






Balancing Safety, Comfort, and Fall Risk: An Intervention to Limit Opioid and Benzodiazepine Prescriptions for Geriatric Patients

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Abstract

Introduction: This study reports on the impact of a clinical decision support tool embedded in the electronic medical record and characterizes the demographics, prescribing patterns, and risk factors associated with opioid and benzodiazepine misuse in the older adult population. **Significance:** This study reports on prescribing patterns for patients ≥ 65 years-old who presented to Emergency Departments (ED) or Urgent Care (UC) facilities across a large healthcare system following a fall ($n = 34,334$ encounters; $n = 25,469$ patients). This system implemented a clinical decision support intervention which provides an alert when the patient has an evidence-based risk factor for prescription drug misuse; prescribers can continue, amend or cancel the prescription. **Results:** Of older adults presenting with a fall, 31.4% ($N = 7986$) received an opioid or benzodiazepine prescription. Women and younger patients (65-74) had a higher likelihood of receiving a prescription ($P < .0001$). 11% had ≥ 1 risk factor. Women were more likely to receive an early refill ($P = .0002$) and younger (65-74) men were more likely to have a past positive toxicology ($P < .0001$). A prescription was initiated in 8,591 encounters, and 946 (9.0%) triggered an alert. In 58 cases, the alert resulted in a prescription modification, and in 80 the prescription was canceled. **Conclusions:** Documented risk for opioid misuse in the elderly was 10% among patients presenting to the ED/UC after a fall. The dangers associated with opioid/benzodiazepine use increase with age as does fall risk. Awareness of risk factors is an important first step; more work is needed to address potentially hazardous prescriptions in this population.

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Introduction

Concern for increasing opioid prescription use among older adults is rising;¹ in 2016, U.S. Department of Health and Human Services data estimated that 1 third of Medicare Part D participants received a prescription opioid.² This population poses a specific set of potential complications from psychoactive agents like opioids including, but not limited to, falls, respiratory impairment, and delirium.³⁻⁵ The opioid crisis has been described as the largest human-made epidemic in public health history^{6,7} and although much of the discussion concerns the younger population suffering an overdose, this epidemic does not exclude those over the age of 65. In fact, older adults have higher use of prescription opioids, evidence for increasing misuse, and greater risks associated with increasing dosage and combination of multiple types of central nervous system (CNS) altering agents (ie opioids in combination with benzodiazepines).⁸⁻¹¹ ED visits by older adults with identified opioid misuse were shown to increase by nearly 220% from 2006 to 2014.¹²

Opioid use among older adults is associated with falls and can result in poor outcomes. Patients taking higher doses of these medications had nearly a 3-fold increase in fall risk.¹¹ Of those who report falling, 30% had recurrent falls, defined as 2 or more in the previous year.¹³ In addition, patients with recurrent falls can become deconditioned as these fall events restrict subsequent daily activity that provide the necessary physical conditioning to protect an individual from subsequent falls. This restriction is associated with significant morbidity and mortality and places patients at risk for further mobility loss, balance problems, and ultimately an increased risk of institutionalized care.¹⁴

While we have more information about the addictive potential of benzodiazepines and opioids than previously, our patients continue to deal with the effects of past liberal use of opioids as many patients have become dependent from prior exposure. Longer exposure times are associated with a substantial decrease in life expectancy.¹⁵ There is a paucity of research and attention on national trends of opioid use in those 65 and older despite the increased risk of side effects in this age group; additionally, there is evidence suggesting increasing misuse. One possible explanation for increasing misuse is that older adults suffer from common painful conditions such as osteoarthritis (almost 50% of older adults)

and neuropathic pain (32-35%).¹⁵⁻¹⁷ These types of pain are difficult to target and treat. Opioids, however, are not the recommended first-line medication for this scenario unless pain is both acute and severe.^{15,18-21} Efforts to avoid unnecessary opioid exposure, particularly for patients with neuropathic pain, are important.¹⁵ There is a paucity of research and attention on national trends of opioid use in those 65 and older despite the increased risk of side effects in this age group.

Older adults are particularly vulnerable to the risks of drugs with CNS effects-altering agents, falls related to medication effects, and concern for polypharmacy. While there are many identified risk factors for falls in older adults, medication misuse is 1 that stands out as potentially actionable. The purpose of this study is to report on the impact of a clinical decision support tool embedded in the electronic medical record that allows characterization of the demographics, prescriptions written, and patient risk factors for opioid misuse and abuse in the older adult population. Our primary aim is to quantify the use of opioids for pain control in the outpatient management of older adults after falls. Secondly, we report the demographics and highlight potential areas for risk of abuse, misuse, and overprescribing utilizing a clinical decision support tool. Lastly, we hope to uncover significant associations between the patient's problem list and the rates of receiving an opioid or benzodiazepine prescription.

Methods

Patient Population

This is a prospective study of prescribing patterns and response to a real-time clinical decision support intervention embedded in the EHR for older adults presenting to outpatient emergency facilities for falls in a large healthcare system. The analysis included patients 65 years or older who presented to an Emergency Department (ED) or Urgent Care (UC) with a fall included on the problem list for the visit from January 1, 2016, to December 31, 2018. This system includes a total of 22 EDs and 29 UC. A free text search for 'fall' in the diagnosis description of any encounter diagnosis code was used as inclusion criteria. Visits for subsequent encounters or sequelae were excluded. Demographic information including age, gender, race, and zip code was queried. Age was categorized into intervals as

65-74, 75-84, and 85+ years. Race was pulled from the EHR and organized into the categories 'Black', 'White', and 'Other'. Income was approximated by the average income for the zip code of the patient's listed residence using the 2016 Individual Adjusted Gross Income Tax Zip Code Data.²²

Information about all prescriptions for opioids or benzodiazepines initiated in EDs or UCs was captured using an electronic health record (EHR) integrated clinical decision support tool titled Prescription Reporting with Immediate Medication Utilization Mapping (PRIMUM).²³ PRIMUM provides point-of-care clinical decision support to promote safe prescribing of opioids or benzodiazepines by informing the prescriber when a patient has at least 1 of the following evidence-based risk factors for misuse or abuse: early refill, 2 or more onsite administration of pain medication in previous 30 days, three or more prescriptions in previous 30 days, previous presentation for opioid overdose, and a history of positive toxicology screen.²³ Early refill is defined as a refill on a prescription with at least half the prescription remaining. Past positive toxicology included urine drug screens for substances of abuse as well as blood alcohol levels.²³ PRIMUM alerts relies on patient risk factor information previously documented in the same EHR. Prescriptions for buprenorphine were removed prior to analysis, as this agent is prescribed for medication-assisted treatment for opioid use disorder and would not be prescribed solely as a pain treatment. All other opioids and benzodiazepines were included (Appendix 1). In response to the alert, prescribers may continue, amend, or cancel the opioid or benzodiazepine prescription.

Data Analysis

Chi-square tests were used to determine if there was an association between demographic groups and the likelihood of receiving a prescription. The average risk factors per patient was found using a Kruskal-Wallis or Mann-Whitney U test.

A multivariable logistic model with a random effect for site was used to determine which factors were associated with the receipt of an opioid and/or benzodiazepine prescription. To ensure independent patient observations, 1 encounter per patient was included. If a patient had more than 1 fall encounter, the last fall encounter was included as this last encounter would be the most representative and relevant for reviewing patient-level risk factors. P-values were adjusted for multiple comparisons using Tukey-Kramer method. Upper extremity fracture, lower extremity fracture, pelvis fracture, other fracture, head injury, weighted Charlson comorbidity index, age, gender, race, history of opioid/

benzodiazepine, and whether the encounter was a single or subsequent fall were included in the model. In addition, a single or multiple falls by opioid prescription history interaction term was included in the model to discern if there was an association between a prescription and those experiencing multiple falls. This association could highlight, even in our short time frame and local population, the direct role of CNS-altering agents and the increase in risk of falls.

All statistical tests were two-tailed and P-values less than .05 were considered statistically significant. SAS software version 9.4 (SAS Institute Inc, Cary, NC, USA) was used for all analyses. [Supplemental Table 1](#) provides additional information regarding how each variable was defined.

Results

The total number of encounters for patients age 65+ from January 1, 2016, to December 31, 2018 for ED was: 247,542 and for Urgent Care: 56,431 for a combined total of 303,973. Following the query and application of inclusion and exclusion criteria, a total of 34,334 encounters, 25,469 patients, and 8715 orders were included in analysis. Of the 25,469 patients, 31.4% (N = 7986) received a prescription.

Patient-Level Data – Bivariate Associations

The association between patient demographic characteristics and whether an opioid/benzodiazepine was prescribed are presented in [Table 1](#). 40.1% were 65-74 years old. 34.8% were 75-84 years and 25.1% were 85+. Younger patients were more likely to receive an opioid or benzodiazepine prescription (39.52% ages 65-74; 29.84% ages 75-84; 20.39% ages 85+; $P < .0001$). The cohort was majority White (83.77%) and 68.1% were female. Of those identified as White, Black, or Other, prescriptions were dispensed in 31.53%, 29.03%, and 38.17% of cases respectively. Women were more likely to receive an opioid or benzodiazepine prescription compared to men (32.93% and 27.98%, respectively), $P = < .0001$.

Of the 25,469 patients, 31.4% (N=7986) received a prescription. 7913 received an opioid only, 36 received benzodiazepines only, and 37 received both ([Supplemental Table 2](#)).

Among patients who received a prescription, the association of patient demographic factors (age, race, gender, income) and average number of risk factors per encounter for opioid misuse are presented in [Table 2](#) and [Table 3](#). 813 patients who received a prescription triggered at least 1 alert. 313 (11.75%) triggered an alert for an early refill. 133 (4.71) had 2 or more onsite administration of pain

Table 1. Association of Patient-Level Factors On Whether An Opioid Or Benzo Was Prescribed^a.

	TotalN = 25,469	Did Not Receive RxN = 17,483	Did Get RxN = 7986	P-Value
Age				
65-74	10,217	6,179 (60.48)	4038 (39.52)	<.0001
75-84	8,867	6,221 (70.16)	2646 (29.84)	
85+	6,385	5,083 (79.61)	1302 (20.39)	
Race				
Black	3,259	2,313 (70.97)	946 (29.03)	<.0001
Other	807	499 (61.83)	308 (38.17)	
White	20989	14,372 (68.47)	6,617 (31.53)	
Gender				
Female	17,356	11,640 (67.07)	5,716 (32.93)	<.0001
Male	8,113	5,843 (72.02)	2,270 (27.98)	
Average Income of patient zip code				
\$20-49,999	11,891	7,983 (67.13)	3,908 (32.87)	<.0001
\$45,000+	12,044	8,473 (70.35)	3,571 (29.65)	
Number of fall Visits				
1	20,195 (79.29)	14,115 (69.89)	6,080 (30.11)	<.0001
2+	5274 (20.71)	3,368 (63.86)	1,906 (36.14)	

^aRow totals may not sum up to column total due to missing data.

Table 2. Among Patients Who Received A Prescription, Risk Factors By Patient Demographic Characteristics.

	Early Refill		Onsite Administration		3+ Medications		Overdose		Positive Toxicology screen	
	n (%)	p	n (%)	p	n (%)	p	n (%)	p	n (%)	p
Age										
65-74	153 (3.79)	.67	73 (1.81)	.44	22 (.54)	.79	27 (.67)	.007	123 (3.04)	<.0001
75-84	111 (4.20)		43 (1.59)		14 (.53)		5 (.19)		22 (.83)	
85+	49 (3.76)		17 (1.31)		9 (.69)		3 (.23)		3 (.23)	
Race										
Black	22 (2.33)	.0003	16 (1.69)	.92	5 (.53)	.84	6 (.63)	.40	50 (5.29)	<.0001
Other	3 (.97)		6 (1.94)		1 (.32)		0 (.00)		4 (1.30)	
White	286 (4.32)		109 (1.66)		38 (.57)		29 (.44)		93 (1.41)	
Gender										
Female	253 (4.43)	.0002	97 (1.70)	.62	37 (.65)	.11	29 (.51)	.14	63 (1.10)	<.0001
Male	60 (2.64)		35 (1.54)		8 (.35)		6 (.26)		85 (3.74)	
Income										
\$20-49,999	141 (3.61)	.06	86 (2.20)	.0014	27 (.69)	.23	23 (.59)	.07	87 (2.23)	.048
\$45,000+	159 (4.45)		45 (1.23)		17 (.48)		11 (.31)		57 (1.60)	

medication in previous 30 days. 45 (1.77%) patients had more than 3 prescriptions for opioid or benzodiazepines in the previous 30 days. 35 (1.09%) patients had a recorded prior opioid overdose. 148 (4.1%) patients had a positive past positive toxicology screen. Younger patients were

more likely to have a previous overdose ($P = .007$) and positive toxicology screen ($<.0001$). White ($P = .0003$) and female ($P = .0002$) patients were more likely to have early refill. Black ($<.0001$) and male ($<.0001$) patients were more likely to have a positive toxicology screen.

Encounter-Level Data

Table 4 presents the average number of risk factors per encounter where a prescription was initiated. Age was associated with number of risk factors, with younger patients being more likely to have more risk factors for opioid misuse. There was no association between gender, income, and number of risk factors.

Among the 34,404 encounters, 8591 encounters had an opioid or benzodiazepine prescription initiated. 946 of those encounters triggered an alert. In 80 encounters, the prescription was not completed, resulting in 8511

encounters with an opioid or benzodiazepine prescribed. In 58 encounters, the prescription was influenced by the alert (prescriber clicked 'cancel'), but an opioid or benzodiazepine was still prescribed later in the encounter. 7913 were prescribed opioids only, 36 were prescribed benzodiazepines only, and 37 had both.

Order-Level Data

The medications prescribed included hydrocodone-acetaminophen 60.83% (N = 5301), tramadol 22.85% (N = 1,991), oxycodone-acetaminophen 10.95% (N = 954),

Table 3. Among Patients Who Received A Prescription, The Percentage That Triggered The Toxicology Risk Factor.

	Alcohol (BAC)		Cocaine		Marijuana	
	N (% yes)	P value	N (% yes)	P value	N (% yes)	P value
Age						
65-74	84 (2.08)	<.0001	29 (.72)	<.0001	24 (.59)	<.0001
75-84	21 (.79)		0 (.00)		1 (.04)	
85+	3 (.23)		0 (.00)		0 (.00)	
Race						
Black	25 (2.64)	.0013	25 (2.64)	<.0001	11 (1.16)	.0002
Other	4 (1.29)		0 (.00)		0 (.00)	
White	78 (1.18)		4 (.06)		14 (.21)	
Gender						
Female	46 (.80)	<.0001	10 (.17)	<.0001	12 (.21)	.0087
Male	62 (2.73)		19 (.84)		13 (.57)	
Income						
\$20-49,999	58 (1.48)	.5374	22 (.56)	.0108	20 (.51)	.0023
\$45,000+	47 (1.32)		7 (.20)		4 (.11)	

Table 4. Average Number Of Risk Factors Per Encounter.

	0	1	2	3	P value*
Age					
65-74	3590 (88.34)	395 (9.72)	72 (1.77)	7 (.17)	.0003
75-84	2378 (89.93)	266 (9.95)	27 (1.01)	3 (.11)	
85+	1210 (92.23)	88 (6.71)	13 (1.61)	1 (.08)	
Race					
Black	843 (87.90)	103 (10.74)	11 (1.15)	2 (.21)	.0078
Other	291 (94.17)	17 (5.50)	1 (.32)	0 (.00)	
White	5937 (89.06)	621 (9.32)	99 (1.49)	9 (.14)	
Gender					
Female	5122 (88.92)	542 (9.41)	87 (1.51)	9 (.16)	.2425
Male	2056 (89.78)	207 (27.64)	25 (1.09)	2 (.09)	
Income					
\$20-49,999	3493 (88.63)	382 (9.69)	60 (1.52)	6 (.15)	.6298
\$45,000+	3202 (88.97)	343 (9.53)	49 (1.36)	5 (.14)	

(*Kruskal-Wallis or Mann-Whitney U test).

Table 5. Multivariable Analysis: Association of Patient Factors and Receiving a Prescription.

Patient Characteristic		Odds Ratio	Lower OR	Upper OR	P-Value
Lower Extremity Fracture	Yes	2.753	2.373	3.194	<.0001
	No	Ref	—	—	
Upper Extremity Fracture	Yes	8.766	7.858	9.78	<.0001
	No	Ref	—	—	
Pelvis Fracture	Yes	4.059	3.209	5.135	<.0001
	No	Ref	—	—	
Other fracture	Yes	3.257	2.987	3.55	<.0001
	No	Ref	—	—	
Head injury (S00.x)	Yes	.514	.467	.565	<.0001
	No	Ref	—	—	
Weighted CCI category	0	Ref	—	—	
	1-3	.703	.643	.769	<.0001
	4-6	.649	.515	.818	<.0001
	7+	.447	.222	.899	.0163
Age	65-74	2.79	2.512	3.099	<.0001
	75-84	1.778	1.595	1.981	<.0001
	85+	Ref	—	—	
Race	White	Ref	—	—	
	Asian	1.089	.624	1.898	.9795
	Black	1.02	.896	1.163	.9789
	Other	1.362	1.068	1.735	.0059
Gender	Male	Ref	—	—	
	Female	1.084	1.012	1.16	.0209
Multiple fall x Rx history interaction term	No Rx history, not multiple fall	Ref	—	—	
	Rx History, not multiple fall	.777	.656	.922	.0008
	No Rx history, multiple fall	.515	.453	.584	<.0001
	Rx history AND multiple fall	.52	.396	.682	<.0001
Location type	Emergency	Ref	—	—	
	Urgent care	.384	.292	.505	<.0001

oxycodone 2.13% (N = 186), other opioid 1.19% (N = 104), acetaminophen-codeine 1.18% (N = 103), any benzodiazepine .87% (N = 76) (Supplemental Table 3).

Multivariable Analysis

The random effect for site was statistically significant (P=.0003) and the intraclass correlation for site was .08, indicating that 8% of the variability in receipt of an opioid is accounted for by facility. The association of patient factors and receiving a prescription are presented in Table 5. Having an upper extremity fracture was associated with being more likely to receive a prescription compared to no upper extremity fracture (OR: 8.766, 95CL: 7.858-9.78). Head injury was associated with being less likely to receive a prescription compared to no head injury (OR: .514 95CL: .467-.565). As Charlson Comorbidity index increased, the likelihood of receiving a prescription decreased. Young

ages were more likely to receive a prescription compared to the 85+ group.

The multiple fall x opioid prescription history interaction term was statistically significant (P=.046). Patient-encounters with an opioid prescription history and a single fall were less likely to receive a prescription (OR: .777 95CL: .656-.922) than patients with no opioid prescription and a single fall. Patient-encounters with multiple falls and no opioid prescription history were also less likely to receive a prescription (OR:0.515 95CL:0.453-.584). However, having both a history of opioid prescriptions *and* multiple falls did not further decrease likelihood of receiving a prescription (OR: .520 95CL:0.396-.682).

Discussion

Use of opioids and benzodiazepines prescription provision is an example of an intervenable cause of balance issues and falling in the elderly population. About 1/3 of

our patient population received an opioid prescription, placing it in line with the national data. Over 31% of patients received an opioid and/or a benzodiazepine prescription for the encounter: 7913 received an opioid, 36 received a benzodiazepine prescription and 37 received both. Women and younger patients (65-74) had a higher likelihood of receiving a prescription ($P < .0001$). Hydrocodone-acetaminophen was most often prescribed (60.83%). 11% had ≥ 1 risk factor for opioid misuse ($N = 872$); women were more likely to receive an early refill ($P = .0002$) and younger men more likely to have a past positive toxicology ($P < .0001$). A prescription was initiated in 8,591 encounters and then 946 (11%) triggered an alert. The alert resulted in modification of the opioid or benzodiazepine prescription in 58 (6.1%) and cancellation of the prescription in 80 (8.4%). Progress has been made in mandating review of prescription drug monitoring programs (PDMP) prior to prescribing opioids as well as integrating PDMP review into electronic medical records. However, accessibility via the electronic medical record varies widely by EHR vendors and mandates vary by state. The PRIMUM clinical decision support intervention provides the prescriber critical information related to risk, such as positive toxicology screens or prior overdose, as well as benzodiazepines that are not included in PDMPs in addition to current prescriptions.

The estimated world-wide prevalence of chronic pain in the elderly is between 25-85%¹⁸ Patel et al²⁴ found 52.9% of older adults experience bothersome pain with high rates especially in those who are female, obese and experiencing musculoskeletal and depressive symptoms. Pain is not attributable to physiological aging but it can contribute to functional decline including increased risk of falls and an earlier or greater degree of dependence on institutional care.²⁵ Carter et al findings suggested that 6.4 older adults with opioid misuse disorder visit the ED every hour, with more than half of these visits resulting in hospitalization. Their findings additionally showed that over the course of the included sample period (2006-2014), the estimated rate of older adults presenting to the ED for opioid misuse increased by 203%.¹² Our data showed that 7970 opioid and 73 benzodiazepine prescriptions were written for ~25,500 patients presenting for a fall during a 2-year timeline. Period. Those with an upper extremity fracture were more likely to receive a prescription for the encounter compared to any other fracture time in the outpatient setting. There are 2 potential reasons for this; firstly, upper extremity fractures can often be managed non-operatively but can be painful, especially if a reduction is performed; secondly, those who do require surgery can often be performed in an outpatient setting and can be sent home with a prescription for pain management. The concern for

subsequent falls increases if a patient with an injured extremity is given a CNS agent for analgesia.

Opioids are psychoactive drugs that increase instability and therefore risk of falls, fall-related injuries, and fractures.²⁶ Psychotropic drugs have also been shown to impair balance performance along with reaction time which are both key sensorimotor functions in preventive falls.²⁷ The American Geriatric Society Beers Criteria Update Expert Panel in 2019 has advised against using opioids except in severe acute pain due to the increase risks of falls, fractures, and overdose associated with polypharmacy.¹⁹ Polypharmacy is a concern for all medications but especially when 2 or more CNS-altering agents have the opportunity to interact. These agents can be difficult to wean due to physiologic (and psychologic) dependence, especially in those with little physiologic reserve. Therefore, preventative action can begin with avoiding the exposure in the first place. Clinicians should leverage non-opioid modalities, to include non-opioid medications (ie acetaminophen, NSAIDs) as well as cognitive (ie aromatherapy, cognitive behavioral therapy) and physical strategies (ie massage, TENS). As with most disease processes, preventative action is more effective and efficient than reactive intervention and our study offers insight into how information gleaned from decision support can be effectively used on both fronts.

Our data showed up to an 8% variability in prescribing behaviors based on facility. It is possible that there are facility-specific culture, policies, or general prescribing habits by physicians and other prescribers, and this warrants further investigation. In our population, the multiple fall x opioid prescription history interaction term was statistically significant ($P = .046$). However, the ability of this interaction to explain variation in prescribing patterns was limited. Additional exploration of this group is necessary to provide decision support for prescribers.

Blake et al found that approximately 1/3 of adults over the age of 65 fall at least once every year.^{14,28,29} We found 25,524 patients and 34,404 encounters for falls within 2 years, representing 11.3% of all encounters among patients over 65 years of age ($N = 303,973$ encounters in ED or UC during the time period). De Rekeneire et al¹³ found that 24.1% of women and 18.3% of men reported falling within a 12 month period and of those, 30% had recurrent falls defined as 2 or more in the previous year. In addition to an initial presentation for fall, subsequent falls are concerning and hold greater potential catastrophe for devastating injury such as hip fracture. It is estimated that one-fourth of women and one-third of men die after hip fracture.³⁰ The CDC has estimated that approximately 95% of hip fractures among older adults are due to falls. Effective strategies to prevent debilitating injuries are needed and the prevention effort can begin by evaluating opioid

use, patient risk factors, history of falls and facility influence on prescriptions.

[Strengths/Limitations]

This study includes a large number of patients over 2 years with significant diversity among patients, prescribers, and facilities all exposed to the same intervention and with centralized data capture via the EHR. This uniform collection system across a large data set allows for less effect of human error. There is no direct link, however, between patient presentation and prescriptions written so we can only demonstrate an association, not direct causation. We can only report prescriptions written, we do not know if it was filled, consumed, diverted, disposed, or misplaced. We do not have the granularity of detail to report what other CNS altering agents a patient maybe be taking regularly, including but not limited to anticholinergics, muscle relaxants, benzodiazepines (by other prescribers) or anti-epileptics. Additionally, we do not know specific comorbidities that might factor into fall risk independent of medication, but we can report the number of points on the CCI as previously mentioned. This lack of detail, however, helped our view of the patient population as we included all-comers who presented after a ‘fall’ without limiting our numbers by excluded specific sub-populations. Additionally, we were unable to assess differences by geographic area, due to a lack of variability in this patient sample, with the vast majority of patients presenting from metro areas. Unfortunately, due to the design of the intervention, we do not capture all details about the initial prescriptions before the alert interrupts the workflow. Therefore, we can report on whether the order was canceled and whether a new medication was ordered or no opioid or benzodiazepine at all, however, we are unable to determine if there was a change in the medication or if there was a decrease in the number of pills provided. While this does limit the granularity of detail, we did achieve the goal of reporting on prescriptions in the face of alerted risk factors. Our specific purpose was to quantify the use of opioids and benzodiazepines, highlight potential areas for risk of abuse, misuse, and overprescribing, and to uncover significant associations between the patient’s problem list and the rates of receiving a prescription regardless of any additional medical factors. As previously stated, the Beers Criteria advises, with moderate strength of evidence, against using opioids except in severe acute pain and there are no patient-level factors included as a caveat.¹⁹

The clinician decision to provide opioids or benzodiazepines to elderly patients after a fall is multifaceted and our study aims to use a large and representative dataset to help characterize this population, highlight prescribing patterns, and identify high-risk use patterns. Approximately

10% of patients receiving an opioid for an outpatient visit have at least 1 pre-defined risk factor and this finding offers a reason for a provider to pause before writing a prescription. Balancing safety and comfort is challenging, particularly in this high-risk population who experience an injury potentially associated with significant pain. Awareness of risk factors is an important first step; more work is needed to address potentially hazardous prescriptions in the older adult population.

Declaration of Conflicting Interests

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Data Accessibility Statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Supplemental Material

Supplemental material for this article is available online.

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