Transitions of Care

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Goal: The goal of this article is to learn how to develop a process to identify patients that require additional attention after being discharged from the hospital by focusing on patient-specific characteristics and discharged medications to prevent adverse drug event (ADE) related readmissions. Various interventions that can be utilized to decrease the rate of these ADEs from occurring will also be discussed.

Objectives: At the conclusion of this lesson, successful participants should be able to:
1. Identify high-risk patient characteristics that would likely result in hospitalization.
2. Identify high-risk medications that are likely to result in ADEs.
3. Discuss interventions for making patient transitions safer.
4. Discuss ways to implement these interventions in practice.

INTRODUCTION

Hospital readmissions continue to be a problem in health systems across the United States. Approximately 20% of Medicare patients are readmitted within 30 days of discharge, while 75% of these readmissions are preventable. This is a hindrance for patients, as it causes decreasing rates of functional independence and well-being. These high readmission rates are also a major cost burden, at an estimated $17.4 billion per year. Clearly, readmission rates are a problem, and they need to be targeted for improvement. The Partnership for Patients initiative is a one billion dollar federal project aimed at trying to tackle this problem. The initiatives aim is to reduce the number of preventable re-hospitalizations by 20% by the end of 2013. This will help to reduce health care costs as well as improve patient safety.

Attention has been focused on looking at ADEs among patients in the hospital, however, not much has been directed towards the events happening in the outpatient setting. High-alert medications have been known to practitioners for a long time in the hospital setting. Recently a study was published identifying which medication classes were the most prevalent in the outpatient setting with the elderly population that is most prone to ADEs and hospital readmissions. Budnitz DS, et al. first conducted a study on which age ranges of patients that are most likely to experience an ADE. They then focused their next study on that age range, trying to diagnose which medications were most implicated in their ADEs and subsequent hospital readmissions. This information is powerful, and will allow health care practitioners to focus on the interventions needed in this population as well as patients with these medication classes.

Many discrepancies occur between transitions of care for the patient. Efforts have been directed at offering solutions to mitigate or eliminate these discrepancies from happening. Medication reconciliation is most likely the best solution based on the literature; however, other avenues have been explored.

DEFINITIONS

Adverse drug events: any noxious, unintended, and undesired effect of change in administration of a previously prescribed medication.

Readmission: “CMS defines readmission as the admission of a patient to a hospital within thirty days of their discharge from a hospital pursuant to one of the applicable conditions.”

Medication reconciliation: “Medication reconciliation is the process of comparing a patient's medication orders to all of the medications that the patient has been taking. This reconciliation is done to avoid medication errors such as omissions, duplications, dosing errors, or drug interactions. It should be done at every transition of care in which new medications are ordered or existing orders are rewritten. Transitions in care include changes in setting, service, practitioner or level of care. This process comprises five steps: 1) develop a list of current medications; 2) develop a list of medications to be prescribed; 3) compare the medications on the two lists; 4) make clinical decisions based on the comparison; and 5) communicate the new list to appropriate caregivers and to the patient.”

Polypharmacy: “The use of a number of different drugs, possibly prescribed by different doctors and filled in different pharmacies, by a patient who may have one or several health problems.”

BACKGROUND AND LITERATURE REVIEW

ADEs are multi-factorial. Commonly, ADEs are due to suboptimal prescribing, patient non-adherence, suboptimal monitoring, unintentional overdoses, and
Polypharmacy, as demonstrated in Table 1. There is commonly a lack of coordination between the patient’s health care practitioners which is why this transition is an improvement area to target. Sub-optimal monitoring is witnessed in over 67% of the ADEs. It has been recognized as the most common reason for preventable ADEs.10

Approximately 33% of ADEs are contributory to patient’s non-adherence.9 Medication side effects were the most common reason for ameliorable ADEs.10 These effects decrease patient adherence to the medications because of their unpleasant nature. By informing the patient about the possible side effects, they are aware of what they need to report to the physician, in hopes of shortening the duration of their symptoms.

Suboptimal prescribing accounts for approximately 380,000 to 450,000 reported preventable ADEs each year.11 Preventable ADEs occurred 56% of the time during the ordering process according to a Bates et al. study.12

Unintentional overdoses are common with medications that have a narrow therapeutic range. The complexity of some medications that patients consume does not help this matter. Some medications rely on patient consistency, in timing, as well as diet. Some patients may not understand, due to a low health literacy, how crucial it is to take these medications exactly as prescribed. The four medication classes that will be discussed below are all subject to unintentional overdose by patients, and this is why these medications are most often implicated.5 This is an area pharmacists can take advantage of by stressing the importance of how to properly take medications, manage medications, and make patients aware of the side effects to deter the lack of adherence.

Polypharmacy is common in patients 65 years or older, approximately 40% take five to nine medications and 18% take ten or more.3 When patients have a large amount of medications to keep track of (i.e. remembering each dosage form, the time of day, administration methods, etc.) the process becomes more confusing, and patients may forget to take their medications, or simply get tired of the task.13

**HIGH-RISK PATIENT CHARACTERISTICS**

Older adults are almost seven times more likely to have an ADE that readmits them to the hospital than a younger person.3,4 Patients aged 60 through 64 years old have an estimated annual rate of ADEs 2.9 per 1000. The estimated annual rate of ADEs is 4.9 per 1000 patients aged 65 and older and 6.8 per 1000 patients aged 85 years or older. Patients 65 years or older have a seven time higher rate of ADEs requiring hospitalization than those younger than 65. One quarter of the ADEs were from patients 65 years or older, and one half of these require hospitalization.4 In addition to elderly patients taking many medications, they also have several factors that make them higher risk for experiencing an ADE. The likelihood of elderly patients having liver disease, kidney disease, physical weakness, co-existing conditions, greater frequency and number of concomitant drugs used and/or age-related physiologic changes is much higher than patients less than 65 years old. Health care practitioners need to take this into consideration when prescribing these medications, monitoring these medications, and counseling patients about these medications. Practitioners should also be cognizant of patients gender, age, weight, creatinine clearance, and comorbidities when prescribing.14

**HIGH-RISK MEDICATIONS**

The Partnership for Patients goal is to reduce the incidence of harm due to high-alert medications in the hospital by 50% by the end of 2013.2 Though this is a hospital initiative, all health care entities should strive to reach this goal and reduce patient harm from high-risk medications.

Some medications have a high ability to cause harm to patients even when used correctly. A small group of medications have been identified to cause most of the documented serious adverse events.7 Hospitalizations involving warfarin, insulins, and oral hypoglycemic agents were nearly all implicated due to unintentional overdose.3 In patients 65 years or older, drugs that required regular monitoring were the culprits for 85.4% of overdose visits.4 Table 2 describes the medications and the variables contributing to their ADEs.

Two studies found that approximately 94% of admissions due to antidiabetic agents were due to patient non-adherence (i.e. patient would take therapy without eating).9 This, again, is an opportunity for the pharmacist to educate the patients on the appropriate medication use and side effects. The elderly might not associate confusion, dizziness, and weakness with low blood sugar that their antidiabetic medication is causing. If patients would prefer a more intensive information session, referrals to diabetic education centers/clinics are available.

Approximately 63.3% of warfarin related admissions were due to hemorrhage. 88.1% of antiplatelet related hospitalizations were due to hemorrhage. Anti-coagulation clinics have been proven to demonstrate better anticoagulation control and reduce thromboembolic and bleeding events as far as monitoring is concerned. A risk versus benefit strategy needs to be imparted when prescribing patients antiplatelet agents or warfarin. Patient education on hemorrhagic symptoms may also help to ward off associated ADEs.3

Interdisciplinary efforts that aid in the safe medication management of hematologic and antidiabetic agents have high potential to mitigate these ADEs.3 Medication dosage changes and discontinuations are common among older adults at the time of admission and discharge.14 Discontinuations and drug
dosage changes are the typical attributes to ADEs, while medication substitutions are not a significant contributor. There is typically at least one medication reconciliation or adherence issue post discharge in approximately 80% of patients.\(^1\) The average time from medication alteration to ADE is 14 days, which is why, prior to discharge, many of these patients are readmitted, rather than addressing the problem in the hospital.\(^14\) These changes are necessary to accommodate the patient’s clinical condition or to use the facility’s formulary, which is why medication reconciliation is so critical. If these discrepancies are not addressed, patients could be over treating or undertreating for an extended period of time, which could lead to disastrous outcomes.\(^12\) Efforts are being made to contain this issue, the Joint Commission for Accreditation of Healthcare Organizations (JCAHO) now requires medication reconciliation at the time of hospital admission and discharge.\(^12\) This needs to be taken a step further and have, at minimum, a triple check upon readmission to their home.

Transcribing patient information between facilities, post discharge, is also a major issue. Incomplete or inaccurate communication regarding the patient’s new medication regimen can lead to ADEs. Many high-risk patients have several different providers (i.e. specialists, primary care physician, etc…) that do not coordinate care. Most facilities do not share patient records because they are not affiliated with one another, thus, providing opportunity for medication mismanagement.\(^15\) An intervention implemented upon home readmission has the likelihood to identify most medication discrepancies and prevent most ADEs.\(^15\) When asked, patients identified three key issues they encountered once they were discharged home: “at-home care management, medication knowledge, and continued access to health care providers.”\(^16\) Referrals to specialty clinics or home health care services may offer an immense benefit to the patient and mitigate ADEs, thereby reducing hospital readmissions.

Discharge counseling is associated with a significantly lower rate of preventable ADEs 30 days after hospital discharge.\(^17\) Discharge orders can be confusing, and many patients may not understand them. Several studies claim that the pharmacist is the ideal health care professional suited to implement a program to help prevent readmissions.\(^18\) Patients that are aware of possible side effects from their medications were about half as likely to experience an ADE. This is an area of controversy, as some clinicians state that patient’s knowledge of side effects increases their likelihood of developing the mentioned symptoms, while Forester, et al. says that patients will now think these symptoms are “expected” so may not report it as an ADE.\(^10\)

Several studies, Schnipper, et al., Walker, et al., and Forster, et al., have measured how beneficial it is to have pharmacists implement a follow-up phone call program three to five days post discharge.\(^17,19,20\) In one study, they found discrepancies between the patient’s discharge medication regimen and their home medication regimen 71% of the time. Aside from detecting discrepancies, this intervention may help with patient medication adherence, and help to detect ameliorable ADEs.\(^17\) Patients that received a follow-up phone call 72 hours after discharge had lower rates of 14-day hospital readmission in a study that took place at the University of Michigan.\(^19\)

The importance of seeking follow-up care needs to be emphasized to patients prior to discharge. Patients are monitored more closely in the hospital, which is another reason an increased number of ADEs may be detected post-discharge. Patients need to know that there are clinics available to aid them in their education, initiation, and maintenance. With the monitoring and accountability that is associated with these clinics, patients are more likely to have better disease state and medication management. Therefore, outcomes will improve and readmission will decrease.

IMPLEMENTATION OF THE STRATEGIES

The Plan Do Study Act (PDSA) Cycle is designed to help implement small tests of change within an institution. Once these tests are preformed small scale, follow-up tests are conducted to address gaps in the change and make improvements. Upon fixing the problems on the smaller scale, a wider scale test of change can take place leading to a full implementation of change. The purpose of doing the PDSA cycle in this manner is to persevere from failures, decrease emotional frustrations, and increase spread, among others.

Continue the PDSA cycle until no further modifications are necessary. The following literature summaries are examples of how different health systems have implemented the PDSA cycle into making drastic improvements.

The ways Partnership for Patients is addressing their high-alert medication (HAM) issues are in a strategic manner. Two suggested methods are to address the class of medications with the most or least amount of complexity. Once your facility tackles that class by adopting safety tools you can move to the next HAM on your list. By picking one medication class and working to improve that you can implement the strategies that work and discard the ones that do not as you transition from each HAM.\(^2\) This strategy can be carried over to any outpatient facility in the same way.

Kaiser Permanente Northern California (KPNC) Program has created a High-Alert Medication Program (HAMP) in their hospitals to address the ADEs associated with HAMs. Their
goals/objectives were met with the following strategies identified in Table 6.

They first developed a task force, then communicated their message to all participating bodies and educated and trained everyone involved. This team design is ideal for reducing ADEs, and it is reproducible in virtually any health care setting. They also designed a trigger tool to track their improvements made in reducing ADEs.11

Halasayamani et al. developed a discharge checklist with the input of over 120 clinicians highlighting the crucial aspects before transitioning a patient home. The checklist is a great standardization tool that allows the care providers to make sure they covered everything necessary. Though this implementation will take time, it is shifting the focus of discharge to an admission, because the patient is being “admitted” to their next place of care. This transition deserves just as much attention as when the patient reported to the hospital.21

One study, Curry et al., had pharmacists identify patients that were high risk for readmission then visit those patients in their homes to reconcile and optimize medication regimens from patients’ multiple care settings, as well as their over-the-counter (OTC), and herbal medications. The pharmacist also provided care management and ongoing support to the recently discharged patient for 30 days post discharge. After the pharmacist did an in-depth evaluation of the patient’s medication regimen and optimized it, he or she educated the patient or caregiver on each of the patient’s current medications focusing on indication and adverse effects.13

Medication side effect counseling can help to prevent ameliorable ADEs.10 Simply by counseling the patient on side effects of their medications, the health care provider can decrease the risk of an ADE by fifty percent.9 By informing our patients of possible side effects, this in turn may make them more adherent with medication monitoring for fear of experiencing the discussed side effect.

Focusing on the high risk medications mentioned in this paper is a good starting point.

TECHNOLOGY ADVANCES

The utilization of technology has helped to improve drug safety from the implementation of computerized physician order entry, physician decision support, bar code scanning, and smart pumps, etc. However, when a new system is made, it cannot be installed then left alone. It requires addressing and educating people about the software in order for it to be successful.20

There are current studies targeting alert notifications by trying to reduce overrides due to alert fatigue. These studies are incorporating patient characteristics and risk factors for developing a certain symptom or side effect from the medications the practitioner will prescribe. This will hopefully help to decrease suboptimal prescribing.

I-DENTI-FIED Inc. has produced an identity card to access a person’s medical information. The card contains the patient’s medical history and current health record which can be accessed through a barcode system by software through a secure network. This is incredibly helpful whereby it will identify the patient and show patient’s health history (allergies, medications, disease states, etc…) to expedite care. This will greatly aid in the medication reconciliation process if there is critical information already loaded to the device and the only thing the health care practitioners have to do is scan it to obtain all vital information. Aside from health information, this system also contains emergency contacts, insurance coverage, and past procedures. I-DENTI-FIED Inc. believes this will help to reduce waste, medical errors, and consequently hospital readmissions.23

CONCLUSION

There are many strategies that can be adopted to help reduce the occurrence of ADEs and, therefore, readmission to the hospital. They have been repeatedly identified. Simply knowing what causes ADEs does not alone help patient safety; instead a plan must be put into action. Multidisciplinary prevention strategies should be focused on communication and education in the community and pre-discharge. There should be a strong focus on drug classes that are most involved and methods or referrals for patients to get the appropriate care they need (anticoagulation clinics, diabetics, home monitoring, and laboratory and serum drug concentration monitoring).9 Patients that are especially likely to experience these ADEs (elderly, renal dysfunction, polypharmacy) should especially be targeted on the importance of adherence and monitoring, and be given referrals, if needed.7 Setting goals, creating a team that is committed to improving patient safety, having effective communication among all team members, providing continual education, and measuring your progress to maintain sustainability are all steps to take in implementing a change in your practice area.
REFERENCES


### Table 1. Multifactorial Grid of Adverse Drug Effects:

- Suboptimal monitoring
- Patient non-adherence
- Suboptimal prescribing
- Unintentional overdoses
- Polypharmacy

### Table 2. Commonly Implicated Medication Classes:

<table>
<thead>
<tr>
<th>Medications</th>
<th>Variables Contributing to ADEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warfarin (33.3%)</td>
<td>• Complexity of dosing and monitoring • Patient adherence • Drug interactions • Dietary interactions</td>
</tr>
<tr>
<td>Insulins (13.9%)</td>
<td>• Pharmacology of drug • Complexity of dosing • Adjustments due to stress due to illness, and amount of carbohydrates consumed</td>
</tr>
<tr>
<td>Oral antiplatelet agents (13.3%)</td>
<td>• Bleeding events • Irreversibility of clopidogrel (Plavix®) • No defined optimal level of platelet inhibition</td>
</tr>
<tr>
<td>Oral hypoglycemic agents (10.7%)</td>
<td>• Narrow therapeutic range</td>
</tr>
</tbody>
</table>

### Table 3. Interventions to mitigate ADEs:

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication Reconciliation</td>
<td>Discrepancy recognition • Decrease ADEs</td>
</tr>
<tr>
<td>Transition Communication</td>
<td>Discrepancy recognition • Decrease ADEs</td>
</tr>
<tr>
<td>Patient Education</td>
<td>Side effect awareness • Greater medication understanding • Decrease ADEs</td>
</tr>
<tr>
<td>Follow-up Telephone call</td>
<td>Discrepancy recognition • Increase patient adherence • Decrease ADEs</td>
</tr>
<tr>
<td>Post-discharge clinics/improved monitoring</td>
<td>Optimize therapy • Decrease ADEs</td>
</tr>
</tbody>
</table>
Table 4. Barriers to Successful Medication Reconciliation15

1. Difficulties in staffing a task that is labor-intensive
2. Risk of clerical errors during reconciliation
3. Lack of prescriber awareness of reconciliation findings
4. Lack of influence of reconciliation findings on prescriber decision-making

Table 5. The Plan Do Study Act Cycle21

<table>
<thead>
<tr>
<th>Plan</th>
<th>Describe the small test of change your institution wants to adopt, something that can be accomplished over the next week. Then identify WHO, WHAT, WHERE, and WHEN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do</td>
<td>Carry out the test of change, and document what was done throughout the process.</td>
</tr>
<tr>
<td>Study</td>
<td>Look through the collected data and analyze the results.</td>
</tr>
<tr>
<td>Act</td>
<td>Describe the appropriate modifications that need to be implemented to the test results to improve the test of change.</td>
</tr>
</tbody>
</table>

Table 6. High-Alert Medication Program Strategies11

1. Identifying high-risk and problem-prone medications as HAM
2. Standardizing HAM handling practices
3. Enhancing education programs related to HAM practices, embedding these into annual core competencies of all staff who handle medications
4. Developing monitoring functions at both the regional and local levels to ensure sustainability and ongoing systems improvements