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A Case Study Using the Beers List Criteria to Compare Prescribing by Family Practitioners and Geriatric Specialists in a Rural Nursing Home

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Abstract

Previous studies have concluded that inappropriate medications and/or too many medications can lead to adverse events in older adults. The Beers List of potentially inappropriate medications (PIMs) for use in the elderly was developed to help guide clinicians to safely prescribe medications. Moreover, in the United States, policies exist regulating the number of prescriptions nursing home residents may take. Few studies have compared family and geriatric providers' prescribing trends. The aim of this study was to compare prescribing by family and geriatric providers in a rural U.S. nursing home using a nonequivalent 2-group analysis design with data collected via retrospective chart audits ($N=92$). Nursing home residents in the nongeriatric provider group had fewer total comorbidities ($U=p<.001$) and were less likely to have congestive heart failure ($\chi^2=p<.001$), coronary artery disease ($\chi^2=p<.001$), and degenerative joint disease ($\chi^2=p<.001$). Despite this, on average, providers who were not geriatric trained prescribed twice as many drugs per patient ($U=p<.001$). The odds were significantly greater of being prescribed 9 or more drugs (odds ratio 13.15, 95% confidence interval 4.3–39.5) or being prescribed at least 1 PIM (odds ratio 6.25, 95% confidence interval 1.3–29.0) if the prescriber was not geriatric trained. The prevalence in this nursing home of receiving at least 1 PIM and polypharmacy were 36.9% and 72.8%, respectively. Promethazine accounted for 46.9% of all PIMs prescribed. Geriatric education appears to have influenced prescribing patterns at this facility, with geriatric-trained providers adhering more closely to evidence-based guidelines for older patients. As geriatric educational content is incorporated into nongeriatric specialty areas, pharmacology and prescribing competencies should be an area of ongoing focus for educators.

Potentially inappropriate medication (PIMs) use in older adults gained considerable recognition after a seminal study in 1991 by Beers et al.,¹ who reported that 40% of nursing home residents had received at least 1 PIM (defined as drugs not recommended for use in older adults or that are used for excessive lengths of time). These findings led to the development of the Beers List of potentially inappropriate medication use in the elderly, a list of criteria to guide prescribing practices among older adults.¹ The Beers criteria have since been revised to include drugs that should not be prescribed to elderly patients and/or

drugs that should not be prescribed in certain situations.² Using the Beers criteria in populations of nursing home residents, investigators found that 70% of Swedish,³ 75% of Dutch,⁴ and 40% of U.S.⁵ nursing home residents received at least 1 PIM.

There is increasing concern that residents of nursing homes may have increased morbidity and mortality by receiving PIMs and/or numerous medications. Investigators have reported that adverse events occurred more frequently in nursing home residents in whom PIMs were administered.⁴ These events include hip fractures,⁶ increased risk of injury from falls,⁵ developing delirium,⁵ more frequent hospitalizations,⁷ and death.⁷ Adverse events may be associated with age-related functional loss in both the hepatic and renal systems.^{8,9} These changes are critical to the potential development of adverse events resulting from drug toxicity because most drugs are metabolized via the hepatic or renal systems. Decreased function of these drug clearance pathways, combined with multiple drugs to be cleared, can place older adults at risk. Prudent prescribing practices would mean that the minimum number of drugs should be prescribed and that the drugs prescribed should have the lowest potential of adverse effects. There are a number of therapeutic substitutions for drugs included in the Beers List, and using these has the potential to decrease adverse events in nursing homes.

Most nursing homes in the United States receive federal funds paying for residents enrolled in the Medicare or Medicaid programs. Nursing homes that receive federal money have detailed guidelines for prescribing medications to residents.¹⁰ More specifically, the American Health Care Association (AHCA) prescribing recommendations were developed from the Beers List of PIMs for use in the elderly. The AHCA determined that the prescribing and administration of 9 or more drugs^{10–12} placed older adults at an increased risk for adverse events, mandating limits on the numbers of prescriptions a resident should take. However, regulatory policies limiting the numbers of prescriptions may have unintended consequences for older adults.¹² Despite the potential benefits of prescribing multiple medications to manage many medical conditions (e.g., cancer, heart failure, diabetes), clinicians may be fearful of punitive measures and underprescribe to conform to U.S. policy.¹³ Specifically, fines can result if anti-polypharmacy guidelines are not followed in U.S. nursing homes and adverse consequences—falls, broken bones, and even death—occur. Punitive damages are covered by AHCA Federal Tag 329, which states that a resident has the right to be free of unnecessary medications.¹⁰ In contrast to these policies, investigators^{12,14} contend that to treat many medical conditions appropriately, 2 or more medications are required. For example, multiple medications may be appropriate in the management of diabetes mellitus,¹⁵ heart failure,¹⁶ Parkinson's disease,¹⁷ and cancer pain.¹⁸

Studies have shown that prescribing trends may be linked to certain provider characteristics. Previous studies report that better prescribing practices occurred among practitioners who were under age 60,¹⁹ female,²⁰ had additional geriatric training,¹ specialization other than internal medicine,¹⁹ and frequent consultation with psychiatrists.²⁰ Moreover, a lack of focused geriatric pharmacotherapy in education programs has been identified as barrier to appropriate prescribing in older adults.^{20,21}

In 2008, the Institute of Medicine (IOM) released a report acknowledging the United States' aging population and also pointing out its lack of geriatric specialists and the lack of geriatric content in nongeriatric specialty education programs across disciplines.²² The IOM report called for providers across specialties caring for geriatrics to have core geriatric competencies embedded in their education.²² In response to this report, an expert panel reviewed outcomes of advanced practice nurses (APNs) in nursing facilities noting the lack of studies examining geriatric trained providers compared with nongeriatric trained providers in nursing homes.²³ The panel concluded that such studies are necessary to support implementation of the IOM recommendation.²³

This study's purpose was to compare the prescribing practices of 2 groups of providers. One group had board certification as geriatric nurse practitioners or geriatric medicine physicians (geriatric providers) and the other group had board certification as family nurse practitioners or family physicians (family providers). To accomplish this, we used the AHCA Long-Term Care Survey prescribing standards to describe the use of PIMs and polypharmacy between the geriatric and family providers. Using the AHCA prescribing recommendations—developed from the Beers List for use in older adults, we hypothesized that geriatric trained providers would 1) prescribe fewer PIMs and 2) have fewer residents prescribed 9 or more medications.

Methods

The design of this study was a nonequivalent 2-group analysis. Data were collected using a retrospective chart audit by the primary author (TM). The study received approval from the University of Tennessee Health Science Center Institutional Review Board. The medical director of the nursing home provided a letter of agreement for the study.

The primary independent variable was Geriatric or Family Practice provider group, and the primary dependent variables were the number of PIMs prescribed and the number of residents prescribed 9 or more medications.

Setting and Subjects

A rural for-profit nursing home located in a southern U.S. city (population 6,432) agreed to participate in the study. The nursing home capacity is 120 dually certified long-term care or rehabilitation beds. All records of residents residing in the facility during March 2008 were potentially included in the study. Two primary clinicians (1 nurse practitioner and 1 physician) in the facility were geriatric-trained providers, and 2 nurse practitioners and 4 physicians were trained in family practice nursing or medicine. Both groups held national certification in their respective specialties.

Inclusion criteria were residents residing in the nursing home at the time of the chart audit. Individuals had to be residents (long-term or rehabilitation) for the entire month of March 2008. Exclusion criteria were missing medication administration records, illegible medical records, and patient length of stay of less than 1 month. Ninety-six residents' records were available during the day of the chart audit. Three records were excluded because the resident was not present for the entire month of March 2008. One additional record was excluded

because the medication administration record (MAR) was missing at the time of data collection leaving a final of 92 patient records.

Protocol

After collecting demographic data, physician orders and the MAR were checked and coded for each record. An Excel spreadsheet with 2 columns was used to collect the data directly from the medical chart with no personally identifying information included. Second, the Excel spreadsheet listed each of the Beers criteria,² and each time a drug was identified from the list, it was coded as present on the spreadsheet in the appropriate column. Third, the sum total was then calculated on all 92 records on how many PIMs were prescribed each type of prescriber. Fourth, the total number of written medications prescribed in the medical record was counted for each resident, and this included scheduled and as-needed medications. The primary author was blinded to provider type during data collection.

Statistical Analyses

The data were imported directly from Excel into SPSS 16.0 (IBM Corporation, Somers, NY) and were tested for the assumptions of normality. The data did violate the assumptions of normality. Descriptive statistics (Table 1) were used to describe provider characteristics and the prevalence of PIMs and polypharmacy. The Mann-Whitney *U* statistic was used to compare the numbers of prescriptions between provider groups. Odds ratios were used to further describe the association between provider training and the number of prescriptions written, as well as the likelihood of being prescribed a PIM. The nursing home residents in each provider group were characterized using descriptive statistics. The Mann-Whitney *U* statistic was used to compare the mean age and number of comorbidities between the nursing home residents in each provider group. Pearson's chi-square was used to compare the prevalence of comorbidities likely contributing to polypharmacy in nursing home residents between provider groups.

Results

The mean age of the residents whose charts were audited was 81 with 74 female and 18 male records in the sample. The 2 groups of charts (geriatric practice and family practice) were equally divided by age (geriatric: mean 5 83 years; nongeriatric: mean = 80 years; $U = p = .128$) and sex. Patients in the geriatric-trained group had significantly more total comorbidities (geriatric: mean = 9.3 comorbidities; nongeriatric: mean = 6.2 comorbidities; $U = p < .001$). Patients in the geriatric trained group were more likely to have congestive heart failure (CHF; geriatric: $n = 23$ [72%]; nongeriatric: $n = 16$ [27%]; $\chi^2_5 p < .001$), coronary artery disease (CAD; geriatric: $n = 32$ [100%]; nongeriatric: $n = 33$ [55%]; $\chi^2 = p < .001$), and degenerative joint disease (DJD; geriatric: $n = 31$ [97%]; nongeriatric: $n = 22$ [37%]; $\chi^2 = p < .001$). The 2 groups of charts had no significant difference in prevalence of diabetes mellitus (geriatric: $n = 10$ [31%]; nongeriatric: $n = 17$ [30%]; $\chi^2_5 p = .764$), dementia (geriatric: $n = 27$ [84%]; nongeriatric: $n = 40$ [67%]; $\chi^2_5 p = .069$), and chronic obstructive pulmonary disease (geriatric: $n = 7$ [22%]; nongeriatric: $n = 10$ [17%]; $\chi^2_5 p = .538$).

The demographics and sample characteristics of the providers are located in Table 1. On average, the geriatric-trained providers were slightly older with nearly twice as many years of experience. The primary care providers who were not geriatric trained prescribed twice as many drugs per patient during the 30-day study period as did those providers trained in geriatrics, geriatric: median = 7, interquartile range 5–11 drugs; nongeriatric: median = 14, interquartile range = 10–18 drugs; $U = p < .001$). The odds of being prescribed 9 or more drugs was significantly greater (odds ratio 13.15, 95% confidence interval 4.3–39.5, $p < .001$) if the prescriber was not geriatric trained. The odds of being prescribed a Beers List drug (Table 1) were significantly greater if the prescriber was not geriatric trained drugs; $U = p < .001$). The odds of being prescribed 9 or more drugs was significantly greater (odds ratio 6.25, 95% confidence interval 1.3–29.0, $p < .009$). The prevalence of Beers List medications and poly-pharmacy in the current study were 34 of 92 or 36.9% and 67 of 92 or 72.8%, respectively. Of all PIMs prescribed, promethazine accounted for 46.9%, propoxyphene and “iron supplements >300 mg/day” each accounted for 12.3%, and diphenhydramine accounted for 8.3% (Table 2).

Discussion

This study’s primary purpose was to use the AHCA Long Term Care Survey prescribing standards to compare the prevalence of PIMs and polypharmacy between 2 groups of providers. One group had board certification as geriatric nurse practitioners or in geriatric medicine, and the other group had board certification as family nurse practitioners or family physicians.

Although our findings on the prevalence of the prescription of PIMs are similar to recent studies^{24,25} (Table 2), we found that 1 PIM not reported in previous studies, promethazine, was the most frequently prescribed drug. This finding is important because promethazine can cause altered levels of consciousness or sedation increasing fall risk.⁵ Likely reasons for promethazine’s frequent use in this sample include its low cost, availability on the facility formulary, and regional prescribing patterns.

Several confounding factors have been identified as potentially influencing the observed differences in prescribing patterns between the geriatric- and nongeriatric-trained providers. First, prescribing practices may be the result of formulary restrictions placed on the provider or institution.²⁵ Second, relationships between individual providers and pharmaceutical companies may lead to PIMs being prescribed to older clients.²⁶ Third, pharmacists serve on institutional boards and committees and in these roles can influence prescribing trends.¹³ A final reason may be the education that health care providers receive. We note that efforts are ongoing to improve geriatric competencies among health care providers.^{22–24}

Despite managing patients with significantly higher numbers of comorbidities and having more patients with several chronic illnesses including CHF, CAD, and DJD (Table 3); geriatric-trained clinicians, in this particular facility, were more likely to meet AHCA prescribing guidelines than family practice clinicians. Although the number of medications alone cannot be interpreted as a surrogate for quality of care, we found distinct differences in prescribing patterns between the 2 groups, suggesting that geriatric education is a key factor

in providers' adherence to evidence-based recommendations for prescribing in the geriatric population.

The differences in prescribing patterns of geriatric- and nongeriatric-trained providers in this study have implications for nurse educators. Unfortunately, geriatric specialization is not commonly selected by APNs.^{27,28} Thus, experts are increasingly calling for integration of geriatric competencies into all specialties, including family practice,^{22,23,27-30} yet there is a relative lack of literature supporting this supposition.²⁴ Our findings suggest that geriatric training influences prescribing patterns and adherence to evidence-based standards. We recommend the ongoing integration of geriatric-specific pharmacological training and prescribing competencies into the curricula of all specialties likely to manage geriatric patients. In particular, we recommend the inclusion of concepts such as the adverse effects associated with polypharmacy and PIMS, the appropriate and necessary use of multiple medications to manage illness, and a working knowledge of the Beer's List and screening tool of older persons' potentially inappropriate prescriptions (STOPP)/screening tool to alert doctors to the right treatment (START) criteria.³¹

Limitations to the current study include the retrospective design, which relies on previously recorded data. Second, this study was further limited to 1 nursing home, and the prescribing trends among the clinicians may not reflect the prescribing practices of all clinicians, limiting the generalizability of the findings. However, these findings are similar to others reported in the literature.²⁰ Third, the Beers List of PIMs is based on expert opinion^{2,20,32} and individual clinicians may consider certain medications appropriate and necessary for their patients. Fourth, the current AHCA guideline of 9 or more medications is not without its weaknesses, and although it served as a convenient breaking point for this study, future studies could aim to identify unnecessary medications via a more reliable method such as an expert panel or the STOPP/START criteria. Fifth, we did not control for facility or provider characteristics (other than additional geriatric training). Notwithstanding these limitations, significant differences were found.

In conclusion, because of the intent to protect older adults from PIMs, the Beers List has been guiding standards of practice and influencing prescribing policy in many health care settings. Regulatory officials should be aware that comorbidities exist that may require PIMs and/or numerous medications to manage symptoms appropriately. Overall, findings from the current study demonstrate that the prevalence of PIMs and polypharmacy may be a concern in nursing homes. Furthermore, reasons for the frequent use of promethazine in this facility should be examined. Future studies are necessary to control for provider training, characteristics, and their relation to adverse outcomes.

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Table 1.

Characteristics of Prescribers

Characteristic	Geriatric Trained (<i>n</i> = 2)	Family Practice (<i>n</i> = 6)
Age (mean)	61	54
Years in Practice (mean)	34	19
Charts per Group (<i>N</i> = 92)	32	60
Prescribed 1 Beers List medication (Aim 1)	4	30
Prescribed 9 Medications (Aim 2)	19	6
Prescribed 9 Medications (Aim 2)	13	54

Table 2.

Frequency of Beers List Medications Prescribed by Specialty

Medication	Geriatric Trained	Family Practice	% Total
Scheduled Medications			
Iron Supplement >325 mg/day *	0	6	12.3
Amitriptyline *,†	1	1	4.0
Chlorpheniramine	0	1	2.0
Ranitidine 300 mg or therapy greater than 12 weeks *	0	1	2.0
Ticlopidine	0	1	2.0
Oxybutynin *,†	0	1	2.0
Diazepam †	0	1	2.0
As-needed Medications			
Promethazine	3	20	46.9
Propoxyphene *	0	6	12.3
Diphenhydramine *,†	0	4	8.3
Lorazepam >3 mg per day †	0	3	6.2

Common inappropriate medications prescribed in previous studies:

* Lau et al.²⁴

† Barton et al.²⁵

Table 3.

Characteristics of Patients by Provider Group ($N = 92$)

Characteristic	Geriatric Group ($n = 32$)	Family Practice Group ($n = 60$)	p Value
Mean Age, years [*]	83	80	0.128
Mean Total Comorbidities [*]	9.3	6.2	<0.001
Specific Comorbidities, n (%) [†]			
Diabetes mellitus	10 (31%)	17 (30%)	0.764
Congestive heart failure	23 (72%)	16 (27%)	<0.001
Coronary artery disease	32 (100%)	33 (55%)	<0.001
Degenerative joint disease	31 (97%)	22 (37%)	<0.001
Dementia	27 (84%)	40 (67%)	0.069
Chronic obstructive pulmonary disease	7 (22%)	10 (17%)	0.538

^{*} Mann-Whitney U test.

[†] Chi-square test.