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Special Report from the CDC

Healthcare utilization and costs among older adult female drivers and former drivers☆,☆☆,★

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ABSTRACT

Purpose: This study compared the healthcare utilization and costs for specific types of medical services among older adult women who currently drive and those who no longer drive. *Methods:* This study included 347 women aged 65 or older who were either former (had stopped driving) or current drivers, randomly sampled from a large U.S. health plan to participate in a telephone survey, and who had automated health records with healthcare utilization and cost data. Bivariate analyses and generalized linear modeling were used to examine associations between driving status and healthcare utilization and costs. *Results:* Adjusting for age, income, and marital status, former drivers were more likely than current drivers to use mental health care services (RR = 3.37; 95% CI: 1.03, 10.98). Former drivers also tended to use more inpatient (RR = 1.85; 95% CI: 0.88, 3.87) and emergency services (RR = 1.89; 95% CI: 0.96, 3.70), but results did not reach statistical significance. Total annual healthcare costs in 2005 were almost twice as high for former drivers compared with current drivers ($13,046 vs. $7,054; mean difference = $5,992; 95% CI: -$360, $12,344), although this relationship was not statistically significant (CR = 1.61; 95% CI: 0.88, 2.96). *Impact on Industry:* Former drivers were more than three times as likely as current drivers to use mental health services, and tended to use more emergency and inpatient services. Further research on factors that potentially mediate the relationship between driving status and health service use is warranted.

1. Introduction

By 2030, it is expected that nearly 20% of the U.S. population, or more than 71 million people, will be age 65 or older (Federal Interagency Forum on Aging-related Statistics, 2010). Among the top concerns for this growing older population is the ability to remain independent, which is closely linked to mobility and driving (DeGood, 2011).

Prior research has shown that older non-drivers make 15% fewer trips to the doctor and 65% fewer trips for social purposes than older drivers (Bailey, 2004). While there has been some research on the association between driving cessation and older adult health (e.g., decreases in functional abilities, decreases in vision, and increases in depressive symptoms), little research has focused on the relationship between driving cessation and healthcare utilization and costs (Edwards, Lunsman, Perkins, Rebok, & Roth, 2009; Fonda, Wallace, & Herzog, 2001; Harrison & Ragland, 2003; Marottoli et al., 1997; Ragland, Satariano, & MacLeod, 2004). The purpose of this study was to compare healthcare utilization and costs for specific types of medical services among former and current drivers.

☆ The *Journal of Safety Research* has partnered with the Office of the Associate Director for Science, Division of Unintentional Injury Prevention in the National Center for Injury Prevention and Control at the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia, USA, to briefly report on some of the latest findings in the research community. This report is the 25th in a series of CDC articles. Look for other such articles in future issues of the *Journal of Safety Research*.

☆☆ Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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Table 1
Demographic Characteristics of Older Women by Driving Status*.

	Former Driver N = 57	Driver N = 290	P-Value †
	n (% of former drivers)	n (% of drivers)	
Age group			
65-74	3 (5.3)	161 (55.5)	<0.001
75-79	15 (26.3)	62 (21.4)	
80+	39 (68.4)	67 (23.1)	
Marital status			
Single, divorced, widowed, separated	29 (51.8)	130 (45.1)	0.36
Married or dating/life partner	27 (48.2)	158 (54.9)	
Household income			
Less than $25,000	17 (33.3)	87 (32.5)	0.90
$25,000 or more	34 (66.7)	181 (67.5)	
Highest level of education			
High school graduate or less	18 (32.1)	86 (29.7)	0.97
Some post-high school, but less than college graduate	25 (44.6)	136 (46.9)	
College graduate	7 (12.5)	33 (11.4)	
Post graduate	6 (10.7)	35 (12.1)	
Employed at least part-time			
No	53 (93.0)	240 (82.8)	0.05
Yes	4 (7.0)	50 (17.2)	
Race			
non-White	3 (5.3)	26 (9.0)	0.44
White	54 (94.7)	264 (91.0)	
Area of residence			
Urban	49 (89.1)	237 (83.5)	0.29
Rural	6 (10.9)	47 (16.6)	

*Some responses are missing for marital status (3), income (28), highest level of education (1), and area of residence (8) categories; cells may not sum to N = 347.
†P-value for chi-square test.

2. Methods

Study participants were 479 randomly selected English-speaking adults aged 65 or older who participated in a telephone survey between December 2003 and August 2005. Participants were randomly sampled from the membership files of a large integrated health plan, which provided insurance and health care to more than 550,000 individuals. Inclusion criteria included enrollment in the health plan for at least three years prior to the study period. The analysis was restricted to women who had ever driven and for whom there were 2005 healthcare utilization and cost data, which excluded 132 adults, for a final sample size of 347. The study was approved by the institutional review board of the health plan.

2.1. Data Sources

Administrative records were used to assemble data on the use of emergency room, hospital outpatient, inpatient, and mental health services, as well as the number of visits to primary care and specialty providers and the number of pharmacy fills. The cost system obtains utilization information from several different systems in the health plan and calculates the precise cost for each unit of service delivered. Costs were assigned to patients based on the units of service they utilized. These data have been rigorously validated through research and clinical applications (Boudreau, Doescher, Saver, Jackson, & Fishman, 2005; Rivara et al., 2007).

During the telephone survey, current driving status was determined by asking, "Do you drive now?" and "Have you ever been a licensed driver?" Based on responses to these questions, respondents were classified as current or former drivers.

2.2. Data Analyses

All analyses were carried out using SAS statistical software, version 9.2 (SAS Institute Inc.; Cary, NC). Bivariate analyses were conducted to examine demographic differences by driving status. Wald chi-square tests were used to determine statistically significant differences and p-values less than 0.05 were considered statistically significant.

Year 2005 health care utilization and cost data were compared by calculating the percentage of former drivers and current drivers using healthcare services, the mean number of healthcare visits, and the average costs for healthcare services. Generalized linear models (GLM) with a log link were used to compare healthcare utilization and costs for former drivers versus current drivers (reference group), while accounting for potentially confounding variables. For infrequently occurring health services (emergency room, hospital outpatient, inpatient, and mental health services), we estimated the relative risk of any use of services for former drivers compared to current drivers. For frequently occurring services, (pharmacy, primary care, and specialty care), we estimated incident rate ratios. Models were adjusted for age, income, and marital status (defined as married or having a dating/life partner vs. single, divorced, widowed, or separated).

To assess potential non-response bias, we performed a propensity score analysis and examined differences between survey respondents and non-respondents. The estimated probability of response differed according to driving status so regression models were rerun and adjusted for propensity scores. No meaningful differences were observed, so the results without propensity score adjustment are reported.