Roles Health-System Pharmacists Can Play to Improve Patient Outcomes and Safety

With the changing climate of healthcare focused on cost reduction and patient-centered care, there are many exciting opportunities available for pharmacists within today’s hospital setting. In addition, with the advancement of medicine and the development of more complex medication regimens, there exists a demand for capable health-system practitioners versed in the safe and effective delivery of medication. There have been numerous studies that have shown that the inclusion of a pharmacist within an interdisciplinary healthcare team leads to increased patient safety and ultimately a reduction in healthcare costs due to improved patient outcomes. This discussion will focus on three specific opportunities that exist for health-system pharmacists to take a greater role in improving patient safety within the hospital setting. First, the value of the medical home model and pharmacists within the interdisciplinary healthcare team will be highlighted. Secondly, case-studies will be discussed that show the benefit that pharmacists play in the management of high-risk medication regimens such as anticoagulation therapies. Lastly, with the advent of increasing technologies within the hospital setting, pharmacists will be required to take a greater role in the development and implementation of IT systems within the hospital environment.

Approximately 20% of all adverse events that occur in hospitals can be attributed to drugs. Within the hospital emergency department environment alone, the Institute of Medicine estimated 3.8 million annual adverse drug events (ADEs) could have been prevented according to a 2001 report. Because so many ADEs occur within the hospital setting, this leaves a large opportunity for pharmacists to take an active role in preventing their occurrences. Recent studies have shown that the incorporation of a pharmacist within an interdisciplinary healthcare team has the ability to reduce patient morbidity and mortality while reducing total healthcare costs.

One example that highlights the value of pharmacists is a 2008 publication that determined if the presence or absence of clinical pharmacists in ICUs resulted in different mortality rates, ICU length of stay, and ICU charges for Medicare patients with hospital acquired infections, community acquired infections, and sepsis. Mortality increased in ICUs without pharmacists by 23.9%, 16.2% and 4.8% for hospital acquired infections, community acquired infections, and sepsis, respectively. Also, ICU length of stay was longer and Medicare billings increased in all three categories in ICUs without pharmacists. All of these differences were found to be statistically significant. In another 2009 study that evaluated the effects of multidisciplinary teams on adverse drug events in pediatric trauma patients, prescribing errors were reduced by 40% (25 vs 15, p=0.05) with the inclusion of a pharmacist within the team. In addition, administration errors were reduced 53% (19 vs 9, p=0.05).

An additional study that was published in 2009 examines the benefits provided by a clinical pharmacist on a multidisciplinary neurosurgical team. This before-after study design had 2156 patients...
(1007 before and 1079 after addition of a pharmacist) and studied primary endpoints of hospital length of stay, cost, mortality, and readmission rate using data from the UHC Clinical Resource Management database. In the patients with a pharmacist present, pharmacy acquisition costs decreased from $4833 to $3239/patient, or $1,718,260 over two years. In addition, the hospital length of stay decreased from 8.56 to 7.24 days (p=0.003) and 30-day readmission rate decreased from 11.49% to 7.22% (p<0.001) in the patient group that included the pharmacist within the multidisciplinary team. The inclusion of a pharmacist within an interdisciplinary team in the hospital setting has been shown to reduce costs, improve outcomes, and lead to the reduction of preventable adverse drug events.

Another important step that can be taken to improve patient safety within the hospital setting is to increase pharmacist oversight of complex or high-risk medications regimens. According to a 2010 ASHP national survey of pharmacy practice in the hospital setting, about two-thirds of hospitals provide pharmacists anticoagulation consultations and in about half, pharmacists provide nutrition support consultations and patient teaching. For each type of consultation examined, nearly all pharmacy directors indicated that 80% or more of the recommendations made by pharmacists are adopted.2

A good example of how pharmacists can help improve outcomes by managing specific medication regimens can be seen in a recent 2011 study conducted by a Michigan hospital. "Warfarin is implicated in approximately 30% of reported anticoagulant-related errors." In order to improve warfarin management and safety, Henry Ford Hospital implemented an inpatient Pharmacist-Directed Anticoagulation Service (PDAS). This study aimed to evaluate the impact of this service on both transition of care and safety of patients receiving anticoagulation with warfarin. The transition of care evaluated metrics included: appropriate enrollment in the anticoagulation clinic, documented inpatient-to-outpatient provider contact, documented inpatient provider-to-anticoagulation clinic communication and patient follow-up with clinic within five days of discharge. The transition of care was considered effective if compliance with all of the transition of care metrics occurred. The composite safety endpoint of the study was measured by identification of thromboembolism, occurrence of major bleeding, or an INR ≥ 5.3

Of the 500 patients that were included in the study, transition of care metric compliance occurred in 73% more patients in the PDAS group (p<0.001). In addition, there was a 32% reduction in occurrences of the composite safety endpoint in the PDAS group (p=0.103) which was driven primarily by a reduction in rate of INR ≥ 5 (p=0.076).3 There are numerous medications that pose increased risk to patients due to food and drug interactions, complex kinetics, and difficulty of administration and dose adjustments. It is important for hospitals to consider the management of these high-risk medications to pharmacists versed in the complexity of these drugs to improve patient outcomes and reduce ADEs.

The final opportunity for pharmacists to improve patient safety within the hospital setting is development and oversight of electronic ordering and dispensing solutions utilized by health systems. Advances in technology have "changed medication ordering, communication with pharmacy, transcription, dispensing, and administration of medications during the past 10 years." According to the 2010 ASHP national study of pharmacy practice in the hospital setting, 58.6% of hospitals have partially or completely implemented electronic medical record (EMR) systems. And of these hospitals which have
adopted EMR systems, 7.7% have a complete EMR system with no paper records.\textsuperscript{2} With the advent of these new technologies comes the opportunity for enormous advances within medicine but also for the introduction of new challenges.

With regards to patient safety, the promise of e-prescribing has the ability to reduce the time gap between point of care and point of service.\textsuperscript{1} In recent years, the Centers for Medicare and Medicaid Services has strongly incentivized providers to use e-prescribing with medication decision support (MDS). In a 2006 national survey on medication management trends performed by ASHP, the time of ordering of a medication to the point of delivery within hospitals decreased by 88%, from an average of 90 to 11 minutes, after the implementation of a pharmacy informatics system with computerized physician order entry (CPOE).\textsuperscript{6} Further evidence suggest that if e-prescribing is incorporated with MDS, 95% of potential adverse drug events missed by simple e-prescribing systems could be avoided. The estimated savings for the reduction of these ADEs within the ambulatory setting alone results in a healthcare savings of $3.5 billion.\textsuperscript{1} These improvements in patient safety using e-prescribing with MDS is due to reductions in illegible prescriptions as well as reduction in prescriptions that have incomplete or incorrect information.

While pharmacy informatics has the ability to improve patient safety and reduce costs, it also has introduced new challenges that must be addressed. Because e-prescribing systems with MDS have yet to be perfected, the overall improvements seen in patient safety and increased efficiency have been met by different issues created by the utilization of a computer-based system. One estimate calculated that for every one preventable ADE identified by the medication decision system, 331 alerts are created that do not require an intervention. Another study concluded that only 10% of alerts are needed to account for 60% of the preventable ADEs and 78% of the preventable ADEs that provide a cost savings to the healthcare system.\textsuperscript{1} In addition to the false alerts created by the system that do not require interventions, the selection of unintended medications or misselection of directions or dosage is possible with e-prescribing. Because the doctor is no longer able write for a prescription on a script pad, the doctor may incorrectly select a medication from the list that populates on the computer leading to incorrect ordering of a medication. Pharmacists must pay close attention to monitor medications selected using e-prescribing to ensure they are safe and effective for the patient. Also, because pharmacists are experts in the utilization and delivery of medications, they must take an active role to design and implement effective pharmacy informatics systems in order to increase healthcare efficiency, reduce costs, and improve patient safety and outcomes.

Due to the changing landscape of healthcare and advent of new technologies, pharmacists have numerous new opportunities to improve healthcare quality and delivery. The incorporation of a pharmacist within a multidisciplinary team and the management of high-risk medication regimens by pharmacists have shown to improve patient outcomes. In addition, due to their understanding of the appropriate usage and effective delivery of medications, pharmacists must play an active role in the development and implementation of emerging EMRs and e-prescribing technologies. As healthcare continues to evolve, pharmacists must continue to adapt within the health-system setting to ensure medications are safe and effective for the patients they serve.
References


