examination at most during 1 of the four 15-month follow-up periods. Among the 3 groups of patients studied, utilization was particularly low for persons with diagnosed DM and no eye complications. Age, marriage, education, and a higher score on the Charlson index were associated with more periods with an eye examination. Male gender, being limited in instrumental activities of daily living at baseline, distance to the nearest ophthalmologist, and low cognitive function were associated with a reduction in frequency of eye examinations.

Conclusions: Rates of eye examinations for elderly persons with DM or frequently occurring eye diseases, especially for DM, remain far below recommended levels in a nationally representative sample of persons with health insurance coverage. Several factors, including limited physical and cognitive function and greater distance to an ophthalmologist, but not health insurance coverage, account for variation in regular use. *Ophthalmology 2014;121:2452-2460 © 2014 by the American Academy of Ophthalmology.*

Regular eye examinations for persons diagnosed with diabetes mellitus (DM) or chronic eye diseases are important for detecting potentially treatable vision loss. Monitoring, surveillance, and evaluation of visual health are widely recognized as prerequisites for effective, accessible, and high-quality individual and population-based health services.[1]

Lack of health insurance coverage has been cited as a reason for underutilization of eye care services,[2–6] and government-mandated insurance coverage for such services has been recommended.[3] However, despite universal coverage for eye care services in Medicare, especially among persons diagnosed with chronic conditions of the eye and chronic conditions leading to eye complications, such as DM, many elderly persons in the United States fail to obtain regular eye care.[7]

Previous studies have identified gaps in use of eye care. A study of longitudinal rates of annual eye examinations of Medicare beneficiaries with diagnoses of DM, glaucoma, and age-related macular degeneration (AMD) using Medicare claims data from the 1990s reported that only 50% to 60% of beneficiaries diagnosed with DM had eye examinations in a 15-month period.[7] Of those followed for $\geq$75 months after a DM diagnosis, about three quarters had 1 or more 15-month gaps in examination receipt during follow-up. Receipt of regular eye examinations was more frequent among beneficiaries with a glaucoma diagnosis. Among beneficiaries diagnosed with AMD, regular receipt was somewhere between rates for glaucoma and DM. That study did not analyze reasons for differences in rates of receipt of regular eye examinations.

Other research has assessed eye care utilization among persons at high risk for vision loss and reasons for lack of use.[2] Factors considered in previous studies as possibly responsible for lack of use have included black race and Hispanic ethnicity,[8–11] lower literacy levels, lower

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educational attainment, lack of health insurance,[3] and geographic barriers to access.[7,12–16]

Although there have been studies of the utilization of eye care,[12,17] there is ample room for expanding the current state of knowledge on the subject. Existing studies often fail to use multivariate analysis or include explanatory variables that are likely to be proxies for more fundamental reasons for underutilization. For example, educational attainment, measured by the number of years of schooling completed, may be a proxy for innate cognitive function, a greater propensity to consider long-term consequences of present decisions, and the value the individual attaches to the benefit of improved vision. Some individuals, particularly elderly persons, may not place a high value on benefits from treatment likely to occur in the distant future because their own expected longevity is short and they have other chronic conditions to be treated.

Much of the previous empirical analysis of utilization of eye care services has relied on cross-sectional data with a look-back period of a year.[3] However, gaps in utilization can only be accurately measured when examined over a longer time period with longitudinal data. The underlying concept is receipt of regular eye care, not whether the person had a visit in the time span of a year.

Often reports of use and diagnoses have been from patients. There is evidence that self-reports tend to overestimate utilization of vision care.[18,19] Actual diagnoses and reports of receipt of diagnostic and therapeutic procedures are likely to be more reliable.[18,19] Having a better understanding of the impediments to receipt of regular eye examinations is a first step in the design of effective interventions to improve the situation.

Using longitudinal data from the Health and Retirement Study (HRS) merged with Medicare claims data, this study documented gaps in the receipt of regular eye examinations and assessed the roles of a broad range of determinants of regular receipt of eye care examinations over a 5-year follow-up period. Medicare beneficiaries included in our study entered the analysis sample with a diagnosis of DM, glaucoma, or AMD recorded as of the baseline year 1998, 2000, or 2002. HRS interviews conducted in 1998, 2000, and 2002 provided information on personal attributes of the beneficiary; claims data provided diagnostic information and evidence for the frequency of eye examinations during follow-up.

Methods

Data

The HRS collects data on income, employment, health insurance, physical and cognitive function, and health-related behaviors. Survey responses from HRS were merged with Medicare claims data using a cross-walk file provided by HRS. Both the cross-walk file, needed to link personal identifiers from the HRS with Medicare claims, and the claims data were obtained from the Centers for Medicare and Medicaid Services on a restricted use basis.

The HRS is a national, longitudinal data fielded every other year starting in 1992. Originally, HRS surveyed persons aged 51 to 61 and their spouses/partners, who could be of any age. By 1998, persons in the 51- to 61-year-old age range were 57 to 67. In 1998, the Aging Dynamics of the Oldest-Old, a survey of persons aged ≥70 in 1993, conducted in 1993 and 1995, was combined with the HRS. We used data from Medicare Part B claims from 1993 through 1997 for the 1998 baseline, from 1993 through 1999 for the 2000 baseline, and from 1993 through 2001 for the 2002 baseline to identify beneficiaries with the study's diagnoses. We used Part B claims filed by ophthalmologists and optometrists over a 5-year follow-up period to measure eye examination frequency during follow-up. Medicare is a national health insurance program that serves Americans who reside within the geographical borders of the United States. Most Medicare beneficiaries qualify by being >65 years old.

Claims data included information on diagnoses (International Classification of Diseases, 9th Revision, Clinical Modification [ICD-9-CM]), procedures (Current Procedural Terminology, Healthcare Common Procedure Coding System), Center for Medicare and Medicaid Services provider specialty codes, and dates of service. Institutional review board approval for this study was obtained from the Duke University Office of Research Support.

Sample Selection

We identified individuals diagnosed with AMD, glaucoma, or DM at baseline (Table 1). We excluded individuals <68 years of age at the baseline date to allow ≥3 years of look-back. Moreover, we excluded individuals enrolled in a Medicare Advantage plan (private plans available to beneficiaries in Part C in lieu of traditional Medicare plans). The public use claims file did not include claims for care rendered to beneficiaries in Medicare Advantage plans. Finally, we excluded persons who died within 5 years of baseline.

From an initial sample of 10 826, we included 2151 individual Medicare beneficiaries who satisfied our study's sample inclusion criteria. To measure receipt of eye examinations, we created four 15-month time periods, starting from the baseline year. We used a 15-month rather than a 12-month period to allow for unforeseen difficulties in scheduling or attending appointments.[7]

Model Specification

To measure the receipt of eye examinations, we created a continuous variable ranging from 0 (never examined) to 4 (examined in all 15-month periods).[7] Eye examinations were based on the presence of specific procedure codes or codes for other encounters coupled with specialty codes for ophthalmologists or optometrists (Table 2). Because we sought to measure monitoring and surveillance, rather than to quantify receipt of services, a beneficiary was credited with at most 1 eye examination during a given 15-month period.

We included several categories of factors, measured at baseline, likely to affect receipt of an eye examination as explanatory variables.

Demographic and socioeconomic characteristics of the beneficiary—age, gender, marital status, household income, supplemental insurance to Medicare through either a private insurer or Medicaid, and educational attainment, measured in years of schooling completed—were obtained from the HRS. Older age, female gender, being married, higher household income, having additional insurance, and more years of education were expected to increase frequency of eye examination receipt.[20,21]

An individual's health and functional status was measured by the Charlson Comorbidity Index as well as the presence of ≥1 activity of daily living or instrumental activity of daily living (IADL) limitation. We used data on diagnoses and procedures from claims from 1993 to each beneficiary's baseline year to create the Charlson Comorbidity Index value