Role of Clinical Pharmacist on Optimizing Sedatives and Anticholinergics Medication Therapy on Hospitalized Geriatric Patients

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Abstract: The use of potentially inappropriate medications (PIMs) is a significant problem in the elderly and it is associated with poor outcomes. Pharmacist intervention has been utilized to minimize and reduce the number of unnecessary and potentially harmful medications in the elderly. The objective of this study is to determine how a clinical pharmacist review and patient counseling impact the optimization of quality of care in elderly hospitalized patients. The study was conducted at Saint Elizabeth's Medical Center in Boston, United States. Geriatric patients 65 years and older were screened by electronic medical record being on sedatives and anticholinergic medications categorized into two groups (retrospective and prospective). Retrospectively, a total of 806 patients were on sedatives and anticholinergic medications over 3 months period, 208 patients were included for data analysis. Prospectively, 591 were on sedatives and anticholinergic medications over two months period, 40 patients were randomly identified for discharge counseling and follow-up phone calls. The results showed an average length of hospital stay of 4.60 days retrospectively and 4.55 days prospectively. Number of readmissions within 30 days of discharge was 36 (17%) retrospectively and 8 patients (20%) prospectively. The average drug burden index (DBI) for retrospective subset eligible for DBI calculation (n=43) was 0.69 (0.2-1.47), and for prospective subset (n=13) was 0.54 (0.33-1.3). Higher average DBIs were recorded in readmitted groups, for retrospective subset (n=36) was 0.76 (0.5-1.47), and for prospective subset (n=8) was 0.71 (0.33-1.3). In conclusion, targeting patients with high DBI is a potential for pharmacist interventions and discharge counseling. In addition, involving pharmacists in reviewing geriatric patients medications during their hospital stay may reduce polypharmacy.
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Keywords: Elderly; drug burden index; sedatives; anticholinergics; pharmacist; polypharmacy.

1. Introduction

Geriatric patients have significant clinical pharmacokinetic and pharmacodynamic changes which make them at a higher risk for adverse effects from medications (Fick et al., 2012). These changes can result in medications having longer durations of action, greater risks of toxicity, and increased frequency of preventable adverse effects. Since the elderly population is rapidly growing; clinicians have a responsibility to understand the unique physiological and pathophysiological changes associated with aging in order to ensure appropriate medication therapy. A significant problem in older people is the use of potentially inappropriate medications therapy (PIMs). Morbidity and mortality related to medication use may result from different issues, including adherence issues, drug-drug interactions, drug-disease interactions, drug dosing, medication misuse by patients, and even transcription or dispensing errors. Inappropriate medication prescribing is a potential problem that has received a significant amount of attention in the medical literature as it relates to medication use in older adults (Courtney et al., 2011). One reason is that inappropriate medication prescribing, loosely defined, has been suggested as a common cause of adverse drug events (ADEs) in all types of patient care settings (Guay, 2008). Another reason for this focus is that, compared with the other factors mentioned above, medication prescribing may be perceived as an easier target for broad-based interventions (targeting prescribers, rather than patients) (Vinks et al., 2009). A clinical pharmacist intervention to reduce doses, minimize the overall number of unnecessary and potential harmful medicines in geriatric patients has been utilized to improve patient care (Fick et al., 2003).

The goal of this project is to determine how a clinical pharmacist review and patient counseling impact the optimization of quality of care in elderly hospitalized patients.

2. Material and Methods

The study was conducted at Saint Elizabeth's Medical Center in Boston, United States, and approved by institutional review board. A retrospective review was performed by a clinical pharmacist identifying patients greater than 65 years old from the hospital electronic database for a three months period who are on selected PIMs, including sedatives and anticholinergic medications. Baseline

data collected and evaluated includes patient demographics, number of PIMs, length of hospital stay, and readmissions. This was followed by a prospective review where different group of geriatric patients greater than 65 years old on selected PIMs were identified by a computerized daily report, patient were counseled on discharge and the clinical pharmacist did a follow-up phone call within 7 days of discharge. The clinical pharmacist reviewed these patient profiles utilizing the Beers' criteria, the Medication Appropriateness Index (MAI), and the Drug Burden Index (DBI).

The Equation used DBI= $\sum (D/D+\delta)$

Where D is the daily dose taken by the individual and δ is the minimum effective daily dose approved by FDA.

Data Collection and Outcomes: Retrospectively, a total of 806 patients were on sedatives and anticholinergic medications, 208 patients were included for data analysis. Prospectively, 591 were on sedatives and anticholinergic medications, 40 patients were randomly identified for discharge counseling and follow-up phone calls (figure 1).

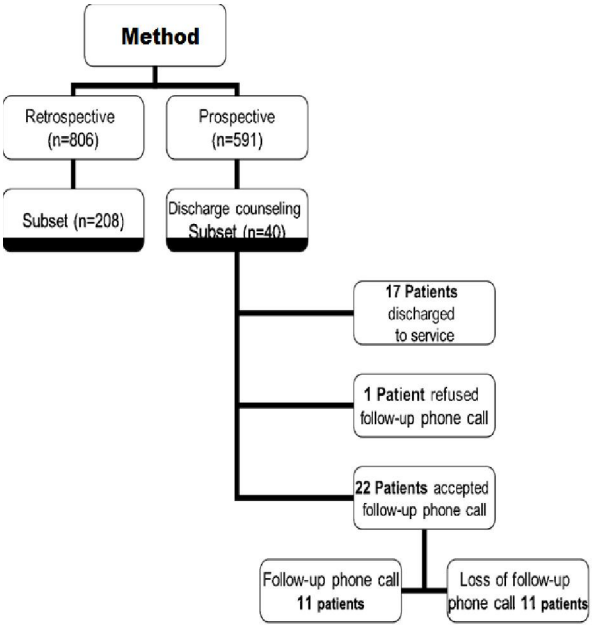

Figure 1. Method scheme

Patient demographics, number of medications on admission, number and class of medications with anticholinergic and sedative effect. In addition, DBI was calculated for patients. Primary outcomes were length of hospital stay, and readmission within 30-days of discharge.

Statistical Analysis: Continuous data were compared and expressed as the mean and percentage. I explained the data without assessing statistical significance.

3. Results

Patients characteristics are in table 1. There was no significant difference between groups. Most of the patients were admitted under the surgery service followed by medicine service. The average number of medications on admission was 8.9 retrospectively, and 9.8 prospectively. The average number of medications with anticholinergic and sedative effect was 2 retrospectively, and 1.35 prospectively.

Table 1. Patients characteristics

		Retrospective Subset (n=208)	*Prospective Subset (n=40)*
Age Mean (range)	Age in years	77.1 (65-98)	77.7 (65-95)
Gender n (%)	Male	95 (46%)	17 (43%)
	Female	113 (54%)	23 (57%)
Service n (%)	Surgery	79 (37%)	15(38%)
	Medicine	74 (36%)	15(37%)
	Cardiology	24 (12%)	2 (5%)
	Psychiatry	14 (7%)	2(5%)
	Orthopedics	12 (6%)	4 (10%)
	Gynecology	4 (2%)	2(5%)
Number of medications on admission, mean (range)		8.9 (3-34)	9.8 (1-21)
Number of anticholinergics and sedatives per patient, mean (range)		2 (1-7)	1.35 (1-2) On Discharge

Most of the patients were on sedatives medications, followed by being on both medications with anticholinergic and sedative effects, and the lower number of patients were on medications with anticholinergic effects only (figure 2). This was consistent retrospectively and prospectively for the whole population and for the subset as well (figure 3). The most prescribing drug class was opioids followed by benzodiazepines and antihistamines.

The outcomes in terms of average length of hospital stay were 4.60 days retrospectively and 4.55 days prospectively. Number of readmissions within 30 days of discharge was 36 (17%) retrospectively and 8 patients (20%) prospectively (table 3). The average

DBI for retrospective subset eligible for DBI calculation (n=43) was 0.69 (0.2-1.47), and for prospective subset (n=13) was 0.54 (0.33-1.3) (table 2). DBI score is categorized into <1 associated with lower risk of side effects to elderly (figure 4). DBI scores >1 considered higher risk patients and maybe associated with more adverse effect complications, we may consider those patients for pharmacist review and interventions. In the readmitted groups the average DBI scores showed higher results for retrospective subset (n=36) was 0.76 (0.5-1.47), and for prospective subset (n=8) was 0.71 (0.33-1.3) (table 4).

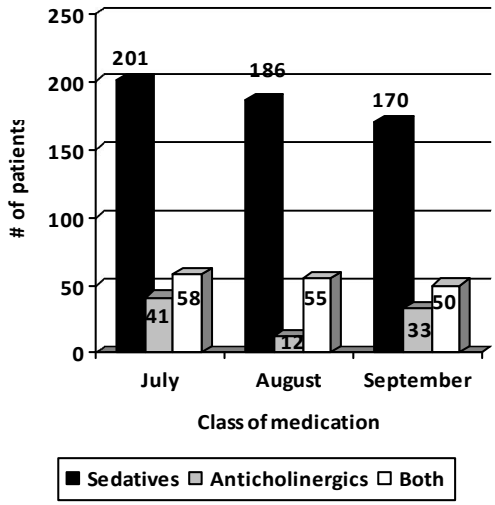

Figure 2. Retrospective patients exposed to anticholinergics, sedatives, or both (n=806)

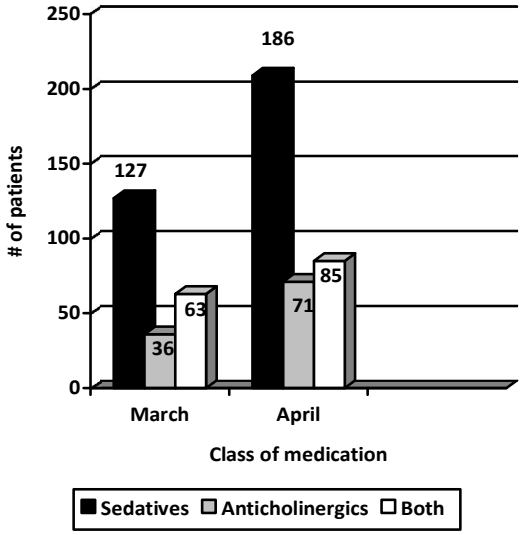

Figure 3. Prospective patients exposed to anticholinergics, sedatives, or both (n=591)

Table 2. Results of drug burden index

	Retrospective subset (n=43)	Prospective subset (n=13)
Averag DBI, range	0.69 (0.2-1.47)	0.54 (0.33-1.3)

DBI= drug burden index.

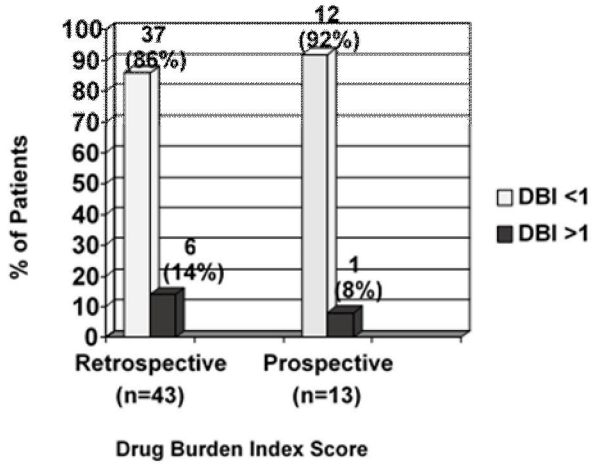

Figure 4. Subset of drug burden index scores. The DBI was categorized as low (<1), high (>1). DBI= drug burden index.

Table 3. Outcomes results

	Retrospective subset (n=208)	Prospective subset (n=40)
Length of hospital stay, mean (range)	4.6 (1-31)	4.55 (1-13)
Number of readmissions within 30 days (%)	36 (17%)	8 (20%)

Table 4. Readmission subanalysis

	Readmitted retrospective subset (n=208)	Readmitted prospective subset (n=40)
Number of readmissions within 30 days (%)	36 (17%)	8 (20%)
Number of patients on >4 medications on admission (%)	29 (81%)	7 (87%)
Number of patients on >1 medication with anticholinergic and sedative effect (%)	19 (53%)	3 (38%)
Average DBI (range)	0.76 (0.5-1.47)	0.71 (0.33-1.3)

DBI= drug burden index.

4. Discussions

Sedatives, anticholinergic medications, and DBI scores decreased from hospital admission to the time of discharge in the two groups. Interestingly, in this study, the total number of medications including regular medications, topical, ophthalmological, 'as needed', increased. This finding is similar to previous studies that found that drug use increased during hospitalization by Betteridge et al. (2012) and Saad et al. (2012).

The results of the present study confirm the findings of Best et al. (2013) who found that DBI was not associated with an increased length of hospital stay in older people. Length of hospital stay and readmission rate were almost similar when pharmacist reviewed patient sedatives and anticholinergics medication regimen in both retrospective group and prospective group. This maybe due to the small sample size in the prospective group. More patients will be needed to show more significant results.

DBI is a novel pharmacologic risk assessment tool that measures an individual's total exposure to anticholinergic and sedative medicines, has been associated with impaired physical function, falls, and increased hospitalization in older adults (Castelino et al., 2010). Readmitted patients on both groups showed higher DBI scores, which maybe an alarming tool for pharmacist to review, reevaluate the regimen and apply counseling to the patient. DBI has been utilized more in an outpatient settings, in this project we were testing its usefulness in hospitalized patients and at time of discharge. Medications that were used on an 'as needed' basis were not taken into account when computing the DBI scores because the effect of intermittent use of sedative and anticholinergic medication use on function is not known. Some studies showed no difference when they added or not (Wilson et al., 2011).

Our study has several limitations. Small sample size, barriers in data collection (language, patients sleeping, poor cognitive functions), DBI was not calculated for medications which were administered as needed anticholinergics and sedatives drugs, and some patients were discharged to nursing home or rehab centers and could not be followed by a phone call. In addition, some patients could not been reached on their contact information.

In conclusion, targeting patients with high DBI is a potential for pharmacist interventions and discharge counseling. In addition, involving pharmacists in reviewing geriatric patient's medications during their hospital stay may reduce polypharmacy.

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