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FALLS AMONG BENEFICIARIES: RISK FACTORS AND PREVENTIVE SERVICES, 2014

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Falls are the leading cause of injury among older adults, and many are potentially avoidable[i]. This study examines probable fall-related injuries among older Medicare beneficiaries in Washington state, 2012–14, to identify potential avenues for improvement in fall prevention.

Methods

The study population consisted of Medicare fee-for-service (FFS) beneficiaries in Washington state, continuously enrolled in Medicare parts A and B for 2012–14, age 67 or older at the end of 2014, who had at least one probable fall-related episode of care in 2014. Medicare fee-for-service part A, B and D claims and beneficiary data for the years 2012, 2013 and 2014 were obtained from the Center for Medicare Services. Fall-related episodes of care were identified, adapting the methods of Kim et al 2016[ii]. Probable fall-related claims that had diagnosis or procedure codes consistent with a fall-related injury were identified.

Probable fall-related injuries included fractures of the lower limb, upper limb, ribs or clavicle, dislocations or sprains of the shoulder, elbow, wrist or knee and head trauma or fracture. Claims with procedure codes for diagnosis or treatment of fall-related injuries, or which specified accidental fall as cause of injury were also included. Claims with a cause of injury code inconsistent with accidental fall, such as motor vehicle accident, were excluded. (See Appendix, Table 1 for the full list of diagnosis and procedure codes used.) Fall-related claims were grouped together into fall-related episodes using a 60-day time window. A fall-related claim was designated as the start of a new fall episode if it was not preceded by any other fall-related claim for the same beneficiary in the prior 60-days. Our method departed from Kim et al, 2016, in two respects: 1) Kim included procedure codes for diagnostic imaging of the chest. We restricted this to diagnostic imaging of the ribs to exclude beneficiaries whose primary diagnosis was lung-related illness rather than rib injury. And 2) Kim used a 30-day time window, but followed episodes of care into skilled nursing and hospice settings. We lacked data for skilled nursing and hospice, so we expanded the time window to 60-days to better ensure distinct episodes.

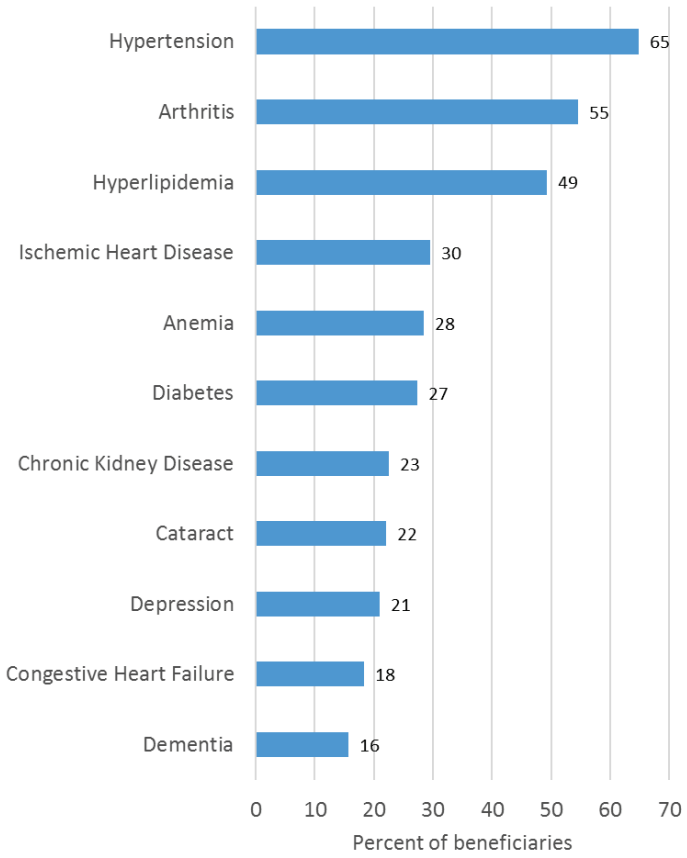
For beneficiaries with at least one fall-related episode starting in 2014, we examined claims for the two-years prior to the most recent fall to identify risk factors and assess utilization of emergency or fall preventative care. We identified beneficiaries with chronic health conditions at the time of the fall, using Chronic Conditions Data Warehouse, or, CCW categories produced by the Centers for Medicare and Medicaid Services. In addition to the chronic conditions provided by CCW, we identified beneficiaries with diagnosis codes for urinary tract infection, nutritional deficiency, chronic pain and fractures using claims dated between one month and two years prior to the most recent fall date. We then identified preventive and emergency procedures performed between one month and two years prior to the fall. For each beneficiary with a probable fall in 2014 and continuously

enrolled in Medicare part D, we identified prescriptions for fall risk medications[iii] where the supply dispensed overlapped the fall date. International Classification of Disease, Ninth Revision, or ICD 9 diagnosis codes, Current Procedural Terminology, or CPT procedure codes, and RxNorm Concept Unique Identifier, or RXCUI prescription drug codes are listed in the Appendix, Table 2.

Results

Of 597,175 continuously enrolled FFS beneficiaries age 67 or older, 78,154 (18 percent) had a probable fall-related episode in 2014. The median age of beneficiaries who fell was 77. The majority (62 percent) were female. Among all continuously enrolled FFS beneficiaries age 67 or older, the median age was 75, with 55 percent female. Half the study population (49 percent) had at least one prior fall-related episode in the past two years, and a quarter (24 percent) had two or more prior falls.

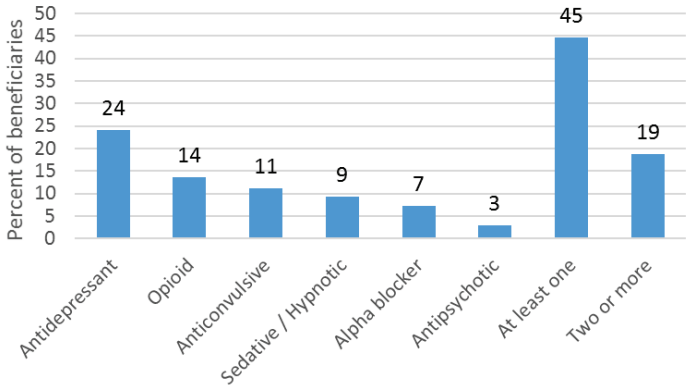
Figure 1. Chronic conditions among Medicare beneficiaries with probable falls, 2014



Chronic health conditions were more common among beneficiaries who had fallen compared to the general Medicare population. Hypertension (65 percent), arthritis (55 percent) and high cholesterol (49 percent) were the most common. Women were more likely than men to have arthritis, depression and osteoporosis. Men were more likely than women to have ischemic heart disease. The full list of CCW chronic condition prevalence is given in the Appendix, Table 3. Diagnoses for urinary tract infection (19 percent), nutritional deficiency (13 percent), prior fracture (12 percent) and chronic pain (6 percent) were also observed in the two years prior to the fall.

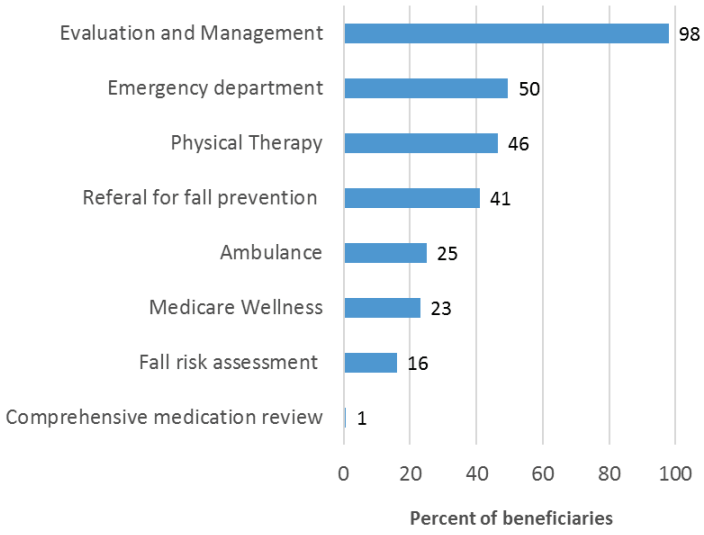
Fall risk medications were common, with 45 percent of the study population taking at least one fall risk medication at the time of the fall, and 19 percent taking two or more. Antidepressant medications were most common (24 percent) followed by opioids (14 percent), anticonvulsive (11 percent), sedatives (9 percent), alpha-blocker antihypertensive (7 percent) and antipsychotics (3 percent). Two percent were taking both opioids and benzodiazepine sedatives. Among those with arthritis, 24 percent were taking an opioid analgesic at the time of the fall.

Figure 2. Frequency of fall risk medications taken at the time of fall among disabled beneficiaries



Half the study population (50 percent) had an emergency department visit, and a fourth (25 percent) had an ambulance ride. Nearly all (98 percent) had at least one evaluation and management visit, but only 23 percent had a Medicare wellness visit, and only 1 percent had a comprehensive medication review. Forty-one percent were referred for fall prevention and 46 percent had physical therapy, but only 16 percent had a comprehensive fall risk assessment. Among the study population with one or more prior fall episodes, 56 percent had referrals for fall preventive services, 60 percent had physical therapy, and 19 percent had a comprehensive fall risk assessment.

Figure 3. Preventive and Emergency Services in the Two Years Prior to Fall



Discussion

In our analysis, 18 percent of Medicare FFS beneficiaries age 67 and older had a probable fall-related injury in 2014. It should be noted that this estimate only accounts for falls that resulted in an injury serious enough to generate a medical claim. In the 2014 Behavioral Risk Factor Surveillance System 31 percent of Washington state seniors reported having fallen in the past year.[1] Clearly falls and ensuing injuries represent a significant medical burden, and an impediment to wellbeing for the senior population.

Many of those with fall-related injuries in 2014 had conditions present in the two years prior to the fall that might have served as indicators of elevated fall risk. Half had prior probable fall related injuries. Nearly half were taking at least one fall risk medication, and a fifth were taking two or more at the time of the fall. Chronic health conditions, most notably arthritis, were common among beneficiaries who fell. Most beneficiaries had at least one primary care evaluation and management visit, which represented a potential opportunity to assess fall risk and establish a strategy for fall prevention.

The U.S. Preventive Service Task Force recommends exercise as an effective intervention strategy to prevent falls and fall-related injuries in community dwelling adults age 65 and older who are at increased risk of falls. Multifactorial interventions, consisting of an initial comprehensive assessment followed by customized interventions, were also found to reduce fall risk, though the evidence for the benefit of exercise was stronger. Vitamin D supplements were not found to be effective[iv,v].

Among those with prior falls, referrals for fall preventive services and physical therapy were common among beneficiaries with prior falls, however, the practice is not universal. In line with the U.S. Preventive Service Task Force recommendations, ensuring that all patients with identifiable fall risk are referred to appropriate ongoing exercise programs should be a key strategy in fall prevention.

Only 22 percent of beneficiaries with probable falls had a Medicare wellness visit, and only 15 percent had a comprehensive fall risk assessment. Though use of fall risk drugs was common, only 1 percent had a comprehensive medication review. Low utilization of these preventive services in Washington state is consistent with national studies,[vi,vii] and represents an area for improvement.

Caveats

The function of medical claims is for billing and reimbursement. Diagnoses or procedures which are not reimbursed or reimbursed at low levels may be under reported. Discrepancies in coding of diagnoses and procedures may exist among providers. Cause of injury codes that would definitely identify falls are not always implemented. We identified probable falls based on injuries that are likely results of accidental falls, but other causes are possible. Claims related to the same fall episode are not grouped together in the data. Our 60-day window for episodes of care may have combined claims from distinct events, or separated claims that were actually related to the same injury. Our analysis only considered fee-for-service beneficiaries. Medicare Advantage beneficiaries comprised 30 percent of the Medicare population in Washington state 2014. Assessing the magnitude of these potential biases would require an extensive review of medical records which is outside the scope of this study.

Acknowledgements

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Appendix: Diagnosis, drug class and procedure codes; chronic condition prevalence

Table 1. Fall-related injury diagnosis and procedure codes

Diagnosis	ICD 9 Codes
Fracture: Hip, lower limb, upper limb, ribs, clavicle	820, 808, 812-817, 821-824, 8070, 8071
Head fracture	800-803
Head trauma	850-854
Dislocation: shoulder, elbow, wrist, knee	831-833, 836
External cause accidental fall	E880-E888, E917, E929, E978
Exclusion codes – External cause not fall	E806, E812-E814, E867, E878, E879, E915, E916, E919, E920
Procedures	**CPT Codes**
Cast and splint	2900-2907, 2931-2949, 29081-29086, 29305-29309, 29450, 2911, 2912, 29105-29109, 29130, 29131, 29505-29515
Repair / treat fall-related fracture	2350, 2360-2362, 2367, 2450-2457, 2465-2467, 2550-2560, 2750, 2753, 2775, 2776, 2778, 2781, 2843, 27193, 27194, 27215-27228, 21800, 21805, 21810, 23510-23515, 23630, 23665-23669, 23680, 24580-24587, 24620, 24635, 24680-24685, 25611, 25620, 25650-25628, 26600, 26605, 26607, 26608, 26615, 26645, 26650, 26665, 26740, 26746, 26720, 26725, 26727, 26735, 26742, 26750, 26750, 26755, 26756, 26765, 27510-27514, 27540, 27790-27792, 27794, 27825-27828, 27520, 27524, 27808-27809, 27820-27823, 28440-28445
Repair / treat fall-related dislocation	23650, 23655, 23660, 24600, 24605, 2461525660, 25670, 25671, 25675, 25676, 25690, 25695, 27550, 27552, 27556-27558, 27560, 27562, 27566
Diagnostic imaging for fall-related injury	7110, 7111, 7310, 7312-7321, 7356, 7357, 73020, 73030, 73040, 73060, 73070, 73080, 73085, 73110, 73112-73115, 73201, 73202, 73206, 73218-73225, 73580, 73700-73706, 73721-73725

Table 2. Fall risk factors, emergency and preventive services and fall risk prescriptions

Diagnosis	ICD 9 Codes
Urinary tract infection	597, 5990
Nutritional deficiency	26
Fracture	800-829
Chronic pain	3382 - 3384
Prescription Drug Class	**RXCUI Codes**
Alpha blocker	CV150
Antidepressant	CN609, CN601
Opioid analgesic	CN101
Anticonvulsive	CN400
Sedative / hypnotic	CN300, CN302, CN309,
Antipsychotic	CN701, CN709
Procedures	**CPT Codes**
Evaluation and management	97001-97004, 99201-99350
Emergency department	99281-99285
Physical therapy	97001-97004, 97140, 97530, 97535, 97112, 97113, 97116, 97139, 97939, 97014, 97035, 97032, 97012, 97150, 98960. 98941, 97750, 95381, 90901, 97799, 97026, 97124, 97033, 29350, 29540
Referral for fall prevention	97001-97004, G0179-G0181, 99490, 99495
Ambulance	A0021, A0080, A0100-A0210, A0225, A0380, A0382, A0384, A0390, A0392, A0394, A0396, A0398, A0420, A0422, A0424, A0425-A0436, A0800, A0888, A0999
Medicare Wellness Visit	G0402, G0438, G0439
Fall risk assessment	3288F
Comprehensive medication review	90862, 99605, 99606, 1160F

Table 3. Chronic health conditions present at the time of the fall

Chronic Conditions Data Warehouse Chronic Health Condition	Percent among FFS beneficiaries with probable falls, age 67+			Age-standardized Percent*	
	Both sexes	Female	Male	All FFS beneficiaries, age 67+	Probable falls, age 67+
Hypertension	64.8	65.4	63.8	29.0	62.0
Arthritis	54.5	57.5	49.8	15.9	55.1
Hyperlipidemia	49.2	47.1	52.8	24.2	49.9
Ischemic Heart Disease	29.5	23.4	39.5	13.3	27.2
Anemia	28.5	28.7	28.0	9.8	25.9
Diabetes	27.3	25.3	30.6	15.1	28.0
Chronic Kidney Disease	22.6	21.6	24.2	9.2	20.1
Cataract	22.1	22.5	21.5	12.3	23.4
Depression	21.0	24.7	15.0	8.0	20.9
Congestive Heart Failure	18.3	17.7	19.3	6.9	15.2
Dementia (incl. Alzheimer)	15.7	17.0	13.5	4.7	10.9
Atrial Fibrillation	14.7	13.2	17.2	5.1	12.2
Glaucoma	12.9	13.5	11.8	6.0	11.9
COPD	12.2	11.6	13.2	5.1	11.8
Osteoporosis	10.5	15.2	2.8	2.9	8.9
BPH	7.0	0.0	18.4	3.1	6.8
Asthma	6.7	7.9	4.8	2.5	7.0
Alzheimer's	5.8	6.4	4.7	1.8	3.8
Stroke	5.5	5.3	5.9	1.8	4.8
Breast Cancer	4.8	7.6	0.1	1.9	4.6
Prostate Cancer	4.2	0.0	10.9	2.0	4.0
Hip Fracture	4.0	4.8	2.6	0.4	2.9
Lung Cancer	1.1	1.1	1.1	0.7	1.1
Heart Attack	1.0	0.8	1.1	0.4	0.8
Endometrial Cancer	0.4	0.7	0.0	0.2	0.4

*For comparison with the general population, percentages were age-standardized to the 2000 U.S. census age distribution.

[i] Bergen G, Stevens MR, Burns ER. Falls and Fall Injuries among Adults Aged ≥65 Years — United States, 2014. MMWR Morb Mortal Wkly Rep 2016;65:993–998. DOI: http://dx.doi.org/10.15585/mmwr.mm6537a2.

[ii] Kim, S., D. S. Zingmond, E, B. Keeler, L. A. Jennings, N. S. Wenger, D. B. Reuben and A. A. Ganz. Development of an algorithm to identify fall-related injuries and costs in Medicare data. *Injury Epidemiology*. 2016. 3:1.

[iii] American Geriatrics Society 2015 Beers Criteria Update Expert Panel. American Geriatrics Society 2015 updated Beers criteria for potentially inappropriate medication use in older adults. *J Am Geriatr Soc* 2015; 63(11): 2227–2246.

[iv] Grossman, D. C., Interventions to prevent falls in community-dwelling older adults: US Preventive Services Task Force Recommendation Statement. *JAMA* 2018, 319(16):1696-1704.

[v] Guirguis-Blake, J.M., Y. L. Michael, L. A. Perdue, E. L. Coppola, and T.L. Bell. Interventions to Prevent Falls in Older Adults: Updated evidence report and systematic review for the US Preventive Services Task Force. *JAMA* 2018, 319(16):1705-1716.

[vi] Ganguli, I., J. Souza, J. M. McWilliams, and A. Mehrotra. Trends in use of the US Medicare Annual Wellness Visit 2011-2014. *JAMA*. 2017. 371(21): 2233-2235.

[vii] Pearson, C. F. Few Medicare beneficiaries receive comprehensive medication review services. Avalere press release, 2014. http://avalere.com/expertise/managed-care/insights/few-medicare-beneficiaries-receive-comprehensive-medication-management-serv.