# MARQUIS IMPLEMENTATION MANUAL

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Introduction

Unintentional medication discrepancies during transitions in care (such as hospitalization and subsequent discharge) are very common and represent a major threat to patient safety. One solution to this problem is medication reconciliation. In response to Joint Commission requirements, most hospitals have developed medication reconciliation processes, but some have been more successful than others, and there are reports of pro-forma compliance without substantial improvements in patient safety. There is now collective experience about effective approaches to medication reconciliation, but these have yet to be consolidated, evaluated rigorously and disseminated effectively.

Our goal in this manual is to compile the best practices around medication reconciliation efforts and provide enough detail so that each site can adapt these to its environment. The other goal is to explain the fundamentals of quality improvement and how they can be applied to medication reconciliation efforts. We have striven to build in flexibility, recognizing that each site will have a different starting point and individual strengths and weaknesses.

I would like to thank all those who contributed to the development of this manual. The MARQUIS team comprises an incredible group of clinicians, support staff and advisors whose tireless dedication to this project has made this manual a reality. We hope this collection of best practices will assist you in your efforts to improve your medication reconciliation process, and help keep your patients safe throughout all their transitions in care.

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SECTION A: Setting the MARQUIS TEAM Up for Success:

I. First Steps

1. Overview of MARQUIS (Multi-Center Medication Reconciliation Quality Improvement Study)

Medication errors and adverse drug events (ADEs) at times of care transitions, including admission to and discharge from the hospital, are common events. In part, these errors are due to unintentional discrepancies in patients’ medication regimens as they move across different sites of care. The goal of this project is to develop better ways for medications to be prescribed, recorded and reconciled accurately and safely at times of care transitions when patients enter and leave the hospital.

The MARQUIS study team will work with six different hospitals as they improve their medication reconciliation practices, with the goal of developing a method of effective medication reconciliation that improves patient safety and can be implemented at other institutions after completion of the study. To set your team up for success, we have developed this implementation manual to lay the foundation for the initiation of the MARQUIS interventions.

2. Pre-Implementation Actions

Steps recommended prior to initiation of the study include:

- Clarify key stakeholders, reporting hierarchy and approval process
- Obtain support and approval from the institution
- Assemble an effective multidisciplinary quality improvement team
- Set general goals and a timeline (specific for each intervention launched)
- Turn general goals into specific goals
- Follow a framework for improvement
- Complete the MARQUIS pre-intervention site assessment

Other initial steps include the following:

- Learn about best practices
  Review the literature for medication reconciliation (included in this manual, Section A, Chapter IV, and as a PowerPoint slide presentation at https://hospitalmedicine-marquissiteworkspace.pbworks.com) and identify related guidelines and core measures. Then, along with your assigned MARQUIS mentor, select (or tailor) the interventions that are aligned with the scope and goals identified by your project team.
• Analyze care delivery
  Care delivery should be recognized as a series of intermediate and interdependent steps leading to the endpoint of interest. Therefore it is important to:
  ♦ Diagram your current care delivery processes.
  ♦ Process-map your current care delivery system of medication reconciliation. (Qualitative analysis: Diagram care delivery to identify steps in the care process that may be unnecessary or may contribute to non-value-added variation in practice. Likewise, identify areas that are either missing or need important redundancy. A description of this process can be found in Section A, Chapter V, part 4.
  ♦ Identify interrelated steps and “failure modes.”
  ♦ Identify steps that should become targets for improvement efforts.
  ♦ Select metrics for evaluating key components of your program. (Quantitative analysis: Analyze outcomes of the care processes in a way that your project team can react to effectively. A description of this process can be found in Section A, Chapter V, part 5.

• Track performance
  The MARQUIS data collection tool, “QuesGen,” will assist each site in collecting data needed to track performance on key metrics of the provided interventions. Your team will have the ability to plot and report data graphically using run charts. Your team will also be able to compare its progress with the progress of others in the study.

• Choose reliable interventions
  The MARQUIS study will provide each site with a toolkit of standardized processes and protocols that can be tailored to your unique care environment. A mentor will be assigned to each site in order to help facilitate the transition from current medication reconciliation practices to the components of the MARQUIS intervention.

Section A, Chapter V, “Assembling the Team and Developing Strategy,” provides further details regarding these pre-implementation actions.

3. Clarifying Key Stakeholders

A stakeholder is an individual or group with a direct interest or whose interests may be affected by the project outcome. Every medical center has stakeholders who should be made aware of new initiatives prior to implementation. These individuals or committees may have direct involvement in the project or may influence the project outcome; for example, they may offer insight and guidance regarding initiatives that have been successful (or unsuccessful) in the past.

Involving stakeholders early is also important for the approval process. There is typically an approval process that should be completed in order to maximize awareness, provide legal protection and improve the success of interventions. Stakeholders are important for “buy-in” and can influence decision makers or may have organizational authority. This can improve the overall success of the initiative as well as provide resources for process improvements down the line.
Each medical center may have different stakeholders who are appropriate to involve. Some examples of stakeholders in medication reconciliation initiatives are:

- Pharmacists
- Hospitalists
- Nursing Leadership
- Primary Care Providers
- Hospital Administration
- Patient Safety Personnel
- Risk Management Personnel
- Case Management/Home Care Coordinators
- Social Workers
- Information Technology Department
- Marketing and Public Relations Divisions

4. Obtaining Support and Approval from the Institution

Your team needs support from your medical center leadership to enhance your medication reconciliation improvement effort. Securing institutional buy-in and administrative support is essential. Although you may not yet have robust data, the rationale for directing resources toward medication reconciliation efforts should be clarified as soon as possible. A direct line to administrative support for your effort, either through a direct reporting structure or by including a senior administrator on the team, should be in place before you go any farther. One example of an approach is to have an “executive sponsor” (e.g., CEO, CMO, CNO) or administrative champion of the project. This executive sponsor can help put medication reconciliation in the context of other hospital-wide priorities, help mobilize resources (personnel and/or financial) and help remove political and other obstacles. This sponsor should receive regular updates on the project, attend at least some committee meetings (ideally), and be an advocate of the project to other members of hospital leadership.

We also recommend obtaining another form of institutional support; namely, a “clinical champion” or champions. These are well-respected clinicians in your institution who are opinion leaders (i.e., the type of person to whom other clinicians turn for advice on patient care matters). Having a clinical champion on your QI committee and emotionally invested in this project can have several advantages when trying to convince front-line staff of the importance of medication reconciliation and the need for change.

Meet with members of your administration and with potential clinical champions. Bring prepared “talking points” and, ideally, some preliminary information you have collected demonstrating the need for the administration’s attention. Talking points may include:

- Medication discrepancies are highly prevalent: up to 67% of inpatients have at least one unexplained discrepancy in their prescription medication history at the time of admission.¹
- A recent study at Partners Healthcare found that on average, each patient on a general medicine service had more than one discrepancy with potential for patient harm in either admission or discharge medication orders.²
- Approximately 70% of potentially harmful discrepancies are due to history errors, usually errors of omission (i.e., not realizing a patient was taking a medication prior to admission).²
- Healthcare providers often gather medication history information from several sources (e.g., inpatient medical records, outpatient clinic records, prescription bottles and outpatient pharmacy records). However, researchers from a variety of clinical settings have shown that discrepancies exist between what is documented in these records and what the patient is actually taking. There is rarely a single source of truth upon which healthcare providers can rely.³
• Prescribing errors due to inaccurate or missing patient medication histories and medication omissions may not be preventable with most currently available Computerized Physician Order Entry (CPOE) systems.4

• Up to 27% of all hospital prescribing errors can be attributed to incomplete medication histories at the time of admission.5

• 33% of patients discharged from the ICU had one or more of their chronic medications omitted at hospital discharge6 and 73% of patients had at least one medication discrepancy between the surgery and anesthesiology preoperative medication histories.7

• 22% of medication discrepancies could have resulted in patient harm if the discrepancy continued during his or her hospitalization and 59% of the discrepancies could have resulted in patient harm if the discrepancy continued after discharge.8

• Readmission impact: It is estimated that more than one-third of elderly patients taking three or more prescription drugs for chronic conditions are hospitalized within six months of hospital discharge, and 20% of readmissions were caused by drug-related problems.9 Two randomized controlled trials have shown a significant reduction in post-discharge healthcare utilization with comprehensive medication reconciliation interventions (the larger of the two studies showed a 16% reduction in readmissions and emergency department visits in one year, from 2.24 to 1.88 per patient).10,11

• Financial Implications for the institution: Not including reductions in readmission rates, medication reconciliation can save money by reducing ADEs. The literature estimates the cost of a preventable ADE at $4,800 per event based on a 1997 study done by Bates.12 Some organizations have calculated an ADE cost as high as $10,375.13

Case vignettes can illustrate specific outcomes from error due to inadequate medication reconciliation. Specific cases of patients who have experienced such an ADE can often be a powerful supplement to data regarding the institution’s current practices and, therefore, support the need for resources. In addition to adding the “patient’s voice” to your communications, these vignettes can highlight the particular areas that your initiatives are directed at improving.

5. Summary

TASK A: Identify key stakeholders, committees (including your organization’s QI committee) and special groups that need to be aware of your efforts to improve the medication reconciliation process within your organization.

TASK B: Identify an executive sponsor; discuss the importance of medication reconciliation with him/her; obtain a letter of support.

TASK C: Identify at least one clinical champion; discuss the importance of medication reconciliation; and enlist his or her participation in your medication reconciliation QI committee.

TASK D: Consider developing a business case for your organization as highlighted in Appendix 1 to assist with illustrating the importance of this project to leadership.

II. Medication Reconciliation: Definition

Medication reconciliation is a process of identifying the most accurate list of all medications a patient is taking and should be taking — including name, dosage, frequency and route — and using this list to provide correct medications for patients anywhere within the healthcare system. This definition is compatible with that of The Joint Commission and also includes ordering medications accurately, which is ultimately the purpose of medication reconciliation.

Inpatient medication reconciliation consists of the following steps:

1. At admission, the appropriate provider takes the “best possible medication history” (BPMH). A BPMH is the most accurate list of medications the patient should be taking and the list of medications the patient is actually taking prior to admission. This list should be clearly documented and updated throughout the hospitalization if more information becomes available.

2. Use the BPMH and the patient’s clinical condition to order correct hospital admission medications. Any unintended discrepancies between the BPMH and admission orders should be identified and resolved.

3. At the time of hospital transfer or discharge, compare the BPMH and current inpatient medications to create a correct set of transfer or discharge orders. Any unintended discrepancies between preadmission, current and transfer/discharge orders should be identified and resolved. Reasons for any purposeful discrepancies (i.e., for clinical reasons) should be documented.

4. At discharge, provide patients and/or caregivers with an accurate medication list and appropriate education regarding the discharge medication regimen, including name, dose, frequency, route and purpose. Any new medications, changes in dose or frequency, and stopped medications compared with the preadmission medication regimen should be clearly identified and explained. The importance of managing medication information should be explained to the patient and/or caregiver.

5. The discharge medication regimen should be documented and communicated with post-discharge providers regarding changes from the preadmission regimen and the reasons for those changes.
III. Medication Reconciliation: Process

This section describes each step of the medication reconciliation process in detail, including the personnel and information requirements. Note that rather than assigning each step to a particular type of clinician, we instead describe the knowledge, skills and behaviors required to perform that step. As you analyze your current medication reconciliation processes and envision the ideal “future state,” this information will help you decide who should perform each of these steps and what additional resources you might need (e.g., time, training, information technology). In later sections, we discuss explicitly assigning roles and responsibilities of various personnel to these various steps. We also describe an “intensive bundle” for high-risk patients, in which the personnel conducting some of these steps might differ (e.g., the type of person who takes a best possible medication history might be different for high-risk and average-risk patients).

OVERVIEW

- Admission
  - Step 1: Take a Best Possible Medication History (BPMH) to create the Preadmission Medication List (PAML). Record the PAML in the patient’s chart.
  - Step 2: Write admission medication orders.
  - Step 3: Compare the PAML with admission orders, and identify and correct any unintentional discrepancies in admission orders.

- Transfer
  - Step 4: If applicable, write transfer medication orders, using the PAML and current inpatient (pre-transfer) medications as a guide.
  - Step 5: Compare PAML medications, pre-transfer medications and transfer medications, and identify and correct any unintentional discrepancies in transfer orders.

- Discharge
  - Step 6: Write the Discharge Medication List (DML) using the PAML and current inpatient medications as a guide. Document the DML.
  - Step 7: Compare the PAML, current inpatient medications and the DML. Identify and correct any unintentional discrepancies in the DML.
  - Step 8: Review the DML with patient. Highlight and explain stopped, changed or new medications compared with the PAML and the reasons for those changes.
  - Step 9: Forward a second copy of the DML to post-discharge providers. Explain stopped, changed or new medications compared with the PAML and reasons for those changes.
ADMISSION

Step 1: Take a Best Possible Medication History (BPMH) to create the Preadmission Medication List (PAML). Record the PAML in the patient’s chart.

Goal: Collection and documentation of a patient’s preadmission medication history and creation of a PAML on admission.

Note: * = additional information found in Information Requirements section, below.

Personnel Requirements

NOTE: This may entail two jobs: one person to identify sources of medication information and gather those sources, and another person to create the PAML.

Job 1: Identify and obtain preadmission medication sources, create a first draft of the PAML

Knowledge

1. Definition of what a medication is*
2. General knowledge of types and names of medications
3. General knowledge of medication-related information and what constitutes a complete medication order (e.g., dose, formulation, route, frequency, indication)
4. Sources of medication history information based on local health system* (e.g., how to contact local primary care practices to obtain outpatient medication lists)
5. Common sources of challenges and errors in obtaining an accurate medication history (e.g., omissions, wrong dose, wrong dose form, multiple names for one drug – generic/brand or multiple brand names, look-alike and sound-alike drug names)

Skills

1. Patient interviewing skills for obtaining an accurate medication history
2. Communications skills for contacting outside resources to obtain a medication history (e.g., pharmacies, PCP offices, skilled nursing facilities)
3. Organizational skills, to locate and use paper medical chart resources for medication lists, prescription history, etc.
4. Familiarity with accessing electronic health records (EHRs), if available, to view medication lists, physician and nursing notes for medication history, etc. (see below for a complete list of possible medication sources)
5. Ability to communicate with admitting physician about the medication list, questions about list, etc.
6. Ability to gather information from a collection of patient medications and decipher what is actually prescribed for the patient and taken by the patient
7. Ability to probe the patient/caregiver about medications that may have been omitted from the list based on a list of probes or knowledge of patient’s medical condition (e.g., patient has asthma but there aren’t any inhalers on the list)*
8. Ability to know when medication list is accurate and information gathering can cease.
9. Optional: Ability to use medication resources to identify pill by color, shape, indication, etc.

Behaviors

1. Perseverance in obtaining the BPMH
2. Communication and working in multidisciplinary teams
System Resources

Tools
1. Computer/EHRs
2. Telephone, paging system and fax machine
3. Documentation tool to record medication history
4. Online resource — or other current resources — for pill identification and common medications
5. Ample time to collect a proper BPMH (approximately one minute per medication; more in the most complex patients)

Information Requirements

Best Possible Medication History (BPMH) Requirements:
1. All medications documented (using The Joint Commission definition of medications\textsuperscript{14})
2. For each medication document:
   a. Medication name
   b. Medication dose, strength and formulation
   c. Medication use schedule (frequency/time of day)
   d. Indication
   e. Start/stop dates
3. Medication allergies and reactions
4. Sources of medication history information (see Section B, Chapter IV for how to take a BPMH)
5. Checklist of probe questions (see Section B, Chapter IV for how to take a BPMH)

Resources
1. “Tips to remember when interviewing patients” from Safer Healthcare Now Campaign, How-to-guide
2. See also Section B, Chapter IV for a complete guide to taking a Best Possible Medication History, and Appendix 3 for a BPMH teaching toolkit, including teaching slide deck and small-group case-based teaching activity)

Notes:
If there is more than one person involved in generating the PAML, these people should all have access to previous versions of the medication list or historical data about the medications. This way, the PAML can be iteratively refined over time by several clinical personnel, but it should not be done “in silos” by personnel who do not communicate with each other.

The following personnel have performed these duties described in the above section at other locations: medical assistant (may need additional training about medications), licensed practice nurse (may need additional training about medications), registered nurse, pharmacy technician, pharmacy student, pharmacist, mid-level provider (NP, PA) and physician. As generating the list is potentially time-consuming and this task requires less medication knowledge than the clarification of the medication list (Job 2, below), it may be warranted for physicians and pharmacists to obtain assistance in generating the list from these other personnel.
Job 2: Finalization of Preadmission Medication List

Goal: Review of the draft PAML created in Job 1 to ensure that preadmission medications, doses, schedule and route of administration are appropriate.

Knowledge
1. Advanced knowledge of medications, their indications, appropriate dosing
2. Knowledge of the patient’s medical conditions
3. Sources of medication history information based on local health system
4. Common sources of challenges and errors in obtaining an accurate medication history

Skills
1. All of the skills in Step 1 or the ability to work with someone who completed Step 1 to assist with clarification of the list if problems are noted.
2. Electronic health record or chart use to review the patient’s past medical history and medication use.
3. Ability to review the patient’s known medical history and compare to the medication list created in Job 1 to determine that the preadmission medications, their doses, their schedule and the routes listed are appropriate based on the known information about the patient.

Behaviors
1. Perseverance in obtaining the most accurate preadmission medication history
2. Communication and working in multidisciplinary teams

System Resources
Tools
1. Computer/EHR access
2. Telephone, paging system and fax machine access
3. Documentation tool to record the final version of the PAML
4. Detailed medication information reference database

Information Requirements
1. Patient’s past medical history
2. Medication list created in Job 1

Notes:
1. This function is typically performed by the patient’s provider (i.e., physician or mid-level provider), or a pharmacist who is knowledgeable about the patient. Supervision may be required for physician trainees, mid-level providers or other providers without significant medication knowledge and experience.
2. The entire process of taking and documenting an accurate PAML is the single most critical challenge in the medication reconciliation process, causing by far the greatest number of errors with potential for patient harm. As you work toward improving your processes, this area should require much of your team’s attention.
Step 2. Write admission medication orders.

Goal: To write correct admission orders, taking into account the patient’s PAML and his or her current medical conditions.

Knowledge
1. Advanced knowledge of medications, their indications, appropriate dosing
2. Knowledge of the patient’s medical conditions – both the patient’s past medical history and his or her presenting condition upon hospital arrival

Skills
1. Ability to order appropriate medications for each patient’s medical conditions

Behaviors
1. Attention to detail to ensure that each PAML medication is accounted for (continued, held, changed or replaced)

System Resources

Tools
1. Computer/EHR
2. Reconciliation tool to compare the admission medication orders with the PAML (ideally linked to the admission ordering process)

Information Requirements
1. Patient’s past medical history and admission problems/conditions
2. PAML

Notes:
This step is performed by the patient’s ordering provider. Most of this process is part of usual care outside of medication reconciliation. However, the more appropriately this step is performed (i.e., writing orders that take the PAML into account), the less work required in Step 3.

Step 3: Compare the PAML with admission orders, identify and correct any unintentional discrepancies in admission orders.

Goal: To identify discrepancies between the PAML and admission orders. Intentional discrepancies (i.e., for medical reasons) should be documented. Unintentional discrepancies (due to errors) should be identified and corrected.

Knowledge
1. Advanced knowledge of medications, their indications, appropriate dosing
2. Knowledge of the patient’s medical conditions – both the patient’s past medical history and his or her presenting condition upon hospital arrival
3. The understanding of what constitutes a medication discrepancy
4. Common sources of challenges and errors in performing medication reconciliation

Skills
1. EHR or chart use
2. Ability to:
   1. Review the admission medication orders, provider admission note and PAML
   2. Determine discrepancies between the PAML and admission orders
   3. Know when to contact a provider about a discrepancy (clinical judgment)
   4. Determine which discrepancies are intentional and unintentional
   5. Facilitate changes to the admission medication list to reconcile unintentional discrepancies
Behaviors
1. Perseverance in obtaining the most accurate medication admission orders
2. Communication and working in multidisciplinary teams

System Resources
Tools
1. Computer/EHR
2. Telephone and paging system
3. Policy and Procedure that outlines process, what constitutes a discrepancy and preferred method of contacting a provider
4. Documentation tool to record the reconciliation of the admission medication orders and the PAML
5. Detailed medication information reference database

Information Requirements
1. Patient’s past medical history and admission problems/conditions.
2. PAML
3. Admission medication orders

Notes:
1. This function is typically performed by a pharmacist or the patient’s admitting provider, i.e., physician or mid-level provider. It is preferred that the reconciliation occur by someone other than the person writing the admission orders as it is assumed that the admission orders are written using the PAML and therefore self-checking may not pick up all unintentional discrepancies.
2. If performed by someone other than the person who wrote the admission medication orders, that person may not be aware of the intentional discrepancies from the PAML, thereby creating additional work for the reconciler to determine intentional versus unintentional discrepancies unless clearly documented in the admission notes.
3. While this step has often been the focus of medication reconciliation efforts, it is actually one of the least important. Unintentional discrepancies between the PAML and admission orders are rare because it is often the same person writing the orders as who just wrote (or at least verified) the PAML, writing admission orders often occurs shortly after documenting the PAML, and the PAML is usually easily accessible at this point in the workflow.
4. It is currently implied that the provider writes the admission medication orders, however, it may be good to also specify “HOW” to do that, i.e., 1) review the PAML, 2) determine which medications to continue, discontinue, hold or modify upon admission, 3) determine new medications to be ordered.

TRANSFER
Step 4: If applicable, write transfer medication orders, using the PAML and current inpatient (pre-transfer) medications as a guide.

Goal: To write correct transfer orders, taking into account the patient’s PAML, current inpatient medications and the patient’s current medical conditions.

Knowledge
1. Advanced knowledge of medications, their indications, appropriate dosing
2. Knowledge of the patient’s medical conditions – both the patient’s past medical history, his or her presenting condition upon hospital arrival, and the patient’s pre-transfer hospital course

Skills
1. Ability to order appropriate medications for each patient’s medical conditions

Behaviors
1. Attention to detail to ensure that each PAML and pre-transfer medication is accounted for (continued, held, changed or replaced).
System Resources

Tools
1. Computer/EHR
2. Reconciliation tool (paper or electronic) to compare the PAML, current (pre-transfer), and transfer medication lists (ideally linked to the transfer ordering process)

Information Requirements
1. Patient’s past medical history and admission problems/conditions
2. Hospital course
3. PAML
4. Current inpatient medications

Notes:
This step is performed by the patient’s ordering provider. As with writing admission orders, much of this step is beyond the scope of medication reconciliation. However, if a provider can accurately order transfer medications taking into account the PAML and current inpatient medications, then Step 5 becomes much easier.

Step 5: Compare PAML medications, pre-transfer medications and transfer medications, identify and correct any unintentional discrepancies in transfer orders.

The requirements are the same as those for Step 7, reconciling medications at discharge. Instead of reconciling the PAML and current inpatient medications with discharge orders, the goal here is to reconcile the PAML and current (pre-transfer) medications with transfer orders.

DISCHARGE
Step 6: Write the Discharge Medication List (DML) using the PAML and current inpatient medications as a guide. Document the DML.

Goal: Create an accurate list of medications that the patient should take upon discharge from the hospital.

Knowledge
1. Advanced knowledge of medications, their indications, appropriate dosing
2. Knowledge of the patient’s medical conditions – both the patient’s past medical history, his or her presenting condition upon hospital arrival and the patient’s entire hospital course

Skills
1. Ability to order appropriate medications for each patient’s medical conditions, anticipated post-discharge course, and for his or her discharge destination
2. Ability to decide what to do with each PAML and current medication at discharge

Behaviors
1. Attention to detail to ensure that each PAML and current inpatient medication is accounted for (continued, held, changed or replaced).

System Resources
Tools
1. Computer/EHR
2. Discharge reconciliation tool (paper or electronic) to compare the PAML, current and discharge medication lists (ideally linked to the discharge ordering process)
3. Tool to write prescriptions for patient to fill after discharge
Information Requirements
1. Patient’s past medical history and admission problems/conditions
2. Entire hospital course
3. PAML
4. Current inpatient medications

Notes:
1. This step is typically performed by the patient’s ordering provider. If a provider can accurately order discharge medications taking into account the PAML and current inpatient medications, then Step 7 becomes much easier. Supervision may be required for physician trainees, mid-level providers or other providers without significant medication knowledge and experience.
2. For brief hospitalizations or hospitalizations for a surgical procedure, the PAML may be the appropriate discharge medication list with the addition of a few medications needed at discharge or routine medications to hold at discharge. In these cases, a less skilled person may create the discharge medication list, which is then reviewed and finalized by the discharging provider.

Step 7: Compare PAML, current inpatient medications and the DML. Identify and correct any unintentional discrepancies in the DML.

Goal: Reconcile PAML and current hospital medication list with discharge medication orders and identify and resolve any potential unintentional medication discrepancies.

Knowledge
1. Advanced knowledge of medications, their indications, appropriate dosing
2. Knowledge of the patient’s medical conditions – both the patient’s past medical history and his or her presenting condition upon hospital arrival and the patient’s hospital course
3. Common sources of challenges and errors in creating a discharge medication list, e.g., medications unintentionally omitted on discharge that are on the PAML but were not continued during the hospital stay, medications continued on discharge that were intended for in-hospital use only (e.g., stress ulcer prophylaxis, bowel regimen, sleepers)

Skills
1. EHR or chart use
2. Ability to 1) review the PAML, current hospital medication list, and discharge medication list/orders, 2) review provider notes about discharge plans, patient condition on discharge, 2) determine discrepancies between the two lists and discharge plans from notes, 3) determine which discrepancies are intentional and unintentional, and 4) facilitate changes to the discharge medication list to resolve unintentional discrepancies

Behaviors
1. Perseverance in reconciling different sources of information
2. Communication and working in multidisciplinary teams

System Resources
Tools
1. Computer/EHR access
2. Telephone and paging system access
3. Documentation tool to record the reconciliation of the discharge medication orders with the current medications and the PAML
4. Detailed medication information reference database
**Information Requirements**

1. Patient’s medical history, hospital course and provider notes on discharge about discharge plans.
2. PAML
3. Current hospital medication list
4. Discharge medication list/orders.

Notes:

1. This function is typically performed by a pharmacist or the patient’s admitting provider, i.e., physician or mid-level provider. If resources allow, it is preferred that the reconciliation occur by someone other than the person writing the discharge orders as it is assumed that the discharge orders are written using similar methods and, therefore, self-checking may not pick up all unintentional discrepancies.
2. If performed by someone other than the person who wrote the discharge medication orders, that person may not be aware of the intentional discrepancies, thereby creating additional work for the reconciler to determine intentional versus unintentional discrepancies unless clearly documented in the discharge notes.
3. After taking an accurate preadmission medication history, this is the second-biggest source of potentially harmful medication errors related to the medication reconciliation process. Appropriate resources should be allocated to potential solutions as described later in this manual.

**Step 8: Review the DML with patient. Highlight and explain stopped, changed or new medications compared with the PAML and the reasons for those changes.**

Goal: Ensure that the patient understands the post-discharge medication regimen and how it differs from the preadmission medication regimen.

**Knowledge**

1. Identity of the “active learner” who should receive this information

**Skills**

1. EHR or chart use
2. Ability to determine from the discharge medication list which medications have changed from PAML
3. Ability to communicate effectively with patients and caregivers with varying levels of health literacy
4. Ability to use “teach back” as a technique to confirm understanding

**Behaviors**

1. Perseverance in providing the patient with the most accurate discharge medication list
2. Provide sufficient answers to patient questions about the discharge medication list
3. Communication and working in multidisciplinary teams

**System Resources**

**Tools**

1. Computer/EHR access
2. Telephone and paging system access
3. Documentation tool to record providing the patient a copy of his or her discharge medication list and any needed medication-related patient education
Information Requirements
1. Discharge medication list
2. PAML or discharge medication list formatted in a way that designates changes from the PAML
3. Patient education materials

Notes:
1. This function is typically performed by a nurse or pharmacist.
2. The patient’s discharging provider may be needed to reconcile patient medication issues or questions (e.g., late discovery of a medication discrepancy).

Step 9: Forward a second copy of the DML to post-discharge providers. Explain stopped, changed or new medications compared with the PAML and reasons for those changes.

Goal: To clearly explain to post-discharge providers the discharge regimen, including changes from prior to admission and the reasons for those changes.

Knowledge
1. Name and contact information of post-discharge providers and how best to transfer documents and communicate with them

Skills
1. EHR or chart use
2. Ability to determine from the discharge medication list which medications have changed from PAML
3. Ability to communicate effectively with providers

Behaviors
1. Perseverance in giving providers the most accurate discharge medication list
2. Provide sufficient answers to provider questions about the discharge medication list
3. Communication and working in multidisciplinary teams

System Resources
Tools
1. Computer/EHR access
2. Telephone and paging system access
3. Documentation tool to give post-discharge providers a copy of their discharge medication list and any additional medication-related information

Information Requirements
1. Discharge medication list
2. PAML or discharge medication list formatted in a way that designates changes from the PAML
3. Provider communication template or documentation tool

Notes:
1. This function is typically performed by a nurse or pharmacist.
2. The patient’s discharging provider may be needed to reconcile patient medication issues or questions (e.g., late discovery of a medication discrepancy).
3. Communication can mostly be in the form of documentation, but ideally it includes detailed information (like rationale for medication changes) often absent in typical discharge documentation and also allows for direct communication in case of questions.
4. The actual transfer of discharge documents can be automated or performed by less-skilled personnel.
IV. Medication Reconciliation: Brief Literature Review

In preparation for MARQUIS, the study investigators reviewed 38 articles that reported on inpatient medication reconciliation interventions. Of these, 21 were descriptive studies, including 17 pharmacist-related interventions and 4 miscellaneous interventions, and 17 were comparative studies (10 RCT, 7 pre-post), including 10 pharmacist-related interventions, 3 electronic/IT-related interventions, and 4 miscellaneous interventions.

Descriptive Studies

The descriptive studies reported on several outcomes, including the number and type of discrepancies identified with implementation of the intervention. The majority of these studies, as noted above, reported on pharmacist-related interventions with common components including pharmacist obtainment of medication history, reconciliation with admission orders, patient counseling and reconciliation of medications at the time of discharge. A major portion of these interventions took place at the time of admission, with fewer occurring at the time of discharge or at both times. These studies showed a high number of medication discrepancies identified after implementation of the pharmacist intervention. For example, Vira et al. demonstrated that with introduction of a pharmacist-performed comprehensive medication history and reconciliation at admission and discharge, 60% of patients were identified as having more than one unintentional medication discrepancy on admission or discharge orders, with a mean of 2.3 unintentional discrepancies per patient. Of the unintentional medication discrepancies, 18% were deemed “clinically important.”15 Other non-pharmacist interventions included in the descriptive studies involved 1) multidisciplinary efforts with defined roles of nurses, pharmacists and physicians, 2) use of a checklist and 3) the availability of the patient’s own medications on presentation, and as with the pharmacist-related interventions, all demonstrated high numbers of medication discrepancies identified (and presumably corrected) with implementation of the intervention.

Comparative Studies

As noted above, there were 17 comparative studies reviewed, of which 10 that reported on pharmacist-related interventions, 3 that reported on electronic interventions and 4 that reported on other miscellaneous interventions.

Pharmacist-related Interventions, Summary of Intervention Components + Results

A summary of the timing of the pharmacist intervention in relation to the patient’s hospital stay and the components of the interventions are as follows:
<table>
<thead>
<tr>
<th>Author, year (study design)</th>
<th>N</th>
<th>Timing of Intervention</th>
<th>Components of Intervention</th>
</tr>
</thead>
</table>
| Michels, 200316 (Pre-Post)  | NR    | Admission              | - Completed preadmission medication history  
- Created checklist form to be filled out by surgeon post-operatively  
- Reconciled medications with physicians’ orders post-operatively |
| Bolas, 200417 (RCT)         | 162   | Admission, during hospital stay, + discharge | - Completed medication history on admission  
- Reconciled with admission orders  
- Patient counseling during hospitalization regarding medication changes  
- Medication reconciliation on discharge  
- Patient counseling on discharge  
- Formation of discharge letter sent to outpatient pharmacist and provider |
| Nickerson, 200518 (RCT)     | 253   | Discharge              | - Medication reconciliation on discharge  
- Assessed appropriateness of medications  
- Patient counseling on discharge  
- Discussed pertinent discharge medications and faxed form to outpatient pharmacist + provider |
| Schnipper, 200619 (RCT)     | 176   | Discharge + post-discharge | - Medication reconciliation at discharge  
- Patient counseling at discharge  
- Follow-up telephone call post-discharge |
| Kwan, 200720 (RCT)          | 464   | Admission              | - Preadmission complete medication history  
- Generated post-operative order sheet from preadmission medication list  
- Reconciled medication post-operatively |
| Bergkvist, 200921 (Non-RCT) | 115   | Admission, during hospital stay, + discharge | - Medication reconciliation on admission  
- Assessed appropriateness of medications throughout hospital course  
- Patient counseling throughout hospital course  
- Medication reconciliation on discharge |
| Gillespie, 200910 (RCT)     | 400   | Admission, during hospital stay, discharge + post-discharge | - Comprehensive medication history on admission  
- Medication reconciliation on admission  
- Patient counseling during hospitalization and at discharge  
- Communication with outpatient provider at discharge  
- Follow-up telephone call to patient two months post-discharge |
| Koehler, 200911 (RCT)       | 41    | Admission, during hospital stay, + discharge | - Medication reconciliation on admission  
- Assessed appropriateness of medications throughout hospital course  
- Patient counseling throughout hospital course  
- Medication reconciliation on discharge  
- Creation of discharge form that was sent to outpatient provider and given to patient |
| Walker, 200912 (RCT)        | 724   | Discharge + post-discharge | - Medication reconciliation at discharge  
- Assessed appropriateness of medications  
- Patient counseling  
- Communication with outpatient provider  
- Follow-up telephone call to patient 72 hrs post-discharge |
| Vasileff, 200913 (Non-RCT)  | 74    | Admission              | - Comprehensive medication history on presentation to the emergency room  
- Documentation of the preadmission medication list into a form that the physician would then ‘continue’ or ‘discontinue’ |
Results of the pharmacist-related intervention studies demonstrated the following:

<table>
<thead>
<tr>
<th>Author, year (study design)</th>
<th>Timing of Intervention</th>
<th>Components of Intervention</th>
<th>Impact of Intervention on following outcomes:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Medication Discrepancies</td>
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<tr>
<td>---</td>
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<tr>
<td>Michels, 2003¹⁶ (Pre-Post)</td>
<td>Admission</td>
<td>Formation of a medication list from pre-existing electronic sources + reconciliation</td>
<td>+</td>
</tr>
<tr>
<td>Bolas, 2004¹⁷ (RCT)</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Nickerson, 2005¹⁸ (RCT)</td>
<td></td>
<td></td>
<td>+</td>
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<tr>
<td>Schnipper, 2006¹⁹ (RCT)</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>Kwan, 2007²⁰ (RCT)</td>
<td></td>
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<td>+</td>
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<tr>
<td>Bergkvist, 2009²¹ (Non-RCT)</td>
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<td>+</td>
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<tr>
<td>Gillespie, 2009²² (RCT)</td>
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<td></td>
<td>+</td>
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<tr>
<td>Koehler, 2009²³ (RCT)</td>
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<td>+</td>
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<tr>
<td>Walker, 2009²⁴ (RCT)</td>
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<td>+</td>
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<tr>
<td>Vasiljeff, 2009²⁵ (Non-RCT)</td>
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<td>+</td>
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<tr>
<td>SUMMARY OF POSITIVE STUDIES</td>
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<td>6/6</td>
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</tbody>
</table>

+ indicates statistically significant improvement with intervention versus control
~ indicates no statistically significant difference between intervention and control

Common themes of the two studies that demonstrated improvement in healthcare utilization¹⁰,¹¹ include:
1) involvement of elderly patients, 2) high amount of pharmacy involvement, 3) communication with the primary care physician at time of discharge and 4) establishment of patient follow-up after discharge.

Electronic/IT-related Interventions, Summary of Intervention Components + Results

Below is the summary of the three information technology-focused interventions:

<table>
<thead>
<tr>
<th>Author, year (study design)</th>
<th>N</th>
<th>Timing of Intervention</th>
<th>Components of Intervention</th>
<th>Impact of Intervention on following outcomes:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Medication Discrepancies</td>
</tr>
<tr>
<td>Agrawal, 2009⁹⁹ (Pre-Post)</td>
<td>NR</td>
<td>Admission</td>
<td>Formation of a medication list from pre-existing electronic sources + reconciliation</td>
<td>+</td>
</tr>
<tr>
<td>Murphy, 2009⁹⁹ (Before/After)</td>
<td>NR</td>
<td>Discharge</td>
<td>Formation of a medication list from pre-existing electronic sources + reconciliation</td>
<td>+</td>
</tr>
<tr>
<td>Schnipper, 2009⁹⁹ (RCT)</td>
<td>322</td>
<td>Admission + Discharge</td>
<td>Formation of a medication list from pre-existing electronic sources + reconciliation</td>
<td>+</td>
</tr>
<tr>
<td>SUMMARY OF POSITIVE STUDIES</td>
<td></td>
<td></td>
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<td>2/2</td>
</tr>
</tbody>
</table>

+ indicates statistically significant improvement with intervention versus control
* findings were only significant at one of the two sites involved in the study
It should be noted that the studies in this category all incorporated a pre-existing electronic source of medication information to facilitate creation of a preadmission medication list; using this list, the prescribing physician could perform medication reconciliation on admission and/or discharge.

**Miscellaneous Interventions:**

The four studies involving other interventions are listed below.

<table>
<thead>
<tr>
<th>Author, year (study design)</th>
<th>N</th>
<th>Timing of Intervention</th>
<th>Components of Intervention</th>
<th>Impact of Intervention on following outcomes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poole, 2006&lt;sup&gt;27&lt;/sup&gt;</td>
<td>100</td>
<td>Discharge</td>
<td>Discharge worksheet</td>
<td>+</td>
</tr>
<tr>
<td>Varkey, 2007&lt;sup&gt;28&lt;/sup&gt;</td>
<td>102</td>
<td>Admission, throughout hospital stay + discharge</td>
<td>Education of staff on medication reconciliation</td>
<td>+</td>
</tr>
<tr>
<td>Midlov, 2008&lt;sup&gt;29&lt;/sup&gt;</td>
<td>427</td>
<td>Discharge</td>
<td>Use of medication report with reconciled medications on discharge</td>
<td>+</td>
</tr>
<tr>
<td>Chan, 2010&lt;sup&gt;30&lt;/sup&gt;</td>
<td>407</td>
<td>Admission</td>
<td>Education of staff on medication reconciliation</td>
<td>+</td>
</tr>
</tbody>
</table>

**SUMMARY OF POSITIVE STUDIES**

<table>
<thead>
<tr>
<th>Medication Discrepancies</th>
<th>Potential Adverse Drug Events</th>
<th>Healthcare Utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/3</td>
<td>1/1</td>
<td>1/1</td>
</tr>
</tbody>
</table>

+ indicates statistically significant improvement with intervention versus control

The one study that demonstrated improvement in healthcare utilization<sup>29</sup> described use of a physician-generated medication report that included a brief summary of hospitalization, medications on discharge, and detailed medication changes made during hospitalization, and limited this intervention to elderly patients admitted from/returning to a nursing home.

**Conclusions**

When summarizing the literature on medication reconciliation interventions and acknowledging the possibility of publication bias, one finds the most evidence-based support for the use of pharmacist-related medication reconciliation. Furthermore, as evidenced by the studies demonstrating improvement in healthcare utilization, the more heavily the pharmacist is utilized (with performing medication history at admission, medication reconciliation at admission and discharge, patient counseling, and post-discharge communication with outpatient providers and/or communication with the patient), the more successful the intervention appears to be.

A key aspect of the pharmacist-related interventions includes that of performing an accurate medication history at time of admission, which leads to less errors propagated throughout hospitalization. The subsequent steps in medication reconciliation may be a smaller/easier part of the process after an initial accurate medication history.

In reviewing the “most successful” studies across all types of intervention, common traits include 1) targeting a “high-risk” group, which, in these studies, includes elderly patients (age range of > 60-80), +/- high number of medications at time of admission (ranged from > 4-16 pre-admission medications), +/- high number of co-morbid conditions (typically at least three co-morbid conditions); 2) receipt of “buy-in” from their institution prior to implementation of the intervention; and 3) intervention was implemented in a contained environment, i.e., to/from specific nursing homes.
V. Assembling the Team and Developing a Strategy

In starting a quality improvement (QI) project, you should realize that in many cases, resistance will come from both complexities inherent in the existing system and the ingrained hierarchical culture of most hospitals. A strong, focused and well-led team is perhaps the most effective strategy to address these barriers.

1. Identify Team Members

Team Leader
There is both a science and art to leadership for quality improvement and the effective management of resources. The best Team Leaders help the team see the overarching goal while always feeling connected to the larger mission of serving patients. Strong leaders learn the abilities, strengths and motivations of team members. Tasks should be distributed accordingly and clearly. A Team Leader is able to build consensus among team members and various stakeholders, and knows who, how and when to ask for resources.

QI Team Facilitator
The QI Team Facilitator plays the pivotal role in ensuring that the team functions constructively and that the project stays on track. The QI Team Facilitator owns the team process, including team rules and QI methodology. This role requires project management skills and at times may call for the ability to balance team dynamics or introduce appropriate QI tools. While mastery of the topic literature is not required, a general understanding and acceptance of quality improvement methodology are needed. The QI Team Facilitator need not be an expert on QI tools at the outset but should have a readiness to acquire new tools and a talent for moving projects forward. Often the QI Team Facilitator simply helps the team stay focused on systems rather than individuals. For smaller-scale projects, the QI Team Facilitator could be the same person as the Team Leader, but for more ambitious projects, or for projects involving buy-in from disparate physician and nursing groups (like MARQUIS), a separate facilitator is strongly recommended.

Local Hospital Opinion Leader
The local hospital opinion leader is a key leader who cares for patients and is well respected among other clinicians. This person is important for getting buy-in from front-line staff. Occasionally, opinion leaders may be initially skeptical of new innovations or critical of the new improvement effort. Involve the local hospital opinion leader as early as possible and appreciate how important these leaders will be as a resource to overcome barriers. If the opinion leader is seen as committed to the overarching goals of the medication reconciliation project, others will more readily adopt new changes and adjust their personal workflow.

Content Experts
While the Team Leader ensures the cooperation and functioning of the team and the QI Team Facilitator attends to systems and methods, content experts lend authority to the team’s interventions and can be invaluable for gaining buy-in. Some suggestions include:

- Providers well-versed in the adverse drug event or medication reconciliation literature
- Pharmacists who focus on medication safety
- Nurses or others with expertise in transitions of care, the discharge process, etc.
- Local leaders in quality, safety, cost containment or risk management

Content experts may be helpful for reviewing and summarizing the relevant literature, including its applicability to your institution and patient population. These individuals may be aware of a greater range of metrics available to evaluate the success of your QI project. They will be invaluable in reviewing and formulating medication reconciliation forms, protocols and educational materials.
Process Owners
Recognize that certain people on the front lines already are “experts” in the things that they do. Obtaining buy-in from these individuals will help to ensure that workflow disruption is minimized and that new changes/improvement steps are well accepted. Generally, process owners should come from each service (pharmacy, nursing, physicians, etc.) and geographic area (emergency department, medical, surgical, intensive care unit, etc.). They may also include unit clerks and others who are involved in the medication reconciliation process on the front lines. These process owners must have direct knowledge of how work currently is done, ability to envision how it might be improved, and the ability to facilitate that change among front-line staff. Process owners will be involved early in mapping current processes and performing a gap analysis. They also need to be in positions of influence among their peers and can represent their constituencies as interventions are developed and implemented.

Health IS/IT Experts
To lead modifications to the electronic health system and/or to pull clinical and administrative data from existing electronic data sources, the team will need an engaged representative from your hospital’s Information Services (IS) department.

Data Analyst
For gathering the data needed for the project, you will need a local expert. Data that can be retrieved electronically typically will require the expertise of a data or financial analyst. The data analyst should be able to set up one-time or recurring reports from the electronic data source(s). Data that must be collected from chart review are often best performed by a clinically savvy person, for instance a nurse, pharmacist, or member of the quality office.

Below, we have included a sample QI Team Roster for you to fill out. Besides providing the names and contact information for all team members, it serves as a tool to ensure that all the right personnel are part of the team. Your team roster may vary from this and does not need to include all of these personnel – you should be flexible as you address different aspects of the medication reconciliation process.

TASK E: (Team Leader): Fill out the names and contact information of members of your MARQUIS Team* and construct a team roster and group e-mail to help the team communicate.

*You may identify only three or four key personnel at the outset but may draft others onto the team as additional roster needs become clear. We recommend trying to enroll a range of personnel early, within two to three weeks.
### Medication Reconciliation Quality Improvement Team Roster

<table>
<thead>
<tr>
<th>Team Function/Staff</th>
<th>Name</th>
<th>E-mail</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team Leader</td>
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<tr>
<td>Project Manager</td>
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<tr>
<td>Data Analyst</td>
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<tr>
<td>Information Technologist</td>
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<tr>
<td>Quality improvement expert (if different from above personnel)</td>
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<tr>
<td>Content Experts – may be identified in roster below</td>
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<tr>
<td>Team Facilitator – may be identified in roster below</td>
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<tr>
<td>Opinion Leader /Clinical Expert – may be identified in roster below</td>
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<tr>
<td>Senior Administrator/Executive Champion</td>
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<tr>
<td><strong>Providers</strong></td>
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</tr>
<tr>
<td>1. Attending Physician(s)</td>
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<td>2. Emergency Department Physicians</td>
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<tr>
<td>3. Surgeon(s)</td>
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<tr>
<td>4. Anesthesiologist(s)</td>
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<tr>
<td>5. Trainee(s)</td>
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<tr>
<td>6. Non-Physician Provider(s) (PAs, NPs, etc.)</td>
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<tr>
<td><strong>Nursing</strong></td>
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<tr>
<td>7. Nurses</td>
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<tr>
<td>8. Nurse Manager(s)</td>
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<tr>
<td>9. Clinical Nurse Specialists</td>
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<tr>
<td>10. Nurse Educators</td>
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<tr>
<td>11. Nurse Assistants</td>
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<tr>
<td><strong>Pharmacy</strong></td>
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<tr>
<td>12. Pharmacists for Emergency Department Patients</td>
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<tr>
<td>13. Pharmacists for Inpatients</td>
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<tr>
<td>14. Pharmacy Tech(s)</td>
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<tr>
<td><strong>Affiliated staff</strong></td>
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<td>15. Unit Assistants</td>
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<td>16. Others</td>
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<tr>
<td>Patient or Family Representative</td>
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</table>

*Collectively, these personnel should come from each of the settings where you are planning to improve your medication reconciliation process – for example emergency department, medical wards, surgical wards, preoperative testing and intensive care units, etc. It is not necessary to have each type of personnel from each setting, as long as collectively all sites are represented.*
2. Establish Team Rules and Guidelines

Articulate Aims
Identify the overarching goal and role of the MARQUIS team. Gain consensus among all team members. Write it down as precisely as possible. For example, the goal of your team may be to adopt best practices in medication reconciliation across your institution. Later in this chapter we discuss how to establish general aims and turn them into specific aims (i.e., ones that are measurable).

Communicate Expectations
Make it clear that everyone has a role and that each role requires the individual to take ownership for completing project tasks that are assigned to him or her.

Build Rapport
This can often be accomplished by establishing certain ground rules:
1. Ensure an open and safe discussion environment: consider all ideas fairly; address the problems rather than the people; avoid ad hominem attacks
2. Be inclusive: value all potential contributors, including diverse views
3. Seek consensus: find a solution acceptable enough that all members can support it and no member opposes it. Be aware in particular that consensus is not the same as a unanimous vote. Consensus may not represent everyone’s first choice, nor is it a majority vote (i.e., when only those in the majority get something they are happy with, with those in the minority possibly getting something they don’t want at all). The keys to achieving consensus include discussion with good communication and willingness to compromise.

Set Ground Rules
At your very first team meeting, the MARQUIS team rules need to be established and everyone needs to explicitly agree to them. The QI Team Facilitator is usually given the task of gaining consensus on and enforcing the team rules. Use the team rules below as a starting point. The team should modify the rules as needed, then officially record and acknowledge them. To some, these rules may appear a bit preachy. The key principle that must be adhered to is this: everyone on the team must be encouraged to speak up, and all views must be respected. Traditional concepts of rank have no place here. A unit clerk should feel comfortable telling the lead physician, “I don’t think that will work because of [reason]. Why don’t we try it this way?”

In addition to these rules, it should be made very clear that potential members should notify the leader quickly if they cannot devote the requisite time and effort so that suitable replacements can be found. Timely minutes as well as a quick turnaround for comments/corrections should be the rule.

TASK F: (QI Team Facilitator): Announce team rules and post a large, readable version at each team meeting.

Recommended Team Ground Rules:
• All team members and opinions are equal
• Team members will speak freely and in turn
• We will listen attentively to others
• Each must be heard
• No one may dominate
• Problems will be discussed, analyzed or attacked (not people)
• All agreements are kept unless renegotiated
• Once we agree, we will speak with “one voice” (especially after leaving the meeting)
• Honesty before cohesiveness
• Consensus versus democracy: we each get our say, not our way
• Silence equals agreement
• Members will attend meetings regularly
• Meetings will start and end on time
Promote Effective Team Behaviors and Dynamics

Studies of healthcare teams have demonstrated certain behaviors that can lead to more effective teams. How team members interact with one another is critical, and teams should strive to remove authority gradients. Because the perspective of every team member is potentially critical, every perspective must be heard. To do this, team members must be comfortable expressing their viewpoints. Try to pick people who have reputations for being collaborators. It is up to the leader and facilitator to promote constructive team dynamics.

Although meetings with the whole team are invaluable, they can occasionally become impractical or impossible to schedule. Team “huddles,” or “working groups,” where part of the team meets briefly to advance action items, can be very effective for overall progress.

Team Behaviors and Dynamics
1. Effective leadership
2. Team members monitor each other’s performance and provide constructive feedback
3. Redistribute tasks as a particular situation demands using accurate knowledge of team members’ individual skills
4. Ability to adapt to changing circumstances
5. Clearly identified and agreed-upon goals and objectives
6. Trust between team members
7. “Closing the loop” with communication — for example, calling to say an e-mail is being sent; sending the e-mail; verification that the e-mail was received
8. Ensuring that all team members are “on the same page”

Quality Improvement Resources

Any team that wants to effectively improve the medication reconciliation process should understand the basics of effective implementation and improvement. Having an improvement framework sketched helps a team’s chances of realizing breakthrough improvement. At least one or two hospitalists in your group should become very familiar with the general framework for improvement and with quality improvement (QI) tools. Medical center resources — such as a patient safety officer, a QI leader, or a QI facilitator — may be available at your institution. You should identify these individuals and enroll them in your cause at the earliest stages. Courses are also available (including several available on the SHM website at www.hospitalmedicine.org/ResourceRoomRedesign/html/QI_Primer.ppt) to teach the principles of quality improvement. At least one member of the team should strongly consider attending the Quality Pre-Course offered each year on the day prior to the start of the SHM Annual Meeting.

TASK H: Identify in-hospital QI resources.
TASK I: Identify educational opportunities to learn more about QI principles and who should take advantage of these opportunities.
3. Set General Goals

Creating focus and momentum are critical for your team at the start of your medication reconciliation project. You can create both by rallying your team around a general aim, a statement of what you intend to accomplish. The general aim should also be a “stretch,” aggressive enough to force your team to make a system change that will be clinically meaningful, durable and transferable. At this early stage it also helps to be clear about the eventual scope of your project. Will you focus on all patients? Or will you focus on a subset of medical patients, surgical patients, high-risk patients or all patients admitted to a particular unit? Try to be as inclusive, yet realistic, as possible about the eventual scope (i.e., within the 21 months of the study). Regardless of your eventual scope, you will begin serial cycles of testing and learning on a small scale, i.e., Plan-Do-Study-Act, a practical approach that can make very large projects manageable before expanding to other units or service lines. In your general aim you will need to include a timeline, critical for creating a sense of urgency and motivation.

Examples of general aims for medication reconciliation:

- Within the next 12 months, all patients admitted to the medical service will receive best-practice care in medication reconciliation.
- Within the next 12 months, we will eliminate readmissions and emergency room visits due to medication reconciliation errors for patients discharged from our hospital.

Eventually you will convert your general aim to one that is a more specific, measurable, time-limited, population-circumscribed goal (see below, part 6).

Your team will also benefit from having a formal sense of organization and clarity over terms of service to the team. Writing a formal charter at this point gives you a chance to develop a discrete identity for your team, including a name (e.g., Medication Reconciliation Task Force), a roster and sense of purpose (e.g., general aim). Consider adapting the sample charter included below.
MARQUIS Medication Reconciliation Task Force

Reports to: Chief Quality Officer
Staffed by (Project Manager):
Composition: Chair
Co-chair
5-8 members
Terms: Chair and co-chair shall serve for at least one year term. Members shall serve for 2 years.
General Aim: Eliminate emergency room visits and readmissions due to medication reconciliation errors for patients discharged from our hospital.
Charge: Implement the national MARQUIS best-practice bundle for medication reconciliation at our hospitals
Objective: Standardize medication reconciliation practice to align with the following best practices as defined by MARQUIS:
1. Standardize risk stratification of newly admitted patients and measure performance in risk stratification
2. Standardize the practice of taking medication histories at time of hospital admission and measure performance
3. Standardize process of reconciling preadmission medications, current medications, and discharge orders and measure performance
4. Standardize process of educating patients in a literacy sensitive fashion about changed, discontinued, and new medications at the time of discharge and measure performance
5. Standardize process of communicating with responsible post-discharge providers regarding the final discharge medication list and measure performance
6. Spend additional time and expert personnel on the medication reconciliation process for patients identified as high-risk for medication reconciliation errors.

Responsibilities:
Chair
1. Lead the team to create and implement the national MARQUIS best-practice bundle for medication reconciliation
2. Ensure the team represents the range of stakeholders from our hospital
3. Develop, update and execute the project plan.
4. Identify problems and risks as they arise and develop ways to address them with the team
5. Plan team meetings and handle meeting logistics, supported by project manager.
6. Assign responsibilities for task force members, supported by project manager.
7. Set deadlines for completion or update of activities.
8. Make recommendations for changes when necessary.

Co-chair
1. Co-lead with the Chair.

Task Force Members
1. Contribute fully to the project and share knowledge and expertise.
2. Represent their constituencies in analyzing current practice and developing and implementing interventions
3. Participate in meetings and discussions.
4. Complete assignments between meetings.
5. Communicate progress to team.
4. Map Your Current Medication Reconciliation Process

Qualitative Analysis
Process Mapping
What the team learns from drawing and discussing a map of the current process can be surprising as well as motivating. Self-discovery can uncover waste, duplicated efforts, lack of consensus on current process, hidden complexities and opportunities to streamline or simplify.

When first beginning to map out the medication reconciliation processes at your hospital, first start with a high-level diagram. For example, review each of the steps of the medication reconciliation process as outlined in Section A, Chapter III and revise them for your hospital. A number of interrelated steps, concentrated particularly at admission and discharge, combine to determine the cumulative risk of a patient having unintended medication discrepancies with potential for harm. Whether, who, when, where and how a hospital standardizes its approach at these high leverage moments will determine the health of its medication reconciliation apparatus.

Then, you will want to delve into each of these steps in more detail. The goal here is to diagram what happens to your patients currently under the best of circumstances. This is not the time (yet) to discuss what goes wrong with these steps (that comes next, during the gap analysis), but neither are you mapping a reality that doesn’t yet exist at your hospital (later, you will map out the ideal future state). We suggest breaking down the process into smaller parts, for example, create more detailed diagrams for each situation, such as the presentation to the Emergency Department (ED) and subsequent hospital admission, intra-hospital transfer, and hospital discharge. Elective surgical admissions and direct admissions will likely require separate diagrams from admissions through the ED. In each of these diagrams, you will want to make the following clear:

1. What steps are being performed?
2. Who is performing those steps?
3. When are these steps being performed (in relation to the patient’s hospitalization and relative to the other steps in the process)?
4. Which steps are dependent on previous steps and which are not (e.g., what steps are performed serially and which can be done in parallel)?
5. When is information or responsibility being transferred from one person to another?
6. Are there branch points that depend on certain situations or decisions?

There are certain conventions that can be used when creating these diagrams. For example, a diamond usually represents a yes/no decision (i.e., a branch-point), an oval inputs and outputs (e.g., data or documentation), and box for a task performed, and arrows for direction. Another convention is to create a “swim-lane” diagram, in which each lane represents a different type of personnel (e.g., physician, pharmacist, nurse), and flow moves left to right down the lanes. Below, we show swim lane diagrams for the medication reconciliation process at Brigham and Women’s Hospital (circa 2006) for admission from the ED, elective surgical admission and discharge home.
Gap Analysis
Once you have diagrammed the medication reconciliation process under the best of circumstances, the
team should try to estimate how often each step occurs. For those steps that occur less than 100% of
the time, have the team list those things that can and do go wrong in the current system. This simple
qualitative “gap analysis” may reveal how little or how much the current process must be re-engineered.

Patient Admitted to the Medical Service from the Emergency Room

Patient/Family

- Patient/Family
  - Provides Medication History

Admitting Physician (MD)

- Notified about Admission
- Reviews and Prints out MSL

- Collects pre-admission medication history from Patient/Family
- Performs H&P

- Builds PAMI, using PAMI Builder
  - Documents intent to continue vs. discontinue for each medication

- Documents H&P
  - Cuts and pastes PAMI into the traditional Medication section

- Refers to PAMI as admission orders are written

- Update PAMI and active inpatient orders as necessary

Pharmacist (Ph)

- Reviews Admission Orders and PAMI
- Notifies MD if discrepancies uncovered

Admitting Nurse (RN)

- Key:
  - MSL - Medication Source List
  - PAMI - Pre-admission medication list
  - H&P - History and Physical

- Uses PAMI to review medication history during admission assessment

- Discrepancies in PAMI uncovered (e.g., after family brings in medication bottles), Notifies MD

Patient admitted for elective surgery. Seen in Pre-op Evaluation Center (PEC) 1 week before surgery.

Patient/Family

- Patient/Family
  - Provides Medication History

Nurse Practitioner (NP) in PEC

- Reviews MSL
  - Collects pre-admission medication history from Patient/Family
  - Performs assessment

- Builds PAMI, using PAMI Builder

- Attached PAMI printed to H&P (for insertion in chart post-op)

Operating Physician (MD)

- Reviews PAMI (form NP), and interim medication changes from anesthesiologist's notes
- Update PAMI, and document intent to continue vs. discontinue medication
- Refers to PAMI, as admission orders are written

- Update PAMI and active inpatient orders as necessary

Pharmacist (Ph)

- Reviews Admission Orders and PAMI
- Notifies MD if discrepancies uncovered

- Uses PAMI to confirm medication history, Notifies MD if discrepancies uncovered

Admitting Nurse (RN)

- Key:
  - MSL - Medication Source List
  - PAMI - Pre-admission medication list
  - H&P - History and Physical

- Uses PAMI to confirm medication history, Notifies MD if discrepancies uncovered

Society of Hospital Medicine
When things do go wrong (these are known as “failure modes,”) discuss why they go wrong. This is not the time to assign blame, but rather critically evaluate the process (remember that it is the system, not people, that is being evaluated). One advanced technique you may consider to help you is a cause-and-effect diagram (sometimes known as an Ishikawa diagram or Fishbone diagram because it looks like the spine and ribs of a fish). The failure mode (e.g., errors in taking an accurate medication history) is at the head of the fish. The major ribs coming off the spine represent the broad categories of system problems that lead to this result: humans, technology, policy & procedure, resources, environment. Then, identify specific causes as branches off each of these categories (for example, under resources, you could put “not enough pharmacists in the ED”).

Make an attempt at this point to prioritize these “failure modes,” i.e., where things can and do go wrong in current practice. Examples of actual failure modes (below) may be helpful to review or discuss.

**Potential Failure Modes in Medication Reconciliation**

- **At admission, preadmission medication list inaccurate (errors of omission and commission)**
  - patient cannot remember all medications, doses or schedules
  - provider uses out-of-date sources of information to construct medication list
  - best-practice approach to taking medication history not standard or expected

- **At admission, risk assessment not routine or standard**

- **Throughout hospitalization, high-risk patients receive low-intensity effort despite complex medication reconciliation needs**

- **At discharge:**
  - no standard approach, easy method or institutional expectation setting to print a discharge medication list depicting changed, discontinued and new medications
  - no standard approach or institutional expectation to educate patients about changed, discontinued or new medications
  - no standard approach to confirm patient comprehends education received about discharge medications
  - no standard approach or institutional expectation to communicate with next provider regarding discharge medication list

- **Post-discharge, no standard approach to reach out to patients to address questions about medication regimen or difficulty filling prescriptions**
To help you prioritize failure modes, you should consider doing, with the help of your mentor, a “hazard analysis.” Briefly, for each failure mode identified above, your QI team scores it (from 1 to 10) on three different scales: how likely is it to occur (extremely likely is a 10), how much patient harm would it cause if it did occur (extreme harm is a 10), and how difficult is it to detect before the error reaches the patient (extremely difficult to detect is a 10). The product of these three numbers provides a semi-quantitative way to identify the biggest problems, those that should be corrected first by your new medication reconciliation processes.

**Prioritizing Interventions**
Finally, when deciding which interventions to tackle first, you should consider creating a 2-by-2 table, another common QI technique. First, a 2-by-2 table is constructed: high and low yield, and high and low cost or effort. Proposed interventions (designed to solve the biggest problems identified above) are mapped to each of the four boxes. Interventions that are high yield and low cost should be taken on first, followed by low-yield, low-cost and high-yield, high-cost. Interventions that are low yield and high cost should be avoided. In Section B of this manual, we will discuss in detail each intervention from which you will create your list.

**Quantitative Analysis**
Ultimately you and your hospital care most about clinical outcomes, such as whether or not a patient develops a preventable adverse drug event (ADE) leading to harm and/or return to the hospital. Your chances to reduce ADEs begin the moment the patient is admitted and continues into the post-discharge period. To help your team focus attention and resources on the highest yield interventions, it is extremely helpful to understand the most frequently missed chances to prevent ADEs. These misses can be thought of as high leverage points to “get right” for the future state.

Empirical analysis of each step in the status quo medication reconciliation process can be helpful. We recommend the following audit exercise: for 10 patients observe – and briefly interview if helpful – providers as they enter medication orders for admission; repeat the audit for 10 patients at discharge. Using the high-level flow diagram you previously developed, and count the frequency with which you observe failures in any of the key steps. For example, at admission you should determine by observation and/or by survey whether the providers risk-stratify the patients in any way, whether high-risk patients get any extra attention, whether providers follow best practices when taking a medication history, etc. At discharge, determine how well providers reconcile preadmission, current and discharge medications, whether best practices are followed for discharge patient education, how well discharge regimens are communicated with post-discharge providers, etc. Tally up the prevalence of success for each step. Observations for these 20 patients should take no more than 10 hours total if you choose the right time of day. With quantitative information like this the improvement team can make rational local arguments for standardizing the medication reconciliation process.
Map the Ideal Medication Reconciliation Process: MARQUIS

The MARQUIS Steering Committee, using inputs from a national expert advisory board, has outlined the ideal medication reconciliation process based on available evidence and best practice, below. Note that the MARQUIS Standard and Intensive Bundle each have the same core elements. The standard and intensive bundles differ primarily in that higher risk patients may require additional dedicated time and expertise to manage most effectively the complexity of steps 2, 3 and 4. That extra time and expertise could be delivered by a range of qualified individuals, from physicians to pharmacists, non-physician providers and skilled trainees. Decisions about who should perform elements of the intensive bundle should be made locally based on available resources and the skills required in each step of the process (see above, Section A, Chapter III). Note also that with just a little ingenuity each step in the bundle can be designed by the local MARQUIS team to produce a documentation trail that can allow for measurement of completion of each step.

High Level Flow Diagram: MARQUIS

<table>
<thead>
<tr>
<th>Pre-Admission</th>
<th>Admission / Transfer</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Risk stratification: standard approach for placing patients in high or low risk pathway</td>
<td>2. Interview: standard approach at admission to taking Best Possible Medication History (BPMH)</td>
<td>3. DC Reconciliation: standard approach at discharge to highlight changed, discontinued, or new medications</td>
</tr>
<tr>
<td>4. Education: standard approach at discharge to educate patient on changed, discontinued, or new meds</td>
<td>5. Forwarding: standard approach at discharge to forward discharge medication list to next provider</td>
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</tr>
</tbody>
</table>

**Abbreviations**
- BPMH = Best Possible Medication History
- PAML: Preadmission Medication List
- A = Admission; T = Transfer; D = Discharge; ML = Medication List

**Key:**
- = Patient
- = Standard Provider
- = Intense Provider

High-Level Flow Diagram of Ideal Medication Reconciliation: Based on the results of a risk stratification at the time of admission, an intensive version of the standard MARQUIS bundle can be applied to higher risk patients, and a less-resource intensive, standard version to lower risk patients.

5. Identify Your Measurement Strategy

Before defining your measurement strategy, there are several useful principles to review about collecting and using data. The first principle is to build measurement, whenever possible, into the workflow. How can you build measurement into the workflow? Think about how care team members who perform the desired clinical actions will leave a durable documentation trail – paper or electronic –that can be readily audited.
The second principle is to build “measure-vention,” whenever possible, into the workflow as well. Measure-vention extends the first principle by feeding the results of measurement immediately back into the clinical environment as the basis for intervention. This strategy gives the front-line care team real-time awareness of missed opportunities, putting them in a position to act in real time to mitigate missed opportunities while the patient is still under your influence. For example, a daily report of patients who do not have a PAML could be produced and discussed during structured interdisciplinary rounds. The result of the discussion would be a plan to create a PAML for each of these patients.

The third principle is that retrospective or concurrent sampling can still be quite valuable. A sampling strategy that uses 20 randomly selected patients per month can be statistically appropriate as well as relatively quick and easy (not to mention persuasive to both hospital leadership and front-line staff). To make the time commitment more manageable five patients could be audited each week with the results rolled up into monthly reports. There are several common sampling strategies and we mention them here just to help your team choose one and remain consistent:

- **Convenience sampling** – patients are selected by reviewers because they are available in the emergency room or on the ward, but otherwise there is no particular selection process. Convenience samples categorized by ward or service would be a common model.

- **Stratified random sampling** – patients from several important patient groups are randomly sampled (e.g., MARQUIS high-risk vs. low-risk, medical vs. surgical, ward vs. critical care patients). The advantage of this method is the ability to allocate limited data collection resources on patient groups at higher MARQUIS risk, or at higher risk for not receiving care per protocol, or with other criteria important to the medication reconciliation effort.

- **Random sampling** – all patients in a representative population are subject to selection. For example, all patients older than 18 years and hospitalized for > 24 hours are assigned a number, and an Excel random number generator (a free plug-in application) produces a list of 10 patients subject for review that day. The data collector goes to the first random patient generated for the audit. This method has the advantage of giving a broader picture of the MARQUIS bundle component adherence across the institution. The main disadvantage is the potential that some small but important patient group, such as MARQUIS high-risk patients, will only be subject to a few audits.

**For the purposes of the MARQUIS study, we are recommending random sampling of patients within the population where you plan to conduct the intervention over the course of the study. Even if this population is beyond the scope of initial efforts (which it likely will be), as the implementation is broadened the results will reflect the depth and breadth of your quality improvement efforts.**

The team should also choose between sampling active inpatients or recent discharges. The former approach has the distinct advantage of enabling real-time insights into process barriers and important reasons to adjust the new process. The advantage of the latter is convenience to reviewers, with the recognized loss of impact on the patient reviewed in real time.

If possible the team should designate an individual or two to collect, collate, plot and manage the data. Many improvement projects falter or die simply because data collection is inadequate. Available data collection resources may dictate methods and definitions in any given medical center. Whatever method is chosen, consistency and usefulness are critical. It is usually helpful to pilot the metric definitions and steps in data collection to learn and solve stumbling blocks. In much the same way the team performs cycles of Plan-Do-Study-Act (PDSA) for care delivery improvements, it should go through several cycles of PDSA to optimize the measurement system. The team will also need to be clear about which patient population will be included in the measurement.
At every team meeting, specific aims should be reviewed and data representing progress or non-progress toward these aims should be presented to the group. The best way to do this is with a graph. Especially when presenting performance within the institution’s reporting structure, graphical formats will be more effective than denser tabular format. Run charts plot performance data over time.

Compared to tables of data, run charts offer a quicker picture of how an intervention is working relative to baseline. Run charts should be annotated along the x-axis where new interventions or events occur. Annotation can make it easier to see the effects of different stages of an intervention – or to subtract the effect of known secular trends. For QI projects, monthly plots are usually adequate, although when testing new or revised improvement strategies via PDSA, weekly plots may be desirable in order to see effects sooner. As part of MARQUIS we will supply tools to easily enter data and create run charts.

Now recall again the steps of the ideal medication reconciliation process. Each step can be designed to produce an “output” and each output can represent a process measure. In the version of the flow diagram below, note how the outputs for each step in the ideal process can be viewed as process measures.

### Abbreviations

- BPMH = Best Possible Medication History
- PAML = Preadmission Medication List
- A = Admission; T = Transfer; D = Discharge; ML = Medication List

### Building Measurement into the MARQUIS Bundle

<table>
<thead>
<tr>
<th>Pre-Admission</th>
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<th>Discharge</th>
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<td>Intensive Reconciliation</td>
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</tr>
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#### MARQUIS Standard Bundle

- Output: Risk status documented
- Output: BPMH to provider
- Output: PAML (within 24 hours of admission)
- Output: ML₁ depicting changes
- Output: Patient educated
- Output: ML₂ forwarded to provider

#### MARQUIS Intensive Bundle

- Process Measure #1: Prevalence of Risk Stratification
  - # admitted patients with documented risk status/total # eligible admitted patients
- Process Measure #2: Prevalence of Preadmission Medication List (PAML)
  - # admitted patients with documented PAML (within 24 hours of admission)/total # eligible admitted patients
- Process Measure #3: Prevalence of Reconciled Discharge Medication Lists (ML₁)
  - # discharged patients with reconciled ML₁/total # eligible discharged patients
- Process Measure #4: Prevalence of Patients Effectively Educated
  - # discharged patients affirming comprehension of ML₁/total # eligible discharged patients
- Process Measure #5: Prevalence of Forwarded Discharge Medication Lists (ML₂)
  - # discharged patients with ML₂ received by provider/total # eligible discharged patients
With the help of your mentor, your team can use one or more of the data collection and measurement principles discussed earlier in this section to track and improve performance for these process measures.

To summarize this section, a reliable medication reconciliation apparatus is one where all five MARQUIS process measures are performed all the time, like a bundle. The success of your MARQUIS team, then, can be judged by how frequently eligible patients in your hospital receive the entire MARQUIS bundle. Efficient and regular measurement, therefore, will be fundamental to growing the MARQUIS apparatus in your hospital.

6. Turn General Goals into Specific Goals

Using these specific MARQUIS bundle elements, your team can transform its general aim from Part 3 of this Chapter into a more specific goal. Specific goals should describe the performance you intend to achieve in the future and can be written by using the SMART mnemonic:

A. **S**pecific
B. **M**easurable
C. **A**ggressive yet Achievable
D. **R**elevant
E. **T**ime-bounded

A “roll-up” SMART goal for the entire MARQUIS project would be valuable to articulate. Example: We will apply all elements of the MARQUIS bundle to > 90% of high-risk medicine inpatients by December 31, 2012.

Your team can make such a SMART goal achievable by using a framework for improvement and a step-wise approach to each bundle component. For instance, a line-up of several SMART goals can help your team focus on each of the bundle components individually.

Example: The **Prevalence of MARQUIS Risk Stratification** among admitted medicine patients will be > 90% by June 30, 2012.

Example: The **Prevalence of PAMLS** among admitted medicine patients will be > 90% by July 31, 2012.

Example: The **Prevalence of Reconciled Discharge Medication Lists (MLs)** among discharged medicine patients will be > 90% by August 31, 2012.

Example: The **Prevalence of Patients Effectively Educated** among discharged medicine patients will be > 90% by September 30, 2012.

Example: The **Prevalence of Forwarded Discharge Medication Lists (MLs)** among discharged medicine patients will be > 90% by October 31, 2012.

Using such a stepwise approach with each MARQUIS bundle component, you and your team can begin to visualize how and when you will achieve overall excellence in MARQUIS bundle performance.

**TASK J**: Develop a process measure for each step of your intervention to determine if your institution is completing each of the steps appropriately.

**Process vs. Outcome Measures**

One fundamental principle of QI work is to measure both processes and outcomes. In general, processes are more susceptible to change than outcomes. Therefore, if your QI efforts do not result in process improvement, then it is safe to assume that outcome improvement is not possible with the intervention you have implemented. Conversely, if you do see outcomes improvements without process improvements, your intervention is not responsible for this change.
To rigorously determine the true impact of the MARQUIS bundle on patient safety, each site is responsible for collecting outcome data on a monthly basis. By the time the intervention formally begins, your site will have collected five months of baseline data (on a random sample of patients) on the following outcomes:

1. Number of unintentional medication discrepancies per patient
2. Number of unintentional medication discrepancies per patient due to history errors
3. Number of unintentional medication discrepancies per patient due to reconciliation errors in discharge orders
4. Percent of patients without any unintentional discrepancies
5. Average accuracy of PAMLs
6. Percent of PAMLs built within 24 hours of admission
7. Emergency Department visits or readmissions to the hospital within 30 days of discharge

Also, while likely not available at first, each of the first three outcomes will be further adjudicated for potential for patient harm. As part of the MARQUIS study, each of these outcomes will be graphed for you throughout the intervention.

Just as you develop specific aims for process measures, your team should develop specific aims for outcome measures:

**Example:** By October 31, 2012, there will be a 50% reduction in unintentional medication discrepancies per patient.

### 7. Follow a Framework for Improvement

To manage each phase of the project successfully and as a method to communicate progress to your team as well as your stakeholders there is great value in knowing how each of the team’s activities contributes to the overall progress of the improvement effort. In other words, a coherent framework can serve as a project plan, timeline and communication device.

Your team will make progress for each component of the MARQUIS bundle by advancing along several fronts for each bundle component simultaneously. Each MARQUIS bundle component can be considered somewhat of a QI project of its own. A time-tested approach to QI projects is summarized below.

**Framework for Improvement**

1. **Identify best practice.** Determine what needs to be done for which patient population at which phase of the hospitalization and then draft a protocol to establish an expected standard for care teams to observe.

2. **Analyze care delivery.** Identify the high leverage points in the clinical workflow where introduction of the new protocol will have the highest yield with the lowest cost and effort.

3. **Create performance tracking.** Use the three principles discussed earlier for creating a measurement system – build measurement into the workflow, use measurement when possible and rely on sampling if necessary – to enable regular data collection and charting that is reliable, inexpensive and directly relevant to the aim.

4. **Integrate the protocol** into the clinical workflow, using five key principles below to maximize both front-line uptake and reliability

5. **Perform cycles of PDSA** to perfect both #3 and #4
A new protocol – or standardized set of expectations for consistent medical management – will usually fail unless the team pays attention to the details. There are five key principles to successfully integrate your team’s new protocol for each of the bundle components.

<table>
<thead>
<tr>
<th>Principle #1</th>
<th>Keep things simple for the end user</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principle #2</td>
<td>Do not interrupt the workflow</td>
</tr>
<tr>
<td>Principle #3</td>
<td>Design reliability into the new process</td>
</tr>
<tr>
<td>Principle #4</td>
<td>Perfect on a small scale before spreading widely</td>
</tr>
<tr>
<td>Principle #5</td>
<td>Monitor adherence to the protocol</td>
</tr>
</tbody>
</table>

In general, you and your team can rely on your MARQUIS mentor for assistance with each of these principles. But specifically for Principle #3, your team should be thinking creatively and realistically about how to use local practice and resources to build reliability into the new process. Awareness campaigns and education are often necessary, but alone are invariably insufficient. Try to use one or more of the following high-reliability strategies in addition to education:

**High-Reliability Strategies**

- Desired action is the default action (not doing the desired action requires opting out)
- Desired action is prompted by a reminder or decision support
- Desired action is standardized into a process that already exists
- Desired action is scheduled to occur at regular intervals
- Responsibility for desired action is redundant (i.e., shared by >1 person)

8. **Complete MARQUIS Site Assessment**

At this point, all site leaders should complete the pre-intervention MARQUIS site assessment with the assistance of their QI team. The site assessment has two parts, and collectively they help you assess the readiness of your site to begin to improve the quality of your medication reconciliation process.

**Part 1: Readiness to Implement Interventions**

The first part of the site assessment tool provides a preview of some of the medication reconciliation intervention components as a way to get your QI team thinking about its current processes and its readiness to begin customization and implementation of the various bundle components.

**Part 2: How Patient-Centered Is Your Medication Reconciliation Process?**

Site leaders or pharmacists can use this assessment to help gauge the patient-centeredness of the institution’s medication reconciliation process. This assessment, which can be found as part of the site assessment in Appendix 2, is divided into three sections – the medication history, discharge medication list and discharge counseling. It is not intended to generate a score, nor is there a point threshold for considering the process patient-centered. Rather, it is intended to assist the site leader or pharmacist in determining how well key aspects of the medication reconciliation process meet the needs of patients, particularly those with low health literacy or limited English proficiency. This assessment will also help identify opportunities for improvement. The tool is adapted from PILL Study Pharmacy Assessment Guide, a two-site randomized controlled trial conducted by two of the MARQUIS investigators.32

Now that you and your QI team have a sense of the principles of medication reconciliation and quality improvement techniques, you are ready to consider each of the proposed components of the intervention in Section B.
In this section, we discuss in detail each of the components of the MARQUIS medication reconciliation intervention. We should make it explicit at the outset that the goal is not to implement all of these components at once in all patients. Rather, using the QI techniques described in Section I, your QI team should prioritize and then gradually customize, implement and iteratively refine these components, first on a very small scale. Over time, the effectiveness of each component will increase as it is iteratively refined, the number of components will increase, and the breadth of implementation will increase as the intervention is spread. Which interventions are implemented first will depend in part on the results of your site assessment but also on first principles, i.e., which interventions are most likely to be high yield. We provide guidance on the latter throughout the discussion of the various components. In Chapter IX, we address issues of phased implementation and iterative refinement.

Measurement
As part of the MARQUIS study, each site will perform a detailed survey of achievement of “milestones” in the medication reconciliation intervention on a monthly basis. This allows sites and their mentors to track progress (or challenges) with implementing each of the components (including the depth and breadth of implementation). This allows mentors to provide more customized guidance to each site. It will also allow the study investigators to better understand which intervention components are most important for improving medication safety. In each chapter of this section, we provide a brief discussion of how these milestones will be measured for each intervention component.

I. Assigning Roles and Responsibilities to Clinical Personnel
Medication reconciliation is a team effort between many people: depending on the institution, patients and families, physicians, nurses, medical assistants, pharmacists and pharmacy technicians are often involved. It is important that the healthcare personnel involved in medical reconciliation have the knowledge, skills, behaviors and resources to perform the tasks assigned to them.

In Section A, Chapter III, we discussed in detail the personnel requirements for each step of the medication reconciliation process. As the team completes the process map of the current medication reconciliation process, think about the personnel performing the steps in the medication reconciliation process and ask these questions:

- Do they have the knowledge, skills and behaviors needed to complete the task?
- Who else in the organization has these skills?
- Is the “best” person for the task the person who is completing the task?

For example, the hospital may have a unit nurse completing Step 1: Create accurate list of pre-admission medications. Additional persons who have the skills to perform the task include the physicians on the unit and the unit pharmacist. However, the physician is currently performing Step 2 of the process. The team may decide that the nurse will continue to perform Step 1 of the process for low-risk patients, but that the nurse will alert the pharmacist if the patient is screened as high risk and the pharmacist will perform Step 1 on those patients (because previous studies have shown that pharmacists often take better medication histories than either physicians or nurses).
• Does the organization provide the resources needed for the person to complete the task, including providing adequate time within the person’s assigned duties to complete the task as prescribed?
  ♦ If not, are the resources easily available/obtainable, or will the team need to request additional resources for the project?
  ♦ Can personnel be used creatively to increase efficiency? For example, pharmacy technicians or students may be capable of gathering preadmission medication sources and performing an initial patient interview (Step 1, job 1), while a pharmacist may be needed at the end to confirm the accuracy of the PAML (Step 1, job 2).

• Does the organization support teamwork across the different disciplines performing the tasks?
• Does it support communication among the team members?

Discuss personnel and organizational resource issues with your QI team and project mentor to ensure the development of ideal processes based on the constraints within your system.

Once roles and responsibilities of various clinical personnel have been assigned and vetted with all stakeholders, this information needs to be effectively communicated to all front-line staff. Each clinician should know his or her role, how it relates to everyone else’s role, and responsibilities for communication and teamwork.

Another concept to be addressed is who (i.e., what role) “owns” the medication reconciliation process. For example, many experts feel that the attending of record should own this process since the end result of medication reconciliation is a correct set of medication orders, and it is the attending who is ultimately responsible for the accuracy of these orders. This may conflict with the current views of many attending physicians, who view medication reconciliation as a regulatory requirement that is someone else’s problem. Changing this view may require a “social marketing” campaign (see Section B, Chapter X) aimed at removing the stigma of medication reconciliation. In the end, front-line clinicians should be aware of who owns the process (especially if it is them).

**Measurement**
As part of the MARQUIS toolkit, we have developed a short survey to be administered to front-line staff, assessing whether they understand their role in the medication reconciliation process and who they perceive “owns” the process. Ideally this survey is administered monthly until most staff answer the survey correctly.
II. Improving Access to Preadmission Medication Sources

Studies have shown that the biggest cause of potentially harmful errors in the medication reconciliation process is errors in taking the preadmission medication history. Taking an accurate history is a challenge for many reasons:

- patients and their caregivers often have a poor understanding of their medication regimens (or are unable to communicate at the time of admission)
- patients do not bring their pill bottles to the hospital nor have an accurate and up-to-date list
- patients have many providers, and no one provider takes ownership for ensuring the accuracy of the medication list
- we have a fragmented medical system with many different medical record systems that don’t talk to each other
- there is no single “source of truth” for medication information (or any medical information)

Thus, it should come as no surprise that in some studies there is at least one serious medication error in admission or discharge orders per patient due to the history-taking process alone.

There are a number of potential solutions to these problems, including:

- facilitated access to preadmission medication sources
- empowering patients and caregivers to own their medication lists
- assigning responsibility to PCPs (or the patient-centered medical home) to keep the medication list in the medical record accurate and up to date
- improving inpatient history-takers with better training and more time to do the process well
- better information technology (IT) to process the sources of medication information in a coherent way

Throughout this manual, we will address most of these solutions. In this chapter, we will discuss one of them: improving access to sources of preadmission medication information.
Sources of Preadmission Medication Information
There are several potential sources of preadmission medication information, each with its own advantages and disadvantages.

<table>
<thead>
<tr>
<th>Source</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
</table>
| Pharmacy prescription refill information           | 1. Often only source for some medications, especially if patient is from outside own medical system  
2. Provides information about adherence           | 1. Expensive to obtain  
2. Difficult to integrate with other information sources                                                                 |
| Outpatient electronic medical record (EMR) medication list | 1. May be easy to obtain and integrate with CPOE, especially if integrated EMR        | 1. Only accurate if maintained by outpatient providers  
2. Doesn’t work if patients are from practices that don’t use that EMR                                                     |
| Medication data from Health Information Exchanges (e.g., a Regional Health Information Organization-RHIO) | 1. May allow access to data from a variety of healthcare systems  
2. Data may be in a coded form that’s relatively easy to use             | 1. Few regions with a robust system in place as of yet  
2. May have issues with data quality  
3. Only as accurate as the sources it comes from                                                                 |
| Patient personal health records medication list    | 1. Empowers patients/caregivers to own list, which in the end may be the best solution  
2. In theory might work regardless of system from which the patient gets regular care                       | 1. Not widely used  
2. Not widely maintained by patients/caregivers  
3. Not widely integrated into outpatient EMRs and inpatient systems                                                      |
| Discharge medication list from recent hospitalization | 1. If from same hospital, easiest to access  
2. May be easy to integrate into CPOE  
3. At one point in time, was accurate (in theory) | 1. May be out of date  
2. Access limited to discharges from same hospital or hospital system                                                      |
| Patient/caregiver’s verbal report                  | 1. May be easy to obtain if patient communicative or caregiver available  
2. Assesses patient/caregiver understanding                                                          | 1. May be very inaccurate or incomplete  
2. Not available in some cases (e.g., patient delirious, family not available)                               |
| Medication list on paper from patient/caregiver    | 1. Easy to obtain (if available)  
2. A bridge to a long-term solution                                                      | 1. May be very inaccurate or incomplete  
2. Often not available                                                                                               |

In the next chapter, we will discuss ways to make patients better owners of this process, thus improving the availability and accuracy of their own verbal reports and hand-written lists. In this section, we will restrict ourselves to improving the availability of the other sources.
Choosing Among the Sources

As can be seen from this table, there is no one perfect source of medication information. Thus, history-takers often have to use several of them and triangulate the data to come up with a “best possible medication history.” (See below.) Thus, hospitals wishing to improve their medication reconciliation process might choose to work on improving access to several of these sources. Which one(s) to choose may depend on which ones seem most feasible given the current environment. For example, a hospital within a larger system that uses a single EMR in the inpatient and outpatient settings might choose to improve access and integration with outpatient EMR medication lists (and the accuracy of those lists). And, in theory, Meaningful Use requirements should make it easier to obtain medication lists from any EMR. A hospital within a state with a robust Regional Health Information Organization might choose to go the Health Information Exchange route.

In most other hospitals, the best choice may be trying to obtain pharmacy prescription fill information. This information is platform independent and has data for most patients and prescriptions regardless of their healthcare system affiliation. Thus, while integration within existing computer systems might be a problem, it is reasonably comprehensive for most patients. Plus, it can provide useful information about non-adherence. For example, if a patient on average fills a 30-day prescription every 45 days, it is reasonable to assume that adherence is around 67%. If a patient hasn’t filled or refilled a prescription for months, it is likely that the patient isn’t taking it at all. This information can avoid inpatient adverse drug events (e.g., giving all four anti-hypertensives to a patient who has never taken more than two at once), and can identify patients in need of programs designed to improve long-term adherence.

Approaches to Improving Access

The major supplier of national pharmacy prescription data is Surescripts after a merger with HubRx several years ago. The decision to buy access to this information is a major one that would need to be made at the highest levels of your organization, but it has tremendous potential advantages. In one study in Ontario, Canada, access to equivalent information (when added to an existing robust medication reconciliation system) led to an 85% reduction in potentially harmful medication discrepancies among surgical patients, from 9.6 to 1.4 per 100 patients.

Depending on your situation, it may also be possible to work with a dominant pharmacy chain in your area to improve access to their prescription fill information. For example, you could establish a system whereby filling out and faxing a simple form to the chain leads to them faxing you back recent fill information for that patient without having to go through a lot of paperwork. These data would be more limited, but the barrier to entry might be much lower than a Surescripts investment.

In all these cases, issues of patient privacy and HIPAA compliance will likely be raised. Although patient privacy is always a priority, HIPAA is not an issue when information is gathered for the purposes of providing medical care. One solution to this problem is to add a form to the paperwork that patients sign at admission that gives the hospital the right to obtain this information from pharmacy sources.

Improving access to other sources of medication information noted in the table above will likely require the work of IT and other personnel and capital resources. One job of your QI committee will be to explore the feasibility, costs and advantages of facilitating access to each of these sources and deciding which ones, if any, are worth the effort. Your mentor can then work with you on how to facilitate access.

One final note: once your system has obtained access to one or more of these sources of preadmission medication information, it will be important to figure out how to serve up this information to clinical personnel. After all, if presented poorly, it could just lead to greater confusion. This may not be a major problem if access is restricted to a limited set of clinically trained pharmacists, but would be a much greater problem if opened up to all potential history-takers. Ideally, your information systems would be able to integrate the data from various sources (e.g., one row per medication regardless of where the data come from). Alternatively, you train providers to start with the one most reliable source and move on to other sources of data as required.
**Measurement**

Monthly, the Team Leader will be asked about access to each data source, either electronically or via facilitated paper access. The survey will also ask what proportion of patients is affected by access to this source (e.g., if your hospital obtains access to the medication lists in one EMR, what proportion of inpatients come from practices that use this EMR). These questions should be answerable by the QI team with the possible exception of facilitated paper access, which may require direct observation (or better yet, a paper trail) to determine how often the source is being accessed in reality.
III. Patient-Owned Medication Lists

The patient-owned medication list can be represented in a number of formats. The most common is a medication list on paper provided by the patient or caregiver. These lists can be created and maintained by the patient/caregiver, or be provided by the patients’ healthcare provider(s). Increasingly these lists are becoming part of an electronic personal health record (PHR). These PHRs can be integrated with the provider’s EMR or health plan or maintained by the patient independently. Lastly, recent hospital discharge medication lists are often provided to patients/caregivers at the time of discharge. Regardless of the source, these lists serve as important starting points to review with the patient and other sources.

If all patients admitted to the hospital came with a completely accurate and up-to-date medication list in their possession, then many of the hazards of medication reconciliation would be avoided. Long-term, this is the ideal solution, although clearly it is high cost. Much of this work needs to happen in the outpatient setting where patients can be given medication list templates and taught why and how to maintain them (see Chapter X for a discussion of social marketing techniques aimed at achieving this goal). However, this intervention can also “begin at home” by giving patients a medication list template (e.g., for their wallet) at discharge and teaching them how to maintain the list.

Paper Forms

In Appendix 4, we include several examples of patient-friendly discharge medication lists that can get patients started on the right track at the time of hospital discharge (see also Section B, Chapter V on discharge medication instructions). In Appendix 5 we provide an example of a paper form that patients can use in the outpatient setting to keep track of their medications. We recommend designing and “branding” a similar form for your own institution. These forms need to be simple to fill out and keep up to date. We therefore recommend limiting the number of fields to be completed to the following:

1. Patient information
   a. Name
   b. Phone number
   c. Emergency contact (including name and phone number)
   d. Pharmacy(ies): name, town, address, phone number for each
   e. Physicians and other prescribers: name, address, phone number for each
   f. Allergies

2. Medication information
   a. Medication name
   b. Instructions for use with specific examples, e.g.,
      i. Atenolol 100 mg tablet, 1 tablet by mouth 1 time a day OR
      ii. Atenolol 100 mg by mouth 1 time a day
   c. Purpose

3. Date form last filled out (provide several lines)

Forms should include some general instructions as well:
   a. Include not just pills but patches, creams, ear or eye drops, inhalers, etc.
   b. Include prescribed medications and over-the-counter medications
   c. Include medications you take every day and those only taken when needed
   d. Include medications you take once a week or once a month
Electronic Forms
In Appendix 5, we include a list of some commercial products where patients can keep their medication information on-line. This approach has several advantages: it is easier to keep the list updated, they can often produce one list to keep at home and a second list to keep in a wallet or purse, the list can be accessed from anywhere and can be shared with providers. At some point, these lists may also be able to interact with EMRs (e.g., allowing the information to be vetted and then imported into an EMR’s medication list). On the other hand, we also acknowledge that many patients and their families may not be able to keep an electronic list, e.g., because of security concerns, lack of access to the internet or lack of computer literacy. Your site may (and probably should) decide to endorse use of one particular electronic product and at the same time produce a single paper form to be used when an electronic form is not feasible.

Either way, most of the effort should be spent on systems to keep these lists updated (by providers and/or by patients) rather than on form design – a list is only useful if it is accurate.

Measurement
The monthly survey focuses on whether a standard medication list form is given to most inpatients at discharge, whether such a form is given to high-risk outpatients in most referring primary care practices, whether systems are in place to keep the list updated between visits (ideally by empowering patients to own the list), and whether the inpatient teams routinely rely on this source at the time of admission. Some of this information can be gathered by creating a paper trail of this part of the intervention; the rest may need to rely on direct observation of a sample of cases, on provider and patient surveys, and on measurement of the accuracy of patient-maintained lists in various settings.
IV. Provider Education: 
Guidelines for Taking a Best Possible Medication History

Taking an accurate preadmission medication history may be the single most important step to improving medication safety during transitions in care. It is also often the most difficult. Below are guidelines you can use when training your front-line staff, both for the “standard bundle” in average-risk patients and for the “intensive bundle” in high-risk patients.

Compiling the Best Possible Medication History

• The goal is to obtain complete information on the patient’s medication regimen, including:
  - Name of each medication
  - Formulation (e.g., extended release)
  - Dosage
  - Route
  - Frequency
  - Non-prescription medications (e.g., samples, over-the-counter drugs, vitamins, herbals, nutraceuticals and health supplements)

• Ideally, the history will also include information on recent changes in the regimen and when the patient last took each medication. Other important parts of the medication history include:
  - Allergies and associated reactions
  - Name and specialty of the prescribers
  - Name and phone number (or town) of the pharmacy(ies) where prescriptions are filled

To complete a best possible medication history, try to use at least two sources of information when possible and explore discrepancies between the different sources of information. Possible sources include:
  - Patient (via interview)
  - Patient-owned medication lists
  - Family members, caregivers
  - Pill bottles
  - Pharmacy(ies) where patient fills prescriptions
  - Medication lists and/or notes from outpatient providers
  - Discharge medication orders from recent hospitalizations
  - Transfer orders from other facilities

If you are starting from scratch, the questions below will help you take a complete and accurate medication history from the patient and/or family. If your starting point is a medication list, it is important to review and verify each medication with the patient. It is important to remember that medication lists are frequently not current and contain errors. It is best to start by having the patient tell you what he or she is taking, not with you reading the list aloud and asking if it is correct (that would be “leading the witness”). Then use the list to explore discrepancies and confirm missing information. In addition to reviewing the list, you should probe, using some of the questions below, to identify additional medications that may be absent from the list.
Questions to elicit a complete medication list:
For each medication, elicit the dose and time(s) of day the patient takes it. When appropriate, ask about formulation and route of administration. Begin with an open-ended question.

- What medications do you take at home?
- Ask about scheduled medications.
  - Which medicines do you take every day, regardless of how you feel?

- Ask about prn medications.
  - Which medicines do you take only sometimes?
  - What symptoms prompt you to take them?
  - How many doses per week do you take?
  - What’s the most often you are allowed to take it?
  - Do you often take something for headaches? Allergies? To help you fall asleep? When you get a cold? For heartburn? For constipation?

- Fill in gaps. For each medication, elicit the dose and time(s) of day the patient takes it, if this information has not already been provided.
  - When appropriate, ask about formulation (e.g., extended release forms of diabetes and blood pressure agents) and route of administration (e.g., by mouth, in both eyes).

- Assessing the purpose of each medication may lead to additional prompts.
  - What is each medicine for?
  - Do you take any other medications for that?

- Ask about medications for specific conditions that the patient has.
  - What medicines do you take for your diabetes, high blood pressure, etc.?

- Ask about medications prescribed by subspecialists who follow the patient.
  - Does your [arthritis doctor] prescribe any medications for you?

- Ask about medications that are easy to forget, including those that are not taken orally, are taken at night, or are not used at longer intervals, such as weekly or monthly.
  - Do you take any inhalers, nebulizers, nasal sprays, ointments, creams, eye drops, ear drops, patches, injections or suppositories?
  - Do you take any medications in the evening or at night?
  - Do you take any medicines once a week or once a month?

- Ask about non-prescription products.
  - Which medicines do you take that don’t require a prescription? (Over-the-counter medicines, vitamins, herbals and minerals.)
• Assess recent medication use and adherence.
  ♦ When did you take the last dose of each of your medicines?
  ♦ Tell me about any problems that you’ve had taking these medicines as prescribed.
  ♦ Many patients have difficulty taking their medications exactly as they should every day.
    In the last week, how many days have you missed a dose of your [medication]? 

**Time-saving tips:** Start with easily accessible sources, such as the outpatient EMR medication list or recent hospital discharge orders. If patients use a list or pill bottles and seem completely reliable (and the data are not that dissimilar from the other sources, and/or the differences can be explained), then other sources are not needed. If patients are not sure or are relying on memory only, or cannot clearly “clean up” the other sources of medication information, then it’s time to rely on additional sources such as community pharmacy data. If the history is still not clear, especially if there are suspected differences between what the patient is supposed to be taking and what they actually take, then contact outpatient physician offices and/or have the family bring in the pill bottles from home.

**Measurement**
Because of the importance of this step, measurement is essentially built into MARQUIS. As noted above in Section A, Chapter V, part 5, ideally you will have a paper trail of each preadmission medication list in order to measure the process. And the data collection process will provide a run chart of the accuracy of the primary team’s medication history for about 25 patients per month (and later, the number of errors with potential for patient harm).

In addition, we have provided a survey to providers asking them about the quality of training in taking a BPMH, whether they are given adequate time to do it well, and whether they are given feedback on their performance (an easy intervention component to take on early in your efforts).
V. Discharge Counseling: Patient Education and Teach Back Guidelines for Educational Materials

The transition from hospital to home is a vulnerable time for patients. During the weeks that follow hospital discharge, adverse events occur among 19-23% of patients. Moreover, approximately 20% of patients are rehospitalized within 30 days. Most of these problems could be prevented through better communication and coordination of care, with particular attention to the patient’s medications. Thus, an important part of medication reconciliation is to provide patients (and their caregivers) with appropriate education about the discharge medications and their use. Below are some recommendations for effective discharge counseling.

Content of Discharge Counseling

1) Identify the “learner.” Sometimes the patient is not the correct or sole person who needs to understand the new issues with his or her medications. This may be due to cognitive, linguistic, health literacy, cultural or other reasons. The person who may be critical in the process may be, for example, a spouse, child or friend. Ensure you know who that is and include the “learner” in the preparation process of the patient.

2) Focus on the patient’s key concerns.
   a. Patients are generally most concerned with what they need to do. Highlight important instructions and changes to the medication regimen, such as dose changes, deletions and additions.
   b. Inform patients about potential side effects and what to do if they occur. This can improve adherence and reduce excess healthcare utilization after discharge. Such instructions should be very specific, including how to treat the symptoms, when to stop the medication, when to call the physician, and when to go to the Emergency Room.

3) Keep it simple.
   a. Use plain language and avoid medical jargon.

4) Use a standard script.
   a. This helps ensure that the most important information is communicated each time (i.e., it improves reliability).
   b. Content should generally include the following:
      i. Exactly how the discharge medication regimen differs from the preadmission regimen.
      ii. Why these changes were made.
      iii. The indications, directions and potential side effects of all new medications.
      iv. What to watch out for and who to contact if problems arise.
      v. Importance of keeping an up-to-date medication list with them at all times.
      vi. Confirmation of ability to pick up prescriptions.
      vii. If possible, review and address barriers to adherence.

5) Ask patients to “teach back” key information to confirm comprehension. Here are a few tips on how to conduct an effective teach back:
   a. Make it normal.
      i. “I do this with all my patients.”
   b. Put the burden on your shoulders.
      i. “I want to make sure I explained the information clearly.”
c. Be specific about what you want the patient to repeat back. Examples:
   i. “Tell me... what is the new dose of insulin you should take?”
   ii. “We talked about a couple of potential side effects for this new medicine. What were they, and what should you do if they happen?”
   iii. “Show me... how should you use this new inhaler?”
   iv. “What were the changes we talked about making to your medicines?”
   v. “I want to make sure I was clear. Would you tell me what you are going to tell your wife about your antibiotics?”

   6) Solicit questions effectively.
      a. Don’t ask, “Do you have any questions?” (to which patients often reply, “No”).
      b. Do ask, “What questions do you have?”

Providing Medication Instructions That Are Clear to All Patients

Optimally, patients will receive a clearly formatted discharge medication list, which will be used while counseling. Remember to use a professional interpreter or language line when the patient’s primary language is not English, instead of an ad hoc interpreter (e.g., a family member or another staff member, even if a native speaker in the language in question), or the clinician’s own rudimentary language skills.

Many hospital EMRs or prescribing tools are able to print a medication list. However, such lists often are poorly formatted, which makes them difficult for patients to understand. Below are specific recommendations about how to improve the clarity and comprehension of discharge medication lists. This list is adapted from the ACP Foundation/Institute of Medicine recommendations for formatting prescription drug labels.

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Example or Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use explicit text to describe dosage/interval in instructions.</td>
<td>“Take 2 in the morning, and 2 in the evening” rather than “Take two tablets twice daily.”</td>
</tr>
<tr>
<td>Use a universal medication schedule (UMS) to convey and simplify dosage/use instructions.</td>
<td>“A visual aid with standard intervals (e.g., morning, noon, evening, bedtime) can simplify dosing and reinforce text instructions.”</td>
</tr>
<tr>
<td>Organize list in a patient-centered manner.</td>
<td>“Patient-directed content (e.g., drug name, dosing instructions) should have greatest prominence.”</td>
</tr>
<tr>
<td>“When possible, include indication for use.”</td>
<td>“When feasible from a privacy standpoint, include the purpose of the medication.”</td>
</tr>
<tr>
<td>“Simplify language, avoiding unfamiliar words/medical jargon.”</td>
<td>“High cholesterol” rather than “Hypercholesterolemia.”</td>
</tr>
<tr>
<td>“How to take” rather than “sig.”</td>
<td>“Use a 12 point font such as Arial for the most important dosing information. Do not use ALL CAPS, which is more difficult to read.”</td>
</tr>
<tr>
<td>“When applicable, use numeric instead of alphabetic characters.”</td>
<td>“2” instead of “two”</td>
</tr>
<tr>
<td>Use typographic cues (bolding and highlighting) for patient content only.</td>
<td>“Only information most relevant to patients, such as drug name and dose, should stand out.”</td>
</tr>
<tr>
<td>Use horizontal text only.</td>
<td>Do not print some text perpendicular to other text.</td>
</tr>
<tr>
<td>Provide medication list in patient’s preferred language.</td>
<td>“Ideally, the medication list will be printed in both English and the patient’s preferred language, so both healthcare providers and the patient can understand.”</td>
</tr>
</tbody>
</table>

In Appendix 4 we have included examples of discharge medication instructions that adhere to these principles.
Communicating Clearly with Patients

Besides giving providers a standardized script, giving them effective tools for displaying discharge medications, and educating them in teach-back techniques, providers should be taught more generally how to effectively communicate with patients with a variety of literacy levels.

As a supplement to MARQUIS, we are providing an instructional video to educate front-line providers in all these techniques. Ideally, this video could be supplemented with direct observation and feedback, role-playing and other techniques to best convey this information.

Measurement
As with training in taking a BPMH, we have provided a survey to front-line staff to measure whether they have been trained in discharge medication counseling, health communication and teach back, and whether they use a standardized script in most patients and use literacy-sensitive tools. The latter can also be assessed by direct observation and use of a paper trail as part of the intervention. Tools can also be directly compared to the guidelines provided above.
VI. Risk Stratification

In addition to taking better preadmission medication histories, one of the most important interventions to implement is a risk-stratification process with the provision to offer an “intensive bundle” to high-risk patients.

What constitutes a high-risk patient (i.e., high risk for the development of potential and actual adverse drug events caused by error in the medication reconciliation process)?

Many different characteristics have been described in the literature, but the following are the most commonly associated with adverse drug events during transitions in care:

- Age > 65
- Polypharmacy:
  - High number of medications, or
  - High number of medication changes that occur during hospitalization
- Number of high risk medications (i.e., ≥ 3 high risk medications)
- Many co-morbid conditions (i.e., ≥ 3 co-morbid conditions)
- Vulnerable patient: trouble with activities of daily living ADLs, cognitive impairment, non-English speaking, poor understanding of medications
- High healthcare utilization (i.e. seen by > 2 outpatient providers, > 10 outpatient visits in past year)

How do we tailor the above list of high-risk characteristics to make this more applicable?

Based on expert consensus, this is a proposed risk-stratification tool:

<table>
<thead>
<tr>
<th>High-Risk Patient</th>
<th>Low-Intermediate Risk Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Physician concern about patient and medications on admission (“gut check”)</td>
<td>OR</td>
</tr>
<tr>
<td>B. At least 2 of the following:</td>
<td>All other patients</td>
</tr>
<tr>
<td>1. Patient/caregiver cannot provide medication list or pill bottles</td>
<td></td>
</tr>
<tr>
<td>2. &gt; 10 pre-admission medications</td>
<td></td>
</tr>
<tr>
<td>3. &gt; 3 high risk medications (NSAIDs):</td>
<td></td>
</tr>
<tr>
<td>NSAIDs</td>
<td></td>
</tr>
<tr>
<td>Sedative/hypnotics, opioids or anti-psychotics</td>
<td></td>
</tr>
<tr>
<td>Anticoagulants (including anti-platelet agents)</td>
<td></td>
</tr>
<tr>
<td>Insulin</td>
<td></td>
</tr>
<tr>
<td>Digoxin</td>
<td></td>
</tr>
</tbody>
</table>
Application of Risk-Stratification Tool:

An initial step should be to get buy-in for the above characteristics. Consider using local data, if available, to modify list of high-risk characteristics. Then you should examine on-site resources available for the intensive intervention (see Chapter VII on the intensive bundle) and examine your current patient population to observe how many patients would fit into the “high-risk” category based on the above stratification system.

If there is a supply/demand mismatch between high-risk patients and available resources, consider the following:

1. If demand exceeds supply:
   - Raise the threshold for any particular high-risk characteristic
   - Require more than 2 of the given criteria to define as “high risk”

2. If supply exceeds demand:
   - Lower the threshold for any particular high-risk characteristic
   - Require only one of the given criteria to define as “high risk”
   - Add additional criteria to qualify as high risk

3. Consider how this information will be gathered and whether any of it can be gathered automatically (i.e., it may be worth creating a stratification system based solely on electronically available data if it can automatically trigger an intensive intervention)

How to operationalize this tool:

Any of the following providers would be able to complete patient risk stratification based on the above criteria:

- Recommended personnel: Intake nurse on admission floor*
- Alternative personnel:
  - Emergency room nurse performing initial patient assessment on presentation to the hospital
  - Admitting physician
  - Pharmacist, if work-flow such that a pharmacist is assigned to every patient at time of admission
- Any healthcare provider treating patient on admission may trigger the “provider clinical concern” criteria for designating a patient as high risk
Next to be decided is how identification and documentation of patient’s risk status (high versus intermediate/low) is going to be performed in a high-reliability way. For example:

- Add criteria to the nursing intake form, intake nurse completes risk stratification and documents patients’ risk status
- Educate nurses and physicians about triggering the intensive intervention if they have concerns about the patient’s medications even if they don’t meet the above criteria (the “gut check”)
  - patient has poor understanding of his or her preadmission medications
  - suspicion of medication side effects or non-adherence prior to admission
  - concern for medication side effects or non-adherence after discharge
- Add this to the checklist of items discussed during interdisciplinary rounds
- If possible, have the EMR calculate number and classes of preadmission medications and use that to automatically trigger the intensive intervention.

The next issue to be addressed is the notification of pharmacist (or other equivalent personnel) of high-risk patients so that they may receive the intensive intervention bundle. Ideally, once a patient’s risk status is documented, there must be an automatic notification of the intervention personnel, so that high-risk patients can receive the appropriate intensive intervention bundle. Site-specific methods need to be adopted to complete this process step (you may consider doing a process map to evaluate and improve the component). Examples:

- Nursing intake form identifies patient as high risk: After documenting a patient as high risk, the intake nurse notifies the intervention pharmacist
- Physician/healthcare provider identifies patient as high risk: After physician team feels patient should be considered high risk, member of team notifies the intervention pharmacist
- EMR tools identify patient as high risk: Automatic alert is sent to the intervention pharmacist
- Patient identified as high-risk during interdisciplinary rounds: a designated member of the team documents risk and contacts the intervention pharmacist

Measurement

This is based on whether a standardized tool is used to risk-stratify patients, whether the tool is applied to all patients and whether the tool actually drives use of the high-intensity bundle. The answers to these questions could be based on a documentation trail, e.g., use of a risk-assessment form, use of a high-intensity bundle form.
VII. Intervention Components: Intense vs. Standard

As noted in Section A when describing the various steps of medication reconciliation, both the standard and intensive bundle include the following components (see diagrams, below):

- Risk stratification
- Taking a Best Possible Medication History and documenting the Preadmission Medication List (PAML)
- Ordering and then reconciling medications at admission (and transfer if applicable)
- Ordering and reconciling medications at discharge
- Counseling patients and caregivers
- Communicating the discharge medication regimen to the next provider of care

The main differences between the two bundles are the following:

- Who performs each step of the process (e.g., pharmacists may take the medication history, perform discharge reconciliation, and counsel patients in the intensive bundle, while other personnel may do these steps in the standard bundle)
- How much training these personnel receive
- How much time is allocated to the process
- In general, it is expected that in the intensive bundle, a more thorough medication history will be taken, reconciliation at admission may be more active, reconciliation at discharge will be more thorough, more time will be spent with discharge counseling, and there will be more communication with post-discharge providers.

**High Level Flow Diagram: MARQUIS**

<table>
<thead>
<tr>
<th>Pre-Admission</th>
<th>Admission / Transfer</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Risk stratification</strong>: standard approach for placing patients in high or low risk pathway</td>
<td><strong>2. BPMH</strong></td>
<td><strong>2. PAML</strong></td>
</tr>
<tr>
<td><strong>Risk Stratification</strong></td>
<td><strong>Standard Interview</strong></td>
<td><strong>Admission Reconciliation</strong></td>
</tr>
<tr>
<td>Low Risk</td>
<td><strong>Standard Interview</strong></td>
<td><strong>Intensive Interview</strong></td>
</tr>
<tr>
<td>High Risk</td>
<td><strong>Intensive Interview</strong></td>
<td><strong>Intensive DC Reconciliation</strong></td>
</tr>
<tr>
<td><strong>Marquis Standard Bundle</strong></td>
<td><strong>Output: Risk status documented</strong></td>
<td><strong>Output: ML₀ depicting changes</strong></td>
</tr>
<tr>
<td><strong>2. Interview</strong>: standard approach at admission to taking Best Possible Medication History (BPMH)</td>
<td><strong>Output: PAML from BPMH</strong></td>
<td><strong>Output: Patient educated</strong></td>
</tr>
<tr>
<td><strong>3. DC Reconciliation</strong>: standard approach at discharge to highlight changed, discontinued, or new medications</td>
<td><strong>Output: ML₀ depicting changes</strong></td>
<td><strong>Output: ML₀ forwarded to provider</strong></td>
</tr>
<tr>
<td><strong>4. Education</strong>: standard approach at discharge to educate patient on changed, discontinued, or new meds</td>
<td><strong>Output: ML₀ depicting changes</strong></td>
<td><strong>Output: ML₀ forwarded to provider</strong></td>
</tr>
<tr>
<td><strong>5. Forwarding</strong>: standard approach at discharge to forward discharge medication list to next provider</td>
<td><strong>Output: ML₀ depicting changes</strong></td>
<td><strong>Output: ML₀ forwarded to provider</strong></td>
</tr>
</tbody>
</table>

**Abbreviations**

BPMH = Best Possible Medication History
PAML: Preadmission Medication List
A = Admission; T = Transfer; D = Discharge; ML = Medication List
**Risk Stratification**

<table>
<thead>
<tr>
<th>Pre-Admission</th>
<th>Admission / Transfer</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 PAML</td>
<td>3 ML₄</td>
</tr>
<tr>
<td></td>
<td>BPMH</td>
<td>4 ML₅</td>
</tr>
<tr>
<td></td>
<td>Standard Interview</td>
<td>5 ML₆</td>
</tr>
<tr>
<td></td>
<td>Intensive Interview</td>
<td></td>
</tr>
<tr>
<td>Low Risk</td>
<td>Standard DC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reconciliation</td>
<td></td>
</tr>
<tr>
<td>High Risk</td>
<td>Standard Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intensive DC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reconciliation</td>
<td></td>
</tr>
<tr>
<td>Risk Stratification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Step A.** Perform Risk Stratification: standard approach to place patients in high or low risk pathway

<table>
<thead>
<tr>
<th>Low Risk</th>
<th>All others</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Risk</td>
<td></td>
</tr>
<tr>
<td>A. Provider has clinical concern (aka “gut check”), or</td>
<td></td>
</tr>
<tr>
<td>B. Presence of any 2 of the following...</td>
<td></td>
</tr>
</tbody>
</table>
  i. patient/caregiver cannot provide medication list or pill bottles |
  ii. ≥ 10 pre-admission medications |
  iii. ≥ 3 high risk medications (NSAIDs): |
    *NSAIDs |
    *Sedative/hypnotics, opioids, or anti-psychotics |
    *Anticoagulants |
    *Insulin |
    *Digoxin |

**Step B.** Document risk in chart

**Taking a Best Possible Medication History**

<table>
<thead>
<tr>
<th>Pre-Admission</th>
<th>Admission / Transfer</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 PAML</td>
<td>3 ML₄</td>
</tr>
<tr>
<td></td>
<td>BPMH</td>
<td>4 ML₅</td>
</tr>
<tr>
<td></td>
<td>Standard Interview</td>
<td>5 ML₆</td>
</tr>
<tr>
<td></td>
<td>Intensive Interview</td>
<td></td>
</tr>
<tr>
<td>Low Risk</td>
<td>Standard DC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reconciliation</td>
<td></td>
</tr>
<tr>
<td>High Risk</td>
<td>Standard Education</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intensive DC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reconciliation</td>
<td></td>
</tr>
<tr>
<td>Risk Stratification</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Step A.** Interview: standard approach at admission to take best possible medication history

1. Be proactive: gather as much information as possible prior to seeing the patient
2. Prompt questions about:
   a. non-prescription categories: over the counter drugs, vitamins, recreational drugs, herbal remedies.
   b. unique dosage forms: eye drops, inhalers, patches, and sprays.
3. Don’t assume patients are taking medications according to prescription vials (ask about recent changes initiated by either the patient or the prescriber).
4. Use open-ended questions: (“Tell me how you take this medication?”)
5. Use medical conditions as a trigger to prompt consideration of appropriate common medications.
6. Consider patient adherence with prescribed regimens (“Has the medication been recently filled?”).
7. Verify accuracy: validate with at least two sources of information.
8. Obtain community pharmacy contact information: anticipate and inquire about multiple pharmacies.
9. Use a BPMH trigger sheet (or a systematic process / interview guide). Include efficient order/optimal phrasing of questions, and prompt for commonly missed medications.

**Step B.** Sign PAML document in chart
### Patient Education at Discharge

**Step A.** *Educate:* standard approach at discharge to educate patient on new medication regimen

1. Use a standard script
2. Discuss indications, directions, and potential side effects of new medications
3. Discuss exactly how the discharge regimen differs from the one taken prior to admission, i.e., which medications
   - a. are to continue unchanged
   - b. are to continue with changes
   - c. are to stop completely
   - d. are to start new
4. Use literacy sensitive materials
5. Use Teach Back to confirm patient understanding
6. Have patient sign ML₃ after Teach Back

**Step B.** *Place patient-signed ML₃ in chart attesting comprehension*
Medication Reconciliation Forms

If you currently use a paper process for medication reconciliation and for medication order entry, you may decide to continue to use a paper process (the alternative is to implement a computerized process, see Section B, Chapter X). Improvements in the medication reconciliation process will almost inevitably involve changes to your site’s medication reconciliation forms. While this is a necessary and important part of the intervention, it should not be your sole focus (many hospitals equate revising their medication reconciliation forms as equivalent to “solving” the problem of medication reconciliation, much in the same way that sites equate the creation of new order sets as solving problems related to inpatient glycemic control or prophylaxis of venous thromboembolism). Any forms you design will need to be revised as they undergo cycles of PDSA and iterative refinement. And the implementation of new forms will need to be accompanied by measurement (see below) and the other interventions described in this manual.

Communicating with the next Provider re: Discharge Medications

<table>
<thead>
<tr>
<th>Pre-Admission</th>
<th>Admission / Transfer</th>
<th>Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Stratification</td>
<td>Standard Interview</td>
<td>Intensive Education</td>
</tr>
<tr>
<td>Low Risk</td>
<td>BPMH</td>
<td>Standard DC Reconciliation</td>
</tr>
<tr>
<td>High Risk</td>
<td>Intensive Interview</td>
<td>Intensive DC Reconciliation</td>
</tr>
<tr>
<td></td>
<td>ML_A</td>
<td>Standard Education</td>
</tr>
<tr>
<td></td>
<td>ML_T</td>
<td>Intensive Education</td>
</tr>
<tr>
<td></td>
<td>ML_D</td>
<td></td>
</tr>
</tbody>
</table>

**Step A.**

**Forward:** standard approach at discharge to communicating with post-discharge providers regarding discharge medication regimen

1. Fax or send copy of patient-signed ML_D to next provider as part of standard discharge documentation packet
2. Include ML_D in electronic medical record to be accessible by all providers for that patient
3. Make sure documentation includes how discharge medications differ from PAML and reasons for all changes
4. Provide contact information in case of questions

**Step B.**

Place physician-signed ML_D in chart attesting forwarding to next provider

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*Marquis Implementation Manual*
Below, we include some guidelines to consider when designing or redesigning your forms. All of these recommendations need to be considered in light of how your hospital currently operates, especially regarding medication ordering, standards for forms at your institution, etc.

1. An ordering provider should have to write the preadmission medication list only once if possible, i.e., when creating the PAML at the time of hospital admission.
2. The PAML should “copy forward” so that the provider can use it to select medications to continue, hold or stop at admission.
3. The PAML and current medication list should also “copy forward” so providers can construct the discharge medication list from these two other lists (see the triplicate form from Aurora Health in Appendix 6 for an example of how to accomplish these first three tasks).
4. Forms should make it easy to compare the medications on various lists to each other (e.g., PAML and current medications). Ways to do this include presenting different lists side-by-side and/or having sections of the form for medications in different classes (but this requires more work up-front from providers and is a less efficient use of space).
5. The final discharge medication list should ideally sort medications into categories of unchanged, changed, new and stopped compared with the PAML.
6. Discharge medication forms should make it easy to write prescriptions.
7. Forms should accommodate having a second person verify the reconciliation process.
8. Forms should facilitate conversation among providers: why medication changes are being made, what information is unclear, what actions need to be taken.
9. Forms should make it clear who performs each step of the process. Within space limitations, forms can also provide “real-time decision support” regarding how to perform the process.
10. In Appendix 6, we include examples of paper medication reconciliation forms used at various institutions (the form from Aurora Healthcare is an example of one used for documentation and provider orders; the one from Brigham and Women’s Hospital is an example of a form used by a second provider, e.g., a pharmacist, to confirm that the process has been done correctly). The best features of these forms can be used, in conjunction with the above guidelines, to design your own forms. Your mentor can also provide feedback as forms are being designed and redesigned.

Measurement
As noted in Section A, Chapter V, Part 5, ideally each component of the standard and high-intensity bundle comes with its own documentation trail so that measurement is built into the process, i.e., use of a risk-stratification form, use of a standard medication history form, use of a standard admission and discharge medication reconciliation form, use of a patient counseling form, etc. In addition, ideally patients are surveyed to evaluate whether they truly understand their discharge medication regimens, and post-discharge providers could be surveyed to evaluate whether they received documentation of the discharge medication list and understand how and why the list differs from prior to admission.

For the intensive bundle, the documentation could make note of who performs each step and the time spent performing it. The presence of policies clearly defining each of the bundles can also be evaluated. Lastly, a provider survey can evaluate whether front-line staff performing the intensive intervention feel they have received adequate training and are given sufficient time and staffing to conduct their responsibilities properly.
VIII. Improvements in Information Technology: Inpatient Electronic Medication Reconciliation Applications

Information technology is certainly not the answer to all (or even most) medication reconciliation problems, but if designed well, it can improve the reliability, quality and efficiency of the process. For sites that already have an inpatient EMR, they have several choices:

- Buy the latest medication reconciliation upgrades from their vendor
- Buy an independent product that works with their vendor product as much as possible
- Buy information technology that is relatively separate from most EMR functions and therefore does not require a high degree of integration. These might include access to pharmacy data, production of literacy-sensitive discharge instructions, use of on-line medication libraries (e.g., of pill images), and use of patient personal health records
- Integrate where possible
- For sites without an EHR, in some ways the options are easier:
  - Buy an independent product
  - By IT that is separate from EMR functions

Below we have compiled a list of ideal features and functions of medication reconciliation IT based on the literature, the collective experience of the investigators, and consensus. In Appendix 7 we include a list of independent vendors that sell medication reconciliation applications. Any decision to buy and implement IT is a major step that would require a serious investment of resources, both monetary and personnel. And yet it may be one of the higher yield interventions if the software is indeed designed well.

**Ideal Features and Functions**

1. Access to electronic sources of preadmission medication information
   - Community pharmacy prescription fill data (e.g., from Surescripts)
   - Medication lists from ambulatory EMRs in common use among referring providers
   - Discharge medication orders from recent hospitalizations at participating hospitals and/or other hospitals in the region
   - Medication lists from patient personal health records (ideally linked to the ambulatory EMR)

2. Facilitates the comparison of various sources of preadmission medication information
   - Each medication listed once
   - Ability to:
     - see the source(s) of that medication information
     - see differences in doses, frequencies, routes and formulations for each medication
     - see dates prescribed/ordered as appropriate for each source
     - sort medications by medication name, class, date and source

5. Ability to show patient adherence to medications
   - Calculation of medication possession ratio and/or graphs of medication possession time based on pharmacy fill and refill data
   - Access to any documented information from EMRs and PHRs regarding medication adherence, side effects, intolerances, etc.
6. Documentation of the Preadmission Medication List (PAML)
   i. Ability to move preadmission medications into the PAML, with or without changes
   ii. Ability to add new medications into the PAML based on other (non-electronic) sources of information
   iii. Ability to document uncertainty about medications, adherence issues, etc.
   iv. Ability to update the PAML at any time during the hospitalization
   v. Audit trail to document changes to the PAML made over the course of the hospitalization, including when and by whom (person and role)

7. Facilitation of PAML verification
   i. Sign-off that the PAML is ready for verification
   ii. Modify the PAML to resolve any errors in the history-taking process
   iii. Document verification of PAML by a second clinician

8. Facilitation of admission order writing based on the PAML
   i. Document the planned action on admission for each PAML medication: continue without changes, continue with changes, substitute for a different medication, temporarily hold, discontinue
   ii. Ability for continued medications to link to the admission order entry process

9. Facilitation of reconciliation at admission
   i. Flag differences between PAML and admission orders
   ii. Document intentional reasons for changes
   iii. Modify admission orders as needed to resolve unintentional discrepancies
   iv. Document verification of admission orders by a second clinician

10. Facilitation of medication ordering at intra-hospital transfer
    i. Compare PAML to current (pre-transfer) inpatient medications (e.g., sorted by class, differences in medications, dose, route, frequency or formulation highlighted)
    ii. Order medications from either list as Transfer Orders, with or without further modification
    iii. Add new medications at transfer (i.e., not on either list)

11. Facilitation of reconciliation at intra-hospital transfer
    i. Flag differences among PAML, pre-transfer medications, and Transfer Orders
    ii. Document intentional reasons for changes made to Transfer Orders
    iii. Modify Transfer Orders as needed to resolve unintentional discrepancies
    iv. Document verification of transfer orders by a second clinician

12. Facilitation of medication ordering at hospital discharge
    i. Compare PAML to current (pre-discharge) inpatient medications (e.g., sorted by class, differences in medications, dose, route, frequency or formulation highlighted)
    ii. Order medications from either list as Discharge Orders, with or without further modification
    iii. Add new medications at discharge (i.e., not on either list)
    iv. Print and sign prescriptions at discharge (from ordered medications)
13. Facilitation of reconciliation at hospital discharge
   i. Flag differences among PAML, pre-discharge medications, and Discharge Orders
   ii. Document reasons for intentional changes made to Discharge Orders (e.g., compared with the PAML)
   iii. Modify Discharge Orders as needed to resolve unintentional discrepancies
   iv. Document verification of Discharge Orders by a second clinician

14. Tools to facilitate patient/caregiver education
   i. Print a final discharge medication list in patient-friendly language that clearly indicates (with pictures if possible) the indications of each medication, time(s) of day to take it, number of pills/sprays, etc. with each administration, and common side effects to watch for
   ii. Print a picture of each medication (pill, inhaler, etc.) taking into account where the prescription will be filled
   iii. Clearly explain the differences between preadmission and discharge medication regimens, including which medications are new, which have had changes in dose/frequency/route/formulation, which are to be continued without changes, and which preadmission medications should be stopped

15. Tools to facilitate communication with post-discharge providers
   i. Clear documentation in the discharge paperwork of the discharge medication regimen, including a clear explanation of changes compared with the preadmission medication regimen and reasons for all changes
   ii. Ability to transmit this information electronically to post-discharge providers (e.g., to their ambulatory EMR, sub-acute facility EMR, via online portal to hospital’s information systems, or through health information exchange program)

16. Tools to facilitate compliance with medication reconciliation process
   i. Track timing of PAML documentation and verification to time of admission
   ii. Provide alerts, reminders and/or hard stops if PAML not completed in a timely manner

17. Tools to facilitate other QI efforts
   i. Automatically identify a patient at high risk for medication problems (e.g., based on the number and/or classes of medications in the PAML, in admission or discharge orders, and/or based on the number of changes from preadmission to discharge medications) so that further action can be taken

Measurement
This is a list of the key features and functions the application possesses based on the QI team’s knowledge of the software.
IX. Phased Implementation

**Different ways to phase implementation**

Basic Quality Improvement principles argue that any intervention needs to be started on a small scale and iteratively refined before implementing it more widely. Medication reconciliation efforts are no different than other QI interventions in this respect. Moreover, because of the number of personnel involved, the complexity of the work, and the time required to do the process well, the potential for harm of a poorly designed QI effort (e.g., time taken away from other activities, adverse drug events) is high. For all these reasons, we strongly suggest that any medication reconciliation QI effort start small. There are several ways to phase in implementation of a medication reconciliation effort:

1. By floor or service
2. By timing (admission or discharge)
3. By patient risk (e.g., focus on high-risk patients only)
4. By medication (e.g., high-risk medications only)
5. By component (e.g., educational efforts first)

All of these have their merits. We would argue, however, that fragmenting the process by admission or discharge is not ideal because it artificially separates a process that by definition is attempting to achieve seamless care across a continuum. Similarly, we feel that focusing only on certain medications is of limited utility because in the end it is the patient, not the medication, who should be the focus of your interventions. (This is not to say that certain patients may be at higher risk because of the medications they are on, but the result should be a focus on the patient as a whole.)

**Phasing in by location or service**

Initial efforts should impact a limited number of providers and patients, i.e., by focusing on one location or service. Because medication reconciliation efforts are by definition multidisciplinary, ideally you can choose a location that is regionalized, i.e., where nurses and physicians (and maybe pharmacists) care for an overlapping population of patients in one location. If your hospital does not have regionalized services, then your choice of whether to phase in by service (i.e., by doctor or location (i.e., by nurse) may depend on who is doing the bulk of the QI effort. It also may depend on other logistics, such as how pharmacists are distributed. For example, if pharmacists are assigned by location and nurses will be a significant part of your QI effort, then it would make sense to phase in implementation by location, even if that means some physicians will be caring for patients both inside and outside the pilot. At the very earliest stages, it may make sense to intervene only on patients where both one nurse and one physician overlap their care (the "one patient, one day” approach to quality improvement). This pilot could then be expanded to several nurses and several physicians, again only intervening on the patients where care overlaps. Later, when the focus shifts to operationalizing procedures across a population of patients, it becomes more important to involve every patient on a given floor or service.

The choice of where to start depends on several factors:

1. Resources available
2. Flexibility of that location or service
3. Ability to generalize from that location or services to others in the hospital
4. Commitment level of staff
Phasing in by patient risk
As noted above, it may also make sense to focus early efforts on high-risk patients (i.e., a pilot test of the “intensive bundle,” described above). You may get the “most bang for your buck” with these efforts, which can be a real boost for morale (and can generate more support from your administration). These efforts often lend themselves well to pilot studies because they involve a discrete (but often disparate) group of patients and personnel providing the services. As this bundle is optimized, it can gradually involve more of the high-risk population.

Phasing in by component
Lastly, any discrete element of the intervention can (and should) be tested on a small scale, and many can be separated from other components. Such elements might include provider educational efforts (re: definition of medication reconciliation, roles and responsibilities of staff, interdisciplinary communication, taking a best possible medication history, providing discharge education to patients), patient educational efforts (re: owning and maintaining a medication list), use of new medication reconciliation forms, and displaying new sources of preadmission medication information to providers.

Your mentor will help you strategize how to implement your interventions throughout the 21 months of the study.

Measurement
This requires an honest assessment by the Team Leader and QI team regarding the following: whether PDSA cycles are being used to drive iterative refinement of the intervention, whether there is a clear plan for expansion beyond the initial pilot site, whether there is a clear timeline for expansion, and whether the QI team is multidisciplinary.
**X. Social Marketing and Engagement of Community Resources**

**Social Marketing**
Medication reconciliation, like most quality improvement and safety efforts, involves behavioral change, in this case for both patients and providers. Successfully changing behavior requires several things, including an effective intervention, the subject of most of this implementation manual. However, it also requires people who are willing to change and who have the necessary knowledge, attitudes and skills. In earlier sections, we discussed education and training of patients and providers to give them the knowledge and skills they need to be part of a successful medication reconciliation effort. In this section, we discuss an intervention component designed to motivate providers and patients to change; in other words, to give them the requisite attitudes. If providers and patients don’t appreciate the need for change and don’t “buy in,” even the best intervention is likely to fail.

**Social marketing** is the systematic application of marketing, along with other concepts and techniques, to achieve specific behavioral goals for a social good. By employing techniques such as local branding, market research, pretesting of materials, and aligning desired behaviors with patients’ and providers’ self-interests, social marketing can be an effective way to motivate behavior change.

**Messages of Social Marketing for Medication Reconciliation**

As noted above, sites may choose one or both targets for social marketing: patients and providers.

For inpatient providers, the messages might include the following:
1. Medication Reconciliation is not some new regulatory requirement that is someone else’s job, it’s doing what it takes to make sure each patient is ordered the right medications in the hospital and after discharge, and it is your (i.e., attending physicians’) responsibility to make sure this is done correctly.
2. Errors in the medication reconciliation process can undo a lot of otherwise excellent medical care.

For outpatient providers, the messages might include:
1. You need to talk to patients about their medications, including what they think they are supposed to be taking, what they actually take, and whether they are having side effects. Medications only work if your patients are taking them.
2. You need to teach your patients to keep their medication list with them and keep it updated at all times. They are the only ones who see all of their prescribers.
3. You are responsible for making sure the medication list in the medical record is accurate and up to date. Otherwise, many people (inpatient providers, outpatient specialists) may have incorrect information, make poor decisions and prescribe the wrong medications.

For inpatients, the messages might include:
1. There are three questions patients and caregivers should ask their providers about their medications before discharge: 1) how is the discharge medication regimen different than the one I was taking prior to admission, 2) why were these changes made and 3) what problems might I have with these medications (and what should I do if I have these problems)?
2. Keep an accurate and up-to-date list of your medications in your wallet (or on a secure website) at all times.
Finally, for high-risk outpatients, the messages might include:

1. Bring your medication pill bottles and medication list to all provider appointments.
2. Make sure your list is accurate and up to date, keep the list with you, and make sure the medical record matches your list.

Approaches to Social Marketing
There are several ways to bring social marketing into your hospital. One way to begin is to approach your hospital’s patient safety advisory board or the patient representatives on your hospital’s board. These people are usually very committed to patient safety issues but may not be aware of the hazards of poorly performed medication reconciliation. By engaging them in this topic, you might find them to be willing and effective partners in this effort, especially regarding marketing to engage patients. They may also be able to identify certain patient populations most likely to benefit from these efforts (that therefore should be targeted first), provide insights into how to reach these populations, and suggest potential methods most likely to be effective. Another approach is to engage local media outlets to help spread the word. Other techniques might include poster campaigns, distribution of branded materials (like bags to hold a patient’s pill bottles), and taking advantage of community resources such as churches and community organizations (e.g., Lion’s or Rotary Clubs) to help with outreach.

One example of a successful effort was conducted by Aurora Health in Milwaukee, Wisconsin. The goal was to encourage patients to bring their pill bottles and medication lists with them to doctors’ appointments. They delivered the message through churches and community organizations, handed out branded bags for holding medication pill bottles, and developed special medication list forms. The result was a marked increase in the proportion of patients who brought their lists or pill bottles with them to appointments.

For providers, messages and the materials used to distribute them can be carefully “test marketed” with your hospital staff. The goal is to provide a message that is eye-catching, persuasive and convinces each provider that the desired behavioral change is in their own self-interest. The same can be done with representative patients. Such pretesting of materials and market research lends itself naturally to the kind of Plan-Do-Study-Act iterative refinement that is part of every component of this intervention.

Another useful technique is a “doer-non-doer” analysis in which you interview providers who already exhibit the desired behaviors and ask them what motivates them. These messages can then be spread to non-doers.

In Appendix 8, we have included examples of social marketing tools used at the University of California, San Francisco as part of its medication reconciliation efforts and modified for MARQUIS. They focus on the following messages:

1. Definition of medication reconciliation
2. Role clarity for medication reconciliation among providers
3. Role of patients and families in medication reconciliation

You may find that these tools can be modified (e.g., branded for your hospital) and deployed at your own hospital. Your mentor and the members of the MARQUIS steering committee may also be able to provide expertise in employing social marketing techniques to promote medication reconciliation efforts.

Measurement
Questions here include engagement of a patient safety advisory board, use of local media outlets, and use of social marketing techniques with inpatient and outpatient providers and patients. This likely will require provider and patient surveys in addition to documentation trails of patients bringing in medication lists and pill bottles.
Conclusion

We hope you found this guide to be a useful compendium of information regarding how to improve the medication reconciliation process at your hospital. The MARQUIS study team recognizes and appreciates the challenges facing your team while embarking on this very crucial patient safety project. With the expert guidance of your mentor, this manual should assist your hospital in achieving success in improving medication safety during transitions in care.
Appendix 1.
Making the Business Case for Medication Reconciliation

While the focus of this guide has been the impact of medication reconciliation on patient safety, some of the barriers to implementation often include a lack of time and resources (personnel and financial). One way to obtain needed resources is to provide the business case to hospital leadership in financial terms. A common metric that is used to measure this concept is a “return on investment” (ROI); in this instance the “return” is the money saved or costs avoided through enhancements in patient safety and adverse event prevention, and the “investment” is the resources necessary to implement meaningful medication reconciliation.

To assist with defining the ROI on the MARQUIS project, you will need some facts and figures, both locally and nationally, and local expertise. The project team should have baseline knowledge in healthcare financial terms, measurement and assessment of financial impact of quality and safety initiatives and an understanding of the importance of financial analysis in achieving management support of medication reconciliation improvement efforts. It would be helpful to identify a team member who serves as the financial or analytic expert in order to help guide the MARQUIS team with the development of the business case. This individual should also have knowledge or the ability to acquire information about the number of adverse drug events (ADEs) in the facility, and be able to provide the trend analysis of such events, along with any cases that may have been brought to risk management which involve medication reconciliation errors.

Keeping in mind that the size of the hospital drives the potential costs associated with ADEs, it has been estimated that the impact of ADEs may be as significant as $5.6 million per year. Several Agency for Healthcare Research and Quality (AHRQ)-funded studies found that costs per patient can range from $4,500 to more than $38,000 per ADE depending on the severity and location of the event, and that length of stay for patients can increase from between 4.5 to 20 additional hospital days. While the overall goal of MARQUIS is to keep patients safe from harm due to a medication reconciliation error, additional cost-savings benefits to the institution may be considered, and can be calculated, including:

- Decrease in prolonged admissions due to harmful outcomes of medication reconciliation, such as inpatient ADEs (potentially deniable costs, under-reimbursed costs from Diagnosis Related Group (DRG)-based payments and inability to fill a bed with more “profitable” patients)
- Decrease in readmissions or emergency room visits due to ADEs, which can reduce financial losses in several ways:
  - Decrease in unreimbursed healthcare utilization (e.g., under bundled payment schemes)
  - Decrease in penalties from the Center for Medicare & Medicaid Services (CMS) from higher-than-average readmission rates
  - Decrease in penalties under Pay-for-Performance contracts related to readmissions
- Decrease in legal costs due to claims against the organization related to ADEs
- Increase in efficiency due to streamlined processes, decrease in time spent tracking down information, and decrease in role confusion in the medication reconciliation process
- Increase in patient engagement and, potentially, patient satisfaction (which can indirectly increase market share)
- Increase in staff satisfaction, and potentially increased staff satisfaction and decreased staff turnover (decreased expenses of hiring and training new staff and decreased losses in efficiency and quality from working with new staff)
- Increase in referring provider satisfaction (leading to increased market share)
## Individual Intervention Costs to Consider

Use this table as a guide when considering the cost calculations for your chosen intervention(s):

<table>
<thead>
<tr>
<th>Intervention:</th>
<th>Costs to Evaluate:</th>
</tr>
</thead>
</table>
| 1. Develop and disseminate a universally accepted definition of medication reconciliation | • Staff time to develop definition  
• Staff time to train  
• Staff time to evaluate intervention |
| 2. Clarify medication reconciliation roles and responsibilities of all clinical personnel | • Staff time to develop, define and agree on roles and responsibilities  
• Staff time to train  
• Staff time to evaluate intervention |
| 3. Access to preadmission medication sources | • Staff time to create processes to access preadmission medication sources  
• Staff time to evaluate electronic medical record (EMR) vendor preadmission medication sources interface (if available)  
• Costs of vendor products  
• Staff time to implement and train with EMR interface  
• Staff time to evaluate intervention |
| 4. Patient-owned medication lists | • Staff time for evaluation of forms  
• Staff time to create standard forms  
• Staff time to train on implementing forms  
• Printing costs  
• Staff time to evaluate intervention |
| 5. Skilled medication history-takers | • Staff time to adapt curriculum  
• Staff time to train  
• Staff coverage during training  
• Additional staff time to take medication histories (may be offset by gains in efficiency and decreased duplication of effort)  
• Staff time to evaluate intervention |
| 6. Patient discharge education | • Staff time to adapt curriculum  
• Staff time to train on patient education  
• Staff coverage during training  
• Additional staff time to perform ongoing patient education (may be offset by use of tools, gains in efficiency)  
• Staff time to evaluate intervention |
| 7. Leadership Support | • Staff time for review of project with leadership |
| 8. Risk Stratification | • Staff time for planning to operationalize the risk-stratification tool  
• Staff time to train on risk-stratification tool  
• Staff time to perform ongoing risk stratification (may be minimal if processes automated)  
• Staff time to evaluate intervention |
| 9. Intense vs. standard intervention | • Staff time for planning  
• Staff time to train on intense vs. standard bundle  
• Time for staff coverage during intense intervention  
• Staff time to evaluate intervention |
| 10. Phased implementation and other QI approaches | • Staff time for process mapping and planning of implementation  
• Staff time to evaluate intervention |
| 11. Social marketing (SM) and engagement of community resources (CR) | • Staff time for planning effective SM and CR engagement  
• Staff time to train on marketing and community efforts  
• Printing costs or other promotional methods  
• Staff time to evaluate intervention |
| 12. Information technology improvements | • Staff time to identify areas of potential enhancement  
• Staff time to evaluate vendor enhancements available  
• Costs of IT (software, implementation)  
• Staff time to implement and train with IT improvements  
• Staff time to evaluate intervention |
Making the Case – Business Case for Medication Reconciliation

Below is a financial model for medication reconciliation developed by Steven B. Meisel, PharmD. Dr. Meisel is the Director of Medication Safety at Fairview Health Services in Minneapolis, Minnesota.

The Institute of Medicine and others in the literature have published data that a certain percentage of people admitted to a healthcare organization will experience a discrepancy in their medication regimen and a certain percentage of those discrepancies will lead to an adverse drug event (ADE) that could seriously harm a patient. The literature estimates the cost of a preventable ADE at $4,800 per event based on a 1997 study done by Bates et al. Some organizations have calculated an ADE cost as high as $10,375 (Jha et al., 2001).

Fairview’s internal data show that an effective medication reconciliation process can detect and avert up to 85% of these discrepancies. The time it takes to do effective medication reconciliation on admission is estimated to be 15 to 30 minutes. With these assumptions in mind, Meisel outlines the following calculations:

<table>
<thead>
<tr>
<th>Number of discrepancies per patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>x Number of patients per year that one person can reconcile</td>
</tr>
<tr>
<td>x Percent of patients with discrepancies that would result in an ADE</td>
</tr>
<tr>
<td>x Percent effectiveness of process</td>
</tr>
<tr>
<td>x Cost of an average ADE</td>
</tr>
</tbody>
</table>

To calculate the net cost savings, subtract the cost of the anticipated resource investment (staff, equipment, IT) from the gross cost savings. Meisel gives the following conservative model for savings from a medication reconciliation process that uses pharmacy technician resources to reconcile medications on admission to Fairview. Net savings will vary depending on the type of staff you decide to use to perform medication reconciliation (nurse, pharmacist, pharmacy technician, or physician).

1.5 (discrepancies per patient admitted to Fairview)

| x 6,000 patients (average of 20 minutes/patient to complete med rec) |
| x 0.01 (1% of Fairview admissions experience discrepancies that would result in an ADE) |
| x 0.85 (85% of discrepancies avoided through med rec process) |
| x $2,500 (conservative cost of an ADE) |

= $191,250 annual gross savings

- $45,000 (salary and benefits of an incremental pharmacy technician)

= $146,250 annual net savings (325% return on investment in a new staff member)

Source: This model was presented by Steven B. Meisel, PharmD, at The Joint Commission/Institute for Safe Medication Practices Medication Reconciliation Conference, Nov. 14, 2005. Used with permission.
Director of Pharmacy at the University of Wisconsin Hospital and Clinics, Steve Rough, MS, RPh, developed a template to use for pharmacist justification for medication history collection and reconciliation on admission to an organization. Below is an adaptation of the template based on sample data collection.

**Pharmacist Justification for Medical History Collection and Reconciliation on Admission**

| Average # of discrepancies/med errors per patient | 2.5 |
| Number of inpatient admissions per year | 43,312 (2006) |
| Potential med errors per year that can be avoided | 95,286 (2.2 x 43,312) |
| Percent of medications that were potentially harmful to patient during hospitalization* | 2.5% |
| Number of harmful medication errors avoided per year | 2,382 |
| Annual gross savings to hospital ($4,800 per harmful error)** | $11,434,320 |
| Average pharmacist time requirement per admission* | 21 minutes |
| Additional pharmacist FTE needed to provide service (based on 115 admissions daily) | ~5FTE |
| Cost of additional pharmacist FTE (salary + benefits) | $625,000 |
| **Annual Net Savings** | **$10.8M** |

*Based on an evaluation of 651 general medicine patients interviewed by a research pharmacist who obtained a complete medication history and reconciled medications with other documented medication histories and current orders.

**Bates DW, Spell N, Cullen DJ et al. The costs of adverse drug events in hospitalized patients. *JAMA.* 1997; 277:307-11

Source: This template was presented by Steve Rough, MS, RPh, at the American Society of Health-System Pharmacists Summer Meeting, June 26, 2006. Used with permission.

The same template can be applied to other disciplines as well as other transitions in care. By using published error data or by looking at error data at your own institution, you will be able to calculate the number of harmful medication errors per year that can be avoided by doing medication reconciliation. Then by applying a dollar amount to each ADE, a gross annual savings can be calculated for the amount of ADEs that can be avoided by doing medication reconciliation. Next, by plugging in numbers on the count of inpatient discharges per year and the time of medication reconciliation on discharge you would be able to estimate additional full time equivalents (FTEs) needed on discharge. By applying the cost of an FTE for additional staff, you will be able to subtract the cost of the added staff from the annual gross savings of preventing a harmful medication reconciliation error to get the annual net savings of increasing staffing resources to do medication reconciliation on every patient.

Below are the time requirements a pharmacist would need to obtain medication histories and perform medication reconciliation. This information will be helpful if used to calculate the number of pharmacist FTEs needed if your organization decides to implement a pharmacist medication reconciliation program that involves obtaining medication histories and performing medication reconciliation, either in all patients or in just high-risk patients.
**Time Requirements for Pharmacist-Obtained Medication Histories and Reconciliation***

<table>
<thead>
<tr>
<th>Time Requirement</th>
<th>Time per Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average time to obtain medication history</td>
<td>9 minutes/patient</td>
</tr>
<tr>
<td>Average time to obtain medication history and provide necessary interventions/documentation</td>
<td>12 minutes/patient</td>
</tr>
<tr>
<td>Average time for chart review prior to medication history, medication history interview and necessary interventions/documentation</td>
<td>21 minutes/patient</td>
</tr>
</tbody>
</table>

*Based on an evaluation of 651 general medicine patients at Northwestern Memorial Hospital interviewed by a patient safety pharmacist who obtained a comprehensive medication history and reconciled medications with other documented medication histories and current orders.

Lastly, below is a link to the American Society of Health-System Pharmacists (ASHP) website for an interactive ROI calculator in Excel (click on MedRec Return on Investment Model):

http://www.ashp.org/menu/PracticePolicy/ResourceCenters/PatientSafety/ASHPMedicationReconciliationToolkit_1/MedicationReconciliationBasics.aspx

Note that all these ROI calculations assume the only cost savings is from avoidance of ADEs (and implied decreases in length of stay). They do not include cost savings from reduced readmissions, reduced malpractice costs or increases in revenue from increased market share. For example, based on the study by Gillespie noted in Section A, Chapter IV, an intensive medication reconciliation intervention could result in a reduction in emergency department (ED) visits and hospital admissions of 0.36 per patient over 12 months (from 2.24 to 1.88). Depending on your hospital’s financial incentives around hospital admissions, readmissions, and ED visits, the costs avoided of such an intervention can be calculated and added to the above ROI estimates.
Appendix 2.
MARQUIS Site Assessment

MARQUIS Site Institutional Assessment
Assessment Items 1-4 are required at the start of the project.
Assessment Items 5-11 will be useful for planning the intervention later.

Assessment Item 1: Institutional Support

A. Describe at least one way in which hospital administration has confirmed sponsorship of this medication reconciliation project:

B. List the name of the executive sponsor:

C. Describe the communication plan you will use to keep the executive sponsor or appropriate medical staff committee updated on progress:

D. Describe any special resources available to help you accelerate the efforts of your project team:

E. Do you foresee any problems with institutional support for this project?

A team working on an improvement effort this large is doomed to fail without the recognition by hospital administration and medical staff committees of the importance of medication reconciliation. If you haven’t already done so, confirming Institutional Support will assist you in enlisting the administration in your cause and in defining the medical staff entities your team will need to update.
Assessment Item 2: Multidisciplinary Project Team

It is now time to identify your multidisciplinary project team. You won’t be able to improve medication reconciliation without the contributions of multiple disciplines.

Your team should be:
A. Front-Line Expertise (those from the emergency room (ER) or inpatient unit who understand the current system and have the ability to pilot changes to it):
   - Providers
     - Attending Physician(s)
     - Emergency Department Physician(s)
     - Surgeon(s)
     - Anesthesiologist(s)
     - Trainee(s)
     - Non-Physician Providers (PAs, NPs, etc.)
   - Nursing
     - Nurses
     - Nurse Managers
     - Clinical Nurse Specialists
     - Nurse Educators
     - Nurse Assistants
   - Pharmacy
     - Pharmacists for emergency department patients
     - Pharmacists for inpatients
     - Pharmacy Techs
   - Educators
   - Affiliated Staff
     - Unit Assistants
     - Other (describe:__________)
   - Senior Administrator
   - Patient or family representative

B. Technical Expertise (those necessary for implementation of the project):
   - Team Leader
   - Opinion Leader/Clinical Expert
   - Content Expert
   - Project Manager (identify this person now if possible)
   - Data Analyst
   - Information Technologist
   - Quality Improvement Expert (if different from above personnel)
**Assessment Item 3: Study Pharmacist**
A. List the name(s) of your study pharmacist(s):


The study pharmacists will take a “gold standard” medication history for one patient every weekday, which may take an hour per day to accomplish.

**Assessment Item 4: Data Analyst**
A. List the name of your data-analyst:


The data analyst will pull data from your hospital’s administrative data sources into an Excel spreadsheet each month so the data can be uploaded into a centralized database. The list of variables that will be needed is immediately following this assessment.

B. Do you foresee any problems with your QI team?


**Assessment Item 5: Policies and Procedures for Medication Reconciliation**
A. List your hospital’s definition for “medication reconciliation”:


B. Describe the management infrastructure at your hospital responsible for oversight of medication reconciliation:


C. Describe this infrastructure’s process for measuring and improving medication reconciliation performance:


D. What data are reviewed?

E. By whom?

F. How often?

G. If applicable, list your hospital’s policies for each of the following:
   
   - Individual (or role) with overall responsibility for medication reconciliation:
   - Individuals (or roles) with responsibility for each component of medication reconciliation:
   - Communicated process for what needs to be performed during each episode of medication reconciliation:

Please provide current forms/templates/screenshots, etc. used for med rec in your hospital: (upload/attach)

Assessment Item 6: Information Technology

A. Does your hospital use Computerized Provider Order Entry (CPOE)?
   - Yes
   - No
   - Other (describe): _________________________________

B. Does your hospital use an inpatient electronic medical record (EMR)?
   - Yes
   - No
   - Other (describe): _________________________________

C. Does your hospital have an electronic medication administration record (eMAR)?
   - Yes
   - No
   - Other (describe): _________________________________

D. Do you have electronic medication reconciliation software?
   - Yes
   - No
   - Other (describe): _________________________________
E. Does your hospital have plans to change any of these systems in the next 1-2 years?
   □ Yes
   □ No
   □ Other (describe): _____________________________________________________________

F. Is your hospital willing to invest in any new systems?
   □ Yes
   □ No
   □ Other (describe): _____________________________________________________________

Please provide screenshots of current medication reconciliation EHR functionality, including preadmission medication lists (upload/attach)

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Assessment Item 7: Access to Preadmission Medication Sources

A. Does your hospital have easy access to any of the following sources of preadmission medication information?
   □ Community pharmacy prescription fill information
   □ Ambulatory electronic medical record medication lists (if so, list which ones):
     _____________________________________________________________
     _____________________________________________________________
     _____________________________________________________________
   □ Personal health record medication lists
   □ Health information exchange
   □ Ambulatory provider notes

B. Does your hospital have relationships with any community pharmacies, payors, or RHIOs (Regional Health Information Organizations) to better obtain preadmission medication information?
   □ Yes (please list):
     _____________________________________________________________
     _____________________________________________________________
     _____________________________________________________________
   □ No
   □ Other (describe): _____________________________________________________________
Assessment Item 8: Patient Personal Health Record

A. Does your hospital system support use of a patient personal health record?
   - [ ] Yes
   - [ ] No
   - [ ] Other (describe): __________________________________________

If yes:
   - [ ] What proportion of patients use it?
     _____%

- [ ] Does it contain a medication list with detailed medication information?
   - [ ] Yes
   - [ ] No
   - [ ] Other (describe): __________________________________________

- [ ] Do patients and their physicians generally keep it up to date?
   - [ ] Yes
   - [ ] No
   - [ ] Other (describe): __________________________________________

- [ ] Who keeps it up to date – patient or physician or both?

- [ ] Does it link to any EHR in your healthcare system?
   - [ ] Yes
   - [ ] No
   - [ ] Other (describe): __________________________________________

- [ ] Does it link to your inpatient medication reconciliation software?
   - [ ] Yes
   - [ ] No
   - [ ] Other (describe): __________________________________________
Assessment Item 9: Patient Education Resources and Policies

A. Does your hospital routinely use “teach back” in its education efforts?

☐ Yes
☐ No
☐ Other (describe): ________________________________

B. Are patients routinely taught any of the following about their discharge medications?

☐ Who to contact with questions or concerns

☐ Yes
☐ No
☐ Other (describe): ________________________________

☐ Keeping an up-to-date medication list with them at all times

☐ Yes
☐ No
☐ Other (describe): ________________________________

C. Is patient coaching used to help patients/caregivers manage medications after discharge?

☐ Yes
☐ No
☐ Other (describe): ________________________________

D. Does your hospital use educational materials regarding medication use?

☐ Yes
☐ No
☐ Other (describe): ________________________________

If yes, please provide a sample (upload/attach).

BROWSE

E. In the outpatient setting, are patients regularly taught any of the following

☐ Keeping an up-to-date medication list with them at all times
☐ Communicating honestly about medication non-adherence
Assessment Item 10: Provider Education

A. Are providers regularly trained in issues related to medication safety, including delineation of roles related to medication reconciliation and how best to perform them?

- Yes
- No
- Other (describe): ________________________________

Assessment Item 11: Pharmacist

A. Would you describe your pharmacists as centralized or decentralized (e.g., are they in the basement supervising dispensing of medications or are they on the wards)?

- Centralized
- Decentralized
- Other (describe): ________________________________

B. How involved are pharmacists in clinical work (e.g., rounding with medical teams, counseling patients)?

Describe: ______________________________________

________________________________________________

________________________________________________

C. Is pharmacist staffing sufficient for their current responsibilities?

- Yes
- No
- Other (describe): ________________________________

D. Are pharmacists involved in the medication reconciliation process?

- Yes
- No
- Other (describe): ________________________________
  - Describe if yes: ____________________________________

E. Is your institution interested in and/or capable of hiring more pharmacists?

- Yes
- No
- Other (describe): ________________________________
Assessment Item 12: Inpatient Team Functioning

A. Is interdisciplinary communication regarding the medication reconciliation process (check all that apply):
   - Taught
   - Supported with tools
   - Expected as part of routine care
   - Scheduled or otherwise incorporated into routine care
   - Performed well

Additional Comments:

Assessment Item 13: Risk Assessment

A. Does your hospital routinely perform risk assessment to identify patients at high risk for errors related to the medication reconciliation process?
   - Yes
   - No
   - Other (describe):

If yes, what are the criteria and how are they measured?

B. What escalation activities are already performed automatically in patients identified as high risk?

Assessment Item 14: Patient and Community Engagement

A. Are patient representatives on your hospital board engaged in patient safety issues?
   - Yes
   - No
   - Other (describe):

B. Are local community groups interested in working with the hospital to promote patient safety issues?
   - Yes
   - No
   - Other (describe):
Assessment Item 15: Readiness to Engage in Continuous Quality Improvement for Medication Reconciliation

A. Aim statement written (specifying how much improvement, what targeted patient population, and by when).

If this is available/complete, please browse and load this file.

B. Current process mapped (a picture or stepwise description of current medication reconciliation process).

If this is available/complete, please browse and load this file.

C. Gap analysis of current process performed (what can go wrong, how likely is it to go wrong, how much potential for harm when it does go wrong, how likely the error is to go undetected).

If this is available/complete, please browse and load this file.

D. Data flow established for measuring medication reconciliation processes.

☐ Yes
☐ No
☐ Other (describe): ________________________________

Assessment Item 16: Preparing for the Intervention Components (**please mark the interventions you are thinking of doing**)

☐ Have a definition for medication reconciliation
☐ Clarify roles and responsibilities of all staff
☐ Improved access to preadmission med sources (electronically or facilitated process on paper)
  ☐ Pharmacy prescription fill data
  ☐ Recent hospital discharge orders
  ☐ Patient-owned list (e.g., personal health record)
  ☐ Outpatient EMR medication list
☐ Improve patient-owned list
  ☐ Inpatients: patient education at time of discharge; discharge medication wallet card
  ☐ High-risk outpatients: standard form, patient education; efforts to keep it updated
☐ Training in taking medication histories
☐ Patient discharge education
  ☐ Teach back
  ☐ Literacy-sensitive tools
  ☐ Standardized script
  ☐ Staff taught how to provide this education
Leadership support
- Administrative leader to remove barriers, help with resources, provide accountability
- Clinical Champion (ideally, part of QI committee)
- Adequate personnel and monetary resources

Risk stratification
- Routine risk assessment used to drive intensity of intervention

Intensive bundle for high-risk patients
- Adequate staffing and time to perform intensive bundle
- “Best” personnel taking medication histories, reconciling histories with orders, counseling patients, following up with PCPs

Phased implementation of interventions over time
- Clear timeline and plan for expansion

Social marketing, committed community resources
- Committed patient safety advisory board, hospital board or other governing body
  - Get input from board on which patient populations to focus on, how to get their attention

Use of social marketing techniques with
- Providers: why care about medication reconciliation and patient safety
- Inpatients – “ask me 3” – how discharge list is different from preadmission, why changes were made, what to watch for
- High-risk Outpatients – importance of keeping a medication list, keeping it updated, keeping it with them

IT Enhancements/Improvements
- Access to pharmacy data (community/external) and other preadmission medication sources
- Documentation and verification of best possible medication histories
- Facilitation of order writing at admission, transfer and discharge
- Comparisons of medication lists across transitions, facilitation of reconciliation
- Production of literacy-sensitive tools at time of discharge
- Tools to communicate with post-discharge providers
- Better integration with existing inpatient CPOE, EMR, PHR
### How Patient-Centered Is Our Medication Reconciliation Process?

<table>
<thead>
<tr>
<th>Taking the Medication History</th>
<th>Not Doing</th>
<th>Needs Improvement</th>
<th>Doing Well</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forms on which patients provide a medication history are formatted clearly.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Staff who take a medication history are trained in principles of clear health communication.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>The medication history is taken in a quiet environment.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Sufficient time is dedicated to taking the medication history.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>If the patient’s preferred language is not English, a trained interpreter or language line is always used to help obtain the medication history.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Systems are in place to gather medication information from sources other than the patient (e.g., medical chart, community pharmacies).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Discharge Medication List</th>
<th>Not Doing</th>
<th>Needs Improvement</th>
<th>Doing Well</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients are provided a clearly formatted, patient-centered medication list at hospital discharge.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>If the patient’s preferred language is not English, the written discharge medication list is provided in the patient’s preferred language.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Patients receive a phone number that they can call if they have questions about their medicines after discharge.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>
### How Patient-Centered Is Our Medication Reconciliation Process? (Continued)

<table>
<thead>
<tr>
<th>Discharge Medication Counseling</th>
<th>Not Doing</th>
<th>Needs Improvement</th>
<th>Doing Well</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff who provide discharge counseling are trained in principles of clear health communication.</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Discharge counseling is provided in a quiet environment.</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Sufficient time is dedicated to counseling patients about medications at hospital discharge.</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Discharge instructions include exactly how the medication regimen differs from the preadmission regimen.</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Discharge instructions include the indications, directions and potential side effects of new medications.</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Discharge counseling explores possible barriers to medication adherence and how to overcome those barriers.</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>When providing counseling, staff use plain language and avoid jargon.</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>If the patient’s preferred language is not English, a trained interpreter or language line is always used during discharge counseling.</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Family members or caregivers are included in discharge counseling.</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Patients are asked to teach back key information at the end of counseling.</td>
<td></td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Administrative Variable Name</td>
<td>Variable Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DateAdmit</td>
<td>Date and time of admission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Age at time of admission</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DateDisch</td>
<td>Date and time of discharge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DischDest</td>
<td>Discharge destination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRGCode</td>
<td>DRG code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRGDesc</td>
<td>DRG description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>His</td>
<td>Patient’s Latino/ Hispanic ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LabAlt</td>
<td>Laboratory values at discharge: Alanine Transferase (ALT) **If more than 1 result, please give us the last/ most recent result up to discharge.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LabCr</td>
<td>Laboratory values at discharge: Creatinine **If more than 1 result, please give us the last/ most recent result up to discharge.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LabHem</td>
<td>Laboratory values at discharge: Hemoglobin **If more than 1 result, please give us the last/ most recent result up to discharge.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LabNa</td>
<td>Laboratory values at discharge: Sodium **If more than 1 result, please give us the last/ most recent result up to discharge.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>Patient’s primary language</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LevTrainingAdmPhys</td>
<td>Level of training of admitting physician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOS</td>
<td>Length of stay = (d/c dd/mm/yy hh:mm) - (admit dd/mm/yy hh:mm) + (24 hours)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administrative Variables</td>
<td>Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital</td>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Payor</td>
<td>Insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCP</td>
<td>Patient has PCP (upon admission)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>Pt’s race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SourceAdmit</td>
<td>Admission source</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zip</td>
<td>Zip code (in order to obtain median income per household)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICD9Code</td>
<td>ICD-9-CM code</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICD9Desc</td>
<td>ICD-9-CM description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPTCode</td>
<td>Procedure codes (CPT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DProcedure</td>
<td>Procedure date</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ProcDesc</td>
<td>Description of procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DVVisit</td>
<td>PRE - Date of visit within 1 year prior to index hospitalization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VisitType</td>
<td>PRE - Type of Visit (within 1 year prior to index hospitalization)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DateVisit</td>
<td>POST - Date of visit within 30 days of discharge from index hospitalization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VisitType</td>
<td>POST - Type of Visit within 30 days of discharge from index hospitalization; Must be pulled 31 days after discharge date or later</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MedName</td>
<td>Discharge medication list from discharge orders</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix 3.
Best Possible Medication History Toolkit

CASE STUDY/ROLE PLAY

John Doe

The goal of this exercise is to teach other clinicians how to take a “best possible medication history,” including tips for interviewing patients and when to seek additional sources of data.

This exercise works best with a small group of clinicians or trainees (e.g., about five).

As the instructor, you will play the patient, while one of the clinicians should volunteer to interview the patient.

First, explain the scenario to the volunteer: you are interviewing a patient being admitted to the hospital.

“John Doe is a 68M w/ h/o CAD s/p stent to RCA 8/08 p/w worsening chest pain to ED. Patient had stent to RCA 1 year prior to admission for 80% lesion. On repeat cath 15 days afterwards for chest pain, found to have patent RCA stent and 50% proximal LAD lesion. Pt now p/w 2 months of intermittent yet daily L-sided CP, lasts 3-5 min, sharp, no radiation. CP has been occurring more frequently in the last week (3-4x/d) and is requiring increasing amounts of SL NTG to achieve relief. At 4AM on day of admission, pt had more intense CP that was only minimally improved with 3 SL NTG. Pain was associated with SOB/diaphoresis, no n/v, not a/w exertion. He called his PCP and was advised to come into ED.

“In ED: VS Temp 98.2 P 56 BP 214/102 RR 20, sat 100% o n room air. Cardiac enzymes neg x1. CXR negative. Pt was admitted for further work-up. Upon assessment in ED, pt was asymptomatic from elevated BP. Hydralazine 10mg IV x1 brought SBP down from 210 to 179 in ~30 min. However, BP started to rise again afterwards. Amlodipine 5mg PO was added to his anti-hypertensive regimen, which controlled his BP on the floor initially to 140s SBP.”

Then, explain to the volunteer that he/she should interview the “patient” (you) using the techniques in Section B, Chapter IV, Provider Education: Guidelines for Taking a Best Possible Medication History. He/she should “access” sources of medication data before going in to see the patient as they normally would (i.e., they should ask for them and you will provide them), interview the patient (we have provided a script for how they should respond to interview questions), and then make a plan regarding how to complete the BPMH (in general, after the interview, they should say that they would access additional sources of data, explain how they would do that, and then you should provide those sources if asked). At the end, they should compile the complete medication history.

You should “grade” their BPMH against the “gold standard” that we have provided. Then, you should provide feedback to the clinician so that everyone in the group can learn from the experience. The focus should be on the lessons from Chapter IV, including how to ask open-ended questions (i.e., don’t just read a medication to the patient and ask him or her to verify it), how to prompt for additional medications the patient may have forgotten, and when and how to access additional data sources.
We have provided several resources to help with this exercise:

1. Interview script from John Doe (i.e., what John would say about his medications if asked, when prompted and when not prompted).
2. John’s discharge instructions from an admission John had six months ago (accessible from your hospital’s system if the interviewer asks for it).
3. John’s Preadmission Medication List from his local pharmacy (if the interviewer says he/she would call the pharmacy and ask for it).
4. John’s Preadmission Medication List from his PCP’s office (if the interview says he/she would call the patient’s PCP’s office and ask for it).
5. John’s bag of medications (if the interviewer says he/she would call the patient’s family and ask them to bring it in).
6. The gold standard medication list (i.e. what John Doe is actually taking), used as the answer key when providing feedback.

**Interview Script:**

**What John Doe would say about his meds are if asked:**

**Without prompting:**

- Allopurinol 1 or 2 a day depending if I have gout (would say “I think so” if asked whether 50 mg tablets, not sure of dose if not prompted with it)
- Plavix 1 a day (would not recognize it as clopidogrel, would say “I think so” if asked whether it is 75 mg)
- Colchicine twice a day (would say “I think so” if asked whether 0.6 mg tablets, not sure of dose if not prompted with dose)
- Pepcid 20 mg twice a day (would not recognize it as famotidine)
- Glyburide 1mg a day (note real dose is 1.25 mg; if asked whether it’s really 1.25, would say “I’m not sure, maybe“)
- Toprol 50 mg a day (would not say XL, would not recognize it as metoprolol XL)
- Amiloride 5 mg twice a day
- Vasotec 20 mg twice a day (would recognize it as enalapril if asked)

**Would forget to mention Tylenol arthritis and ASA unless prompted about OTCs**

- Tylenol arthritis 2 tablets up to 3 times a day as needed (doesn’t know dose, would say “I think so” if prompted for 650 mg)
- Aspirin ½ tablet every day (adult aspirin if prompted, wouldn’t know dose otherwise; Dr. Weiser told him to take ½ instead of 1 tablet a day)
Would forget nighttime medications unless prompted:

Zocor 40 (note that it’s really 80 mg, if asked about discrepancy, would say “oh yeah, maybe it’s 80”; would recognize it as simvastatin if asked)

“Coudamints” “whatever dose they tell me to take” (if prompted whether recently on 5 mg of warfarin lately, would say “I’m not sure, you can call my coudamint clinic”)

Flomax 1 a day (not sure of dose, even if prompted, and would not recognize it as tamsulosin)

Would forget nitroglycerin unless prompted about prn medications

Nitro 1-2 every day or every other day for chest pain (doesn’t know how often he could take it if needed, doesn’t know dose, even if prompted)

Would forget albuterol unless prompted about inhalers

Albuterol 2 puffs prn – doesn’t use often, doesn’t know how often could take it if needed

Would not mention the following at all because not taking:

Imdur (doesn’t think he’s taking it, not sure)
Advair – has never filled prescription
John Doe’s Bags of Medications (brought in by family)

Morning Ziplock
Allopurinol 2 50 mg tablets: learn he takes 1 or 2 a day depending on whether he has gout
Aspirin ½ tablet: doctor told him to take ½ tablet
Clopidogrel 75 mg tablet
Colchicine 0.6 mg tablet
Famotidine 20 mg tablet
Glyburide 1.25 mg tablet
Toprol XL 50 mg tablet
Amiloride 5 mg tablet
Enalapril 20 mg tablet
Tylenol Arthritis 2 650 mg tablets

Afternoon Ziplock
Tylenol Arthritis 2 650 mg tablets

PM Ziplock
Colchicine 0.6 mg tablet
Famotidine 20 mg tablet
Glyburide 1.25 mg tablet
Simvastatin 80 mg tablet
Warfarin 5 mg tablet
Amiloride 5 mg tablet
Enalapril 20 mg tablet
Tamsulosin 0.4 mg tablet
Tylenol Arthritis 2 650 mg tablets

Also has:
Nitroglycerin bottle of 0.4 mg tablets – takes 1 QD or QOD
Albuterol inhaler: prn. Does not use often.

Does NOT have:
ImDur
Advair discus
<table>
<thead>
<tr>
<th><strong>John Doe’s Discharge Orders/Instructions - From admission 6 months prior to current admission</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Coumadin (Warfarin Sodium) 7.5 mg PO QPM</td>
</tr>
<tr>
<td>Allopurinol 50 mg PO Daily</td>
</tr>
<tr>
<td>Enteric Coated ASA 325 mg PO Daily</td>
</tr>
<tr>
<td>Plavix (Clopidogrel) 75 mg PO Daily</td>
</tr>
<tr>
<td>Colchicine 0.6 mg PO BID</td>
</tr>
<tr>
<td>Pepcid (Famotidine) 20 mg PO BID</td>
</tr>
<tr>
<td>Glyburide 1.25 mg PO BID</td>
</tr>
<tr>
<td>Imdur ER (Isosorbide mononitrate (SR)) 30 mg PO Daily</td>
</tr>
<tr>
<td>Metoprolol Succinate Extended Release 50 mg PO Daily</td>
</tr>
<tr>
<td>Zocor (Simvastatin) 80 mg PO Bedtime</td>
</tr>
<tr>
<td>Tamsulosin 0.4 mg PO Daily</td>
</tr>
</tbody>
</table>

**WARFARIN**
Indicated for anticoagulation: Atrial fibrillation
Anticipated length of anticoagulation: Lifetime
INR Target Range: 2 to 3
Last 3 INR Results:
<table>
<thead>
<tr>
<th>Medication</th>
<th>Dosage</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allopurinol</td>
<td>100 mg po Daily (2 50 mg tabs)</td>
<td></td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>75 mg po Daily</td>
<td></td>
</tr>
<tr>
<td>Colchicine</td>
<td>0.6 mg po BID</td>
<td></td>
</tr>
<tr>
<td>Famotidine</td>
<td>20 mg po BID</td>
<td></td>
</tr>
<tr>
<td>Glyburide</td>
<td>1.25 mg po BID</td>
<td></td>
</tr>
<tr>
<td>Imdur</td>
<td>30 mg poqd</td>
<td></td>
</tr>
<tr>
<td>Metoprolol XL</td>
<td>50 mg po Daily</td>
<td></td>
</tr>
<tr>
<td>Simvastatin</td>
<td>80 mg po QHS</td>
<td></td>
</tr>
<tr>
<td>Tamsulosin</td>
<td>0.4 mg po Daily</td>
<td></td>
</tr>
<tr>
<td>Warfarin</td>
<td>5 mg po QPM</td>
<td></td>
</tr>
<tr>
<td>Amiloride</td>
<td>5 mg po BID (last filled one month ago #120 tabs)</td>
<td></td>
</tr>
<tr>
<td>Enalapril</td>
<td>20 mg BID (last filled 3 months ago #180 tabs – 3-month supply per Walmart)</td>
<td></td>
</tr>
<tr>
<td>Nitro</td>
<td>0.4 mg SL prn chest pain as instructed</td>
<td></td>
</tr>
<tr>
<td>Albuterol inhaler</td>
<td>prn shortness of breath as instructed</td>
<td></td>
</tr>
<tr>
<td>Advair</td>
<td>250/50 mg 1 puff BID – script that he has never picked up/filled</td>
<td></td>
</tr>
<tr>
<td><strong>John Doe’s Preadmission Medication List – PCP Office</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allopurinol 100 mg po Daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aspirin 162.5 mg po Daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clopidogrel 75 mg po Daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colchicine 0.6 mg po BID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Famotidine 20 mg po BID</td>
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<td></td>
</tr>
<tr>
<td>Glyburide 1.25 mg po BID</td>
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<td></td>
</tr>
<tr>
<td>Imdur 30 mg po Daily</td>
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<td></td>
</tr>
<tr>
<td>Metoprolol XL 50 mg po Daily</td>
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<td></td>
</tr>
<tr>
<td>Simvastatin 80 mg po QHS</td>
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<td></td>
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<tr>
<td>Tamsulosin 0.4 mg po Daily</td>
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<td></td>
</tr>
<tr>
<td>Warfarin 5 mg po QPM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amiloride 5 mg po BID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enalapril 20 mg BID</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tylenol Arthritis (650mg) 4-6 tabs per day prn knee pain</td>
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<tr>
<td>Nitro 0.4 mg SL prn chest pain as instructed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albuterol inhaler prn shortness of breath as instructed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advair 250/50mg 1 puff BID</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### John Doe’s Preadmission Medication List – Gold Standard “Answer Key”

<table>
<thead>
<tr>
<th>Medication</th>
<th>Dose/Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allopurinol</td>
<td>50-100 mg po qd - (1-2 50 mg tabs.) – The patient states that he takes 1 or 2 tabs depending on if he has gout pain or not.</td>
</tr>
<tr>
<td>Aspirin</td>
<td>162.5 mg po qd. Dr. Weiser told him he should take 1/2 an adult aspirin per day instead of the full 325 mg qd</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>75 mg po qd</td>
</tr>
<tr>
<td>Colchicine</td>
<td>0.6 mg po BID</td>
</tr>
<tr>
<td>Famotidine</td>
<td>20 mg po BID</td>
</tr>
<tr>
<td>Glyburide</td>
<td>1.25 mg po BID</td>
</tr>
<tr>
<td>Imdur</td>
<td>30 mg po qd – Has not picked up his Imdur 30 mg PO QD since 100 days ago – though it was a 90-day supply per Walmart. He does not remember if he has been taking this at home or not. (He has not) – would need new script</td>
</tr>
<tr>
<td>Metoprolol XL</td>
<td>50 mg po qd</td>
</tr>
<tr>
<td>Simvastatin</td>
<td>80 mg po qhs</td>
</tr>
<tr>
<td>Tamsulosin</td>
<td>0.4 mg po qd</td>
</tr>
<tr>
<td>Warfarin</td>
<td>5 mg po qpm</td>
</tr>
<tr>
<td>Amiloride</td>
<td>5 mg po bid (last filled 2 weeks PTA #120 tabs per Walmart)</td>
</tr>
<tr>
<td>Enalapril</td>
<td>20 mg BID (last filled 3 months PTA #180 tabs – 3-month supply per Walmart)</td>
</tr>
<tr>
<td>Tylenol Arthritis</td>
<td>(650mg) 4-6 tabs per day prn for his knees</td>
</tr>
<tr>
<td>Nitro</td>
<td>0.4 mg SL prn 0 uses 1 or 2 almost QD or QOD at home per himself</td>
</tr>
<tr>
<td>Albuterol inhaler</td>
<td>for prn use – does not use often</td>
</tr>
<tr>
<td>Advair</td>
<td>250/50 mg 1 puff BID script that he has never filled.</td>
</tr>
</tbody>
</table>

For a PowerPoint overview of taking a Best Possible Medication History, please go to this link to download: https://hospitalmedicine-marquissiteworkspace.pbworks.com
## Appendix 4.
Examples of Patient-Friendly Discharge Material

NAME OF HOSPITAL                                                                Medications as of: _MM/DD/YYYY___
*Show this list to your doctor and your pharmacist, and call us if your medicines change in the next 30 days*

<table>
<thead>
<tr>
<th>Medication Name and Dose</th>
<th>What It’s For</th>
<th>Morning/ Breakfast</th>
<th>Afternoon/ Lunch</th>
<th>Evening/ Dinner</th>
<th>Night/ Bedtime</th>
<th>Common side effects</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin EC</td>
<td>Heart</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rash, bleeding</td>
<td>Do not crush or chew.</td>
</tr>
<tr>
<td>325mg one time a day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clopidogrel (Plavix)</td>
<td>Heart</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75mg one time a day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atorvastatin (Lipitor)</td>
<td>Cholesterol</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>May cause upset stomach. Tell your doctor if your muscles start to hurt or feel weak, if your urine turns dark, or if your skin/eyes turn yellow.</td>
<td>Doctor will check blood test results to make sure they’re ok. Do not drink grapefruit juice or Fresca.</td>
</tr>
<tr>
<td>40 mg one time a day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ezetimibe (Zetia)</td>
<td>Cholesterol</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>May cause diarrhea.</td>
<td></td>
</tr>
<tr>
<td>10mg one time a day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metoprolol Succinate (Toprol XL)</td>
<td>Blood pressure, Heart</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>May make you feel tired or dizzy. May cause rash or problems with sex.</td>
<td>If you have diabetes, monitor your blood sugars closely. Do not crush or chew. Take with or immediately after meals.</td>
</tr>
<tr>
<td>150mg one time a day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Medication to take only when you need it

<table>
<thead>
<tr>
<th>Medication Name and Dose</th>
<th>What It’s For</th>
<th>Morning/Breakfast</th>
<th>Afternoon/Lunch</th>
<th>Evening/Dinner</th>
<th>Night/Bedtime</th>
<th>Common side effects</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Albuterol inhaler</strong> (Proventil, ProAir HFA, Ventolin, Volmax)</td>
<td>Trouble breathing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Shake well before use. Hold breath for up to 10 seconds before breathing out.</td>
</tr>
<tr>
<td>2 puffs four times a day when needed to improve breathing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Alprazolam</strong> (Xanax, Niravam)</td>
<td>Anxiety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Make you sleepy or dizzy</td>
<td>Avoid driving or operating heavy machinery when you take this. No alcohol while taking this. Do not suddenly stop taking this</td>
</tr>
<tr>
<td>0.5 mg three times a day when necessary</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Acetaminophen</strong> (Tylenol)</td>
<td>Pain, Fever</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Take with full glass of water. No alcohol while taking this. Don’t take more than 4000mg a day (8 tablets of 500 mg strength)</td>
</tr>
<tr>
<td>325-650mg (one to two tablets) every 4 hours when needed for pain</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Patient Name:** ___________________________

Contact us at XXX-XXX-XXXX if your medications change within the next 30 days and you want an updated medication list.

---

### Medications to stop taking

- Lisinopril
- Metformin

NAME OF HOSPITAL

*Show this list to your doctor and your pharmacist, and call us if your medicines change in the next 30 days*
### Project RED Example:

<table>
<thead>
<tr>
<th>What time of day do I take this medicine?</th>
<th>Picture (the medication from the pharmacy may not look exactly like this)</th>
<th>Medication name and amount # of pills</th>
<th>How do I take this medicine?</th>
<th>Why am I taking this medication?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning</td>
<td>![Image](85x447 to 489x685)</td>
<td>Motrin® (Ibuprofen) 800mg 1 pill</td>
<td>by mouth with food</td>
<td>pain</td>
</tr>
<tr>
<td>Noon</td>
<td>![Image](85x136 to 489x437)</td>
<td>Zestril® (Lisinopril) 10mg 1 pill</td>
<td>by mouth</td>
<td>blood pressure</td>
</tr>
<tr>
<td>Evening</td>
<td>![Image](85x447 to 489x685)</td>
<td>Apresazide® (HCTZ) 25mg 1 pill</td>
<td>by mouth</td>
<td>blood pressure</td>
</tr>
<tr>
<td>Bedtime</td>
<td>![Image](85x447 to 489x685)</td>
<td>Nifedical XL® (Nifedipine) 30 mg 1 pill</td>
<td>by mouth</td>
<td>blood pressure</td>
</tr>
<tr>
<td>If you need it for anxiety</td>
<td>![Image](85x447 to 489x685)</td>
<td>Protonix® (Pantoprazola) 40 mg 1 pill</td>
<td>by mouth</td>
<td>indigestion</td>
</tr>
<tr>
<td>Noon</td>
<td>![Image](85x136 to 489x437)</td>
<td>Flovent® (Fluticasone) 44mcg/puff 2 puffs</td>
<td>by inhalation through mouth</td>
<td>help breathing</td>
</tr>
<tr>
<td>Evening</td>
<td>![Image](85x447 to 489x685)</td>
<td>Motrin® (Ibuprofen) 800mg 1 pill</td>
<td>by mouth with food</td>
<td>pain</td>
</tr>
<tr>
<td>Bedtime</td>
<td>![Image](85x447 to 489x685)</td>
<td>Folic Acid 1mg 1 pill</td>
<td>by mouth</td>
<td>vitamin</td>
</tr>
<tr>
<td>If you need it for anxiety</td>
<td>![Image](85x447 to 489x685)</td>
<td>Alivian® (Lorazepam) 0.5 mg 1 pill</td>
<td>by mouth 1x each day if needed</td>
<td>anxiety</td>
</tr>
</tbody>
</table>

*Example from Project Red Presentation by Brian Jack MD, Associate Professor and Vice Chair Department of Family Medicine / Boston University School of Medicine to the Regional Symposium on Reducing Readmissions The Health Care Improvement Foundation Philadelphia PA May 26th, 2010*
Appendix 5. Recommendations for Content of Patient-Owned Medication Lists

Patients should be strongly encouraged to keep an updated list of their medications with them at all times, particularly when they come to a doctor’s visit, scheduled procedure, Emergency Department, or hospital. A medication list not only helps patients keep track of their medications, but it also serves to communicate this critical information to healthcare providers.

In the context of medication reconciliation, having a patient’s medication list available at the time of hospital admission significantly reduces the likelihood of errors in the clinician’s medication history. It is important, though, that the patient note the date when it was last updated. Referring to an outdated medication list can increase the chance of errors.

- Many templates exist that can be printed and filled in by either patients or their healthcare providers. Examples are provided below. They generally include the patient’s name; when the list was last updated; allergies; and the name, strength and dosing instructions of each medication.

Encouraging patients to keep an updated medication list can be an important way to improve the process and accuracy of medication reconciliation. Health systems can adopt the following strategies to promote medication lists:

- Adopt a template for patient medication lists.
- Provide patients/families with a copy of the template at all healthcare encounters where medications are changed.
- Counsel patients about the importance of keeping an updated medication list and bringing it to all health care encounters. “You wouldn’t go to the mechanic without taking your car, would you?”
- Use social marketing techniques (e.g., posters, promotional videos on closed-circuit TV) to raise awareness.
a. Sample Paper Form:

Below we include a sample medication list based on the principles discussed in Section B, Chapter III. This form can be adapted by your hospital and branded for its own use.

<table>
<thead>
<tr>
<th>My Medication List</th>
</tr>
</thead>
<tbody>
<tr>
<td>My Name:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>My Contact Information:</th>
<th>Address:</th>
<th>Telephone Number:</th>
<th>Emergency Contact Name and Telephone Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>My Pharmacies:</th>
<th>Name:</th>
<th>Telephone Number:</th>
<th>City, State</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>My Doctors</th>
<th>Name:</th>
<th>Why I see them:</th>
<th>Telephone Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>My Allergies</th>
<th>1.</th>
<th>2.</th>
<th>3.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4.</td>
<td>5.</td>
<td>6.</td>
</tr>
</tbody>
</table>

Take this list with you to every office visit, every time you have to go to the hospital, and every time you pick up your prescriptions. Make sure to keep this list up-to-date – update it after every visit and at least twice a year.
<table>
<thead>
<tr>
<th>Medicine Name: (e.g., Atenolol)</th>
<th>Instructions (e.g., 100 mg tablet, 1 tablet 1 time a day OR 100 mg once a day)</th>
<th>Why I take it: (e.g., high blood pressure)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date I last updated this list:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Don’t forget to include medicines other than pills (like patches, eye drops, and injections), over-the-counter medicines, medicines you take at different times of the day or only once a week, and medicines you only take as needed. Copy additional pages of this form as needed.
b. Electronic Patient-Owned Medication Lists (with Vendors)

<table>
<thead>
<tr>
<th>Electronic Patient-Owned Medication List</th>
<th>Website</th>
<th>Details</th>
</tr>
</thead>
</table>
| HealthVault                            | http://www.microsoft.com/en-us/healthvault/ | • A compilation of several on-line tools from various vendors to manage a variety of conditions; tracking medications in one component  
• Ability to connect to providers (outpatient and pharmacy) and devices (i.e., BP, glucometers etc.) |
| MedSort.com                             | https://www.medsort.com | • Medication list and personal health record management system  
• Designed to help patients keep an up-to-date, self-reported list of their medications, allergies and other health information and automatically relay this to their healthcare providers  
• Interactive, secure medium to link patients and physicians  
• Free version and a subscription upgrade version |

![Electronic Patient-Owned Medication List](image)
<table>
<thead>
<tr>
<th>Electronic Patient Owned Medication List</th>
<th>Website:</th>
<th>Details:</th>
</tr>
</thead>
</table>
| MedsFile | https://www.medsfile.com/ | • Complete PHR with mobile access  
• Organized printout of medical information should you choose to take it with you to your doctor’s office  
• Free service (donation model) |

![Medication List Table]

![Supplements List Table]
<table>
<thead>
<tr>
<th>Electronic Patient-Owned Medication List</th>
<th>Website</th>
<th>Details</th>
</tr>
</thead>
</table>
| MyMedSchedule.com                      | http://mymedschedule.com | • Sends reminders to take your medications by text or e-mail  
• Set refill reminders  
• Print in English or Spanish  
• Convenient wallet-size schedules to carry with you  
• Pill box organizers and reminders  
• Free |

### MyMedSchedule.com

**Helping you take the right dose, at the right time, every day.**

#### John Doe

**Revised 2/27/2009 at 12:25 PM**

<table>
<thead>
<tr>
<th>Take These Medications</th>
<th>At These Times</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7am</td>
</tr>
<tr>
<td><strong>Prilosec®</strong> (Omeprazole) 20mg</td>
<td></td>
</tr>
<tr>
<td><strong>Cymbalta®</strong> (Duloxetine HCl) 60mg</td>
<td></td>
</tr>
<tr>
<td><strong>Altace®</strong> (Ramipril) 2.5mg</td>
<td></td>
</tr>
<tr>
<td><strong>Coumadin®</strong> (Warfarin) 1mg</td>
<td></td>
</tr>
<tr>
<td><strong>Januvia®</strong> (Sitagliptin Phosphate) 50mg</td>
<td></td>
</tr>
<tr>
<td>Electronic Patient-Owned Medication List</td>
<td>Website</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Picture Rx</td>
<td><a href="http://mypicturerx.com/">http://mypicturerx.com/</a></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Picture Rx Medication List](image)
Appendix 6.
Sample of Paper Medication Reconciliation Forms

Aurora Health Care Example.
Note that the first 3 pages are in triplicate such that information written on the first pages is copied over to the latter pages.

<table>
<thead>
<tr>
<th>Date Medication /</th>
<th>Vitamin /</th>
<th>Herbal Supplement</th>
<th>Frequency</th>
<th>Dose</th>
<th>Route</th>
<th>Indication</th>
<th>Date</th>
<th>Time</th>
<th>Cont.</th>
<th>Stop</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

THE ABOVE HOME MEDICATIONS HAVE BEEN REVIEWED BY: (Continue medications & 'd above during Inpatient / Outpatient Admission.)

Indicate if additional forms _____ of _____.

Signatures of Person taking history: ____________________________ Date: __________________

This section reserved for Discharge Medication Documentation starting on page 2.
**NOTE PRESCRIPTION**

Prescribers: Please check allergies and evaluate home medications prior to writing discharge prescriptions. Initial all home medications above to indicate which medications should be resumed (not new prescriptions) and which ones are to be discontinued. If additional prescriptions are required, please use a second form.

<table>
<thead>
<tr>
<th>Date</th>
<th>Medication / Vitamin / Herbal Supplement</th>
<th>Dose</th>
<th>Route</th>
<th>Frequency</th>
<th>Indication</th>
<th>Admission Meds</th>
<th>Resume at Discharge</th>
</tr>
</thead>
</table>

The above home medications have been reviewed by: (Continue medications as above during Inpatient / Outpatient Admission.)

**DISCHARGE PRESCRIPTIONS:** (This statement in red indicates original prescription)

Prescribers: Please check allergies and evaluate home medications prior to writing discharge prescriptions. Initial all home medications above to indicate which medications should be resumed (not new prescriptions) and which ones are to be discontinued. If additional prescriptions are required, please use a second form.

Reviewed above home medications for discharge. Resume as indicated above.

Prescriber's Signature: ___________________________ Prescriber’s Name - (Print): ______________________________________

Prescriber’s Instructions: Fax a copy of these discharge prescriptions to my office fax #: ___________________________

• PLEASE WRITE DISCHARGE PRESCRIPTIONS DAY BEFORE DISCHARGE.
• Use ballpoint pen. Cross out all unused lines before giving the patient a copy (before discharge) Signature required.
**HOME MEDICATION RECONCILIATION FORM**

**USE BALL POINT PEN (PRESS FIRMLY)**
- Meds sent home
- Meds stored in pharmacy
- *If additional space is needed, please use a 2nd copy of Home Medication Reconciliation form.

**PATIENT PHARMACY:**
- Phone: ____________________

- Information about medications prior to admission obtained from:
  - Patient
  - Medication List
  - Other

<table>
<thead>
<tr>
<th>Date</th>
<th>Medication / Vitamin / Herbal Supplement</th>
<th>Dose</th>
<th>Route</th>
<th>Frequency</th>
<th>Indication</th>
<th>Admission</th>
<th>Resume at Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**THE ABOVE HOME MEDICATIONS HAVE BEEN REVIEWED BY:** (Continue medications if above during Inpatient / Outpatient Admission.)

- **INDICATE IF ADDITIONAL FORMS_____ OF_____**

- **PLEASE DO NOT WRITE IN THIS BOX.**

**Prescribers:** Please check allergies and evaluate home medications prior to writing discharge prescriptions. Initial all home medications above to indicate which medications should be resumed (not new prescriptions) and which ones are to be discontinued. If additional prescriptions are required, please use a second form.

**Prescriber’s Signature**______________________________ **Prescriber’s Name - (Print)**______________________________

**Prescriber’s Address**______________________________ **DEA#**______________________________ **Phone #**______________________________

**Prescriber’s Instructions:** Fax a copy of these discharge prescriptions to my office fax #: ___________________________

- **PLEASE WRITE DISCHARGE PRESCRIPTIONS DAY BEFORE DISCHARGE.**
- Cross out all unused lines before giving the patient a copy (before discharge). Signature required.

**Reviewed above home medications for discharge. Resume as indicated above.**

**Prescriber’s Signature**______________________________ **Prescriber’s Name - (Print)**______________________________

**Prescriber’s Address**______________________________ **DEA#**______________________________ **Phone #**______________________________

**Prescriber’s Instructions:** Fax a copy of these discharge prescriptions to my office fax #: ___________________________

- **PLEASE WRITE DISCHARGE PRESCRIPTIONS DAY BEFORE DISCHARGE.**
- Cross out all unused lines before giving the patient a copy (before discharge). Signature required.
Home Medications Reconciliation Form, Guidelines for Use:

This form is required for all patient admissions regardless of whether or not they are taking medications at home. Medication reconciliation at admission is defined as listing and reviewing all patient home medications and indicating whether medications should be continued or discontinued upon admission.

Page 1
1. Current patient medications should be documented on the top of page 1 of the "Home Medication Reconciliation Form". If there are no home medications, please indicate "No home medications".

2. Medication history must include the name, dose, route, frequency, indication (if known), and time of last dose (if known).

3. To ensure patient safety, it is important to complete an accurate medication history. Be sure to ask "Do you use any prescription medications, nonprescriptions medications, vitamins, etc.?" Also, ask about medications from Canada or other countries. Note: Many patients will not tell you about medications they are taking from other countries.

4. During an inpatient admission, Home Medications must be continued or stopped. The first page must be signed and used as a physician order and placed under the physician order tab. File any typed lists from patients or nursing homes in the chart as a reference.

5. Please initial and date any additions that are made to the Home Medication Reconciliation Form after the initial admission record.

6. If home medications are continued during inpatient admission, be sure to give a copy to the Inpatient Pharmacy and Respiratory Therapy (if appropriate for your site).

7. Incomplete medication information and any home medications that are not reconciled at the time of admission must be followed up with physician within 24 hours of admission.

Page 2
Sharing the discharge medications with the next caregiver is essential to ensuring patient safety. At the time of discharge, the discharging physician should utilize the "Discharge Prescription" to indicate the medications to be continued at home in addition to any new medications added. The lower portion of the form is to be used as a prescription and a copy should be faxed to the physician.

Page 3
The final copy should remain in the patient’s medical record. Page 3 must be copied and forwarded to next care provider or facility.

NOTE TO MEDICAL RECORDS:
If page 1 is used by Nurse as verbal order for medications: Flag for physician signature and file with Physician Orders.

This document was included in this manual with permission from Aurora Health Care, Milwaukee, WI.
**Medication Reconciliation Form**

**Sources of Information**
- Pill bottles
- Outpatient medical records
- Pharmacy records
- EMR medication list
- D/C Summary
- Transfer List
- Obtained information from patient
- Obtained information from family

### Preadmission Medication

<table>
<thead>
<tr>
<th>(generic name)</th>
<th>Dose and Frequency</th>
<th>Ordered on ADMISSION?</th>
<th>Confirm</th>
<th>Comments on Admission Meds (please note changes from preadmission meds and any discrepancies)</th>
<th>Ordered on DISCHARGE?</th>
<th>Comments on Discharge meds (please note changes from preadmission meds and any discrepancies)</th>
<th>D/C Meds Reconciled</th>
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<tbody>
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</tbody>
</table>

### Additional Medications

<table>
<thead>
<tr>
<th>Medication Dose and Frequency</th>
<th>Ordered on Admission?</th>
<th>Ordered on Discharge?</th>
<th>Comments</th>
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</thead>
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Additional Comments on Admission Meds

1. 
2. 
3. 
4. 
5. 
6.

Additional Comments on Discharge Meds

1. 
2. 
3. 
4. 
5. 
6.
Appendix 7.
Selected Vendors of Electronic Medication Reconciliation Products

There are several stand-alone products available to complement and enhance your current EMR systems and improve the process of medication reconciliation. As noted in the guide (Section B, Chapter X), each hospital needs to decide on the costs and benefits of purchasing such a system. The MARQUIS study team does not want to endorse any particular product, but your mentor can help your hospital decide on a product based on its specific needs. Below are descriptions of several products and links to websites for more information.

**Product:** Clinical Xpert  
**Company:** Thomson  
**Website:** http://thomsonclinicalxpert.com/

**Features:**
- ClinicalXpert delivers real-time patient data to any caregiver directly at the point-of-care via the Web and mobile devices.
- Provides a single system that improves clinical efficiency through better access to critical patient information, identification of high-risk patients, charge and procedure management, care team coordination, and medication reconciliation – all while providing a seamless backup to the core hospital information system (HIS)

**Product:** ExitMeds Med Rec  
**Company:** ExitCare  
**Website:** http://exitcare.com/

**Features:**
- Ability to communicate to the patient the correct status of all medications
- Part of a suite of solutions that includes e-prescribing an patient discharge education

**Product:** Exit Writer  
**Company:** Krames  
**Website:** http://www.exitwriter.com/

**Features:**
- Provides way to document and provides clear patient medication status
- An electronic copy of all information provided to the patient is captured in the patient record
- Provides drug-specific information sheets
- Provides a patient Medication Summary (a check-off list for patient home use)
**Product:** Fusionfx  
**Company:** Carefx  
**Website:** http://www.carefx.com/

**Features:**
- Connects disparate systems and enables interoperability, offering clinicians a common method for accessing multiple data sources
- Data is pulled from multiple sources including: Fusionfx, RxHub, EMR, RHIO, Fusion repository

**Product:** HCS Med Rec  
**Company:** HCS Clinical Solutions  
**Website:** http://www.hcsinc.net

**Features:**
- Obtains a patient’s Prior Medication History including Medication Fill and Refill Information and previous visit information
- Analyzes Prior Medication History
- Provides Medication Transfer and Discharge Reports electronically or through printed media
- Provides Discharge Prescriptions including Patient Medication Education Monographs and Prescriptions Communicate and link directly to existing hospital clinical information systems

**Product:** MediREC  
**Company:** MediWare  
**Website:** http://www.mediware.com/

**Features:**
- A comprehensive medication reconciliation system for patient profiles
- Integrates with most major health information systems
- Designed to work across the continuum of care, from admission to discharge and from order entry to fulfillment and administration

**Product:** MedTracker  
**Company:** DesignClinicals  
**Website:** http://designclinicals.com/about-medtracker

**Features:**
- Interfaces with hospital’s existing electronic health record
- Ability to add medications
- Interfaces to pharmacy database and transmits revised medication list
- Discharge med list printed and faxed directly to outpatient pharmacies
- Endorsed by the American Hospital Association
Product: PDrx  
Company: Iatric  
Website: http://www.iatric.com/MedicationReconciliation  

Features:  
- Offers medication reconciliation solutions that provide medication reconciliation at all transitions of care  
- Issues accurate prescriptions at the time of discharge  
- Captures discharge Rx historical information electronically  
- Completes medication reconciliation  

Product: Rcopia Acute Care  
Company: DrFirst  
Website: http://www.drfirst.com/hospitals.jsp  

Features:  
- Electronically submits outpatient prescriptions to retail and mail-order pharmacies during a patient visit or at discharge  
- Can check medication claim history to make the patient’s home medications available during drug-drug and drug-allergy, as well as other conflict checkpoints  
- Integrates with MEDITECH  
- Providing workflow improvements for clinicians by converting past medications into hospital medication orders  
- Pulls patient’s medication history through multiple electronic prescribing resources  

Product: RxReconcile  
Company: HealthTEK.com  
Website: http://rxreconcile.com/Default.aspx  

Features:  
- Integrates medication reconciliation with the orders process, eliminating redundancy  
- The system is structured to perform on-line Medication Reconciliation at each change in level of care  
- Simple one-screen layout that mimics actual chart management  
- Immediate allergy screening, duplicate med screening, therapeutic and contraindication screening, improving patient care and patient safety  
- Integrates with existing clinical systems to maximize access to current clinical data and minimize maintenance and support. The system utilizes database connectivity to present real-time census and clinical data  
- The application has the ability to convert traditional Latin regimens and routes to “patient-friendly” descriptions. Forms can be customized by the facility using Adobe Acrobat
Appendix 8.
Samples of Social Marketing Materials

Adapted from the University of California San Francisco Medical Center
Social marketing tools around medication reconciliation

"Let me tell you the medications I’m taking."

Bring your medication list or medicines when you come to the hospital or when you see your doctor in the office. Be sure that you and your physicians know all the medicines you are taking at home.

Remember:
• Keep a list
• Keep it up to date
• Keep it with you

YOUR HOSPITAL LOGO HERE
“Doc, before I go, I have questions about my meds.”

Make sure you know the answers to these questions before you leave the hospital:

- How are my medicines different from what I was taking before?
- Why were these changes made?
- What do I need to watch out for?

“Thanks for the prescription, Doc. But which pharmacy fills prescriptions for ‘same as preop’?”

Make sure you know the answers to these questions before you leave the hospital:

- How are my medicines different from what I was taking before?
- Why were these changes made?
- What do I need to watch out for?
Address questions every day:

- Compare home and current medication lists, especially at admission and discharge
- Decide which medications you want to start, stop, continue and change
- Be sure the list is complete and clear for your patient, your team, and the next provider of care – start to finish

“Stop? Start? Continue? Change?”

YOUR HOSPITAL LOGO HERE
An accurate medication list is critical to excellent care.

- Compare home and current medication lists, especially at admission and discharge
- Decide which medications you want to start, stop, continue and change
- Be sure the list is complete and clear for your patient, your team, and the next provider of care – start to finish

There are no missing links in excellent care.

Excellent medication management, every step of the way.

- Compare home and current medication lists, especially at admission and discharge
- Decide which medications you want to start, stop, continue and change
- Be sure the list is complete and clear for your patient, your team, and the next provider of care – start to finish
Stop/Start? Continue? Change?

- Compare home and current medication lists, especially at admission and discharge
- Decide which medications you want to start, stop, continue and change
- Be sure the list is complete and clear for your patient, your team, and the next provider of care – start to finish

Would you let a patient leave like this?

From admission to discharge, our hospital takes pride in our tradition of excellence.

Continue our team’s winning streak. Make sure to check each patient’s medication list before discharge.
Complete the circle of care

From admission to discharge, our hospital takes pride in our tradition of excellence.

Continue our team’s winning streak. Make sure to check each patient’s medication list before discharge.

Your patient’s medication list should never be a question.

Talk to your patients about what they are taking. That’s key to excellent care.
“My patient’s medication list is critical to doing my best.”
—NURSE NAME HERE

“Knowing your patient’s complete medication list is absolutely critical.”
—DOCTOR’S NAME
Talk to your patients about their medications before and after surgery.

From admission to discharge, our hospital takes pride in our tradition of excellence.

Continue our team’s winning streak. Make sure to check each patient’s medication list before discharge.

Tell us what medications you’re taking. Then let us do the rest.

We pledge to give you the absolute best care we can. Your medication list makes that possible.
“Talk to me about my medications.”

I’ll help you make sure that my medication list is complete and up-to-date so that you can do your best.

Your medication list helps me take good care of you.

“I need the med list to be complete and up-to-date.”

My medication list is important to my care.

EXCELLENCE IS WHAT WE PRACTICE.
IN PAML WE TRUST

From admission to discharge, our hospital takes pride in our tradition of excellence. Check the PAML. Get the meds right.

YOUR HOSPITAL LOGO HERE

TOP
(TEN)

TOP 5 THINGS WE LOVE ABOUT MEDICATION LISTS

5. Has meds on it
4. Is a list
3. Is present in the patient chart
2. Makes writing discharge medications easier
1. Helps me provide excellent care

YOUR HOSPITAL LOGO HERE
Appendix 9.
Selected References


36. AHRQ. Reducing and Preventing Adverse Drug Events to Decrease Hospital Costs. Research in Action. 2001(1).