

There is a longstanding concern that commonly used psychoactive medications such as sedatives and tranquilizers may impair driving ability. Today I am going to be focusing on the evidence provided by a number of population-based epidemiologic studies that examine the association between medications and traffic crashes. Unlike small scale clinical studies, these epidemiologic studies used data from large populations to assess the public health effect of medication use on driving safety. These studies estimate the relative risk of motor vehicle crashes associated with certain types of medications, while adjusting for factors that might affect the relationship between driving and medication use, such as age, previous medical care, and health status.

Based on epidemiology, what do we currently know about this problem? Between 1990 and 1998, there were six large population-based epidemiologic studies published that examined the association between medications and traffic crashes. The majority, four of the six, only included drivers aged 65 years and older, while only two included drivers of all ages. These studies used databases that linked Medicare or other large health care databases with emergency or hospital records, pharmacy and prescription data, drivers' license records, and motor vehicle crash reports.

The studies looked at a limited number of psychoactive drugs. All six studies included benzodiazepines (BZDs); three studies also included cyclic antidepressants; two included oral opioids and antihistamines; and one included selective serotonin reuptake inhibitor antidepressants.

Over time, studies defined medications more precisely. For example, while five studies looked at BZDs as a group, two more recent study also assessed long and short-acting BZDs separately. Two studies divided BZDs into sedative hypnotics (that are prescribed for insomnia) and anxiolytics (that are prescribed to relieve anxiety). Three studies included dose-response effects; two compared risks for short- vs. long-term use, and two compared crash risk for long- and short-acting BZDs.

To summarize the results of these studies, despite study limitations, evidence from this research suggests that BZDs increase crash risk as much as 50% and this risk increases with increasing dose or with taking more than one BZD. Two studies suggest that this risk drops with continued use. The majority of the risk may be with the long acting drugs. With the short-acting medications, crash risk seems to be highest during the first week or two of therapy. Among the BZDs, hypnotics that are taken at night appear to pose less risk than anxiolytics that are usually taken during the day.

A limited number of studies provide less convincing evidence about other drugs. Results from only two studies of older adults suggest that cyclic antidepressants may double crash risk while oral opioids and antihistamines do not increase risk.

But there is still a great deal we need to know about this issue. In order to accurately estimate risk, we need to precisely determine exposure. Many psychoactive drugs are prescribed on an "as needed" basis so studies using records and dates for prescriptions may not accurately reflect use. Other drugs, like antihistamines, are available over-the-counter so it is difficult to get accurate data about use. Unlike alcohol, we cannot use blood levels of drugs fat soluble to measure impairment. We need better ways to ascertain what drug or drugs are taken, at what time of day, and at what dosage and then to link this information with data on motor vehicle crashes.

We need to conduct additional epidemiologic studies of BZDs to clarify the differences in risks for long- and short-acting medications, to study the risks associated with hypnotic and anxiolytic BZDs, and to look at risk for short- and long-term use of these drugs. We need further study of antidepressants among people of all ages. And we need to study additional prescription and over-the-counter medications that may impair drivers, such as codeine cough medicines and antihistamines, to see if these also may contribute to an increased risk of motor vehicle crashes.

Studies need to be broadened to include drivers of all ages, to assess whether alcohol in combination with some medications is a significant factor, and to take into account the metabolic effects of aging on drug metabolism and tolerance. We need to know whether impairment differs by gender. We need to understand whether long-term use of some medications increases or decrease risks. And we need to learn more conditions, such as depression, that may influence the relationship between driving ability and the likelihood of taking medications.

To answer these questions, we will need to develop more complete and complex data bases. We will also need to develop new and creative approaches to obtaining detailed information about the use of prescription and over-the-counter medications that may impair drivers. Finally, this information needs to be linked to comprehensive data about motor vehicle crashes.

In summary, these population-based epidemiologic studies have provided us with basic information about the risks of traffic crashes associated with BZDs. However, further research is needed to provide clear and comprehensive answers about the impact of all types of medications on transportation safety in the United States.

References

1.

I.Barbone F, McMahan AD, Davey PG, Morris AD, Reid IC, McDevitt DG, MacDonald TM. Association of road-traffic accidents with benzodiazepine use. *Lancet* 1998;5:239-44.

II.Hemmelgarn B, Suissa S, Huang A, Boivin J-F, Pinard G. Benzodiazepine use and the risk of motor vehicle crash in the elderly. *JAMA* 1997;278:27-31.

III.Leveille SG, Buchner DM, Koepsell TD, McCloskey LW, Wolf ME, Wagner EH. Psychoactive medications and injurious motor vehicle collisions involving older drivers. *Epidemiology* 1994;5:591-98.

IV.Neutel CI. Risk of traffic accident injury after a prescription for a benzodiazepine. *Annals of Epidemiology* 1995;5:239-44.

V.Oster G, Huse DM, Adams SF, Imbimbo J, Russell MW. Benzodiazepine tranquilizers and the risk of accidental injury. *American Journal of Public Health* 1990;80(12):1467-70.

VI.Ray WA, Fought RL, Decker MD. Psychoactive drugs and the risk of injurious motor vehicle crashes in elderly drivers. *American Journal of Epidemiology* 1992;136:873-83.