
 POPULATIONS AT RISK

Medication Lists for Elderly Patients

Clinic-derived Versus In-home Inspection and Interview

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OBJECTIVE: To determine how often the lists of regular medications derived in geriatric clinics by examination of “medication bags” and interview matched those found during in-home inspections and interviews.

DESIGN: Prospective cross-sectional study.

SETTING: Geriatric clinics at three university-affiliated hospitals.

PARTICIPANTS: Consecutive community-dwelling outpatients 65 years or older who were newly referred.

METHODS: The in-home medication inspection used a semistructured interview followed by a room-to-room search. The medications identified in the home were compared with the medication list derived in clinic by examination of the “medication bag” and interview.

MAIN RESULTS: Fifty patients with a mean age of 78.9 years participated. The mean number of regular medications (prescription and nonprescription) was 6.3, and the mean number of regular prescription medications was 3.6. A comparison of clinic versus in-home medication lists revealed that 48% (95% confidence interval [95% CI], 34% to 62%) of patients had at least 1 omission of any regular medication and 19% (95%, CI 10% to 32%) of patients had at least 1 omission of a regular prescription medication.

CONCLUSION: The clinic-derived medication list resulted in a complete listing of all regular medications in only 52% taking regular medications. More specific instructions to patients to bring all prescription and nonprescription medications and all vitamins, herbal, and natural remedies, and more directed

questions by physicians may result in more complete clinic medication lists.

KEY WORDS: medications; home visits; aged.
 J GEN INTERN MED 2001;16:112–115.

Adverse drug reactions are an important cause of morbidity and mortality in the elderly, and are the sole or contributing cause of up to 24% of hospital admissions in this population.¹ Because the elderly are often on multiple medications, thorough medication lists are necessary to identify those seniors at increased risk for adverse drug reactions.

Studies have recommended that patients should routinely bring all their medications to be reviewed by their physicians.^{2,3} Two recent publications have endorsed this policy.^{4,5} Although instructing patients to bring all their medications to office visits may result in more thorough medication lists, the comparison of this method of medication review to in-home inspection has not been well studied.

The primary objective of this study was to determine how often the lists of regular medications derived in geriatric clinics by examination of “medication bags” and interviews matched those found during in-home inspections and interviews.

METHODS

Consecutive community-dwelling patients who were aged 65 years of age or older and were new referrals to geriatric clinics at three Toronto teaching hospitals were screened for participation. Patients were excluded if they did not bring their medications to the appointment, unless the patient claimed not to be taking any medications; lived outside metropolitan Toronto; lacked English fluency, and there was no caregiver to translate; scored less than 24 on the Folstein Mini-Mental Status Examination⁶ (MMSE), and there was no caregiver to provide collateral history; or were unavailable for an in-home assessment within 7 days of the clinic visit. Patients or the primary caregivers of patients with cognitive impairment provided informed written consent. The study was approved by the research ethics boards at the participating hospitals.

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Presented in part at the annual meeting of the Royal College of Physicians and Surgeons of Canada 1998.

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At the time that the clinic appointment was made, the clinic secretary instructed all patients to bring "all their medications." The day prior to the visit, they were all reminded by telephone to bring all their medications. During the visits, a geriatrician recorded the medications brought by the patients and then asked the patients in a nonstandardized fashion about the use of any medications that were not collected. Medications identified by written medication lists brought by the patients or by correspondences from referring physicians were also recorded.

One of the study investigators (JY) interviewed patients in their homes using a semistructured interview. Patients or caregivers were asked to show what medications the patients were taking and to show where these medications were stored. An inventory was taken of all medications found at these locations. The investigator sought permission to inspect common locations including the bathroom, bedroom, kitchen, refrigerator, and living room. The investigator inquired about the use of medications for specific symptoms such as insomnia, pain, constipation, indigestion, and colds, and about the use of certain types of medications such as herbal or natural remedies, vitamins and minerals, inhalers, patches, injections, or eye drops. The patients were also asked whether they used any of their family members' medications. For each medication identified, patients were asked to approximate when the last dose was taken. During the home visit, instrumental and basic activities of daily living were assessed using the Lawton-Brody⁷ and Katz⁸ scales, respectively.

The findings of the in-home assessments were compared to the medication lists derived from the clinic visits. Those medications taken within the past 14 days and identified during the in-home assessment, but not recorded during the clinic visit were considered omissions. We excluded artificial tears, allergy injections, skin creams, and lotions. Medications obtained after the clinic visit were not considered omissions. Compliance and discrepancies in dosages and dosing schedules were not formally assessed.

For analysis, we classified regular medications as those medications taken on a scheduled basis, and pro re nata (PRN) medications as those medications taken only on an as needed basis. The percentage of subjects with omissions is presented with 95% confidence limits computed using the Wilson method.⁹ McNemar's test was used to compare paired binary data.¹⁰

RESULTS

Between October 1, 1997 and December 31, 1997, 89 new geriatric clinic referrals were screened. Sixty-two patients were eligible; 12 declined participation. Fifty patients were included in the analysis. Two of the 50 patients did not bring any medications to the clinic, claiming not to be on any medications. In-home assessment revealed that neither took any regular or PRN

medications in the last 14 days. These 2 patients were removed from the denominator of the proportion of patients with medication omissions.

The participant characteristics are summarized in Table 1. Twenty-eight of the patients were women (56%). The patients ranged in age from 65 to 93 years. Most of the patients were cognitively intact, with 26% scoring less than 24 on the MMSE. There was a wide range in functional abilities, but approximately 75% were independent in all basic activities of daily living. The 12 patients who declined participation were similar to the participants in age, gender, and cognitive status.

Comparison of medication lists derived from the in-home assessments and the clinic visits revealed that 23 patients (48%; 95% confidence interval [95% CI], 34% to 62%) had at least 1 omission of a regular prescription and/or nonprescription medication. Nine patients (19%; 95% CI, 10% to 32%) had at least 1 omission of a regular prescription medication. These regular prescription medications were oxycodone, dorzolamide HCl (Trusopt), potassium supplement, sertraline, tetracycline, alendronate, ticlopidine, beclomethasone nasal spray, warfarin, and insulin.

Twenty patients (42%; 95% CI, 29% to 56%) had at least 1 omission of a regular nonprescription medication. As shown in Table 2, the most commonly omitted medications were vitamins and minerals. Omissions of regular nonprescription medications were more likely than omissions of regular prescription medications ($P = .02$).

If PRN medications are added to the analysis with regular medications, 29 patients (60%; 95% CI, 46% to 73%) had at least 1 medication omission. We did not find that omissions of PRN medications were more likely than omissions of regular medications.

Of the 48 patients taking regular medications, 18 kept them in 2 or more locations. The kitchen, bedroom, bathroom, and refrigerator were the most frequent sites for patients to keep medications, and were used by 56%, 35%, 27%, and 19% of patients, respectively.

Table 1. Characteristics of Study Population*

Characteristic	
Age, y	78.9 ± 6.3
MMSE score [†]	26.1 ± 4.5
Number of medical problems	3.0 ± 1.6
Number of regular medications	6.3 ± 4.1
Number of regular prescription medications	4.2 ± 2.4
Independent in all ADLs [‡] and IADLs, [§] no. (%)	19 (38)
Independent in all ADLs, but dependent in at least 1 IADL, no. (%)	18 (36)
Dependent in at least 1 ADL, no. (%)	13 (26)

* Plus-minus values are mean ± standard deviation.

[†] Three of the 50 patients could not perform the Mini-Mental State Examination (MMSE) due to language barriers.

[‡] Basic activities of daily living (ADLs).

[§] Instrumental activities of daily living (IADLs).

Table 2. Types of Nonprescription Medications Omitted

Type	Number of Patients
Vitamins and minerals*	17
Herbal and natural remedies†	5
Laxative	3
Acetaminophen	2
Aspirin	1
Antacids	1

* Including multivitamins, vitamin C, vitamin E, and iron supplements.

† Including ginkgo biloba, St. John's wort, and amino acid supplements.

Eight medications from 8 patients were identified in clinic, but not found during the in-home assessment. Two were prescription medications (ciprofloxacin, furosemide).

DISCUSSION

Much recent research has focused on in-hospital adverse drug reactions and medication errors.^{11,12} Inpatients represent only a small proportion of the total population at risk when one considers that nearly 2.5 billion prescriptions were dispensed by U.S. pharmacies in 1998.¹³ To identify adverse drug reactions and medication errors, it is necessary to know which medications patients have been exposed to. Unfortunately, there is no gold standard for determining medication use by community-dwelling elderly.

Many previous studies have used patient interviews as the reference standard against which the accuracy of outpatient, inpatient, or pharmacy records were evaluated.^{2,3,14-19} Some studies have augmented the interviews with examination of "medication bags."^{3,18} However, no study has compared the accuracy of the outpatient interview and "medication bag" to in-home room-to-room search and interview. We found that only in about half of the cases did the clinic visits result in a complete listing of regular medications. Nonprescription medications were the most often omitted, but approximately one fifth of patients had omissions of regular prescription medications.

We believe that in-home inspection augmented by a semistructured interview provides the most reliable listing of medications.^{14,20} However, 8 patients had medications that were identified in clinic, but not found during the in-home assessment, so the in-home assessment may not always be comprehensive. Because the in-home assessor was blinded to the results of the clinic-derived medication list, there was no opportunity to clarify these discrepancies with the patients. Recognition of risk factors for medication omission will be necessary to develop and validate protocols to improve clinic-derived medication lists; our sample size limited our ability to identify such factors.

Many of the patients did not bring or report the use of regular nonprescription medications. Due to the growing popularity of herbal and natural remedies, there is increasing recognition that use of medications such as

ginkgo biloba and St. John's wort can result in serious adverse drug reactions and drug-drug interactions.

It is impractical to conduct an in-home medication assessment for every new clinic patient. On average, the in-home inspections and interviews took 42 minutes, a prohibitively long time to verify a medication list. Inspection of the "medication bag" and clinic interview remains the most practical method to obtain medication lists. However, simply instructing patients to bring "all their medications" to the office and using unstructured interviews by geriatricians resulted in incomplete lists of regular medications in about half of the cases. We hypothesize that specific instructions to patients to look throughout their homes for prescription and nonprescription medications and directed questions by physicians about the use of vitamins and minerals, herbal and natural remedies, laxatives, and analgesics will improve the yield of medication lists derived in clinic. Future studies should assess whether these modifications to the clinic visit lead to improvements in the accuracy of patient medication lists.

The authors wish to acknowledge Dr. Shabbir M.H. Alibhai for his helpful comments.

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