Prevalence of Sedating Medication Use Among Older Drivers Presenting in the Emergency Department

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ABSTRACT

BACKGROUND: Adults over the age of 65 are involved in more motor vehicle collisions per mile driven than those under 65.

OBJECTIVE: This study aimed to determine the prevalence of sedating medication use among older drivers, and their recall of advice given by medical professionals about potential for these medications to cause driving impairment.

METHODS: This was a cross-sectional study of older adults (age ≥ 65) who had driven in the last 30 days, presenting at an urban emergency department.

RESULTS: Of the 76 participants, 34 (44.7% [95%CI: 38.7, 50.7]) reported currently using sedating medications. No participants using sedating medications reported being advised by their prescriber about potential driving impairment caused by these medications.

CONCLUSIONS: Given that none of the participants on sedating medications reported previous advice regarding the potential for these medications to cause driving impairment, this at-risk group might benefit from more thorough instruction to limit driving when using sedating medication.

KEYWORDS: Older drivers, sedating medications, driving impairment

INTRODUCTION

Adults over the age of 65 constitute about 13% of the United States population, but account for over 16% of all motor vehicle fatalities.[1] Although this age group drives fewer miles annually than drivers younger than 65, their crash rate per mile driven is higher.[2] Factors associated with aging, such as cognitive impairment, decreased reaction time, and reduced visual acuity, can affect the driving performance of the older driver.[3] Prescription medication use may also impact driving performance, particularly when medications with sedating potential are used. A recent case-control analysis of motor vehicle collision (MVC) data among older Swedish drivers showed that, as the amount of prescribed medications increased, there was a corresponding increase in the number of injurious MVCs.[4]

Between 1999 and 2008, the number of people in the U.S. taking multiple prescription drugs increased, with 36.7% of those aged 60 and older reporting use of 5 or more prescription drugs within the past month.[5] In particular, prescription drugs for pain (e.g. opioids), insomnia (e.g. hypnotics and sedatives), and mood regulation (e.g. anxiolytics) are commonly taken in combination and have the potential to negatively interact, putting older adults at higher risk for adverse effects, which could impair driving performance.[6-8] Benzodiazepines are among the most commonly used drugs by older adults, and there is evidence to show that benzodiazepines reduce the driving ability and safety of older drivers.[9,10]

The emergency department (ED) is an opportune location to study this problem, as it is a likely place for the negative sequelae of sedating medication use to be revealed, particularly with regard to MVCs. Injuries from motor vehicle accidents are the fourth leading cause of nonfatal injuries for U.S. adults 65 or older treated in the ED.[11] However, the prevalence of sedating medication use among older adults presenting to the ED is unknown, even though this group frequents the ED more often than adults under the age of 65.[12]

The information that older adults receive about the potential effects of sedating medications has not been well characterized. It is unknown if they receive advice about these medications' effects from their health care providers or any other sources. The ED encounter provides an opportunity to provide information about the adverse effects of sedating medications on driving performance, particularly when an older adult presents following a MVC.

The objective of this study was to determine the prevalence of sedating medication use among older adults presenting to the ED who reported that they drove a motor vehicle recently. A secondary aim of this study was to evaluate whether older adults who take sedating medications received advice from prescribers about the medications' risks, including their negative effects on driving performance.

METHODS

Study design

We conducted a cross-sectional observational study of older adult patients (age ≥ 65) who were treated in the ED at Rhode Island Hospital for any injury or illness and reported driving in the past 30 days. The Institutional Review Board at Rhode Island Hospital approved the study protocol prior to

beginning the research. We reviewed the ED's electronic medical record (EMR) to identify potentially eligible study participants (age ≥ 65 years, non-critical injury or illness, English speaking), who were then approached in order to perform an in-person assessment of study eligibility. Participants were determined ineligible if they did not report driving a motor vehicle within the past 30 days. We administered a previously validated six-item screener to identify cognitive impairment among potential subjects.[13] Participants with a score ≥ 4 (of a maximum of 6) formed the final study population after providing verbal consent to participate.

Using a medication checklist, participants were asked about their current use of general classes of medications. If participants indicated current use of medications of any class, they were asked if the medication was a prescription or an over-the-counter drug, the name of the medication, and advice they had received from a doctor, nurse or pharmacist about the effect of the medications on the following: fall risk, driving performance, memory, weight, urinary frequency, and ability to smell odors. Non-injury and unlikely drug side effects were included to minimize social desirability response bias. Due to alcohol's synergistic sedating effects, participants were also asked about alcohol use.

Participants were asked about their perception of the effects each medication had on their driving ability. We used a timeline follow-back approach[14] to find the frequency of driving days, usual amount of miles driven in the past week, and history of MVCs in the past 12 months.

Sedating Drug Classification

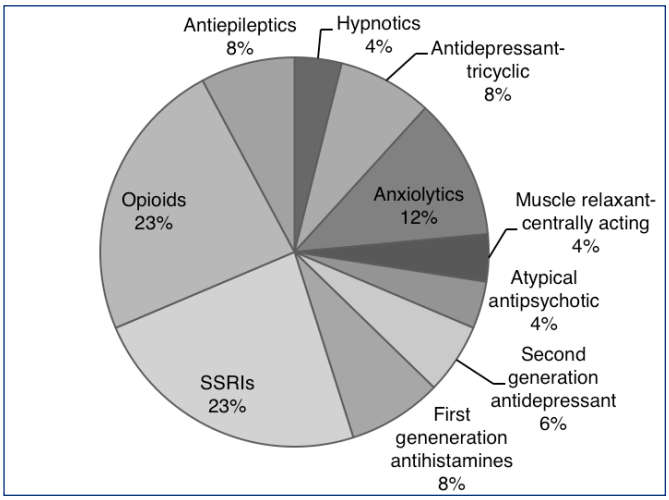
The sedating potential or load of participants' medications, was determined using criteria laid out by the sedative drug model.[8] The sedative model was published in 2011 by Taipale et al.[8] and is based on drugs approved for use in Finland. Primary sedating medications (e.g., conventional antipsychotics, anxiolytics, hypnotics and tricyclic antidepressants) are given a score of 2 and have sedation as a main effect. Secondary sedating medications (e.g., atypical antipsychotics, selective serotonin reuptake inhibitors [SSRIs], antiepileptics, other second- generation antidepressants, and prescription opioids) are given a score of 1 and have sedation as a prominent side effect. Sedative load for each patient is calculated by summing the sedative scores of the medications participants reported using. A sedative load ≥ 2 means that a person was taking at least one medication that is a primary sedative (sedative load=2) or at minimum two medications with sedation as a primary side effect (2 medications with sedative load=1).

Table 1. Demographic characteristics and sedative drug use among the sample population

Characteristic			User of drugs with sedative properties? [n (%)]	
		Total [n (%)]	Yes (n=34)	No (n=42)
Gender	Women	32 (42.7)	16 (47.1)	16 (39.0)
Age (y)	Age Median	72	70	73
	Age IQR	68–78	69–78	67–78
Race	White	67 (88.2)	29 (85.3)	38 (90.5)
	Black	5 (6.6)	3 (8.8)	2 (4.8)
	Hispanic	2 (2.6)	2 (5.9)	0 (0)
	Other	2 (2.6)	0 (0)	2 (4.8)
Partner Status	Married	43 (56.6)	17 (50.0)	26 (63.4)
	Other	33 (43.4)	17 (50.0)	16 (38.1)
Employment	Retired	67 (88.2)	31 (91.2)	36 (85.7)
	Employed	9 (11.8)	3 (8.8)	6 (14.3)

IQR= Interquartile range and is represented by the 25th - 75th percentiles.

Figure 1. Medications contributing to sedative load in study participants by category. SSRIs = selective serotonin reuptake inhibitors



RESULTS

In total, 143 patients were screened for potential study eligibility. Of these patients, 52 were considered ineligible. The most common reasons for study ineligibility were either the patient had not driven in the past 30 days (38%) or patient was cognitively impaired with a six-item screener score < 4 (39%). Of the eligible patients (n = 91), 3 patients refused study consent, and an initial 12 patients completed pilot interviews as part of survey development.

Of the 76 patients enrolled, 34 (44.7% [95%CI: 38.7, 50.7]) reported using medications with sedating qualities (**Table 1**). The most common classes of sedating medications were opioids and antidepressants, together accounting for over half of sedating medications used by study participants (**Figure 1**).

Eighteen participants (23.7% [95%CI: 19.7, 27.7]) registered a sedative load of 2 or greater while 16 participants (21.1% [95%CI: 12.1, 30.0]) had a sedative load of 1. **Table 2** shows the various classes of medications that participants were using and the corresponding sedative load scores for each medication.

Participants had similar driving habits regardless of their sedative load. Participants with a sedative load of 2 or greater averaged 38.3 miles (95%CI: 26, 51 miles) driven per week, while those not on any sedating medications averaged 38.6 miles (95%CI: 21, 56 miles) (**Table 3**). Participants with a sedative load of 1 had similar driving patterns, averaging 39.3 miles (95% CI: 15, 64) driven per week. While not statistically significant at the α=0.05 level, participants with a sedative load ≥2 had a higher rate of MVC in the past 12 months with 17% (95%CI: 0, 34) reporting a MVC compared with 7% (95%CI: 0, 13) reporting a MVC of those with a sedative load ≤ 1.

Alcohol use was highest in the group not on any sedating medications. In that group, 21 (50%) of participants drank at least once a week. Seven (44%) of the participants with sedative load of 1 drank at least once per week. Six (33%) of the participants with sedative load of 2 or greater drank at least once per week.

When asked whether they thought their medications affected their driving, few participants on sedating medications reported that their medications had an effect on driving (**Table 4**). When asked whether the health care provider that prescribed their medications provided any advice about the medication's effect on driving performance, few participants on non-sedating medications (3%; 95% CI 0, 7) and none on medications with a sedative load of 1 or 2, reported being cautioned about the potential for the medications to increase the risk of MVCs.

Table 2. Sedative load and drug classification

Group (ATC code)	Drugs used by participants	Number of participants using each drug (n)	Sedative sum score
Primary sedatives (sedative load=2)			
Hypnotics (N05C)	zolpidem	2	4
Tricyclic antidepressants (N06AA)	amitriptyline, imipramine	4	8
Anxiolytics (N05B)	alprazolam, diazepam, lorazepam	6	12
Drugs with sedation as a prominent side effect or a sedating component (sedative load=1)			
Centrally acting muscle relaxant (M03BX01)	baclofen	1	1
Dopamine receptor agonists (N04BC)	ropinirole	1	1
Atypical antipsychotics	quetiapine	1	1
Other antidepressant (N06AG)	trazodone	2	2
First generation antihistamine	doxylamine, diphenydramine	4	4
SSRIs (N046AB)	paroxetine, fluoxetine, escitalopram, sertraline	12	12
Opioids (N02A)	oxycodone, hydrocodone/ ibuprofen, oxycodone/ acetaminophen, hydrocodone/ acetaminophen, hydrocodone, codeine/acetaminophen	11	11
Antiepileptic (N03)	gabapentin, clonazepam	4	4
Total sedative sum score			**60**

ATC=Anatomic Therapeutic Chemical; SSRIs=selective serotonin reuptake inhibitors.

Table 3. Driving behavior and sedative drug load

	Sedative load=0	Sedative load=1	Sedative load ≥2
Driving Behaviors	**Participants (n) out of total (n=76)**		
	n=42	**n=16**	**n=18**
MVC in the past 12 months [n (%; 95% CI)]	4 (10; 1, 19)	0 (0)	3 (17; 0, 34)
Average miles driven per week miles [(95% CI)]	38.6 (26, 51)	39.3 (15, 64)	38.3 (21, 56)

DISCUSSION

Almost half of the older adult drivers in our study sample were on sedating medications. Previous studies have shown that sedating medications can impair driving ability, and many sedating medications have specific warnings about the risk of driving after taking these medications.[4,9,15] Despite the risks, older adult ED patients in this study who used sedating medications still engaged in driving, and, in a few instances, drove even though they reported that their driving was affected by these medications.

Sedative load was calculated for these participants in order to quantify the sedating potential of the reported medications based on the sedative load model.[8] Across our participants, there were no significant differences in reported driving behaviors. Those with sedative load of 1 or sedative

Table 4. Study participant recall of advice given by health care providers on potential medication side effects

Advice Type	Medications with Sedative Load of 0	Medications with Sedative Load of 1	Medications with Sedative Load of 2
	Percent reporting that advice was given [% (95% CI)]		
Falling risk	8 (1-14)	9 (0-20)	0
MVC risk	3 (0-7)	0	0
Forgetting things	11 (3-19)	13 (1-24)	0
Ability to smell odors	5 (0, 10)	3 (0-9)	8 (0-25)
Obesity risk	2 (0-5)	0	8 (0-25)
Urinary frequency	16 (7-25)	0	0
Percent of participants reporting medication had an effect on their driving	5 (0-10)	13 (1-24)	8 (0-25)

load greater than or equal to 2 drove nearly the same number of miles per week as those who were not on sedating medications. While those with a sedative load ≥ 2 had a higher rate of MVC, this result was non-significant in this observational study. A future study designed with an adequate power to test this hypothesis would be useful. None of the older adults on medications with potential sedating effects reported being given advice about avoiding or adjusting their driving while on the medications due to the potential for the medications to increase the risk of MVCs.

Our study found that older adults reported during an ED visit that they did not change their driving habits after taking sedating medications to accommodate the medications' negative effect on driving performance. Our findings, if replicated, suggest the importance of research to develop an easily administered assessment tool (perhaps within an EMR) for medical providers to identify older adults with a high sedative load and counsel the individuals about the risks of sedating medications and driving performance. Counseling older patients on MVC risks while using sedating medications has the potential to reduce MVCs in this at-risk population.

LIMITATIONS

This is a cross-sectional study of older adult patients who presented to an ED situated in a busy urban setting. The limited sample size and the fact that study participants may not be representative of all older adult ED patients, including those non-English speaking or critically ill, potentially reduces the generalizability of our findings.

Additionally, this study assessed patient recall of prescriber recommendations of medication side effects in this case. Studies have shown that patient recall of physician advice is highly variable with >90% to only 22% of advice being recalled depending on the nature of the advice.[16]

Furthermore, while sedating medications were identified based on criteria laid out by a previous study[8] medication side effects can manifest differently depending on dose of the medication, time of administration, and variable patient pharmokinetics and metabolism. We included all medications with sedating potential based on the rubric by Taipale et al.[8] Some medications included may not be sedating in all individuals, for example SSRIs. However, in the case of SSRIs in particular, somnolence is listed as a common adverse event for SSRIs based on clinical trials conducted by the manufacturers, especially in specific SSRIs such as fluvoxamine and paroxetine.[17] We chose to be sensitive, rather than specific, when it came to including medications with sedating potential as this has greater applicability to future screening and interventions.

Future studies could aim to quantify the attributable risk of different sedating medication for older drivers involved in a MVC. Our study did not assess older adults' use of illicit drugs. Future studies could be designed to assess this to gather a more complete measure of sedative load of older adults involved in MVCs. Future studies could also aim to interview older drivers involved in MVCs and identify whether drivers were using sedating medications.

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