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# National Highway Traffic Safety Administration (NHTSA) Notes

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## Literature Review of Polypharmacy and Older Drivers: Identifying Strategies to Study Drug Usage and Driving Functioning Among Older Drivers

[National Highway Traffic Safety Administration. Literature review of polypharmacy and older drivers: Identifying strategies to study drug usage and driving functioning among older drivers. *Ann Emerg Med*. 2007;49:535.]

The report “Polypharmacy and Older Drivers: Identifying Strategies to Study Drug Usage and Driving Functioning Among Older Drivers” updates the state-of-the-knowledge about the effects of multiple medications on safe driving among older people.

The authors identified 1,600 abstracts published between 2001 and 2004 on polypharmacy, drugs, and older drivers. These abstracts were screened, and 143 relevant articles were reviewed on the following topics: identifying medication use, measuring medication compliance, measuring driving performance, and polypharmacy and older people.

The first section of the report examines physiologic changes that affect how older people metabolize their medications. The report focuses on medications most frequently used by older community-dwelling residents, such as benzodiazepines, opioids, antidepressants, and antidiabetics. In addition, the section provides a general overview of the effects of medication use and crash risk. Although prescription medications are the major focus of the review, over-the-counter (OTC) medication use by older people is included where it was reliably documented in the literature.

The second section of the report reviews the relative merits of several methods used to measure compliance with medication, including clinical judgment, patient self-report, clinical response, biochemical measures, pill counts, pharmacy records, and electronic medication-monitoring devices. The section also examines the factors affecting compliance with medication regimens. Patient-related factors that correlate with low compliance include limited access to health care, financial problems, communication barriers,

and lack of social support. The prescriber-related factors that were found to correlate with low compliance include poor prescriber-patient relationship, poor prescriber communication skills, a mismatch between the prescriber and patient about health beliefs, and a lack of positive reinforcement from the health care provider. In addition, this section examines factors that affect the willingness of older persons to participate in research and offers suggestions to help in recruitment of elderly patients in research studies.

The report concludes with a review of the literature on methods to measure driving performance, including on-road testing and driving simulation to measure driving performance. The relative advantages of naturalistic studies (driving in traffic) and controlled driving (driving on a closed course) are presented, along with reviews of the different levels of driving simulation measures, ranging from noninteractive computer graphic or digital video with no motion to interactive computer graphic visuals with full motion.

Copies of the 104-page report *Polypharmacy and Older Drivers: Identifying Strategies to Study Drug Usage and Driving Functioning Among Older Drivers* can be obtained from the Office of Research and Technology, NHTSA, NTI-130, 400 Seventh Street, SW, Washington, DC 20590 or downloaded from the NHTSA Web site at: <http://www.nhtsa.dot.gov/staticfiles/DOT/NHTSA/Traffic%20Injury%20Control/Articles/Associated%20Files/Polypharmacy.pdf>.

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## COMMENTARY: POLYPHARMACY AND OLDER DRIVERS: BEYOND THE DOORS OF THE EMERGENCY DEPARTMENT (ED) FOR PATIENT SAFETY

[Lotfipour S, Vaca F. Commentary: polypharmacy and older drivers: beyond the doors of the emergency department (ED) for patient safety. *Ann Emerg Med*. 2007;49:535-537.]

On July 16, 2003, a farmer’s market in Santa Monica, CA, was the site of a motor vehicle crash. As reported by the *LA*

*Times*,<sup>1</sup> an 86-year-old retired salesman ran his car through safety barricades and 2-and-a-half blocks, killing 10 and injuring more than 50 shoppers. The collision reportedly occurred when the older gentleman tried to stop but inadvertently hit the accelerator instead of the brake, resulting in the disaster.<sup>2</sup>

This unfortunate event and several other recent events like it have received considerable national media attention. They have also added important new challenges in trying to address the public safety concerns brought on by these high-profile cases. Often these cases have heightened the misguided perception that older drivers as a group are involved in more total collisions than other age groups.<sup>3</sup> The reality is that the number of collisions and chronologic age are inversely related, with total crashes decreasing with advanced age.<sup>4</sup>

Although injury or fatal crashes are never welcomed, somehow positive events do emerge in the aftermath. One positive outcome is that notable crashes like the one in Santa Monica have served as a catalyst for constructive dialogue and collective action between senior health care providers, public health specialists, and traffic safety experts. Furthermore, they have made several of the issues about fitness to drive in older adults (those 65 years and older) a top priority for national highway safety.

One such issue that remains of great concern and yet is not completely understood is that of polypharmacy in older road users. Polypharmacy is generally understood as the routine use of several medications simultaneously. Other definitions have included the use of a medical regimen that includes at least 1 unnecessary medication or the use of 5 or more medications, or the act of prescribing more medications than are clinically indicated.<sup>5</sup> Although variations in the definition of polypharmacy exist, there is little disagreement about the effects medications can have on the many functional aspects of older-adult life.

Polypharmacy effects on falls, activities of daily living, cognitive agility, and driving fitness, coupled with older adult physiologic changes, can have a significant impact on morbidity and mortality.<sup>6</sup> Although it may be commonly understood that cognition, motor function, and vision may become considerably impaired as a result of prescription or over-the-counter medication use, the overall effect of polypharmacy in the context of collision risk is underappreciated by the public. Further, research suggests that seniors behind the wheel and the physicians who routinely care for them may not be giving enough consideration to the cognitive and motor impairment attributable to polypharmacy's placing older adults at increased collision risk.<sup>7</sup> Without proper attention, the negative implications of this "neglect" will unfortunately be increasingly realized as the number and proportion of licensed older adult drivers in the United States increase to 40 million by 2020 (1 in 4 drivers by 2024).<sup>8,9</sup> Also, not only will the number of older adult drivers continue to increase but also, in an attempt to maintain their independence and self-sufficiency, these seniors will be driving more miles per year than ever before.

This month's issue of NHTSA Notes highlights the report titled *Literature Review of Polypharmacy and Older Drivers: Identifying Strategies to Study Drug Usage and Driving Functioning Among Older Drivers*.<sup>7</sup> The goals of the report were to accomplish an up-to-date literature review on polypharmacy in older drivers, to review the methods currently used to measure the use of prescription medications and over-the-counter drugs by older adults, to determine potential cost-effective and practical ways to obtain valid information about prescription medications and over-the-counter drug usage, and to assess the impact on driving performance. Researchers conducted a comprehensive literature review screening 1,600 abstracts published between 2001 and 2004. From these abstracts, investigators thoroughly examined 143 important published articles in the area of medication use and adherence, measuring driver performance and polypharmacy among older people.

Although it is well known that the majority of older adults regularly use several medications, at least 1 study has shown that the use of as few as 3 medications per day can increase the risk of functional decline in older adults by as much as 60%.<sup>7</sup> Such limited function obviously has major implications for the overall safety of seniors, let alone collision risk and in turn the public's safety as they use the nation's roadways. A few important steps in better understanding and addressing polypharmacy in older drivers include finding accurate, feasible, and rigorous research methods. The investigation conducted in the highlighted NHTSA report is an important step in directing future studies in polypharmacy and older road users. In a more practical sense, the report can be seen as a call to emergency physicians to consider polypharmacy in the context of their patients' safety beyond the doors of the ED.

It is common for emergency physicians to routinely care for highly functional older patients who still drive and present to the ED with a laundry list of medications. Unfortunately, it is also likely that many of these patients are discharged from the ED with relatively little thought given to the influence of the medication list on their driving. With the ubiquitous nature of polypharmacy encountered in this setting, emergency physicians should routinely consider how these presenting patients could be placing themselves and others on the roadway at increased risk for crash injury. Similarly, greater consideration should be given to the medications prescribed to seniors on discharge and their potential to impair driving skills. Because many of the most commonly prescribed medications are known to affect driving, it would be prudent to consider strategies to briefly engage and counsel patients about the untoward effects of these medications. Unfortunately, there is a paucity of information in the literature documenting best practices for effectively explaining medication-related effects to patients treated in the ED. Nevertheless, the need exists for prescribing emergency physicians and emergency nurses to be inquisitive about senior patient driving status and in turn to raise patient awareness of

**Table.** Web-based older driver safety resources.

Organization/Group	Website Address
AAA Foundation for Traffic Safety	<a href="http://www.seniordrivers.org">http://www.seniordrivers.org</a>
American Medical Association	<a href="http://www.ama-assn.org/go/olderdrivers">http://www.ama-assn.org/go/olderdrivers</a>
American Occupational Therapy Association	<a href="http://www.aota.org/olderdriver">http://www.aota.org/olderdriver</a>
Grand Driver	<a href="http://www.granddriver.info">http://www.granddriver.info</a>
National Highway Traffic Safety Administration	<a href="http://www.nhtsa.dot.gov/people/injury/olddrive">http://www.nhtsa.dot.gov/people/injury/olddrive</a>

potential medication effects that may impair the driving of older road users.

Because we have only recently entered 2007 and are rapidly approaching 2010, we are reminded that the *Healthy People 2010* objectives continue to call for the reduction of injuries, disabilities, and deaths caused by unintentional injuries.<sup>10</sup> In the past century, some of the greatest advances in public health have been through prevention strategies. Since 1900, the average lifespan has been lengthened by 30 years; 25 of these years are thought to be largely due to advances in public health. These advances include vaccination against common childhood diseases, motor vehicle safety, safer workplaces, and fluoridation of drinking water.<sup>11</sup> As with other clinical disease states, emergency physicians have a valuable opportunity to contribute to older adult public health and safety as they participate in caring for seniors who arrive at the ED for a multitude of medical complaints and conditions. In many situations, these ED visits can be the very event that becomes the “cue to action” that triggers the emergency physician to be concerned about the patient’s current or future ability to drive. Although we might often look for teachable moments to further serve our senior patients in the course of the ED stay, the visit can also serve as an important opportunity for the emergency physician to learn more about the health and safety of older adults beyond the doors of the ED.

According to the Federal Highway Administration, it is projected by 2020 that there will be approximately 40 million licensed older adult drivers in the United States. As the number of older adult drivers increases, there is growing concern for the potential of a significant increase in the number of preventable crash injuries and fatalities in our older road users. Emergency physicians can be instrumental in the reduction of injuries that occur as a result of polypharmacy in our older population. With growing concerns about polypharmacy issues and injury prevention, additional research is needed to better understand medications and their effects on driving safety. Possible areas of research can include the cumulative effects of medications, possible dose adjustment based on age, and the effects of alcohol in conjunction with medication. Emergency physicians can participate in the reduction of the likelihood of crash injury as a result of polypharmacy by providing patient medication safety instructions at discharge, with a focus on driving precautions, asking patients to thoughtfully discuss with their primary care

physician the potential reduction of the number of medications they are taking and referring patients and their families to informative senior driving safety Web sites (Table). Perhaps the best, first, and most important step in approaching polypharmacy and older driver (patient) safety in the ED is to ask senior patients whether they drive.

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