Effect of comorbidities and medications on frequency of primary care visits among older patients

Tina Hu MSc   Neil D. Dattani MD   Kelly Anne Cox MPH   Bonnie Au MSc   Leo Xu   Don Melady MD MSc
Liisa Jaakkimainen MD MSc   Rahul Jain MD   Jocelyn Charles MD

Abstract

Objective To determine if comorbidities and high-risk medications affect the frequency of family physician visits among older patients.

Design Retrospective chart review.

Setting Academic family health team at Sunnybrook Health Sciences Centre in Toronto, Ont.

Participants Among patients aged 65 years and older who were registered patients of the family health team between July 1, 2013, and June 30, 2014, the 5% who visited their family physicians most frequently and the 5% who visited their family physicians least frequently were selected for the study (N=265).

Main outcome measures Predictors of frequent visits to family physicians.

Results The significant predictors of being a high-frequency user were female sex (odds ratio [OR]=2.20, P=.03), age older than 85 years (OR=5.35, P=.001), and higher total number of medications (OR=1.49, P<.001). Age-adjusted Charlson comorbidity index score, number of Beers criteria medications, and Anticholinergic Risk Scale score were not significant predictors (P>.05).

Conclusion Female sex, age older than 85, and higher total number of medications were independent significant predictors of higher frequency of family physician visits among older patients. Validated tools, such as the Charlson comorbidity index, Beers criteria, and Anticholinergic Risk Scale, did not independently predict the frequency of visits, indicating that predicting frequency of visits is likely complex.

EDITOR'S KEY POINTS

• Female sex, age older than 85 years, and higher total number of medications were independent predictors of higher frequency of family physician visits among older patients.

• The high-frequency family physician visit group was mostly composed of older women with a higher mean number of comorbidities, total number of medications, number of Beers criteria medications, and Anticholinergic Risk Scale score compared with the low-frequency group.

• Scores from the age-adjusted Charlson comorbidity index, Beers criteria, and Anticholinergic Risk Scale were not significantly associated with frequency of visits, suggesting that future studies should explore other factors to better predict and understand the care needs of high users of family medicine services.

This article has been peer reviewed.
Can Fam Physician 2017;63:45–50

Effet de la comorbidité et de la médication sur la fréquence des visites de patients âgés pour des soins primaires

Tina Hu MSc   Neil D. Dattani MD   Kelly Anne Cox MPH   Bonnie Au MSc   Leo Xu   Don Melady MD MSc
Liisa Jaakkimainen MD MSc   Rahul Jain MD   Jocelyn Charles MD

Résumé

Objectif Déterminer si les comorbidités et les médicaments à haut risque affectent la fréquence à laquelle les patients âgés consultent un médecin de famille.

Type d'étude Revue rétrospective de dossiers.

Contexte L'équipe de santé familiale universitaire du *Sunnybrook Health Sciences Centre* à Toronto, Ontario.

Participants Parmi les patients de 65 ans et plus qui étaient des clients réguliers de l'équipe de santé familiale, nous avons retenu les 5% qui avaient consulté le plus souvent leur médecin de famille entre le premier juillet 2013 et le 30 juin 2014, ainsi que les 5% qui l'avaient consulté le moins souvent (N = 265).

Principaux paramètres à l'étude Les prédicteurs de consultations fréquentes auprès de leur médecin de famille

Résultats Les prédicteurs significatifs de consultations fréquentes étaient : être une femme (rapport de cotes [RC] = 2.20, $P < .03$), avoir plus de 85 ans (RC = 5.35, $P = .001$) et prendre un grand nombre de médicaments (RC = 1.49, $P < .001$). Le score à l'indice de comorbidité de Charlson, le nombre de médicaments selon le critère de Beers et le score à l'échelle du risque anticholinergique n'étaient pas des prédicteurs significatifs ($P > .05$).

Conclusion Chez les patients âgés, être une femme, avoir plus de 85 ans et consommer un nombre total plus élevé de médicaments étaient des prédicteurs significatifs et indépendants de consultations fréquentes auprès du médecin de famille. Par contre, des outils validés tels que l'indice de comorbidité de Charlson, le critère de Beers et l'échelle du risque anticholinergique n'étaient pas des prédicteurs indépendants de la fréquence des visites, ce qui donne à penser qu'une telle prédiction est vraisemblablement complexe.

POINTS DE REPÈRE DU RÉDACTEUR

• Chez les patients âgés, être une femme, avoir plus de 85 ans et prendre plus de médicaments étaient des prédicteurs indépendants d'un plus grand nombre de visites à un médecin de famille.

• Le groupe de patients qui consultait le plus souvent un médecin de famille comprenait surtout des femmes âgées présentant un nombre moyen de comorbidités plus élevé, un plus grand nombre de médicaments, plus de médicaments du critère de Beers et un score plus élevé à l'échelle du risque cholinergique par rapport au groupe qui consultait peu souvent.

• Les scores ajustés pour l'âge obtenus à l'indice de comorbidité de Charlson, au critère de Beers et à l'échelle du risque cholinergique n'étaient pas significativement reliés à la fréquence des visites, ce qui laisse croire à la nécessité d'autres études pour identifier d'autres facteurs susceptibles de mieux prédire et comprendre les soins que requièrent les patients qui utilisent souvent les services de médecine familiale.

The population of Canada is aging, and the number of people older than 65 years of age is expected to double during the next 25 years.[1] Previous research has shown that a higher number of medications, a higher number of inappropriate medications, and a higher anticholinergic burden increase both all-cause and fracture-specific hospital admissions among older patients.[2-4] Polypharmacy has been shown to increase the risk of rehospitalization and falls among older patients.[3,4] With the increase in the population older than 65, and particularly those older than 85, it is expected that there will be a concurrent rise in both medical comorbidities and number of medications among family practice patients, which might lead to a higher frequency of visits.[5]

Factors such as sex,[6] medical comorbidities,[5] and medication use[7,8] have been associated with an increased frequency of family physician visits among older patients. Although clinical tools have been developed to evaluate comorbidities,[9] potentially inappropriate medications,[10] and anticholinergic risk,[11] most studies have examined their relationship with hospital admissions,[2] adverse events,[12] and mortality.[9] No study has looked at whether there is a relationship between these factors (as assessed with clinically relevant tools) and frequency of family physician visits among older patients. By understanding the relationship between these specific factors and frequency of family physician visits, policies can be developed to provide more cost-efficient and effective primary care for vulnerable older patients in need of more support.

The goal of this study was to determine if comorbidities and high-risk medications, as assessed with clinically relevant tools, affect the frequency of family physician visits among older patients. We hypothesized that increased comorbidities and high-risk medications would be associated with an increase in frequency of visits.

METHODS

This retrospective chart review was approved by the institutional ethics review board of the University of Toronto in Ontario. Among those aged 65 and older who were registered patients of the Sunnybrook Academic Family Health Team in Toronto between July 1, 2013, and June 30, 2014, we selected the 5% who visited their family physicians the most frequently (median 11 visits) and the 5% who visited their family physicians the least frequently (median 0 visits) for the study. This sample represents patients beyond 2 SDs of the mean in the family practice population (N=265).

Data collection
Charts were reviewed retrospectively and information regarding patients' sex, current and previous medical diagnoses, operations, current medications, and number of visits to see their family physicians during the 12 months were recorded. An age-adjusted Charlson comorbidity index score was calculated for each patient. The 2012 Beers criteria[10] and the Anticholinergic Risk Scale (ARS) were used to identify and score high-risk medications.[11] The total number of medications that patients were taking was also recorded. Two reviewers independently calculated these variables for each patient and a consensus was reached when there were discrepancies between scores.

Statistical analysis
All data were anonymized before analysis. One-way ANOVA (analysis of variance) and χ^2 tests were used to compare each variable by frequency of visits to family physicians (low vs high frequency). Logistic regression was used to assess whether sex, age-adjusted Charlson comorbidity index score, Beers criteria medications, ARS score, and total number of medications were significant predictors of the frequency of family physician visits. A *P* value less than .05 was used to determine statistical significance. Statistical analyses were performed using SAS, version 9.2, and SPSS, version 20.

RESULTS

The study sample included 265 patients aged 65 years and older. Women comprised 57% of the study sample. Patient characteristics for the study sample are shown in **Table 1**. Cohen κ statistics were calculated for each variable to determine if there was agreement between reviewers. There was moderate agreement between reviewers for the age-adjusted Charlson comorbidity index score (κ=0.65, *P*<.001), total number

Table 1. Patient characteristics: *N*=265.

CHARACTERISTIC	VALUE
Mean (SD) age, y	77.4 (8.8)
Female sex, %	57
Mean (SD) age-adjusted Charlson comorbidity index score	4.8 (1.7)
Mean (SD) total no. of medications	5.7 (4.4)
Mean (SD) no. of Beers criteria medications*	0.4 (0.7)
Mean (SD) Anticholinergic Risk Scale score†	0.4 (1.0)
Mean (SD) frequency of visits to family physician in 1 y	5.7 (6.2)

*The most common medications were benzodiazepines (lorazepam, diazepam), tertiary tricyclic antidepressants (amitriptyline), and non-selective cyclooxygenase inhibitor nonsteroidal anti-inflammatory drugs (naproxen).
†The most common medications were ranitidine, amitriptyline, and loperamide.

of medications (κ = 0.71, *P* < .001), and Beers criteria medications (κ = 0.64, *P* < .001). There was consensus between reviewers for ARS score (κ = 1.00, *P* < .001).

Patient characteristics by frequency of visits to family physicians are shown in **Table 2**. The high-frequency group was significantly older (*P* < .001), with a higher proportion of women (*P* < .05) compared with the low-frequency group. The high-frequency group also had significantly higher age-adjusted Charlson comorbidity index scores, total number of medications, number of Beers criteria medications, and ARS scores (*P* < .001 for all) compared with the low-frequency group.

Table 3 presents the odds ratios (ORs) and 95% CIs for being in the high-frequency group for each independent predictor, while controlling for all the other variables. Female sex (OR = 2.20, 95% CI 1.07 to 4.52, *P* = .03) and age older than 85 years (OR = 5.35, 95% CI 1.95 to 14.69, *P* = .001) were statistically associated with high-frequency users. A 1-unit increase in the total number of medications was also statistically associated with high-frequency users (OR = 1.49, 95% CI 1.32 to 1.70, *P* < .001).

DISCUSSION

Our results show that the high-frequency group was mostly composed of older women with a higher mean number of comorbidities, total number of medications, number of Beers criteria medications, and ARS score compared with the low-frequency group. Variables independently associated with an increased likelihood of being in the high-frequency group were female sex, age older than 85, and a higher total number of medications. Scores from the age-adjusted Charlson comorbidity index, Beers criteria, and ARS were not independently associated with frequency of visits to family physicians.

Similar to our results, other studies have observed a difference between sexes in the frequency of visits to family physicians. This might be owing to a difference in womens' attitudes toward and willingness to seek

health care services.[13] Several studies have observed that older women were more likely to visit family physicians compared with older men, while men were more likely to visit other specialists or emergency departments.[6,14,15] Women might be more likely to visit their family physicians owing to lower self-reported health status, higher rates of acute illnesses, and willingness to seek help.[6,14] Men might be more likely to delay their visits to family physicians and miss the opportunity for prevention and screening, which might explain their higher prevalence of fatal conditions and higher visit rates to non–family physician specialists and emergency departments.[6]

Our results showed that age, specifically being older than 85 years, was an independent predictor of high frequency of family physician visits. As patients age, they tend to have increased comorbidities, which result in increased medication use[1,8] and might increase family physician and other specialist visits owing to the need for monitoring.[5,16-19] Previous research has demonstrated that people older than 65 years account for the largest proportion of physician service use in Ontario, especially

Table 3. Adjusted logistic regression for predictors of high frequency of family physician visits: *For each variable, all other variables were adjusted in the regression.*

PREDICTOR	OR (95% CI)	*P* VALUE
Female (vs male) sex	2.20 (1.07 to 4.52)	.03
Age (>85 y vs ≤85 y)	5.35 (1.95 to 14.69)	.001
Age-adjusted Charlson comorbidity index score*	1.24 (0.97 to 1.60)	.08
Total no. of medications*	1.49 (1.32 to 1.70)	<.001
No. of Beers criteria medications*	1.37 (0.76 to 2.48)	.29
Anticholinergic Risk Scale score*	0.96 (0.66 to 1.40)	.84

OR—odds ratio.
*The OR reflects a 1-unit increase.

Table 2. Patient characteristics by frequency of visits to their family physicians

CHARACTERISTIC	FREQUENCY OF VISITS TO FAMILY PHYSICIAN	
	LOW (N = 135)	HIGH (N = 130)
Mean (SD) age, y	74.5 (8.7)	80.5 (7.8)*
Female sex, %	50	64†
Mean (SD) age-adjusted Charlson comorbidity index score	4.1 (1.3)	5.5 (1.8)*
Mean (SD) total no. of medications	2.9 (3.0)	8.5 (3.7)*
Mean (SD) no. of Beers criteria medications	0.2 (0.5)	0.6 (0.8)*
Mean (SD) Anticholinergic Risk Scale score	0.2 (0.6)	0.7 (1.2)*
Mean (SD) frequency of visits to family physician in 1 y	0.0 (0.0)	11.7 (2.9)*

P < .001.
†*P* < .05.

family physician services.[6,20] Per capita health care spending in Canada increases exponentially with older populations, with those 85 and older consuming $21 000 per capita compared with people aged 65 to 84 years ($17 000) and those aged 1 to 64 years ($1700).[21]

Our findings revealed that a higher total number of medications was associated with increased frequency of visits, which is similar to findings from other studies.[8,22] This might be owing to an increased risk of adverse drug events (ADEs) and the need for closer monitoring. The risk of an ADE is estimated to be 13% with the use of 2 medications, but increases to a risk of 58% with 5 medications and 82% with 7 or more medications.[23] Studies have shown that 11% to 63% of older patients use medications inappropriately, with 42% being prescribed at least 1 medication without valid indication and 50% receiving inappropriate doses or extended use.[24,25] In family practice settings, ADEs are common, occurring in 25% of patients, with 11% of ADEs being preventable.[26] A recent study showed that 27% of older patients reported taking 5 or more medications on a regular basis, with 12% reporting an ADE that required medical attention, compared with the 5% rate among patients taking only 1 to 2 medications.[8] Another reason that a higher total number of medications might be associated with increased visit frequency is having the wrong medication prescribed or receiving the wrong dose: older patients taking a higher number of medications were more than twice as likely to report these errors compared with those taking 1 to 2 medications.[8]

Other studies have found that high-risk medications are associated with ADEs, increased risk of falls, and increased risk of mortality and hospitalization among older patients.[10,11] Our study did not find high-risk medications as assessed with Beers criteria or the ARS to be predictive of the frequency of family physician visits, which might be owing to high-risk medications leading to more serious or life-threatening issues requiring emergency department visits or hospitalization.[8,27,28]

Previous studies have found that comorbidities, which are expected to increase with increasing patient age, are associated with increased health care use, which includes ambulatory visits, laboratory testing, and hospitalizations.[21,29] Our study did not find the age-adjusted Charlson comorbidity index score to be an individual predictor of frequency of family physician visits. This might be because this index was created to predict mortality rates.[30] Other factors that might influence the frequency of visits to family physicians that are not addressed in the age-adjusted Charlson comorbidity index are hypertension and depression. Depression is common among older patients and is associated with increased primary care visits.[31] One study showed that as depression severity increased among older patients, perceived quality of life and physical and mental functioning decreased and perceived level of disability increased.[32] These factors might also influence the frequency of visits to family physicians and would be useful to examine in future studies.

Given the rapidly aging population and its potential for increased health care use,[21] being able to predict and provide early support to high-frequency users is important. Longitudinal studies have shown that only a small proportion of older patients are high users of health care services.[6,33] One study following older patients for 10 years demonstrated that 42.6% were never hospitalized, 24.6% were consistently low users of health care services, and 4.8% were consistently high users.[33] High users in this study had similar characteristics: multiple comorbidities, functional impairment, and inadequate social supports.[21,33] Knowing these factors and the individual predictors of frequency of visits found in our study might enable early identification of vulnerable older patients in order to provide support. Supporting these high-frequency users might include implementing increased home-care services,[34] which reduce the use of acute care services[35] and improve health outcomes[36]; developing interprofessional collaborative models of care to reduce fragmentation of health care services and provide better case management by addressing the patient's medical, functional, and psychosocial health care needs[34,37]; focusing on safer prescribing practices, shared decision making with patients, and medication reviews to prevent ADEs[8,34,38]; and learning more about the prescribing cascade that is common in geriatric medicine.

Limitations

Limitations of this study include a relatively small sample size at a single site, which limits the precision and generalizability of these findings. Given the retrospective nature of this study, we were unable to ensure that all patients were still being seen at the family practice during the study time frame. We were not able to extract data regarding the nature of each visit to know if the visits were planned and related to chronic disease management, preventive care, and medication monitoring, or unplanned (urgent) and possibly related to increased ADEs. Also, the concept of *multimorbidity* (existence of 2 or more chronic diseases) was not distinguished from *comorbidity* (medical conditions that exist at the time of diagnosis of the index disease or later), which might affect visit frequency.[39] This is an avenue for future research.

Conclusion

Female sex, age older than 85, and higher total number of medications were independent predictors of higher frequency of family physician visits among older patients. Scores from the age-adjusted Charlson comorbidity index, Beers criteria, and ARS were not significantly associated with frequency of visits, suggesting

that future studies should explore other factors to better predict and understand the care needs of high users of family medicine services. 🍁

Ms Hu is a medical student, Dr Dattani is a second-year family medicine resident, and Ms Cox is a medical student, all at the University of Toronto in Ontario. Ms Au is a research associate and Mr Xu is a research assistant, both in the Primary Care Research Unit with the Sunnybrook Academic Family Health Team in Toronto. Dr Melady is an emergency physician at Mount Sinai Hospital and Assistant Professor in the Department of Family and Community Medicine at the University of Toronto. Dr Jaakkimainen is a family physician at Sunnybrook Health Sciences Centre and Associate Professor in the Department of Family and Community Medicine at the University of Toronto. Dr Jain is a family physician at Sunnybrook Health Sciences Centre. Dr Charles is a family physician at Sunnybrook Health Sciences Centre and a research scientist in the Primary Care Research Unit with the Sunnybrook Academic Family Health Team.

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