Intense Use of Fracture-Associated Drugs Among Medicare Beneficiaries in Long-term Care

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INTRODUCTION

Among older adults, common efforts to assess polypharmacy (multiple medications) often focus on simple drug count. Our past work exploring receipt of fracture-associated drugs (FADs) and fractures suggests specific drug combinations may matter more than absolute drug count. We found, in the general Medicare population, hip fracture risk rises steeply as people receive increasing numbers of concurrent FADs, yet this risk decreases slightly with higher intensity of non-FADs.¹ To extend this previous work, we measure FAD and concurrent FAD receipt for a population particularly vulnerable to adverse drug effects—elderly living in long-term care (LTC).² We quantify FAD exposure in this population and compare it with the community-dwelling population to begin exploring an important potentially avoidable risk.

METHODS

Data Sources and Cohort. We used Medicare parts A (inpatient) and B (outpatient) administrative data, 2004–2014, and Medicare part D (prescription) records, 2006–2014, for a 40% random sample of fully enrolled, fee-for-service (FFS) beneficiaries as previously described.¹ From the overall sample, we identified a sub-cohort with prescription fill records suggestive of long-term care or assisted-living settings, namely, 50% or more of annual prescription fills dispensed by a LTC pharmacy.³

Prescription Drug Receipt. We identified 21 distinct FAD groups including antidepressants, antipsychotics, loop diuretics, proton pump inhibitors (PPIs), and opioids.¹ We used fill records to identify medications received and “days supply” to set duration. For each person day, the status for each specific drug group of interest was assigned as exposed or not exposed.

Statistical Analysis. Frequency distributions of FAD receipt (1, 2, and 3 or more) and specific FAD combinations were determined and described as % of total person years (PY) observed for LTC and community-dwelling Medicare beneficiaries. FAD Receipt patterns were compared with the chi-square test using SAS software, version 9.4. Significant associations were considered at p value < 0.05 .

RESULTS

From the sample (5,292,510 beneficiaries, 22,573,534 person years (PY)), 422,111 beneficiaries and 1,803,544 PY met LTC cohort criteria. Overall and in the LTC cohort, 61.1% and 71.4% of beneficiaries were females; 8.3% and 11.9% were black; the mean age was 77.2 years (standard deviation (SD) 7.3) and 84.0 years (SD 8.3), respectively. Beneficiaries in the LTC cohort were more likely than the community-dwelling, elderly population to receive part D low-income subsidy (73.6% versus 27.5%, $p < 0.001$) and to be Medicaid-eligible (68.2% versus 23.1% $p < 0.001$).

Compared with the community-dwelling Medicare population, LTC beneficiaries received more FADs alone and in combination (Fig. 1). Among LTC beneficiaries, 15% of PY were characterized by two, and 19% by three-or-more concurrent FADs; these measures in the total population were 12% and 8%, respectively ($p < 0.001$ for both). Specific, common, concurrent two-way FAD combinations in the LTC cohort included PPI plus selective serotonin reuptake inhibitors (SSRI), SSRI plus second-generation antipsychotics (SGAP), SSRI plus loop diuretics, PPI plus loop diuretics, and SSRI plus opioids. These combinations were received less commonly in the community-dwelling population (Table 1).

DISCUSSION

Medicare LTC beneficiaries received concurrent FADs more often than their non-LTC peers, raising concern for potential iatrogenic and possibly avoidable fracture risk.¹ This higher intensity of prescription drug receipt included co-exposures to psychotropics and opioids and potentially discretionary (e.g., PPI) or relatively contraindicated medications (e.g., SGAP).⁴

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Fig. 1 Receipt of fracture-associated drugs (FADs) as % total person years observed in a 40% random Medicare sample and the long-term care sub-cohort. For FADs, receipt status for 21 single drugs and all two-way concurrent combinations is classified for each person, for each day of observation. 3+ fracture-associated drugs is a classification of person days with 3 or more concurrent FADs. Long-term care individuals are those with 50% or more of annual prescription fills dispensed by a long-term care pharmacy. Frequencies of drug receipt were compared between community-dwelling and LTC beneficiaries using the chi-square test; p value < 0.05 was considered significant. All three comparisons have p value < 0.001 .

This population may warrant an explicit effort to examine and quantify the risk-benefit tradeoff associated with the use of FADs, especially concurrent FADs.

This study is limited by the use of administrative data; prescription fills are a proxy for exposure. We cannot assess clinical appropriateness of prescribing.

Future studies should quantify fracture risk associated with observed drug receipt in this population and relative risk associated with distinct combinations. Future quality metrics could incorporate overlapping adverse drug effects or total FAD burden.¹

Rebecca T. Emeny, PhD, MPH¹

John A. Batsis, MD^{1,2,3}

Nancy E. Morden, MD, MPH¹

¹The Dartmouth Institute for Health Policy & Clinical Practice, The Geisel School of Medicine at Dartmouth, Hanover, NH, USA

²Section of General Internal Medicine, Dartmouth-Hitchcock Medical Center, Lebanon, NH, USA

Table 1 Ten Most Common Single Fracture-Associated Drug and Concurrent Two-Way Fracture-Associated Drug Combinations Among Medicare Beneficiaries in Long-term Care Compared with the Community-Dwelling Medicare Population

	Medicare beneficiaries in long-term care (n = 422,111)		Community-dwelling Medicare population (n = 4,868,813)	
	Person years	% Total person years	Person years	% Total person years
Total observed time	1,803,544		20,759,698	
Single fracture-associated drugs receipt	371,838	20.62	5,281,454	25.44
Concurrent two-way fracture-associated drug receipt	272,620	15.12	2,371,101	11.42
Receipt of specific individual fracture-associated drugs				
Thiazide diuretics	75,155	4.17	2,105,826	10.14
SSRIs	56,425	3.13	436,347	2.10
Loop diuretics	48,960	2.71	420,953	2.03
PPIs	43,882	2.43	787,238	3.79
2nd-generation antipsychotics	29,017	1.61	27,926	0.13
Opioids	19,747	1.09	238,252	1.15
Anticonvulsants	18,353	1.02	177,986	0.86
H2 receptor antagonists	12,917	0.72	111,449	0.54
Nitrates	10,114	0.56	120,585	0.58
Antiparkinson agents	10,101	0.56	65,484	0.32
Receipt of specific concurrent fracture-associated drugs				
2nd generation antipsychotics & SSRIs	17,098	0.95	16,085	0.08
PPIs & SSRIs	15,634	0.87	112,261	0.54
SSRIs & loop diuretics	13,676	0.76	39,485	0.19
SSRIs & thiazide diuretics	13,320	0.74	157,652	0.76
PPIs & loop diuretics	12,834	0.71	88,497	0.43
PPIs & thiazide diuretics	11,537	0.64	320,210	1.54
Anticonvulsants & SSRIs	6482	0.36	29,025	0.14
2nd-generation antipsychotics & loop diuretics	5657	0.31	2772	0.01
SSRIs & opioids	5635	0.31	33,132	0.16
PPIs & 2nd-generation antipsychotics	5596	0.31	4740	0.02

For fracture-associated drugs, status of receipt of 21 single drugs and concurrent two-way drug combinations is classified for each person, for each day of observation. Beneficiaries classified as living in long-term care (LTC) are those with 50% or more annual prescription fills dispensed by a LTC pharmacy. SSRIs selective serotonin reuptake inhibitors and selective norepinephrine reuptake inhibitors, PPIs proton pump inhibitors. Chi-square test was used to compare frequencies of drug receipt between LTC and community-dwelling Medicare beneficiaries; all comparisons are significant with *p* value < 0.001

³Dartmouth Centers for Health and Aging,
Dartmouth College,
Hanover, NH, USA

Corresponding Author: Rebecca T. Emeny, PhD, MPH; The Dartmouth Institute for Health Policy & Clinical Practice, The Geisel School of Medicine at Dartmouth Hanover, NH, USA (e-mail: rebecca.t.emeny@dartmouth.edu).

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Compliance with Ethical Standards:

Conflict of Interest: The authors declare that they do not have a conflict of interest.

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