

MAYO CLINIC PROCEEDINGS

Innovations, Quality & Outcomes

Beyond Solo Interventions: Working Toward Medication Optimization

In spite of considerable improvements to health care delivery, health information technology, and the availability of new medicines, adverse drug events (defined as harm experienced by a patient as a result of exposure to a medication) persistently and detrimentally affect patient safety and quality of life, in addition to affordability and quality of care provided throughout the United States. Since the Agency for Healthcare Research and Quality reported more than a decade ago that roughly 770,000 injuries or deaths result annually from adverse drug events—as well as an estimated financial burden on US hospitals ranging between \$1.6 and \$5.6 billion annually—unfortunately, little has changed.¹ Indeed, one need look no further for sobering reminders of this, particularly as it relates to the national opioid crisis.²

Possible etiologies for this persistent trend are many, and include the notions that (1) the use of medications (ie, prescription, over-the-counter, or herbal) is widespread and increasingly complex; (2) ongoing pharmacotherapeutic advances, while producing improved health for patients suffering from many conditions, are also associated with increased risks; and (3) people generally receive more medications than they ever have, with approximately 12% of adults receiving 5 or more medications.³ Furthermore, the risk of adverse drug events increases with age (both elderly and pediatric patients are more susceptible), individual genetic profile (ie, pharmacogenetic variation is associated with increased risk for drug-gene interactions and potentially

increased toxicity), sex (ie, sex differences in immunological and hormonal physiology influence pharmacodynamics and pharmacokinetics), and disposition, particularly during transitions of care.

The solution to this multifaceted problem remains elusive and likely requires a multi-pronged approach, including improved inter-professional education and training for all health care providers, realization of the full potential of electronic medical and health records and ancillary clinical decision support schema, and enhanced deployment of pharmacists to provide direct patient care (ie, the practice that involves the pharmacist's direct observation of the patient and his or her contributions to the selection, modification, and monitoring of patient-specific drug therapy. This is best accomplished within an inter-professional team or through collaborative practice with another health care provider).⁴

In this issue, Herges et al⁵ embraced the latter concept in their evaluation of pharmacist visits for patients considered to be at high risk for emergent hospital admissions on the basis of use of 10 or more medications, including at least 1 high-risk medication (eg, anticoagulant, antiplatelet, diuretic, or antihypoglycemic agents). The principal findings of their retrospective cohort study suggest that the addition of a pharmacist to an interprofessional care team within the Mayo Clinic system was associated with reduced hospital readmission within the 30-day period after a high-risk patient's discharge from the hospital. The pharmacists' intervention largely consisted of

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medication reconciliation, screening for drug interactions, identification of drug therapy problems, and subsequent clinical documentation of recommendations to the patient's primary care provider (which in this case included physicians, nurse practitioners, and physician assistants) in advance of the patient's upcoming appointment for postdischarge evaluation. The patients who visited with pharmacists were higher risk at baseline (mean LACE (Length of stay; Acuity of admission; Comorbidities; number of Emergency department visits) index 10.9 [2.4] vs 10.6 [2.7] for patients receiving usual care; $P=.02$); however, after adjusting for this in the analysis, the statistical significance remained and favored patients who received pharmacist intervention.

Review of this study raises additional considerations that warrant further comment. First and foremost, the authors note that “[a]ll pharmacists are credentialed by the study institution to deliver medication therapy management services and were authorized via a collaborative practice agreement to initiate, modify, or discontinue medications used to treat chronic diseases on the clinician's behalf”; however, they go on to state that “[p]harmacists intentionally limited collaborative practice agreement use during their portion of the visit so that the pharmaceutical care plan could be discussed with the clinician and agreed upon before the clinician implemented the plan with the patient,” potentially limiting the generalizability of their findings. In addition, although there are many published examples of both clinical and economic benefits associated with including pharmacists on patient-centered care teams, there are fewer examples demonstrating the benefit associated with an approach tailored toward patients receiving high-risk medications for the transition between hospital discharge and ambulatory care follow-up. Aniemeke et al⁶ conducted a retrospective chart review of high-risk adult patients previously admitted to a general medicine unit and determined that the risk for 30-day hospital readmission and 30-day emergency department visit was statistically similar, regardless of whether or not the patients received medication counseling from a pharmacist at discharge. Although these results are disappointing, it is important to realize that patient education in the absence of comprehensive medication management is unlikely to considerably alter clinical outcomes for

patients.⁷ Pellegrin et al⁸ completed a quasi-experimental, mixed methodology investigation designed to evaluate the association between medication management services provided by specially trained hospital and community pharmacists (ie, “Pharm2Pharm”) and rates and costs of medication-related hospitalization in older adults. The investigators concluded that the Pharm2Pharm model was associated with an estimated 36% reduction in the medication-related hospitalization rate for older adults and a 2.6 to 1 return on investment.⁸ Interestingly, and perhaps most notably, the Pharm2Pharm model included a statewide system of medication management services provided by hospital pharmacist specialists in collaboration with community-based pharmacists who served high-risk patients during the transition between hospital and home and for up to a year after discharge. However, when taken together, these 3 studies both exemplify and underscore one of the principal challenges associated with the existing evidence base, that is, that the heterogeneity in approach obscures conclusions about the optimal way to implement pharmacist-provided care to help achieve medication optimization.

In addition, one may argue that these studies support the notion that, to a certain extent, the impact of pharmacist-provided care on meaningful clinical and economic outcomes for high-risk patients depends on the nature, timing, and connectedness of the intervention. The nature of the intervention refers to whether an approach is limited (eg, medication counseling only) or comprehensive (eg, comprehensive medication management supported by collaborative practice agreements and associated credentialing pathways). The timing of the intervention, or whether or not it occurred during hospital discharge, immediately after discharge, or later (ie, aligned with a postdischarge ambulatory care episode), could affect outcomes for patients who might be more distracted or confused in the period immediately after hospital discharge. Connectedness, in this case, refers to the idea that the intervention is designed to be collaborative—both intraprofessionally and interprofessionally—by positioning pharmacists within patient-centered care teams and not separately. This also suggests that the need for real-time collaboration between clinic and hospital-based clinical pharmacists (ie, proximal to the care team) and community-based

pharmacists (ie, distal to the care team in retail pharmacy settings) is critical to the overall success and impact of the intervention.

To meaningfully address the alarming rate—and negative effects—of adverse drug events for patients, providers, and payers, further research efforts are warranted. Such future projects could focus on how to best implement pharmacist-provided care, either physically or virtually, within existing inter-professional and patient-centered care teams in order to help achieve medication optimization. In short, this is the process of ensuring that patients receive optimal medication regimens within a system that ensures optimal medication use (ie, appropriate dispensing, distribution, and handling of medications; automated medication safety systems for identifying critical drug interactions and non-adherence). In essence, this means that it is imperative to “get the medications right.”⁹

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