Multimorbidity and Polypharmacy in Family Medicine Residency Practices

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Abstract

Background: Prescription-related problems among older adults have been of great interest. However, few data are available regarding the prevalence of these problems in US family medicine residency practices (FMRPs). **Objective:** The aim of this research was to examine the prevalence of multimorbidity, polypharmacy, and potentially inappropriate medications (PIMs) use among older adults who visited 5 FMRPs more than once a year. **Methods:** A cross-sectional hospital record review for patients 65 years or older who visited 1 of the 5 university-affiliated FMRPs at least twice during January 1 to December 31, 2014, was conducted. The prevalence of multimorbidity (24 chronic index conditions), polypharmacy, and PIMs use was examined. **Results:** A total of 1084 patients were included in the analyses. The most common chronic conditions were hypertension (87.8%), hyperlipidemia (69.7%), and osteoarthritis (56.1%). The mean number of chronic conditions was 5.3 (SD 2.6). The prevalence of multimorbidity (≥ 2 chronic conditions) was 95.6%. Among these multimorbid older adults ($N = 1036$), the mean number of medication orders was 9.04 (SD 4.36) and 1.57 (SD 0.92) for PIMs, 86.1% met polypharmacy standards (≥ 5 medications), and 33.4% were prescribed one or more PIMs. The proportion of patients with fewer prescriptions at the last visit was 45.4% in the polypharmacy group and 38.0% in the PIMs group. **Conclusion:** Our results suggest a high level of morbidity and complexity among older adults receiving care in FMRPs. Improving the continuity of care as well as promoting interdisciplinary collaboration would have potential to reduce these prescription-related problems. Further research and education to address polypharmacy and PIMs among this population at FMRPs are required.

Keywords

polypharmacy, drug-related side effects and adverse reactions, comorbidity, geriatrics, family practice, pharmacoepidemiology

Background

Polypharmacy (≥ 5 prescription medications) increased in community-dwelling older adults (62–85 years old) from 30.6% in 2005 to 35.8% in 2010.¹ Accumulating evidence suggests there is harm due to polypharmacy and potentially inappropriate medication (PIM) use, especially among elderly multimorbid patients.² Along with these trends, physicians and pharmacists in family medicine practices need to be aware of multimorbidity and polypharmacy, because geriatric care in family medicine is likely to become even more prevalent and important.¹ Since residency training is fundamental for most family physicians and clinical pharmacists to gain geriatric expertise, it is of great interest to understand multimorbidity and polypharmacy in current US family medicine residency practices (FMRPs).

However, there is little data about the prevalence of these problems in US FMRPs. In 2013, Ornstein et al reported the first prevalence of multimorbidity (≥ 2 conditions) among

older adults in US primary care as 77%.² The first PIM prevalence in US outpatient setting was reported by Buck et al in 2009 to be approximately 23%.³ Both studies included patients who received care in this setting as little as once annually. The exact prevalence among older established patients in FMRPs remains unclear, since more than 90% of established patients visit physician offices more than once a year.⁴ In addition, to our knowledge, no literature has been published on polypharmacy prevalence in US FMRPs.

The objective of this study is to examine the prevalence of multimorbidity, polypharmacy, and PIMs in patients aged 65 years or older who visited FMRPs at least twice a year.

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Table 1. The Prevalence of 24 Chronic Index Conditions Among Family Medicine Residency Practice Patients Age ≥ 65 Years (N = 1084).

Index Chronic Condition	Prevalence, % (n) ^a	ICD-9-CM Codes
Hypertension	87.8 (952)	362.11, 401, 402, 403, 404, 405, 437.2, 997.91
Hyperlipidemia	69.7 (756)	272.0-272.1, 272.3, 272.4, 277.7
Osteoarthritis	56.1 (608)	715, 721 (excluding 721.7, 721.8)
Gastroesophageal reflux	41.3 (448)	530.11, 530.81, 530.85
Diabetes mellitus	40.1 (435)	250, 357.2, 362.0, 366.41
Depression	34.0 (369)	290.13, 290.21, 296.2, 296.3, 298.0, 300.4, 311
Atherosclerosis	25.7 (279)	290.4, 433, 434, 435, 436 437.0, 437.8, 437.9, 438, 440, 441, 442, 443, 444, 445, P38.12, P38.44, P39.22, P39.24, P39.25, P39.28, P39.29, V12.54
Chronic obstructive pulmonary disease	24.6 (267)	491, 492, 496
Coronary disease	23.6 (256)	410, 411, 412, 413, 414, 429.7, P36.0, P36.1, P36.3, V45.81, V45.82
Chronic kidney disease	23.0 (249)	250.4, 285.21, 403, 404, 581, 582, 583, 585, 586, 587, 588, 996.73, V42.0, V45.1
Asthma	16.8 (182)	493 (excluding 493.81)
Heart failure	15.1 (164)	402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428
Cerebrovascular disease	15.1 (164)	290.4, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, P38.12, P38.44, V12.54
Osteoporosis and osteopenia	12.6 (137)	733.0, 733.90 (with text indicating osteopenia)
Atrial fibrillation	11.5 (125)	427.31
Chronic liver disease	6.9 (75)	070.22, 070.23, 070.32, 070.33, 070.44, 070.54, 155, 197.7, 571.2, 571.4, 571.5, 571.6, 571.8, 571.9, 572.2, 572.4, 572.8, 996.82, P50.4, P50.59, V10.07, V42.7
Obesity	6.1 (66)	278.09, 278.01, 278.03, 278.8, V85.3, V85.4
Peptic ulcer	5.2 (56)	531, 532, 533, 534, V12.71
Migraine	4.9 (53)	346
Rheumatoid arthritis	4.1 (44)	714
Dementia	3.4 (37)	046.1, 290, 291.2, 292.82, 294.1, 330.1, 331.0, 331.1, 331.2, 331.82
Alcohol use disorders	2.8 (30)	291, 303, 305.0, 357.5, 425.5, 535.3, 571.0-571.3, 790.3, 980.0, 980.9, P94.62
Epilepsy	1.6 (17)	345
Parkinson's disease or syndrome	1.5 (16)	332.0

Abbreviation: ICD-9-CM, International Classification of Diseases, 9th Revision, Clinical Modification code.

^a65+, visited family medicine residency practices ≥ 2 per year.

Methods

We reviewed electronic health record data for all outpatients 65 years or older who visited 1 of 5 university-affiliated FMRPs in Pennsylvania at least twice during 2014. Multimorbidity was defined as having ≥ 2 chronic index conditions, by using the same ICD-9-CM (International Classification of Diseases, 9th Revision, Clinical Modification codes) criteria as Ornstein et al,² from a set of 24 index conditions. We defined polypharmacy as having ≥ 5 prescription orders for oral medications at one visit. Any other form of medications and equipment were excluded. PIMs were defined based on medications recommended to “avoid” in Table 2 of 2015 American Geriatrics Society Beers Criteria for Potentially Inappropriate Medication Use in Older Adults.⁵ The number of prescriptions at first visit during the study period was used for estimating prevalence. The proportion of

older adults with less medication or PIMs at their last visit were examined as an indicator of prescription pattern change for the purpose of capturing the natural trend among FMRPs. Prevalence was compared across the 5 FMRPs using χ^2 tests at the α level of .05. Statistical analyses were performed using STATA/SE 14.2 (StataCorp, College Station, TX). All data were obtained as unidentifiable aggregate counts through the electronic health record system and thus did not meet the definition of human subject research as determined by the University of Pittsburgh Human Research Protection Office.

Results

A total of 1084 patients were included in the analyses. Table 1 tabulates the prevalence of 24 conditions among FMRP patients 65 years or older who visited FMRPs at least twice during the year. Among the 24 conditions, the 3 conditions

Figure 1. The number of 24 chronic index conditions among family medicine residency practice patients age ≥ 65 years (N = 1084). Distribution of the number of 24 chronic index conditions per patient. Twenty-four chronic index conditions were defined by using the same ICD-9-CM criteria as Ornstein et al.²

Figure 2. The number of prescription orders for oral medications among patients age ≥ 65 years who have ≥ 2 chronic index conditions (N = 1036). Distribution of the number of prescription medications at one visit among the multimorbid older adult patients. Rx indicates medical prescription. The number of medications was limited to orally administered medications. Nondrug equipment (eg, inhaler, needles, and glucose monitors) was excluded.

most common were hypertension (87.8%), hyperlipidemia (69.7%), and osteoarthritis (56.1%).

Figure 1 illustrates the number of index conditions per patient and the distribution. The mean number of conditions was 5.3 (SD 2.6) per patient. The prevalence of multimorbidity (≥ 2 conditions) was 95.6%. With the more restrictive definition of ≥ 5 conditions, the prevalence was 58.3%.

Figure 2 represents the number of medications prescribed at their first visit during the study period among the older adults with multimorbidity (N = 1036). The mean number of medications was 9.04 (SD 4.36) and 1.57 (SD 0.92) for PIMs, respectively. Among the multimorbid patients, 86.1% met polypharmacy standards (≥ 5 prescriptions), and 33.4% were prescribed at least one PIM. The prevalence of older adults with ≥ 10 prescriptions was 40.6%.

The proportion of patients with fewer prescriptions at the last visit was 45.4% in the polypharmacy group and 38.0% in the PIMs group. The 5 FMRPs did not differ significantly in the prevalence of multimorbidity (94.7% to 97.0%), polypharmacy (88.5% to 95.9%), and PIM use (31.6% to 37.9%).

Discussion

Our results suggest that multimorbidity, polypharmacy, and PIM use are extremely common among older adults in FMRPs. Furthermore, over half of older adults with polypharmacy or PIMs at the first visit remained on the same, if not more, number of medications at the end of study period.

A 2012 systematic review found considerable variation among reported multimorbidity prevalence, especially in studies using less than 12 index conditions.⁶ In addition, a simple disease count has shown to predict the risk of health outcomes as well as measures taking disease type into account.⁷ Based on these evidence, we adapted the 24 index conditions defined by Ornstein et al,² which enabled inter-study comparison. The higher multimorbidity prevalence among our sample (95.6%) compared to that of Ornstein et al (77%)² may reflect a higher level of sickness and complexity of patients for whom family medicine residents and faculty are providing care, in addition to the difference of inclusion criteria (≥ 1 vs ≥ 2 visits per year). This provides tremendous opportunities for physicians to improve geriatric care regarding multimorbidity and polypharmacy. Further training curricula and educational research should be focused here.

Withdrawing PIMs has been shown to be effective in improving outcomes⁸ and can be done safely.⁹ There are, however, many challenges in reducing medications. The “appropriateness” of the prescription depends on many factors (eg, patient age, life expectancy, and functional and cognitive status).¹⁰ Physicians and pharmacists may feel pressure for not prescribing guideline-recommended drugs.¹¹ Nonetheless, the results of this study set the stage for the need for further research and education to address polypharmacy among older adults.

A recent retrospective cohort study suggested an association of PIM use with increasing numbers of prescribers.¹² Considering that the continuity of care is relatively harder to achieve at residency practices compared to nonresidency practices, improving the continuity of care, as well as promoting interdisciplinary collaboration including pharmacists, would have potential to reduce these prescription-related problems at FMRPs.

Our data were limited to aggregate count, thus having detailed individual data would have strengthened the results. In addition, the lack of information regarding the “appropriateness” of the medication use was an important limitation, which should be addressed in future studies. Finally, our results may not be generalizable to family medicine patients in general, since the data were obtained from a single health care system. However, the similar prevalence across 5 FMRPs serving different socioeconomic groups suggests consistency across the residency practices.

Conclusions

In conclusion, multimorbidity, polypharmacy, and PIM use were extremely common among older patients who visited FMRPs more than once a year. Over 12 months, more than half of patients with polypharmacy remained at the same level or saw an increase in medications. Our results highlight the need for further research and education to address polypharmacy and PIMs at FMRPs. Improving the continuity of care, as well as promoting interdisciplinary collaboration, would have potential to reduce these prescription-related problems.

Declaration of Conflicting Interests

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