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Does Physicians' Clinical Competence, Communication Ability, or Cultural Background Influence Potentially Inappropriate Prescribing of Benzodiazepines and Z-Drugs Among Older Adults With Insomnia?

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ABSTRACT

Objective: The objective of this study is to estimate the association between physician's age, sex, clinical and communication competencies, and cultural background on benzodiazepines and Z-drugs (BDZ) prescribing to older adults with insomnia.

Methods: A cohort of international medical graduates (IMGs) who completed their pre-residency licensure exam in 1998–2004 were linked to all U.S. Medicare patients they provided care to in 2014–2015. Their care records in Parts A, B, and D from all physicians were extracted. The first outpatient visit for insomnia to a study IMG was identified for each patient in that period. The outcome was incident BDZ prescribing by the study physician following the visit. Main exposures were physician age, sex, citizenship at birth, and clinical and communication competency as measured on the licensure exam. The association between physician characteristics and BDZ prescribing, adjusting for physician and patient covariates, was estimated using generalized estimating equations multivariable logistic regression.

Results: We analyzed 28 018 patients seen by 4069 unique physicians. IMGs born in all other regions of the world were less likely to prescribe BDZs compared to U.S.-born IMGs, with physicians from the United Kingdom being least likely (OR 0.54 [95%CI 0.34–0.85]). Neither physician's clinical competency nor communication ability were associated with BDZ prescribing (OR per 10% increase, respectively: 0.95 [95%CI 0.88–1.02] and 0.98 [95%CI 0.93–1.04]). Older physicians remain more likely to prescribe BDZ (OR per 5-year increase 1.04 [95%CI 1.00–1.08]).

Conclusions: The associations between cultural background and physician's age on BDZ prescribing highlight the potential targets for remedial solutions to reduce the use of potentially inappropriate medications.

1 | Background

The use of potentially inappropriate medications (PIMs) increases the risk of potentially avoidable adverse drug events

[1, 2]. Numerous guidelines, including the Beer's Criteria and the Choosing Wisely campaign, have been developed to curb the use of PIMs [3, 4]. One recommendation common across guidelines advises against the use of benzodiazepine and "Z-drugs"

Summary

- We investigated the contribution of physician's clinical skills and communication competency, cultural influence, and other characteristics among international medical graduates (IMGs) on the potentially inappropriate prescribing of benzodiazepines for insomnia.

- We found that U.S.-born IMGs were more likely to prescribe these drugs compared to physicians born in other regions of the world.

- Older physicians were more likely to prescribe these drugs even after accounting for their competencies, suggesting association may be due to inadequate update of current knowledge over time.

- These results highlight the potential targets to curb the use of these high-risk medications.

such as eszopiclone and zolpidem (collectively referred to as BDZ hereafter) in older adults for insomnia due to an increased risk of falls, accidents, and death [5]. Despite numerous educational campaigns, BDZ use remains prevalent: 2.2%–17.6% of older adults are prescribed benzodiazepines [6], with insomnia being the most common treatment indication among this population [7]. It is also the most commonly prescribed PIM [8, 9].

Physicians have a significant influence on the types of medications a patient uses. PIMs are more likely to be prescribed by male [10, 11] and older physicians [10, 12, 13]. These associations have also been reported for BDZ prescribing [14–17]. Although it has been hypothesized that the association with physician age is due to clinical knowledge degradation [13, 18] and that the association with sex is a consequence of differences in communication ability [19, 20], another potential explanation of these observed differences is related to the cultural background of the physician. In addition to the biomedical model, the understanding of illness can also be shaped by one's culture, which comprises regional, ethnic, religious, and other social practices through different time periods [21, 22]. Such cultural differences in the perception and treatment of mental health issues, such as insomnia and anxiety [22, 23], are well documented and are reflected in the use of mental health services by patients of different races [24]. These differences are also observed in the use of BDZs, as the prevalence and patterns of use differ substantially among countries [25, 26].

Some answers may be provided by studying the diverse pool of international medical graduates (IMGs), who come from more than 100 countries and represent ~25% of the physician workforce in the United States (U.S.). Studying this physician pool could provide salient insights into the role that culture, sex, age, and competencies have in BDZ prescribing to devise effective, targeted solutions to reduce their use. We leveraged a unique opportunity to evaluate how these physicians' characteristics influence BDZ prescribing by using linked datasets from the U.S. Education Commission for Foreign Medical Graduates (ECFMG) Clinical Skills Assessment (CSA) of a cohort of IMGs, and Medicare data for older adults seen by these physicians for insomnia. Although this type of examinations has been demonstrated to predict physician performance for up to 12 years

[27–32], our study provides additional evidence of their predictive ability for up to 16 years. If they remain predictive over this longer period, the results would provide insight on the ways to better prepare future clinicians during medical training to support their practice long-term. If competency is not predictive, then it would elucidate other factors which are more important in the long-term in ensuring the quality of care provided by physicians to devise effective, targeted solutions.

2 | Methods

2.1 | Study Design

A historical cohort study of IMG physicians and their patients was conducted. Physicians were eligible if they completed the ECFMG Clinical Skills Assessment (CSA) in 1998–2004, entered practice in the U.S., and conducted an outpatient evaluation and management visit for insomnia for one or more U.S. Medicare patients over the age of 65 between Apr 1, 2014 and Dec 1, 2015. Incident BDZ prescribing was the outcome, which was evaluated in the 30-day period following the insomnia visit using drug dispensation data. A 3-month baseline period was used to measure the patient's comorbidities and prior medication use.

2.2 | Cohort Derivation

All IMGs that successfully completed the CSA examination between 1998 and 2004 were identified from the ECMFG database. First and last names, date of birth, and sex were used to link IMGs to the American Medical Association (AMA) Masterfile to identify those who were granted a license and were practicing in the U.S. between 2014 and 2015. The national provider identifier (NPI) in the AMA Masterfile was used to link to the Centre for Medicare and Medicaid (CMS) files to identify all Medicare patients seen by each study physician between 2014 and 2015. All service records for each patient from any Medicare-eligible physician were then retrieved from the Carrier RIF file, inpatient file, outpatient file, and Part D prescription claim records, as well as their Beneficiary File records. As insomnia management is predominantly provided by primary care physicians, we restricted eligible visits to those occurring in outpatient or emergency department settings, by physicians specializing in family/general practice, and internal medicine.

We identified all patients aged 65 years or older who had an outpatient evaluation and management visit for insomnia by a study physician. Using the International Classification of Diseases, 9th revision (ICD-9) and 10th revision (ICD-10), visits where insomnia was listed in any diagnostic position were identified in the Carrier and outpatient files (Table S1 for diagnostic codes). The first visit to a study physician was retained for analysis. The Beneficiary File was used to ensure that the patient was continuously enrolled in Medicare Parts A, B, and D during the 3-month period prior to and for 30 days after the visit (or until death). We excluded individuals who were dispensed a BDZ during the 3-month baseline period to differentiate BDZs that were newly prescribed by study physicians from renewals of prior prescriptions.

2.3 | Study Variables

2.3.1 | Physician Clinical Skills Competency and Communication Ability

Physician clinical skills competency and communication ability were measured using scores achieved on the ECFMG CSA examination, which is a directly observed performance assessment of 10 or 11 modeled clinical encounters using standardized patients. This examination was the final step in their certification process prior to entry into residency programs and eligibility for licensure in the U.S. [33].

Clinical skills competency represents the ability of the candidate to apply clinical knowledge to adequately perform clinical assessments and make decisions based on a patient's presentation [33]. Candidates are assessed on the quality of history and physical examination, and of diagnosis and management ability assessed through post-encounter clinical notes. Each of these two subcomponents are evaluated out of 100% at each encounter, which are then averaged across encounters. An overall clinical skills competency score is then assigned as a composite of the two components.

Communication ability represents the candidate's bedside manner and ability to communicate in English, which are necessary in fostering doctor-patient relationships [33]. Candidates are assessed on four aspects of interpersonal skills (interviewing and collecting information, counseling and delivering of information, rapport, and personal manner) and English proficiency, with each aspect rated on a 4-point Likert-scale by the standardized patient at each encounter and are then averaged across all encounters [34, 35]. The scores are then combined to yield a composite communication ability score.

A candidate must meet or exceed defined standards on both domains to pass [35]. Successful completion of this type of standardized clinical assessment was, up to the start of the COVID-19 pandemic, required for licensure of all physicians in the U.S. [30].

2.3.2 | Physician Country of Origin

Physicians' citizenship at birth was retrieved from the ECFMG database as a proxy indicator to assess regionally-based differences in the cultural background of the physician and its association with on BDZ prescribing behavior. Citizenship was categorized as the U.S. (reference), Africa, Asia/Oceania, Canada, Mexico/Central America/Caribbean, Eastern Europe, Europe, India, the Middle East, Pakistan, South America, and the United Kingdom (U.K.).

2.3.3 | Physician Demographics, Specialty and Practice Location

Physician sex and date of birth were obtained from the ECFMG database. The physician's age at the time of the index visit was calculated. Specialty, obtained from the CMS database, were classified as internal medicine (reference), or "primary care" for those in family medicine or general practice. Their geographic practice location in 2014 was retrieved from the AMA Masterfile. Practice location was classified as South (reference), Northeast, Midwest, or West. We also adjusted for the physician's volume of insomnia patients, which was a dichotomous variable (high/low) based on if they fell above or below the median proportion of patient with insomnia among the physician cohort.

2.3.4 | Patient Covariates

Patient age, sex, and race/ethnicity were obtained from the CMS Beneficiary Files. The visit location for the insomnia evaluation was defined using the relevant revenue center and procedure codes and classified as office/outpatient clinic or emergency department. We measured the presence of comorbid anxiety, psychosis, depression, and neurological conditions at baseline by determining whether an in- or out-patient record included the relevant ICD-codes as the reason for visit during the baseline period (Table S1). As it is possible for patients to have sought care for insomnia during the baseline period from a non-study physician, we also adjusted for if the patient had a visit for insomnia during the baseline period. We used Part D drug dispensation data, including dispensation date and days supplied, to determine the number of active medications on the date of the insomnia visit.

2.4 | Study Outcome

The outcome was assessed in the 30 days following the visit and patients were classified as having the outcome if they had a dispensation for a BDZ that was prescribed by the same physician who had completed the evaluation visit. This matching was based on the NPIs listed on visit and dispensation records. BDZ use was defined as the dispensation of a benzodiazepine (alprazolam, lorazepam, clonazepam, diazepam, temazepam, clorazepate, triazolam, chlordiazepoxide, clobazam, oxazepam, flurazepam, estazolam, and midazolam) or a "Z-drug" (zolpidem, eszopiclone, and zaleplon). For descriptive purposes, physicians were classified as high-volume prescribers if the proportion of their patients prescribed with a BDZ was above the cohort median.

2.5 | Statistical Analysis

To estimate the associations between incident BDZ prescribing and physicians' clinical competence, communication ability, citizenship, and other physician and patient characteristics we used multivariable logistic regression models within a generalized estimating equation framework to account for clustering of patients within physician [36]. We first modeled the bivariable associations between all physician characteristics and BDZ prescribing, and then included all variables in multivariable models. Clinical skills competency and communication ability scores were added individually in separate models, as these scores are correlated. The effect of score was reported as per 10% increase, and that of physician and patient age as per 5-year

increase. All results are presented as odds ratios (ORs) with 95% confidence intervals (CIs). All analyses were performed using SAS V9.4 [37].

2.6 | Sensitivity Analyses

We completed an additional sensitivity analysis by extending the baseline period to 6 months and restricting analysis to those who did not have any use of BDZs during this period to ensure users were incident users and to better capture comorbidities. Separately, we also restricted analysis to physicians who had seen at least 10 patients for insomnia. We used additional information on the physician's citizenship at the time of medical school and their medical school location to explore how the source of cultural influence through a physician's life course may change the interpretation between cultural background and prescribing behavior. We also use modified Poisson regression models to obtain risk ratios, as well as added a squared-term for scores to account for potential non-linearity between the association of scores and BDZ prescribing.

3 | Results

3.1 | Main Findings

Of the 32 886 IMGs who completed the CSA in 1998–2004, 20.5% could not be linked to the AMA file, either because they had never entered residency programs or because they were not licensed to practice in the U.S. Of the remaining 26 144 IMGs, 4074 had specialties in family medicine/general practice or internal medicine and billed for an evaluation visit for insomnia in an outpatient setting for at least one Medicare patient 65 years of age or older between 2014 and 2015. Five physicians had missing citizenship information, leaving 4069 physicians for final analysis (Figure S1). We identified 28 018 Medicare patients who were evaluated for insomnia by these physicians. Mean patient age was 76.8 (SD 8.2) years and 67.9% were female (Table 1). Regarding comorbidities, 5.7% of patients had depression while 3.0% had anxiety. During the three months prior to the evaluation visit, 6.9% of patients saw another physician for insomnia. Patients were on an average of 3.5 (SD 3.6) medications at the time of the evaluation.

BDZs were prescribed to 23.0% of patients, with 2330 (57.3%) of physicians having prescribed at least 1 BDZ. The mean age of physicians in the cohort was 43.9 (SD 5.6) years and 54.3% were male (Table 2). Physicians with citizenship from India at birth represented the largest group (26.1%), followed by the U.S. (18.9%). The lowest scoring component in the CSA was in diagnosis and management, whereas the highest was in English proficiency. The median volume of patients with insomnia per physician was 4.9% (IQR 2.6%–8.2%). The median proportion of patients in the cohort prescribed a BDZ per physician was 14.3%. There were some differences by prescribing volume in the distribution of physician citizenship, specialty, and region of practice, but were very similar otherwise (Table 2).

After adjusting for all physician and patient covariates, physicians born in all other regions of the world were less likely to

TABLE 1 | Patient characteristics for the overall cohort and those for whom an incident BDZ was prescribed following a visit for insomnia.

Patient characteristics	Overall, N	Prescribed BDZ, N (%)
Total	28 018	6439 (23.0)
Patient sex		
Female	19 024	4274 (22.5)
Male	8994	2165 (24.1)
Patient age		
< 70	7103	1903 (26.8)
70–80	11 529	2828 (24.5)
> 80	9386	1708 (18.2)
Patient race/ethnicity		
Asian	1622	500 (30.8)
Black	2374	441 (18.6)
Hispanic	1425	320 (22.5)
North American native/ Other race	1010	251 (24.9)
White	21 587	4927 (22.8)
Comorbid anxiety		
Yes	829	170 (20.5)
No	27 189	6269 (23.1)
Comorbid neurological disorders		
Yes	612	100 (16.3)
No	27 470	6339 (23.1)
Comorbid psychosis		
Yes	256	28 (10.9)
No	27 762	6411 (23.1)
Comorbid depression		
Yes	1610	270 (16.8)
No	26 408	6169 (23.4)
Insomnia visit at baseline		
Yes	1936	213 (11.0)
No	26 082	6226 (23.9)
Visit Location		
Emergency department	1936	36 (6.6)
Office/Outpatient Clinic	26 082	6403 (23.3)

	Overall, mean (SD)	Prescribed BDZ, mean (SD)
Patient age	76.8 (8.2)	75.4 (7.5)
Number of active medications	3.5 (3.6)	3.4 (3.5)

TABLE 2 | Physician characteristics for the overall cohort and by volume of BDZ prescribing within the cohort.

Physician characteristics	Overall, N	High volume prescriber, N (Column %)	Low volume prescriber, N (Column %)
Total	4069	2002 (100.0)	2067 (100.0)
Physician sex			
Female	1858	896 (44.8)	926 (46.5)
Male	2211	1106 (55.2)	1105 (53.5)
Citizenship at birth			
United States	770	402 (20.1)	368 (17.8)
Africa	243	96 (4.8)	147 (7.1)
Asia/Oceania	596	317 (15.8)	279 (13.5)
Canada	36	20 (1.0)	16 (0.8)
Eastern Europe	302	148 (7.4)	154 (7.5)
Europe	101	43 (2.2)	58 (2.8)
India	1060	507 (25.3)	553 (26.8)
Mexico/Central America/ Caribbean	191	98 (4.9)	93 (4.5)
Middle East	324	174 (8.7)	150 (7.3)
Pakistan	272	117 (5.8)	155 (7.5)
South America	130	65 (3.3)	65 (3.1)
United Kingdom	44	15 (0.8)	29 (1.4)
Physician specialty			
Family/General practice	1966	1020 (51.0)	974 (47.2)
Internal medicine	2075	982 (49.1)	1093 (52.9)
Region of practice			
Midwest	814	359 (17.9)	455 (22.0)
Northeast	881	426 (21.3)	455 (22.0)
West	875	461 (23.0)	414 (20.0)
South	1499	756 (37.8)	743 (36.0)
Volume of insomnia patients			
High	2035	1230 (61.4)	805 (39.0)
Low	2034	772 (38.6)	1262 (61.1)
Physician age			
<40	876	423 (21.1)	453 (21.9)
40–46	1996	965 (48.2)	1001 (48.4)
>46	1227	614 (30.7)	613 (29.7)
	Overall, mean (SD)	High volume prescriber, mean (SD)	Low volume prescriber, mean (SD)
Physician Age	43.9 (5.6)	44.0 (5.7)	43.7 (5.5)
Clinical competence score	64.5 (5.4)	64.4 (5.4)	64.5 (5.3)
Communication score	77.7 (7.9)	77.8 (8.1)	77.7 (7.8)
Number of patients in study cohort	6.9 (10.3)	8.2 (8.3)	5.6 (11.8)

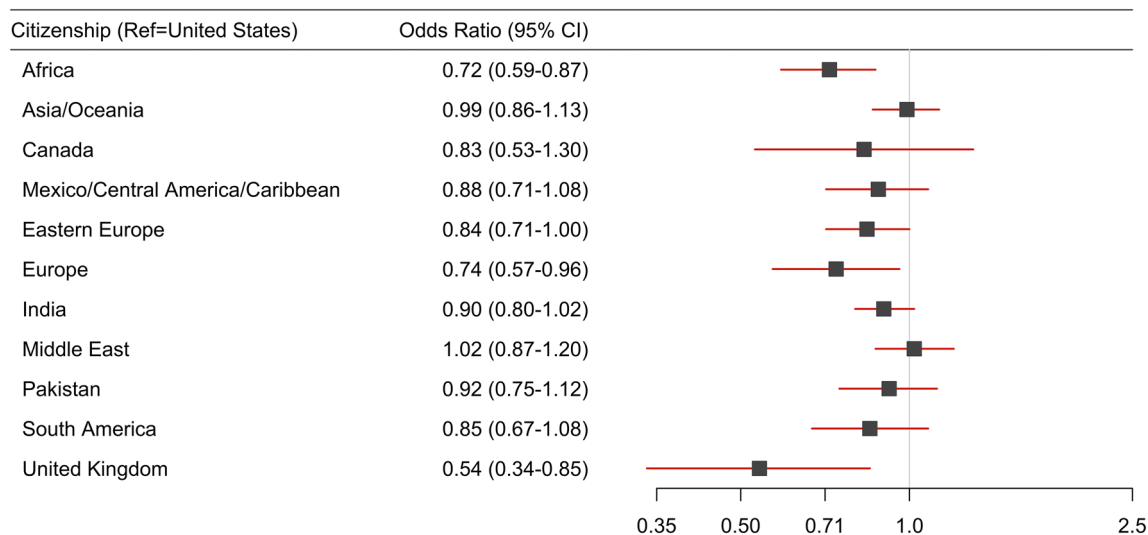| Citizenship (Ref=United States)	Odds Ratio (95% CI)
Africa	0.72 (0.59-0.87)
Asia/Oceania	0.99 (0.86-1.13)
Canada	0.83 (0.53-1.30)
Mexico/Central America/Caribbean	0.88 (0.71-1.08)
Eastern Europe	0.84 (0.71-1.00)
Europe	0.74 (0.57-0.96)
India	0.90 (0.80-1.02)
Middle East	1.02 (0.87-1.20)
Pakistan	0.92 (0.75-1.12)
South America	0.85 (0.67-1.08)
United Kingdom	0.54 (0.34-0.85)

FIGURE 1 | Forest plot of the adjusted association between BDZ prescribing and physician citizenship at time of birth.

TABLE 3 | Association between incident BDZ prescribing for insomnia and physician clinical skills competency and communications scores (per 10% increase).

Clinical skills assessment components	Adjusted* odds ratio (95% CI)
Overall clinical skills competency score	0.95 (0.88–1.02)
History + physical	0.99 (0.93–1.05)
Diagnosis + management	1.00 (0.96–1.04)
Overall communication ability score	0.99 (0.93–1.04)
English-speaking ability	0.98 (0.95–1.01)
Interpersonal skills	1.01 (0.95–1.06)

Note: Physician covariates adjusted for: Sex, age, citizenship at birth, specialty, region of practice, and volume of insomnia patients. Patient covariates adjusted for: age, sex, race/ethnicity, visit location, number of active drugs, and baseline visits for each of insomnia, anxiety, depression, psychosis, and neurological conditions.
*Estimates from multivariable logistic regression estimated via generalized estimating equations.

prescribe BDZs compared to physicians born in the U.S., with physicians from Africa, Europe, and the U.K. being significantly less likely to prescribe BDZs (Figure 1). The magnitude of the association was greatest for physicians from the U.K. who were 46% less likely to prescribe a BDZ following the visit (OR 0.54 [95%CI 0.34–0.85]). There was no significant relationship between clinical skills competence or communication ability and BDZ prescribing, for both overall scores and all sub-scores (Table 3). Female physicians were less likely to prescribe a BDZ than males in both bivariable (OR 0.97 [95%CI 0.89–1.05]) and multivariable analyses that adjusted for communication ability (OR 0.95 [95%CI 0.87–1.03]), although the association was not statistically significant. In contrast, older physicians were more likely to prescribe BDZs, even after adjustment for clinical skills competency (OR per 5-year age increase 1.04 [95%CI 1.00–1.08]).

Although there were no differences between family/general practice physicians and internists in the likelihood of prescribing (Table 4), physicians who saw patients in the emergency department were less likely to prescribe BDZs (OR 0.29 [95%CI 0.20–0.40]), as were physicians practicing in the Midwest when compared to the South (OR 0.90 [95%CI 0.80–1.01]). Physicians with a high volume of insomnia patients were also more likely to prescribe BDZs compared to those with low volume (OR 1.10 [95%CI 1.01–1.20]).

Older patients were less likely to receive a BDZ prescription (OR per 5-year age increase 0.90 [95%CI 0.88–0.91]); however, patient sex was not significantly associated with BDZ receipt. Compared to White patients, Black patients were 17% less likely to receive a BDZ prescription (OR 0.83 [95% CI 0.74–0.92]). Patients who had comorbid neurological conditions, psychosis or depression, or who had a prior visit for insomnia during the baseline period also had decreased odds of receiving a BDZ prescription (Table S2).

3.2 | Sensitivity Analyses

Extending the baseline period to 6 months resulted in loss of statistical significance for most physician characteristics (likely due to reduced sample size). The direction and magnitude of association, however, remained similar. All estimates for patient characteristics were also similar. Additional details of this and other sensitivity analyses are provided in the Appendix 1.

4 | Discussion

Insomnia is the most common reason for BDZ prescribing among older adults and their use remains prevalent despite long-standing recommendations advising against it due to an increased risk of falls and other adverse drug events. We found that IMGs with citizenship at birth from almost all other part of the world were less likely to prescribe these medications to

TABLE 4 | Association between BDZ prescribing and physician characteristics.

Variables	Model 1: Adjusted OR* (95% CI)	Model 2: Adjusted OR* (95% CI)
Clinical competence score, per 10%	0.95 (0.88–1.02)	—
Communication ability, per 10%	—	0.99 (0.93–1.04)
Physician age, per 5 years	1.04 (1.00–1.08)	1.04 (1.00–1.08)
Physician sex		
Male	Ref	Ref
Female	0.96 (0.90–1.05)	0.95 (0.87–1.03)
Citizenship at birth		
United States	Ref	Ref
Africa	0.72 (0.59–0.87)	0.72 (0.58–0.88)
Asia/Oceania	0.99 (0.86–1.13)	0.98 (0.85–1.13)
Canada	0.83 (0.53–1.30)	0.82 (0.52–1.29)
Mexico/Central America/Caribbean	0.88 (0.71–1.08)	0.88 (0.71–1.09)
Eastern Europe	0.84 (0.71–1.00)	0.85 (0.71–1.01)
Europe	0.74 (0.57–0.96)	0.74 (0.57–0.96)
India	0.90 (0.80–1.02)	0.90 (0.79–1.02)
Middle East	1.02 (0.87–1.20)	1.02 (0.87–1.20)
Pakistan	0.92 (0.75–1.12)	0.92 (0.75–1.12)
South America	0.85 (0.67–1.08)	0.85 (0.67–1.08)
United Kingdom	0.54 (0.34–0.85)	0.54 (0.34–0.85)
Specialty		
Internal Medicine	Ref	Ref
Family/General practice	1.03 (0.95–1.12)	1.04 (0.96–1.13)
Region of practice		
South	Ref	Ref
Midwest	0.90 (0.80–1.01)	0.90 (0.80–1.01)
Northeast	1.09 (0.97–1.22)	1.09 (0.97–1.22)
West	1.02 (0.92–1.14)	1.02 (0.92–1.13)
Volume of insomnia patients		
Low volume		Ref
High volume	1.10 (1.01–1.20)	1.10 (1.01–1.20)

Note: Additional patient characteristics adjusted for: Age, sex, race/ethnicity, number of active medications, visit location, insomnia visit at baseline, and the presence of each of the following comorbidities: Anxiety, neurological disorders, psychosis, and depression.
*Estimates from multivariable logistic regression estimated via generalized estimating equations.

a patient following an evaluation and management visit for insomnia than those born in the U.S. Furthermore, we observed that clinical competence and communication ability were not associated with BDZ prescribing. Even after adjustment for clinical competence and other patient and physician characteristics, older physicians were more likely to prescribe BDZ.

Our results suggest that cultural differences by region of the world may influence physician prescribing patterns, which may in turn affect the use of this type of potentially inappropriate medication. This finding is supported by the previous evidence of cultural differences in perceiving and understanding diseases and their care management [23, 38]. Past studies have also shown substantial variation between countries in the rate and pattern of BDZ use, as well as in opioid use for the treatment of non-cancer pain [39–42]. In the context of pain treatment, practitioners in the U.S. have also been found to prescribe opioids at much higher rates than their counterparts in different countries

[41, 43]. Our finding that U.S.-born IMGs are more likely to prescribe a BDZ compared to physicians from other regions warrants further research to understand whether these differences arise from regional practice variations due to differences in treatment availability and guidelines or whether they are due to ethnic/cultural practices and other social beliefs. It should be noted that important differences between domestically trained physicians, U.S.-born IMGs, and other foreign medical graduates have been observed in their practice characteristics and some performance indicators [44–48]. We also cannot infer the effect of American culture on prescribing patterns. As such, the associations may differ among U.S.-born physicians trained domestically. However, as variation in BDZ receipt by patient race/ethnicity was also observed, further understanding on the effects of culture on the prescribing of these medications is critical for identifying potential biases and care inequities.

The finding that older physicians are more likely to prescribe potentially inappropriate BDZs, even after adjusting for clinical competence, adds to the current literature. Past studies have found associations between physician age and increased prescribing of PIMs both in the broader context [10, 12, 13] and specifically in antibiotics and opioid prescribing [32, 49]. Qualitative health services research has put forward two main hypotheses for this association with age: (1) retention of outdated knowledge and practices from the time of training [18] or (2) older physicians being slower to update their knowledge, or adapt their practices to be in-line with current guidelines [13]. Our observation that the association with age remains despite adjustment for various competencies at the time of licensure provides some quantitative evidence to support the latter hypothesis. Future studies should aim to identify the barriers to adopting new guidelines and practice recommendations to devise effective interventions to reduce the use of PIMs by older physicians. The finding that competency measures were not predictive of the prescribing of this PIM was somewhat surprising, as our past studies using the same physician cohort found that greater communication ability reduced use of low-value lipid-lowering medications [50], while higher clinical competency was associated with decreased opioids prescribing by female physicians [51]. The lack of association in the current study may mean that factors other than physician competency are more important long-term predictors of BDZ prescribing.

The lack of association of both physician and patient sex was surprising, because many studies have highlighted that male physicians [14, 15] and female patients [15, 26, 52] are more likely to use PIMs, especially psychopharmaceuticals. This difference may be attributed to the fact that we are investigating incident use of these medications among an older population. By excluding prevalent users, this reduced the number of individuals susceptible to receiving a BDZ while also changing the distribution of characteristics. Indeed, a much greater proportion of prevalent users who were excluded from the study were female (74.9%), whereas only 67% were female in our final cohort. Moreover, most prior studies describe BDZ use at large or among a younger population with mental health disorders [17, 52, 53], rather than insomnia specifically as the treatment indication. In the few studies that have examined insomnia, there was also little evidence of a difference in use of BDZs by patient sex [7, 54]. As such, our work contributes to understanding the important physician factors that influence the use of BDZs in important but not often researched patient population.

Unprecedented access to this type of linked data has allowed us this unique opportunity to, for the first time, understand how physician's age and sex, their cultural background, and competencies influence prescribing behavior while adjusting for patient characteristics. There are some important limitations to note, however. Although we had access to dispensation data, it does not capture prescriptions given to patients that were not filled. It has been estimated that this type of primary nonadherence occurs for ~22%–24% of prescriptions and is mainly associated with cost [55, 56].

Second, our use of citizenship at birth, which we categorized by geographic region, would only crudely capture differences in cultural influences and social beliefs by these regions. We recognize that many of these can vary within or shared by different regions, and may change overtime through one's life course. However, the relatively similar estimates we obtained in our sensitivity analysis when using different proxies of "culture" measured at the time of medical school training provide additional validity to our findings. Analyses using a negative control outcome, such as treatment of diabetes or a cardiac condition, where physician's cultural background is not expected to affect prescribing behavior may be useful to rule out that our finding are the result of residual confounding [57]. However, this method may not adequately address such concerns for our study. One key assumption is that the common causes (e.g. unmeasured confounders and sources of selection or measurement bias) between exposure and the negative control outcome have to be shared with those of the exposure and main outcome. This includes the relevant patient clinical factors, which would differ for every clinical scenario, thus making it difficult to identify a clinical scenario that meets this critical assumption. Another assumption is that physician's cultural background does not impact the selected negative control outcome. However, past studies examining different health conditions (e.g. cardiovascular disease, pain management, and mental health illness [22, 23, 39, 50, 58, 59]) have identified differences in treatment preferences and strategies by geographic region or other cultural influences, and it may be possible for the set of cultural factors that influence prescribing behavior to differ from one ailment to another. Without these two assumptions, a negative control outcome analysis would be uninformative about residual confounding in the main analysis [57].

Third, our use of a shorter baseline period may underestimate patient comorbidities. We do not have reason to believe that this measurement error would be differential by physician characteristics, which would bias our results. Moreover, as the estimates for all patient characteristics remained very similar when baseline period was extended, we are confident that our findings as it pertains to physician characteristics remain valid despite this limitation. Finally, our findings stem from a cohort of IMGs in the U.S., of whom a substantial portion were U.S.-citizens at birth or at the time of training. While we recognize the potential lack of generalizability of our results to U.S.-born physicians trained in the U.S., this physician population remains a substantial portion of the U.S. physician workforce. Our results have significant implications for future policies aimed at enhancing

prescribing quality, and prompt future research in understanding the relationship between culture for this and other types of care behavior.

5 | Conclusions

The prescribing of benzodiazepines for the treatment of insomnia among older adults by older physicians may be attributable to inadequate update of knowledge over time. This represents a potential opportunity for effective, targeted interventions. As well, our results highlight the need to further understand the role of physician's cultural background on the use of these medications to enhance drug safety and care equity.

5.1 | Plain Language Summary

Use of benzodiazepines and Z-drugs to treat insomnia among older adults remains high, despite the risk of potentially avoidable adverse consequences (e.g. falls, accidents, death) and numerous guidelines advising against their use. Physician characteristics and cultural background can greatly influence the types of medications a patient receives. It is also not well-understood the extent to which it is related to their clinical skills or communication competencies. We aimed to understand the relationship between physician characteristics, their competencies, and the use of these potentially inappropriate medications. In our study consisting of older adults covered under U.S. Medicare who were seen for insomnia by IMGs practicing in the U.S., we found that IMGs who were born in the U.S. were more likely to prescribe these drugs compared to those born in any other region of the world. While we did not find that physician's clinical skills nor communication competencies were associated with the prescribing of these medications, physician's age remains a significant factor. This suggests that older physicians may be more likely to use these because of inadequate update of knowledge over time. These results highlight potential targets for remedial solutions to curb the use of these high-risk medications.

Author Contributions

F. K. I.C and R.T. designed the study with assistance from B.H. F.K.I.C performed the data analysis with assistance from M.T.M. and N.G. All authors interpreted the data. F.K.I.C drafted the article, while all authors provided critical revision for important intellectual content. All authors approved of the final version of this article.

Ethics Statement

Ethics approval was provided by the McGill University Institutional Review Board (certificate number A10-E69-16B).

Conflicts of Interest

The authors declare no conflicts of interest.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.