

Open School

Case Study: (AHRQ) Reconciling Doses

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Case study from [AHRQ WebM&M](#)

Learning Objectives: At the end of this activity, you will be able to:

- List the steps involved in medication reconciliation.
- Describe the role of each of the stakeholders in medication reconciliation.
- Discuss how medication reconciliation decreases the opportunity for medication errors and harm.

Description

Faced with a patient who's too confused to remember his medication regimen, a care team administers an overdose of the anticoagulant Warfarin.

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- [PS 102: Human Factors and Safety](#)
- [PS 101: Fundamentals of Patient Safety](#)
- [PS 100: Introduction to Patient Safety](#)

Key Topics

Care coordination and transitions, engage patients and families in care, health information technology, health information technology: electronic health record, hospital operations: discharge planning, reliable processes, transitions in care, medication safety, medication safety: medication reconciliation.

Case & Commentary: Part 1

Frank Federico, RPh, Director, Institute of Healthcare Improvement

A 68-year-old man with a history of diabetes and atrial fibrillation maintained on warfarin presented to the emergency department (ED) with fever and mental status change. Lumbar puncture was attempted three times without success; empiric treatment for meningitis was started. Further examination revealed an area of cellulitis, and intravenous antibiotic therapy was changed accordingly. At the time of admission, the patient was unable to recite his medication history, and his wife was unclear about the doses. However, the EMS run-sheet had a list of the patient's medications and doses. The patient was started on the medication regimen per the EMS report.

Medication reconciliation is defined as the process of collecting the best medication history possible, verifying the list, and comparing it to orders written at admission, transfer, and discharge. Although reconciliation is always useful, it is particularly crucial when patients are unable to provide a complete and accurate medication history or when the history is not available to those who must make treatment decisions.

Evidence supporting the need for and the value of medication reconciliation is strong. More than half of all medication errors occur at the interfaces of care. A review of 22 studies by Canadian researchers found (in the absence of reconciliation) errors in up to 67% of patients' prescription medication histories. Researchers at Johns Hopkins reported that an average of ten prescriptions needed to be changed weekly in the ICU after errors were identified through a reconciliation process.

Implementation of a successful medication reconciliation process ensures that each of the members of the health care team has access to the list of medications that the patient was taking prior to admission, what was ordered at transitions of care, and a method to communicate an intentional medication change or discontinuation. Rather than hoping that a medication was appropriately discontinued and not overlooked, this intervention provides a process to facilitate and standardize communication.

The value of medication reconciliation has been demonstrated "on the ground" by a number of institutions, most prominently Luther Midelfort Hospital, a Mayo affiliate. Based on this work and the data cited earlier, medication reconciliation has been one of the recommended changes for teams participating in Institute for Healthcare Improvement (IHI) collaboratives to reduce adverse drug events. Accordingly, when the IHI launched its 100,000 Lives Campaign to promote six changes proven to improve patient care and prevent avoidable deaths, medication reconciliation was chosen as the focus of efforts to reduce adverse drug events. Moreover, the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) also selected medication reconciliation as one of its 2005 National Patient Safety Goals.

An important step in the process is to collect the best medication list possible. Many patients can and do provide accurate medication histories. When, as in this case, cognitive, cultural, or other barriers prevent them from being able to provide an accurate medication history, it is important to identify

effective ways to collect this history, accepting that the list may initially be incomplete. Interviewing family members and contacting primary care physician offices and local pharmacies may improve the accuracy of the list. Some hospitals have worked with ambulance staff to remind them to pick up prescription bottles or medication lists that may be attached to refrigerators or medicine cabinets. Each organization should have a process to continually improve the system for collecting this medication history.

Case & Commentary: Part 2

Frank Federico, RPh, Director, Institute of Healthcare Improvement

After 2 days, the patient was transitioned to Augmentin. While in hospital, the patient had been receiving 5 mg of warfarin at bedtime, which, according to the EMS intake sheet, was his usual outpatient dose. The team did not confirm this dose with the patient's family, primary physician, or pharmacy. At the time of discharge, his INR was noted to be 4. Realizing the warfarin dose was too high, the team instructed the patient to decrease his dose to 3 mg at bedtime and to have his INR rechecked in 3 days. After 3 days, his INR was 10. He was treated with vitamin K. Two days later, the patient returned to the ED with back pain, lower extremity weakness, and incontinence. He was found to have an epidural hematoma, which was emergently evacuated. One week post-operatively, the patient still had neurologic deficit.

Implementing a medication reconciliation process may represent a change in work flow, requiring more time from staff members. But organizations should be encouraged by those who have successfully implemented a medication reconciliation process as part of a larger medication safety program.

To implement a successful medication reconciliation process, organizations should first examine the system presently in place. Using a high-level flow diagram may be helpful in determining the different entry points into the hospital. An example can be found [here](#). A similar diagram for transfers and discharges will help the team understand what is in place and how to develop a system to support medication reconciliation at each stage.

It is necessary to have a champion and a multidisciplinary team to work on testing different changes that will lead to the desired system. A useful instrument to record the team members and their roles is available [here](#). Senior leadership support is necessary to align the process with other hospital initiatives, provide resources for the project during its development, and remove barriers.

Due to the many entry points for admission into a hospital, each hospital's different levels of care, and each hospital's varied populations, there is no one way to implement this process throughout the hospital. Accordingly, organizations cannot expect to roll out a reconciliation process overnight. Using

a proven improvement methodology (eg, such as the “Model for Improvement”), hospitals can test and implement changes in different settings, using the results of these experiences to inform dissemination.

Medication reconciliation is a multidisciplinary process. Selecting who should be involved in each step along the way should be based on available resources and who can best complete the task. For example, a physician, nurse, pharmacist, or pharmacy technician can collect the medication history. Although pharmacists have been identified as being more effective in taking such a history, there is no reason that they cannot train others to do this well. An effective model may be one in which nurses collect a medication history, pharmacists verify the information, and physicians use the resulting list to aid in making decisions about drug therapy. Physicians also complete the last step described: document reasons or intentions to discontinue, change, or hold medications in a manner that is clear to all.

Forms to collect medication histories have been employed by many organizations. Some have adapted the forms to serve as both a medication list and an order form. Adding columns indicating whether a medication should be continued, discontinued, or placed on hold minimizes re-writing and facilitates communication among disciplines. This model may not be effective in all organizations. As with any new process, hospitals must determine if the changes introduce new opportunities for errors. Forms have also been used in the transfer and discharge process. Placing the list in a prominent place in the chart or using colored paper facilitates access to this information. Several examples of useful forms can be found on the Web sites of the Institute for Healthcare Improvement and the [Massachusetts Coalition for the Prevention of Medical Errors](#).

To complete the process of medication reconciliation, at the time of discharge, the discharge prescriptions must be reconciled with the most recent inpatient orders and the patient medication list prepared at admission. This comparison is useful to screen for therapeutic duplication, possible drug interactions, omissions, or medications not ordered during the inpatient stay.

Technology, if well designed and implemented, can be a useful adjunct to medication reconciliation. Systems whose electronic medical records allow medication histories to be downloaded from an electronic nursing documentation system onto a form reduce the time-consuming and error-prone process of manually completing forms. At discharge, reformatting the patient medication profile from the pharmacy system into a prescription form can streamline the discharge prescription process.

Patients can play a significant role in helping to design a process as well as being active participants in medication reconciliation. Organizations such as McLeod Health in South Carolina have engaged patients in developing a state-wide universal medication form. Individually, patients should be encouraged to carry their medication lists and present them at each health care visit. An example of a patient medication card, which can facilitate this process, can be found [here](#).

Getting Started

Implementing a robust program of medication reconciliation should not be viewed as necessary to meet the regulatory or accreditation requirements but, rather, as a patient safety initiative. The patient should be at the center of this work. A successful medication reconciliation process is one in which all stakeholders are accountable for its implementation, spread, and sustainability. Here are some practical tips for getting an effective program up and running:

- Start with a small segment of the population. The process of collecting the medication history and writing orders for elective surgery patients will be different from that for patients admitted through the ED or a nursing home.
- Evaluate the current system.
- Identify who should participate in each step of the process and define the responsibility of each position. For example, nurses or pharmacists may be used to collect a medication history based on available resources.
- Determine when reconciliation should be applied at transfer. Medication reconciliation applies if medications are reordered or there is intent to change treatment.
- Select/create the forms. This is best done on paper, at first, even if the ultimate intent is to computerize the process.
- Test changes in each area. Organizations must use a measurement strategy to determine the effectiveness of the process that has been implemented. For example, measuring the fraction of unreconciled medications at different transfer points can help those involved understand how well the process is working.

Take-Home Points

- Medication reconciliation is an effective process to reduce errors and harm associated with the loss of medication information as patients transfer through different levels of care.
- In order for medication reconciliation to be successful, all stakeholders must be involved.
- Collect the best medication history possible, verify that history, and ensure that the information is available at the point of order writing.
- Hospitals should develop different processes to support medication reconciliation based on patient entry points into the hospital and available resources.
- Patients can play a vital role in medication reconciliation by carrying an up-to-date medication list and making it available to each provider they encounter.
- Medication reconciliation should be applied any time medication orders are re-written or there is a change in treatment plan.

- Reconciliation at discharge is necessary to avoid therapeutic duplication, drug interactions, and omissions of medications that may have been discontinued or placed on hold during hospitalization.
- Many hospitals have successfully implemented reconciliation using low-technology solutions (eg, forms) rather than computers.

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Discussion Questions

Submitted by Jennifer Boehne, PharmD, Masters in Health Informatics Candidate, University of Minnesota

1. Medications like Warfarin require close monitoring to ensure the patient is taking the correct dose. The Joint Commission issued a Sentinel Event Alert related to anticoagulants in September 2008. In addition, Goal 3E of the 2008 National Patient Safety Goals also addresses anticoagulation safety. What steps has your healthcare facility taken to avoid medication errors involving warfarin or other anticoagulation drugs?
2. The article discusses several ways to obtain information to complete medication reconciliation. Can you think of any other ways you could obtain information?
3. How long should a healthcare facility have to complete medication reconciliation at admission, transfer, and discharge?
4. The case isn't very clear about what strength of tablets the patient had at home or was prescribed. It appears he had 5mg tablets at home. He was instructed to take 3mg tablets at home. Discuss the potential pitfalls of altering a patient's dose and medications at discharge.
5. Technology, if well designed and implemented, can be a useful adjunct to medication reconciliation. At the same time, patients need to take more ownership of their medication list. What should the medication list of the future look like? Should it be paper and be kept in your purse or wallet, stored on a portable hard drive, credit card that can be swiped, available online, etc.? Discuss the pros and cons of these various methods.

Activity

Use the example of the workflow discussed in the case to document the existing workflow from multiple entry points (i.e. ER, elective surgery, etc.) Medication reconciliation is a multidisciplinary process. Identify and discuss who currently completes the medication history and reconciliation process at your healthcare facility. What are the pros and cons of each of these providers taking part in this process? Look at aspects like time, cost, knowledge, etc.