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Pharmacist Medication Review: An Integrated Team Approach to Serve Home-Based Primary Care Patients

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Successfully implemented a remote comprehensive medication review pilot program to address improving patient care, medication safety, and reducing unnecessary healthcare spending.

BACKGROUND

Comprehensive medication review is a patient-centered approach to optimize medication use and improve patient outcomes by ensuring each patient's medication is assessed for indication, effectiveness and safety given patient status and comorbidities.[1] Clinical pharmacists play an essential role within interdisciplinary teams to optimize medication use, alert providers to potential gaps in care, decrease inappropriate prescribing practices, and improve medication safety.[2,3] Physicians in ambulatory settings often have limited access to a dedicated pharmacist resource.

This pilot sought to examine the impact of a comprehensive medication review program by a corporate-based pharmacist on care provided by a home-based primary care (HBPC) practice.

HBPC brings the expertise of primary care providers and the technology of a health care clinic directly to medically complex patients, providing comprehensive, coordinated care in the comfort of their home. Comprehensive medication management in the HBPC population is crucial as these patients have multiple comorbidities and may be at risk for medication-related problems leading to adverse health outcomes.

This pilot population was comprised of persons of advanced age who are medically vulnerable.

On average, the patients were 82 years old and had 13 chronic conditions. The majority of patients were taking 15 or more medications (Table 1). The aim of this study was to describe this pilot program, examine the degree of medication recommendation acceptance by the practice, and assess any potential financial impact.

Table 1. Baseline characteristics of the home-based primary care patients received pharmacist medication review (N=96)

	N	Std
Age, N (%)		
Younger than 65	22	22.9%
65-74	17	17.7%
75-84	23	24.0%
85 or older	34	35.4%
Sex, N (%)		
Male	37	38.5%
Female	59	61.5%
Payers, N (%)		
Traditional Medicare	68	70.8%
Medicare Advantage	20	20.8%
Medicaid	8	8.3%
Chronic Conditions, N (%)		
5-8	23	24.0%
9-12	41	42.7%
13-32	32	33.3%
Medications, N (%)		
8-14	29	30.2%
15-19	35	36.5%
20-47	32	33.3%

METHODS

Study Setting:
The Northwestern Medicine Regional Medical Group Home Care (NM RMG HC) team includes 2 physicians and 3 advanced practice nurses that serve approximately 750 patients. The program workflow emanated from a weekly email sent by the home care providers to the corporate-based ambulatory pharmacist containing a list of patients to review. Selection criteria were patients new to the practice, those taking 5 or more medications, and who had an initial visit with the provider. Patient name, medical record number and date of birth were included. The pharmacist reviewed the EPIC electronic health record (EHR) for each patient.

For each patient, review consisted of reading provider progress notes, history and physical, laboratory results, and the medication list. Following review, each patient was evaluated to confirm: indications for medication use, correct dosage and directions, duplications of therapy, medication efficacy for each medical condition (based on current patient status and lab results), symptom management recommendations, and patient-centered considerations including medication affordability and alternative formulations. A Microsoft Excel spreadsheet was created and consensus regarding outcomes of interest was agreed upon by the pilot team. The spreadsheet contained multiple headings allowing for a consistent and methodical approach to review each patient profile. The completed Excel spreadsheet was returned to the providers weekly. In addition, recommendations were returned to individual providers using the In-Basket messaging functionality in the EPIC EHR system.

Measures: Patients were assessed for number of chronic conditions, number of active medications prescribed, appropriate indication for each medication, dose appropriate for renal, hepatic, age or other specific monitoring parameters, medication listed on the American Geriatric Society Beers Criteria, drug-drug interactions, medications to consider for deprescribing, medications to add to current therapy to optimize disease state treatment. At the end of the pilot program, the charts of those patients were re-reviewed to determine how many of the recommendations provided by the pharmacist were accepted. Three patients where pharmacist recommendations involving medication deprescribing and optimization were accepted by the providers are highlighted in Figure 1 below. **Figure 1: Intervention in Three Select Patients**

79-year-old on eltrombopag for idiopathic thrombocytopenia (ITP)
- Labs - platelets – 451 x 10 (3) uL
- Per Micromedex drug information on eltrombopag,[4] dose adjustment required for platelet counts above 400 x 10(9)/L, in ITP.
- Provider messaged potential dose adjustment required.

Safety: Thromboembolism (venous or arterial) may occur with excessive increases in platelet levels. Incidence of thrombosis in ITP – 6%.

Financial Implications:
"Treatment of an acute VTE on average appears to be associated with incremental direct medical costs of $12,000 to $15,000 (2014 US dollars) among first-year survivors, controlling for risk factors. Subsequent complications are conservatively estimated to increase cumulative costs to $18,000–23,000 per incident case. Annual incident VTE events conservatively cost the US healthcare system $7-10 billion each year for 375,000 to 425,000 newly diagnosed, medically treated incident VTE cases." [5]

49-year-old on multiple CNS depressants, opioids, benzodiazepines, SSRI and z-drug at high doses
- Recommendation to consider medication tapers and consolidation of therapy.
- Patient mentions to provider they had previously used cannabis. Provider tests patient and he is positive for cannabis.
- Note to provider that components in marijuana can interfere with CYP450 enzymes competitively inhibiting the metabolism of other compounds.[6] This interaction could impact benzodiazepines, opioids and CYP2D6 which metabolizes SSRIs and could potentially explain need for increased doses.

Safety: With the legalization of marijuana in many states, including in Illinois, it is imperative for providers to question patients regarding the use of cannabis products. Medically complex patients with multiple comorbidities are at risk for adverse drug reactions.

Financial Implications:
"The average direct costs per patient caused by ADEs were USD $444.90 [95% CI: 264.4 to 625.3], corresponding to USD $21 million per 100,000 adult inhabitants per year. Inpatient care accounted for 53.9% of all direct costs caused by ADEs. For patients with ADEs, the average societal cost of illness was USD $6,235.00 [5,442.8 to 7,027.2], of which direct costs were USD $2,830.1 [2,260.7 to 3,399.4] (45%), and indirect costs USD $3,404.9 [2899.3 to 3910.4] (55%). The societal cost of illness was higher for patients with ADEs compared to other patients. ADEs caused 9.5% of all direct healthcare costs in the study population."[7]

93-year-old patient on warfarin with unstable INR
- Patient on concomitant torsemide.
- Messaged provider regarding torsemide/warfarin interaction.
- Patient transitioned to apixaban after months of INR not within goal – INR supratherapeutic.

Safety: Patient at risk of bleeding, increased fall risk and potential hemorrhage.

Financial Implications:
"Most hospitalization expenditures after an anticoagulant-associated ADR were attributable to nursing costs (mean $33,189 per ADR) followed by pharmacy costs (mean $7,451 per ADR). ADRs which were determined to add incremental expense were associated with significant increases in total hospitalization cost (mean $118,429 vs. $54,858, p = 0.02) as well as cost after the ADR (mean $89,733 vs. $23,680, p = 0.004) compared with ADRs in which no incremental cost was determined to be incurred."[8]

RESULTS

In total, 96 patient charts were reviewed. There were 175 recommendations offered. Of which, 53 (30%) were accepted by the providers. While approximately 19% of patients did not receive any recommendations, ≈28% and ≈29% of patients received one and two recommendations, respectively (Table 2). Among 78 patients who received recommendations, providers accepted at least one recommendation for 40% of these patients.

The most commonly accepted intervention was medication discontinuance/deprescribing and dose adjustments. Eighty-one medications were recommended for deprescribing and 27 medications were discontinued (33%). There were 24 recommended dose adjustments and 11 medications were dose adjusted (46%). Eleven medications were suggested as an addition to the current patient regimen.

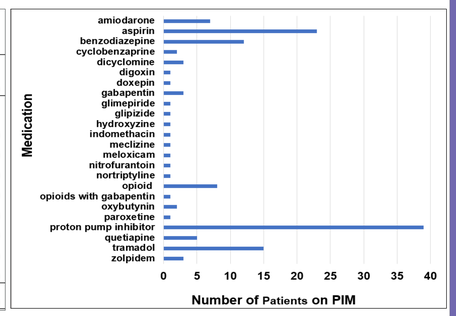
Sixty-four (67%) of the 96 patients were on medications listed as potentially inappropriate on the American Geriatric Society Beers Criteria, 11 patients were not on a Beers List medication and in 21 patients the criteria was not applicable given current age. Figure 2 shows the most common potentially inappropriate medication was a proton-pump inhibitor (41%), followed by aspirin (24%), tramadol (16%), a benzodiazepine (14%) and an opioid (8%).

Table 2: Number of Recommendations Accepted

Table 2. Recommendations from pharmacist medication review and acceptance by home-based primary care providers.

	Number of Accepted Recommendations, N (Row %)					Row Total (Column %)
	Zero	One	Two	Four	Seven	
Number of Recommendations						
Zero	18 (100%)					18 (18.8%)
One	17 (63.0%)	10 (37.0%)				27 (28.1%)
Two	18 (64.3%)	5 (17.9%)	5 (17.9%)			28 (29.2%)
Three	7 (58.3%)	3 (25.0%)	2 (16.7%)			12 (12.5%)
Four	3 (50.0%)	2 (33.3%)		1 (16.7%)		6 (6.3%)
Five	2 (100%)					2 (2.1%)
Seven		1 (50%)			1 (50%)	2 (2.1%)
Eight					1 (100%)	1 (1.0%)
Column Total (Row %)	65 (67.7%)	21 (21.9%)	7 (7.3%)	1 (1.0%)	2 (2.1%)	96 (100%)

Figure 2: Frequency of PIMs



Control Plan: Develop a screening tool identifying patients likely to benefit from pharmacist review.

CONCLUSIONS

- Pharmacist integration identified opportunities to optimize patient care, improve patient safety, and potentially reduce or avoid unnecessary healthcare spending.
- **Using conservative estimates, pharmacist intervention in this pilot program may have resulted in health care cost avoidance in three specific patient cases estimated to be $53,000 in direct medical costs.**
- Pharmacists are uniquely qualified to assist providers in delivering optimal patient care.

REFERENCE

1.The Patient Care Process for Delivering Comprehensive Medication Management (CMM): Optimizing Medication Use in Patient-Centered, Team-Based Care Settings. CMM in Primary Care Research Team. July 2018. Available at http://www.accp.com/cmm_care_process
2.Hanlon JT, Weinberger M, Samsa GP, et al. A randomized, controlled trial of a clinical pharmacist intervention to improve inappropriate prescribing in elderly outpatients with polypharmacy. *Am J Med.* 1996;100(4):428-437. doi:10.1016/S0002-9343(97)89519-8
3.Kovačević SV, Simišić M, Rudinski SS, et al. Potentially Inappropriate Prescribing in Older Primary Care Patients. *PLOS ONE.* 2014;9(4):e95536.doi:10.1371/journal.pone.0095536
4.4. Truven Health Analytics. Eltrombopag. In: DRUGDEX System Micromedex 2.0. Published December 27, 2019. Accessed March 3, 2020. http://micromedex.com
5. Grosse SD, Nelson RE, Nyarko KA, Richardson LC, Raskob GE. The economic burden of incident venous thromboembolism in the United States: A review of estimated attributable healthcare costs. *Thromb Res.* 2016;137:3-10. doi:10.1016/j.thromres.2015.11.033
6. Brown JD, Winterstein AG. Potential Adverse Drug Events and Drug-Drug Interactions with Medical and Consumer Cannabidiol (CBD) Use. *J Clin Med.* 2019;8(7). doi:10.3390/jcm8070989
7. Gyllensten H, Hakkarainen KM, Hägg S, et al. Economic impact of adverse drug events--a retrospective population-based cohort study of 4970 adults. *PloS One.* 2014;9(3):e92061. doi:10.1371/journal.pone.0092061
8. Piazza G, Nguyen TN, Cios D, et al. Anticoagulation-associated adverse drug events. *Am J Med.* 2011;124(12):1136-1142. doi:10.1016/j.amjmed.2011.06.009

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