

MARQUIS IMPLEMENTATION MANUAL

A Guide for Medication Reconciliation Quality Improvement



Hospitalists. Transforming Healthcare.
Revolutionizing Patient Care.

Prepared by MARQUIS Investigators

October 2014

Funded by AHRQ grant 5 R18 HS019598

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For more information about MARQUIS, visit www.hospitalmedicine.org/MARQUIS.

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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 and its accompanying online resources 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

A. 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 has worked with five different hospitals as they sought to 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.

The most effective way to use this manual is as part of a “mentored implementation” program, as was done for the MARQUIS study. However, this manual can also be used by itself to guide quality improvement efforts in medication reconciliation. In this case, we recommend contacting the Society of Hospital Medicine to learn what additional resources are available to assist sites with their efforts. Either way, this guide should serve as a valuable tool as you strive to improve medication safety during transitions in care.

B. Pre-Implementation Actions

Steps recommended prior to initiation of a medication reconciliation initiative include:

- Identify key stakeholders, reporting hierarchy and approval process.
- Obtain support and approval from the institution.
- Assemble an effective multidisciplinary quality improvement (QI) team.
- Set general goals and a timeline for each intervention to be launched.
- Turn general aims into specific aims.
- 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. Then, along with your assigned mentor (if applicable), select (or tailor) the interventions that align 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:

- Process-map your current care delivery system of medication reconciliation 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 D.
- Identify interrelated steps and “failure modes” (i.e., steps in the process prone to error and that lead to suboptimal outcomes).
- Identify steps that should become targets for improvement efforts.
- Select metrics for evaluating key components of your program, i.e., analyze outcomes of the care processes in a way that your project team can react to effectively. A description of this process is found in Section A, Chapter V, Part E.

- **Track performance.**

The MARQUIS data collection tool, “QuesGen,” assisted each study site in collecting data needed to track performance on key metrics of the provided interventions. Data were plotted and reported graphically using run charts, and sites had the ability to compare their progress with the progress of others in the study. If your site is part of a mentored implementation effort, you should have access to a similar data collection tool. If not, then you should plan to use existing software at your disposal to enter data, track outcomes and milestones, and manage the different phases of the project. The sophistication of the software is less important than the act of continuously entering, tracking, reporting and responding to local data from your site.

- **Choose reliable interventions.**

The MARQUIS toolkit provides standardized processes and protocols that can be tailored to your unique care environment. Throughout this manual, there are recommendations regarding which interventions are particularly high yield and/or good places to start. Ultimately, which interventions to implement and in what order will be up to you and your QI team, based on the evidence, baseline practices and gaps in care, local resources and priorities of your institution.

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

C. Clarifying Key Stakeholders

A stakeholder is an individual or group with a direct interest in, 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
- Patient and Family Advisory Council

D. Assigning Roles and Responsibilities to Clinical Personnel

Medication reconciliation is a team effort among 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.

We discuss in detail the personnel requirements for each step of the medication reconciliation process below (Section A, Chapter III). 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: “Take a Best Possible Medication History (BPMH) to create the Pre-Admission Medication List (PAML). Record the PAML in the patient’s chart.” 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 perform 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 taking a “best possible medication history” with general supervision by a pharmacist and at lower cost than having a pharmacist do the entire process alone.
- 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.

It is particularly important that roles be assigned and clarified so that two or more different people are not completing a task where only one is necessary (e.g., a triage nurse in the Emergency Department (ED) taking a medication history, followed by a nurse on the floor [because he or she doesn’t trust the accuracy of the history taken in the ED], and possibly by an intern as well [because the intern has seen the patient before the nurse has had a chance to take the history]).

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) 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 periodically until most staff answer the survey correctly. A sample of the front-line survey may be accessed here: [Front-Line Survey](#).

E. Obtaining Support and Approval from the Institution

Securing institutional buy-in and administrative support is essential. Your team needs support from your medical center’s leadership to enhance your medication reconciliation improvement effort. Failure to obtain this critical support is a large risk likely to compromise the success of your initiative. Although you may not yet have robust local 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 further. One example of an approach is to have an “executive sponsor” (e.g., Chief Executive Officer (CEO), Chief Medical Officer (CMO), Chief Nursing Officer (CNO), Chief Information Officer (CIO)) 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. In our experience, the lack of institutional support has been the biggest predictor of failure of medication reconciliation quality improvement initiatives.

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 one or more emotionally invested clinical champions on your QI committee engaged 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. Be prepared with “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 percent of inpatients have at least one unexplained discrepancy in their prescription medication history at the time of admission.¹
- At baseline, among the first six sites in the MARQUIS program, on average every other patient had one discrepancy with potential for patient harm in either admission or discharge medication orders.^{2,3} This is consistent with other studies using the same methodology.
- Approximately two-thirds of potentially harmful discrepancies are due to errors in obtaining the medication history, usually errors of omission (i.e., not realizing a patient was taking a medication prior to admission).⁴
- 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, discrepancies often 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.⁵
- Most currently available Computerized Physician Order Entry (CPOE) systems do not prevent prescribing errors that are due to inaccurate medication histories.⁶
- Up to 27 percent of all hospital prescribing errors can be attributed to incomplete medication histories at the time of admission.⁷
- Almost one-third (33 percent) of patients discharged from the Intensive Care Unit (ICU) had one or more of their chronic medications omitted at hospital discharge⁸ and 73 percent of patients had at least one medication discrepancy between the surgery and anesthesiology preoperative medication histories.⁹
- More than one-fifth (22 percent) of medication discrepancies could have resulted in patient harm if the discrepancy continued

during his or her hospitalization and 59 percent of the discrepancies could have resulted in patient harm if the discrepancy continued after discharge.¹⁰

- 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, with 20 percent of readmissions caused by drug-related problems.¹¹ 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 percent reduction in readmissions and ED visits in one year, from 2.24 to 1.88 per patient).^{12,13}
- Financial implications for the institution: Not including reductions in readmission rates, medication reconciliation can save money by reducing inpatient ADEs. The literature estimates the cost of a preventable ADE at \$4,655 per event based on a 1997 study done by Bates (dollars updated to 2012).¹⁴ Some organizations have calculated an ADE cost as high as \$10,375.¹³ Hiring seven full-time equivalent (FTE) of pharmacists to take pre-admission medication histories would save an institution more than \$1,000,000 per year due to reduction in ADE rates. Using pharmacy technicians, students or residents to assist in the process, supervised by a pharmacist, may be even more economical.
- Reductions in readmission rates can also translate into significant savings for a hospital due to their involvement in bundled payment plans, capitated insurance contracts, Accountable Care Organization (ACO) arrangements, and penalties from Medicare and Medicaid for having high readmission rates. Readmission costs avoided may be as high as \$1,293,600 per year. By hiring 3.6 FTE of pharmacists to perform discharge medication reconciliation and counseling of the 25 percent of patients at highest risk for medication-related problems after discharge would result in almost half a million dollars savings per year.

These return on investment (ROI) calculations are based on conservative estimates in a hospital with 35,000 admissions per year. Adjustments to these numbers can be made to customize them for any institution's local circumstances.

The ROI calculator, which may be accessed via Appendix I, is also located here: http://tools.hospitalmedicine.org/resource_rooms/imp_guides/MARQUIS/ROI_Calculations_for_MARQUIS.xls.

Appendix I also has additional talking points that can be used to make the business case to administration.

In addition to evidence-based and economic arguments, case vignettes can illustrate specific outcomes from errors due to inadequate medication reconciliation. Specific local 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 and often serve as a powerful motivator for front-line providers.

Finally, it is strongly recommended that you include a patient or family representative on your QI committee and as a representative at meetings with stakeholders. Besides adding the patient's voice to the discussion, which can be an invaluable resource, just the presence of a patient representative can serve as a powerful reminder to stakeholders that this is about patient safety and not about money or politics.

F. 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 or 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 I 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, route, purpose and duration — 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 components:

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 includes medications the patient is actually taking prior to admission (i.e., the BPMH documents patient adherence). 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 pre-admission, 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 patient and/or family/caregiver with an accurate medication list and appropriate education regarding the discharge medication regimen, including name, dose, frequency, route, purpose and duration. Any new medications, changes in dose or frequency, and stopped medications compared with the pre-admission medication regimen should be clearly identified and explained. The importance of keeping an updated medication list should be explained to the patient and/or family/caregiver.
5. The discharge medication regimen should be documented and communicated with post-discharge providers, highlighting changes from the pre-admission 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). Recognize that for each step, there may be multiple clinician types performing the task and that ultimately one clinician needs to be responsible for the product. For example, for Step 1 below, the admitting physician, admitting nurse and the unit pharmacist may all take medication histories from the patient on admission but ultimately one of those clinicians must be responsible for documenting the Best Possible Medication History (BPMH) to create the Pre-Admission Medication List (PAML) in the chart for each type of patient. 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 BPMH might be different for high-risk and average-risk patients).

A. Overview

Admission

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

Transfer

- Step 1:** If applicable, write transfer medication orders, using the PAML and current inpatient (pre-transfer) medications as a guide.
- Step 2:** Compare PAML medications, pre-transfer medications and transfer medications, and identify and correct any unintentional discrepancies in transfer orders.

Discharge

- Step 1:** Write the Discharge Medication List (DML) using the PAML and current inpatient medications as a guide. Document the DML.
- Step 2:** Compare the PAML, current inpatient medications and the DML. Identify and correct any unintentional discrepancies in the DML.
- Step 3:** Provide a copy of the medication list and review the DML with the patient and family/caregiver. Highlight and explain stopped, changed or new medications compared with the PAML and the reasons for those changes.
- Step 4:** Forward a copy of the DML to post-discharge providers. Explain stopped, changed or new medications compared with the PAML and reasons for those changes.

B. Admission

Step 1: Take a Best Possible Medication History (BPMH) to create the Pre-Admission Medication List (PAML). Record the PAML in the patient's chart.

Goal: Collect and document patient's pre-admission medication history and create 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 pre-admission medication sources, obtain a written or verbal history from the source(s) and 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 formulation, 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, primary care provider (PCP) offices, skilled nursing facilities)
3. Organizational skills, to locate and use 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.
5. Ability to communicate with admitting physicians 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/family/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. Phone list of local pharmacies, nursing facilities and physician offices
3. Telephone, paging system and fax machine
4. Documentation tool to record medication history
Ideally, responsible clinicians will have the ability to revise the medication list and/or the ability to document their history in a note, and point out the discrepancies between the documented medication list and what the patient is actually prescribed and taking, for the provider responsible for changing/finalizing the list in Step 2.
5. Online resource — or other current resources — for pill identification and for common medications
6. Ample time to collect a proper BPMH (approximately one minute per medication; more in the most complex patients)

Information Requirements

BPMH Requirements:

1. All medications documented (using The Joint Commission definition of medications¹⁴)
Document the medications that are prescribed and the medications that the patient is taking
2. For each medication document:
 - a. Medication name
 - b. Medication dose, route, strength and formulation
 - c. Medication use schedule (frequency/time of day)
 - d. Indication
 - e. Start/stop dates
 - f. Adherence
3. Medication allergies and reactions
4. Sources used to gather the medication history (see Section B, Chapter II, Part D for how to take a BPMH)
5. Impression of the quality of the medication history taken (i.e., if it is poor due to lack of availability of data sources, another clinician may need to complete the process later)
6. Checklist of probe questions (see Section B, Chapter II, Part D for how to take a BPMH)

Resources

1. “Tips to remember when interviewing patients” from Safer Healthcare Now Campaign, How-to-Guide. You may access the Safer Healthcare Now Campaign here: <http://www.saferhealthcarenow.ca/EN/Pages/default.aspx>
2. See also Section B, Chapter II, Part D for a complete guide to taking a Best Possible Medication History, and Appendix III for a BPMH teaching toolkit, including teaching slide deck (which may be located on the website), small-group case-based teaching activity and simulation-based evaluation tool
3. Best Possible Medication History Teaching Video: <http://www.youtube.com/embed/lt8KfitBeeE>.

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 practical nurse (may need additional training about medications), registered nurse, pharmacy technician, pharmacy student, pharmacy resident, pharmacist, non-physician provider (NPP) (nurse practitioner, physician assistant) and physician. As generating the list is potentially time-consuming and this task requires less medication knowledge than the finalization 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 Pre-Admission Medication List

Goal: Review the draft PAML created in Job 1 to ensure that pre-admission medications, doses, schedule and route of administration are appropriate. At Novant Health Presbyterian Medical Center, pharmacy technicians and admitting physicians partner to complete this process.

Knowledge

1. Advanced knowledge of medications, their indications and 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. Ability to gather information from the EHR or chart to review the patient's past medical history and medication use
3. Ability to double-check the medication list created in Job 1 to determine that the pre-admission 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 pre-admission medication history
2. Communication and working in multidisciplinary teams

System Resources/Tools

1. Computer/EHR access
2. Telephone, paging system and fax machine
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 with the ability to see and verify the changes made to this list
3. Patient, patient family member(s) or patient family/caregiver

Notes:

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.

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 based on the PAML and the patient's clinical condition.

Goal: Write correct admission medication orders, taking into account the patient's PAML and his or her current medical conditions.

Knowledge

1. Advanced knowledge of medications, their indications and 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 the patient's medical conditions

Behaviors

1. Attention to detail to ensure that each PAML medication is accounted for (stopped, changed or new)

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. The more appropriately this step is performed (i.e., writing orders that take the PAML into account), the less work required in Step 3. Optimally Step 2 involves 1) reviewing the PAML, 2) determining which medications to stop, change or modify upon admission and 3) determining new medications to be ordered.

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

Goal: 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 and 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:
 - a. Review the admission medication orders, provider admission note and PAML
 - b. Determine discrepancies between the PAML and admission orders
 - c. Know when and how to contact a provider about a discrepancy (clinical judgment)
 - d. Determine which discrepancies are intentional and unintentional based on the medical record, and provider input if necessary
 - e. Facilitate changes to the admission medication orders 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 document 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

C. Transfer

Step 1: If applicable, write transfer medication orders, using the PAML and current inpatient (pre-transfer) medications as a guide.

Goal: 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 and 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 the patient's medical conditions

Behaviors

1. Attention to detail to ensure that each PAML and pre-transfer medication is accounted for (stopped, changed or new)

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. If a provider can accurately order transfer medications taking into account the PAML and current inpatient medications, then the next step becomes much easier.

Step 2: Compare PAML medications, pre-transfer medications and transfer medications, and identify and correct any unintentional discrepancies in transfer orders.

This step is essentially the same as Step 2 during Discharge and so is not repeated here.

D. Discharge

Step 1: 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 and appropriate dosing
2. Knowledge of the patient's medical conditions – both the patient's past medical history and presenting condition upon hospital arrival and his or her entire hospital course

Skills

1. Ability to order appropriate medications for the 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 medication and current inpatient medication at discharge

Behaviors

1. Attention to detail to ensure that each PAML medication 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

Step 2: Compare the 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 and appropriate dosing
2. The understanding of what constitutes a medication discrepancy
3. Knowledge of the patient's medical conditions – both the patient's past medical history and presenting condition upon hospital arrival and his or her hospital course
4. 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, sleep medications), common medication changes made in the hospital (e.g., for formulary or pharmacokinetic reasons) that need to be changed back at discharge.

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 and patient condition on discharge
 - 3) Determine discrepancies between the two lists and discharge plans from notes
 - 4) Determine which discrepancies are intentional and unintentional, and
 - 5) 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
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, the patient's primary nurse or the patient's discharge 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. This is the second-biggest source of potentially harmful medication errors related to the medication reconciliation process (as noted above, taking an accurate pre-admission medication history is the biggest source). Appropriate resources should be allocated to potential solutions as described later in this manual.

Step 3: Provide a copy of the medication list and review the DML with the patient and family/caregiver. 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 pre-admission medication regimen.

This may include using techniques like teach-back, a teaching technique by which the learner's comprehension is assessed through iterative cycles of demonstration and explanation utilizing open-ended questions; misunderstandings are identified and reconciled; and inquiries about areas of confusion are encouraged.

Knowledge

1. Identification of the "active learner" who should receive this information
2. Knowledge of medications, their indications and appropriate dosing

Skills

1. EHR or chart use
2. Ability to determine from the DML which medications have been stopped, changed or are new from the PAML
3. Ability to communicate effectively with patients and families/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 DML
2. Provide sufficient answers to patient questions about the DML
3. Communication and working in multidisciplinary teams

System Resources/Tools

1. Computer/EHR access
2. Telephone and paging system
3. Documentation tool to record providing the patient a copy of his or her DML and any needed medication-related patient education
4. Detailed medication information reference database

Information Requirements

1. DML
2. PAML or DML formatted in a way that designates changes from the PAML
3. Patient education materials

Notes:

1. This function is typically performed by the discharging physician, a patient's nurse or a pharmacist, especially for high-risk patients.
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 4: Forward a copy of the DML to post-discharge providers. Explain stopped, changed or new medications compared with the PAML and reasons for those changes.

Goal: 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 DML which medications have changed from the PAML
3. Ability to communicate effectively with providers

Behaviors

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

System Resources/Tools

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

Information Requirements

1. DML
2. PAML or DML 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 and physicians via the discharge summary.
2. The patient's discharging provider may be needed to reconcile patient medication issues or questions (e.g., late discovery of a medication discrepancy) or to provide reasons for medication changes if not obvious.
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 performed a systematic review of best practices of hospital-based medication reconciliation interventions.¹ Of the 26 articles included in the review, [10 were randomized controlled trials, three were non-randomized trials with a concurrent control group and 13 were pre-post studies](#). Fifteen studies reported on pharmacist-related interventions, six studies reported on information technology (IT)-focused interventions and five studies reported on other types of interventions including educating staff about medication reconciliation and use of a standardized medication reconciliation tool. The majority of studies (15 of 26) were classified as poor quality, with five studies classified as fair quality and the remaining six studies classified as good quality.

Table 1 summarizes the timing, components and quality rating of all included studies.

Table 2 summarizes study outcomes of all included studies.

A. Pharmacist-Related Interventions

The 15 studies involving pharmacist-related interventions included diverse roles of the pharmacy staff in the medication reconciliation process, as well as varied timing of pharmacy staff involvement during the patient's hospitalization, as demonstrated in Table 1. Included in these studies are the only two studies that demonstrated improvement in healthcare utilization. Common themes of these two studies included 1) limiting the intervention to elderly patients; 2) intensive pharmacy staff involvement, including medication history-taking on admission and medication reconciliation on admission, during hospitalization and at hospital discharge; 3) communication with the PCP via direct communication or use of a template; and 4) telephone follow-up after discharge. The five studies that demonstrated no effect on healthcare utilization had more limited roles for the intervention pharmacist or utilized the intervention pharmacist for a more limited time during hospitalization (e.g., admission or discharge only).

B. IT-Focused Interventions

The six studies on IT interventions all improved access to pre-existing electronic sources of pre-admission medication information such as ambulatory electronic medical records. These interventions leveraged data to create a pre-admission medication list and facilitated comparison of this list with admission and/or discharge orders to help with the medication reconciliation process. These studies consistently reduced medication discrepancies (3/3 studies), potential adverse drug events (PADEs) (1/1 study) and ADEs (1/1 study), but demonstrated no improvement/slightly increased healthcare utilization (1/1 study).

C. Other Interventions

Among the five studies that described other types of interventions, two provided education/feedback to staff about medication reconciliation, and three used a standardized medication reconciliation tool. The standardized tools included a discharge report that provided a brief hospital summary detailing all medication changes that occurred during hospitalization, a six-step standardized nursing approach to medication history taking and reconciliation on admission, and a standard questionnaire used by emergency room physicians on admission. None of these studies were rated as good quality. These studies demonstrated improvement in medication discrepancies (4/4 studies) and in PADEs (2/2 studies).

Table 1: Timing and Components of Interventions

		Timing of Intervention					Components of Intervention						
First Author, Year (Study Design)	N	Pre-Admission	Admission	During Hospitalization	Discharge	Post-Discharge	Medication History Taking	Medication Reconciliation	Patient Counseling	Communication with Outpatient Providers	Review Appropriateness of Medications	Post-discharge Communication with Patient	1 ^U SPSTF Quality Rating
PHARMACIST-RELATED INTERVENTIONS													
Michels, ¹⁸ 2003 (Pre-Post)	NR	√	√				√	√					POOR
Bolas, ¹⁹ 2004 (RCT)	162		√	√	√		√	√	√	√			POOR
Nickerson, ²⁰ 2005 (RCT)	253				√			√	√	√	√		FAIR
Schnipper, ²¹ 2006 (RCT)	176				√			√	√	√		√	GOOD
Kwan, ²² 2007 (RCT)	464		√				√	√					FAIR
Bergkvist, ²³ 2009 (Pre-Post)	115		√	√	√			√	√		√		FAIR
Gillespie, ¹² 2009 (RCT)	400		√	√	√	√	√	√	√	√		√	GOOD
Koehler, ¹³ 2009 (RCT)	41		√	√	√	√	√	√	√	√	√	√	FAIR
Vasileff, ²⁴ 2009 (² Non-RCT)	74		√				√	√					POOR
Walker, ²⁵ 2009 (² Non-RCT)	724				√	√		√	√	√	√	√	FAIR
Eggink, ²⁶ 2010 (RCT)	85				√			√	√	√			GOOD
Lisby, ²⁷ 2010 (RCT)	99		√				√	√			√		GOOD
Mills, ²⁸ 2010 (Pre-Post)	100	√	√				√	√					POOR
Hellstrom, ²⁹ 2011 (Pre-Post)	210		√	√			√	√			√		POOR
Marotti, ³⁰ 2011 (RCT)	357	√	√				√	√					POOR
IT INTERVENTIONS							COMPONENTS						
Poole, ³¹ 2006 (Pre-Post)	100				√		Formation of a medication list from pre-existing electronic sources						POOR
Agrawal, ³² 2009 (Pre-Post)	NR		√				Reconciliation of discharge medications with this list						POOR
Murphy, ³³ 2009 (Pre-Post)	NR		√		√		Formation of a medication list from pre-existing electronic sources						POOR
Schnipper, ³⁴ 2009 (RCT)	322		√		√		Reconciliation of admission orders with this list						GOOD
Boockvar, ³⁵ 2011 (² Non-RCT)	795		√				Pharmacist performed medication history and reconciliation on admission						POOR
Showalter, ³⁶ 2011 (Pre-Post)	34088				√		Formation of a medication list from pre-existing electronic sources Reconciliation of discharge medications with this list						GOOD
OTHER INTERVENTIONS							COMPONENTS						
Varkey, ³⁷ 2007 (Pre-Post)	102		√	√	√		Multidisciplinary medication reconciliation with use of reconciliation form on admission and discharge						POOR
Midlov, ³⁸ 2008 (Pre-Post)	427				√		Use of a physician-generated medication report to next provider of care at time of discharge that includes details of medication changes made during hospital course						POOR
Chan, ³⁹ 2010 (Pre-Post)	407		√				Multidisciplinary medication history and reconciliation on admission Education of healthcare providers on importance of medication reconciliation via lectures, posters around hospital and reminder notes in patient charts						POOR
Tessier, ⁴⁰ 2010 (Pre-Post)	100		√				Nursing performed medication reconciliation with use of a six-step instructional pamphlet						POOR
De Winter, ⁴¹ 2011 (Pre-Post)	260	√					ED physician performed medication history taking and reconciliation with use of a standardized “limited questions list” questionnaire						POOR

Abbreviations: IT = Information Technology; RCT = Randomized Controlled Trial; Non-RCT = Non-Randomized Controlled Trial; NR = Not Reported

¹USPSTF = U.S. Preventive Services Task Force (Please email corresponding author for further details on how quality ratings were assigned.)

²Non-RCT had a concurrent control group, but the sample was a convenience sample as opposed to a randomized sample.

³Given poor compliance during pilot phase, comparison group was reflective of usual care prior to intervention.

Table 2: Study Outcomes

First Author, Yr (Study Design)	*Outcomes Examined				Results	P value or OR [95% CI]
	Medication Discrepancies	Potential Adverse Drug Events (PADEs)	Adverse Drug Events (ADEs)	Healthcare Utilization		
PHARMACIST-RELATED INTERVENTIONS						
Michels,¹⁸ 2003 (Pre-Post)	+				Number of defects decreased from 1.45 per order form to 0.76 in first 16 weeks of implementation	<0.001
					Mean number of defects per individual drug order decreased from 0.25 to 0.12	<0.001
Bolas,¹⁹ 2004 (RCT)	+			~	Decrease in drug name mismatch at 10-14 days post-discharge	0.005
					Decrease in drug frequency mismatch at 10-14 days post-discharge	0.004
					No difference in emergency readmission rates within three months or LOS on readmission	>0.05
Nickerson,²⁰ 2005 (RCT)	+				Medication discrepancies at time of discharge were noted in 56.3% of control patients versus 3.6% of intervention patients	NR
Schnipper,²¹ 2006 (RCT)			+	~	Preventable ADEs 11% in control group versus 1% in intervention group at 30 days post-discharge	0.01
					No difference in healthcare utilization	>0.05
Kwan,²² 2007 (RCT)	+	+			40.2% of control patients had a post-op medication discrepancy versus 20.3% in intervention group	<0.001
					29.9% of control patients had a post-op medication discrepancy with potential for harm versus 12.9% in intervention group	<0.001
Bergkvist,²³ 2009 (Pre-Post)	+				63.5% of control patients had at least one medication error versus 26.9% of intervention patients	0.012
Gillespie,¹² 2009 (RCT)				+	Intervention group had 16% reduction in all hospital visits (quotient of 2.24 in control group versus 1.88 in intervention group) at 12 months follow up	0.84 [0.72-0.99]
					Intervention group had a 47% reduction in ED visits (quotient of 0.66 in control group versus 0.35 in intervention group) at 12 months follow up	0.53 [0.37-0.75]
					Intervention group had 80% reduction in drug-related readmissions at 12 months follow up	0.2 [0.1-0.41]
					No difference in all-cause readmissions, no difference in overall survival at 12 months follow up	>0.05

First Author, Year (Study Design)	*Outcomes Examined				Results	P value or OR [95% CI]
	Medication	Potential Adverse Drug Events (PADEs)	Adverse Drug Events (ADEs)	Healthcare Utilization		
PHARMACIST-RELATED INTERVENTIONS						
Koehler,¹³ 2009 (RCT)				+	38.1% of control group had readmission/ED visit at 30 days versus 10% in intervention group	0.04
					Readmission/ED visit at 60 days was same in 2 groups	>0.05
					Time to readmission/ED visit was 15.7 days in control group versus 36.2 days in intervention group	0.05
Vasileff,²⁴ 2009 (Non-RCT)	+	+			75.6% of usual care patients had ≥1 unintentional discrepancy versus 3.3% of intervention patients	<0.05
					Of the unintentional discrepancies, 2% were felt to have potential for no harm, 40% had potential for minor impact, 52% had potential for significant impact and 6% had potential for very significant impact	IRR <0.8, except for one possible pairing (not specified)
Walker,²⁵ 2009 (Non-RCT)	+			~	Medication discrepancies at discharge were noted in 59.6% of control patients versus 33.5% of intervention patients	<0.001
					No difference in 14-day or 30-day readmission rate, no difference in ED visits within 72 hours	>0.05
Eggink,²⁶ 2010 (RCT)	+	~			Medication discrepancies at discharge were noted in 68% of control patients versus 39% of intervention patients	0.57 [0.37, 0.88]
					Of the medication discrepancies, 29% were felt to have potential for serious harm in the control group versus 32% in the intervention group	NR
Lisby,²⁷ 2010 (RCT)			~	~	No difference in LOS, time to readmission, three-month readmission, ED visits, visits to general practitioners, mortality	>0.05
Mills,²⁸ 2010 (Pre-Post)	+				Medication errors decreased from 3.3 errors/patient pre-intervention to 0.04 errors/patient post-intervention	<0.05
Hellstrom,²⁹ 2011 (Pre-Post)				~	No difference in drug-related healthcare utilization three months post-discharge	0.138
Marotti,³⁰ 2011 (RCT)	+				Mean number of missed medication doses during hospitalization was 3.21 in control group versus 1.07 in intervention group	<0.001

Table 2: Study Outcomes (continued)

First Author, Year (Study Design)	*Outcomes Examined				Results	P value or OR [95% CI]
	Medication	Potential Adverse Drug Events (PADEs)	Adverse Drug Events (ADEs)	Healthcare Utilization		
IT INTERVENTIONS						
Poole, ³¹ 2006 (Pre-Post)	+				Resolution of medication discrepancies increased by 65%	<0.001
Agrawal, ³² 2009 (Pre-Post)	+				Unintended discrepancy rate decreased from 20% pre- intervention to 1.4% post- intervention	NR
Murphy, ³³ 2009 (Pre-Post)	+				Unintended medication discrepancies decreased from 90% to 47% on surgical floors, and from 57% to 33% on medical floors	0.001
Schnipper, ³⁴ 2009 (RCT)		+			Average number of PADEs per patient was 1.44 in the control group versus 1.05 in the intervention group	0.72 [0.52-0.99]
Boockvar, ³⁵ 2011 (Non-RCT)			+		Intervention group experienced 43% reduction in adverse drug events caused by admission prescribing changes classified as errors	0.57 [0.33, 0.98]
					No difference in adverse drug events caused by all admission prescribing changes	1.04 [0.68, 1.61]
Showalter, ³⁶ 2011 (Pre-Post)				~/-	No difference in composite outcome of 30-day readmission or ED visit from pre-intervention to post- intervention	0.17
					30-day readmission rate was 10.2% pre-intervention compared to 11% post-intervention	0.02
OTHER INTERVENTIONS						
Varkey, ³⁷ 2007 (Pre-Post)	+				Mean number of medication discrepancies per patient at time of admission decreased from 0.5 pre- intervention to 0 post-intervention	0.018
					Mean number of medication discrepancies per patient at time of discharge decreased from 3.3 pre- intervention to 1.8 post-intervention	0.003
Midlov, ³⁸ 2008 (Pre-Post)		+			8.9% of control group had potential adverse drug events that would lead to required medical care (readmission to hospital or visit to PCP) compared with 4.4% of intervention group	0.049

First Author, Year (Study Design)	*Outcomes Examined				Results	P value or OR [95% CI]
	Medication	Potential Adverse Drug Events (PADEs)	Adverse Drug Events (ADEs)	Healthcare Utilization		
OTHER INTERVENTIONS						
Chan,³⁹ 2010 (Pre-Post)	+	+			Unintentional medication discrepancy rate per admission decreased from 2.6 pre-intervention to 1.0 post-intervention	<0.001
					The proportion of admissions with one or more clinically significant unintentional medication discrepancies decreased from 46% pre-intervention to 24% post-intervention	0.023
Tessier,⁴⁰ 2010 (Pre-Post)	+				Medication discrepancies were present in 42% of patients pre-intervention versus 20% of post-intervention patients	0.03
De Winter,⁴¹ 2011 (Pre-Post)	+				Mean number of medication discrepancies per patient was 1.1 in control group versus 0.6 in intervention group	<0.001

Abbreviations: LOS = length of stay; IRR = Inter-rater reliability; IT = information technology; ED = Emergency Department; PCP = Primary Care Physician; RCT = randomized controlled trial

*Outcomes examined intervention versus "usual care" as the comparison group (detailed in Table 1) for all studies.

+ indicates statistically significant improvement with intervention versus control in at least one outcome in this category

~ indicates no statistically significant difference between intervention and control in at least one outcome in this category

- indicates statistically significant worsening with intervention versus control in at least one outcome in this category

D. Conclusions

In conclusion, in our review we found that various interventions including those involving pharmacy staff, IT and other types of interventions successfully decreased medication discrepancies and potential adverse drug events, but demonstrated inconsistent benefit on adverse drug events and healthcare utilization, compared to usual care.

The medication reconciliation literature is most robust for pharmacist-related interventions, which were evaluated in 15 of 26 included studies and four of six good-quality studies. Several of these articles evaluated clinical outcomes such as preventable adverse drug events and healthcare utilization, rather than solely examining process measures such as medication discrepancies. In the two studies that demonstrated improvement in healthcare utilization, the pharmacy staff was heavily involved, performing a comprehensive medication history at admission, medication reconciliation at admission and discharge, patient counseling, discharge communication with outpatient providers and post-discharge communication with the patient. Other common elements of the successful pharmacist-related medication reconciliation efforts included communication with post-discharge providers regarding the discharge medication regimen, including how and why the regimen differed from prior to admission, and patient education and follow-up. In review of all pharmacist- and non-pharmacist-related interventions, common elements of successful interventions were the targeting of a “high-risk” subgroup, evidence of institutional support and performing the intervention in a defined population, e.g., patients to/from a nursing home or in the setting of an elective surgical admission.

In summary, existing evidence most supports pharmacist-related interventions compared to usual care in producing the best patient outcomes, with high degree of pharmacist or pharmacy staff involvement in all medication reconciliation-related processes being most effective. Targeting interventions to a subset of patients considered at greatest risk of an ADE, such as elderly patients, patients taking many medications and/or patients with many co-morbid conditions, may be of highest yield. This evidence also suggests that taking an accurate medication history and communicating with post-discharge providers are important steps, especially for achieving reduction in post-discharge healthcare utilization.

V. Assembling the Team and Developing a Strategy

In starting a 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.

A. Identify Team Members

Senior Administrator / Executive Champion

A member of the “C Suite” (e.g., CEO, CMO, CNO, CIO) or similar administrative champion of the project (e.g., director of safety and quality for the hospital) 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 executive sponsor should receive regular updates on the project, attend at least some committee meetings and be an advocate of the project to other members of hospital leadership.

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 medication reconciliation literature is not required, a general understanding and acceptance of QI 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.

Clinical Champion/Hospital Opinion Leader

The clinical champion 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 clinical champion 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.³¹

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 ADE 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, the 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. Such process owners include unit-based nursing directors, pharmacist leaders for a portion of the hospital and residency leadership.

Information Technologist

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.

Patient/Caregiver Representative

This is a person who has been a patient or caregiver for a patient in your hospital system, often someone who has suffered an adverse event because of a medication reconciliation error. Ideally, these representatives are passionate about the issue, can represent broad patient/family interests beyond any narrow agenda and are articulate in expressing their ideas. Often these representatives can be identified with the help of the hospital director of Patient/Family Relations.

On the following page, 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 email 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

Team Function/Staff	Name	Email	Phone
Team Leader			
QI Team Facilitator – may be identified in roster below			
Data Analyst			
Information Technologist			
QI Expert (if different from above personnel)			
Content Experts – may be identified in roster below			
Clinical Champion/Hospital Opinion Leader – may be identified in roster below			
Senior Administrator/Executive Champion			
*PROVIDERS			
1. Attending Physician(s)			
2. Emergency Department Physicians			
3. Surgeon(s)			
4. Anesthesiologist(s)			
5. Trainee(s)			
6. Non-Physician Provider(s) (PAs, NPs, etc.)			
*NURSING			
7. Nurses			
8. Nurse Manager(s)			
9. Clinical Nurse Specialists			
10. Nurse Educators			
11. Nurse Assistants			
*PHARMACY			
12. Pharmacists for Emergency Department Patients			
13. Pharmacists for Inpatients			
14. Pharmacy Tech(s)			
AFFILIATED STAFF			
15. Unit Assistants			
16. Others			
17. Patient or Family Representative			

**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.*

B. Establish Team Rules and Guidelines

Articulate Aims

Identify the overarching goal and role of the MARQUIS team. Gain consensus among all team members. Write the goal 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 those with 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 person 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, sending an email; verification that the email 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 QI tools. Medical center resources — such as a patient safety officer, a QI leader or a QI facilitator — may be available at your institution. 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 G: Identify in-hospital QI resources.

TASK H: Identify educational opportunities to learn more about QI principles and who should take advantage of these opportunities.

C. 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 within the timeline of your project.

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, which is 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 F).

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 on the next page

<<Sample>>

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 two 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: <ol style="list-style-type: none">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 pre-admission medications, current medications, and discharge orders and measure performance.4. Standardize process of educating patients in a literacy-sensitive fashion about stopped, changed 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:	<p>Chair</p> <ol style="list-style-type: none">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. <p>Co-chair</p> <ol style="list-style-type: none">1. Co-lead with the Chair. <p>Task Force Members</p> <ol style="list-style-type: none">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.

D. Map Your Current Medication Reconciliation Process

Qualitative Analysis Process Mapping

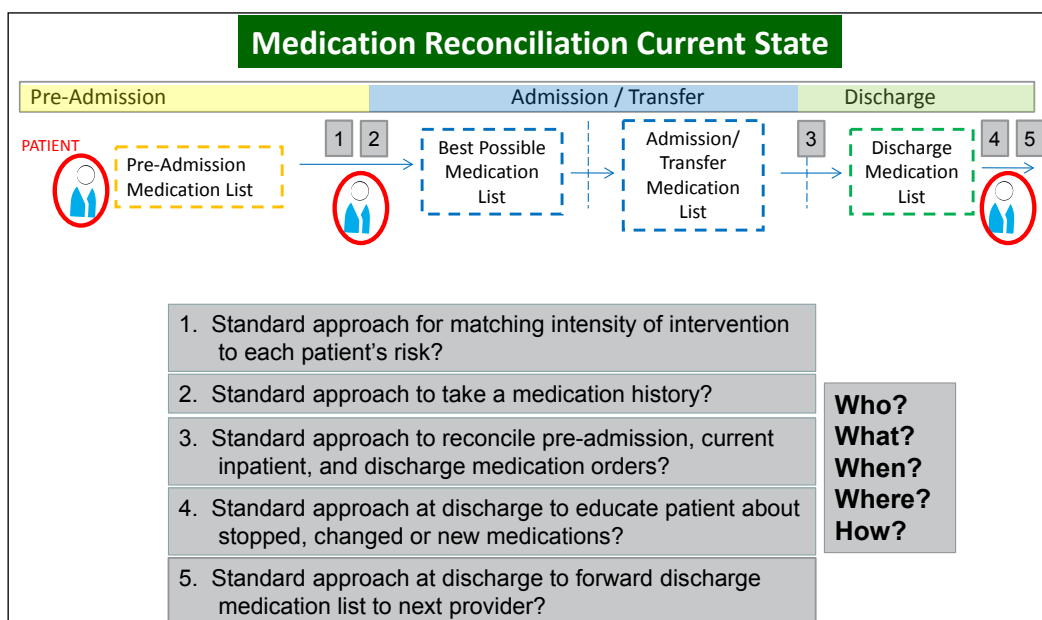
What the team learns from drawing and discussing a map of the current process can be surprising as well as motivating. Self-discovery can uncover waste, duplicated efforts, lack of consensus on current process, hidden complexities and opportunities to streamline or simplify.

When first beginning to map out the medication reconciliation processes at your hospital, 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.

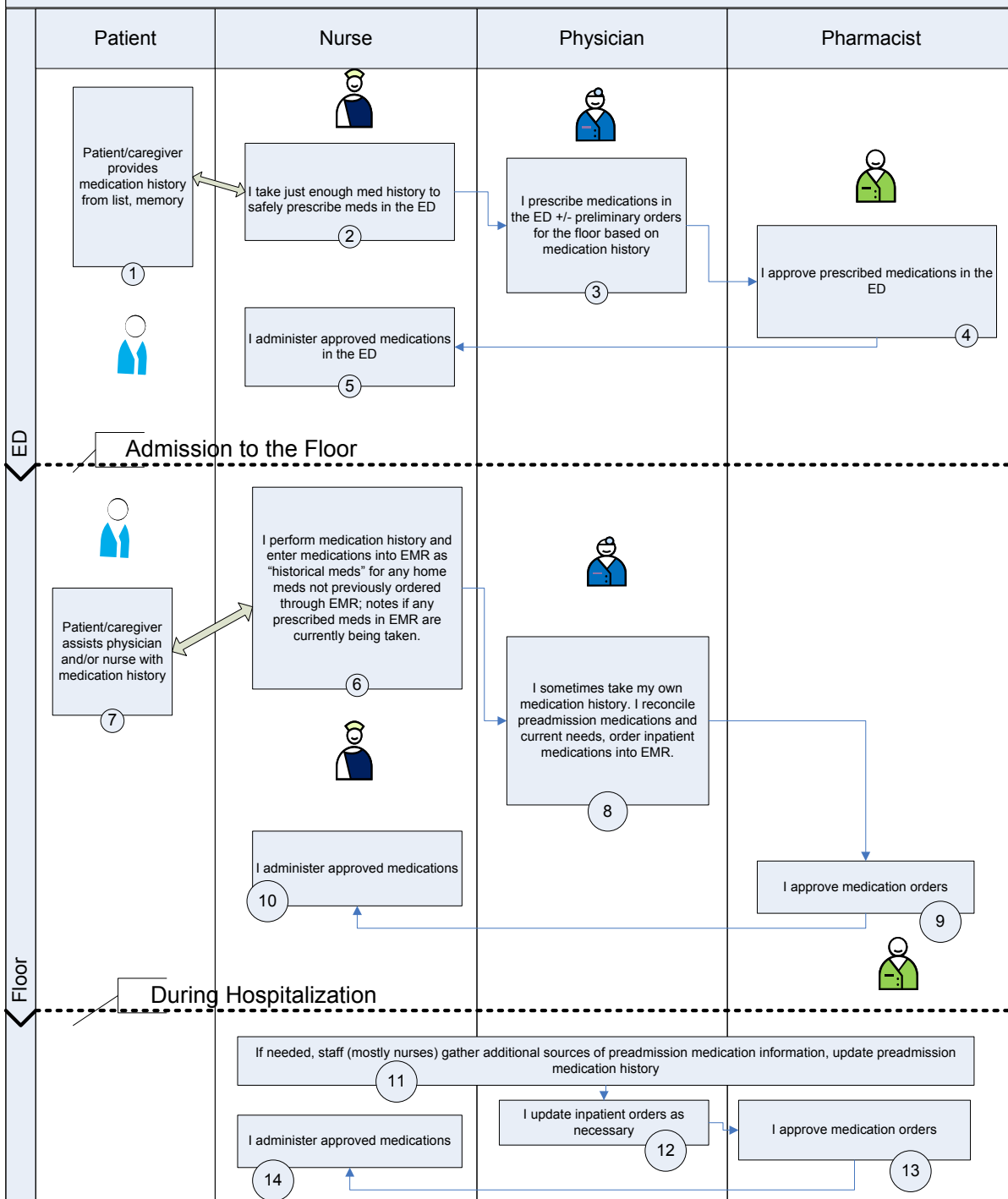
Next, you will want to delve into each of these steps in more detail. The goal here is to diagram what happens to your patients currently under the best of circumstances. This is not the time (yet) to discuss what goes wrong with these steps (that comes next, during the gap analysis), but neither are 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 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:

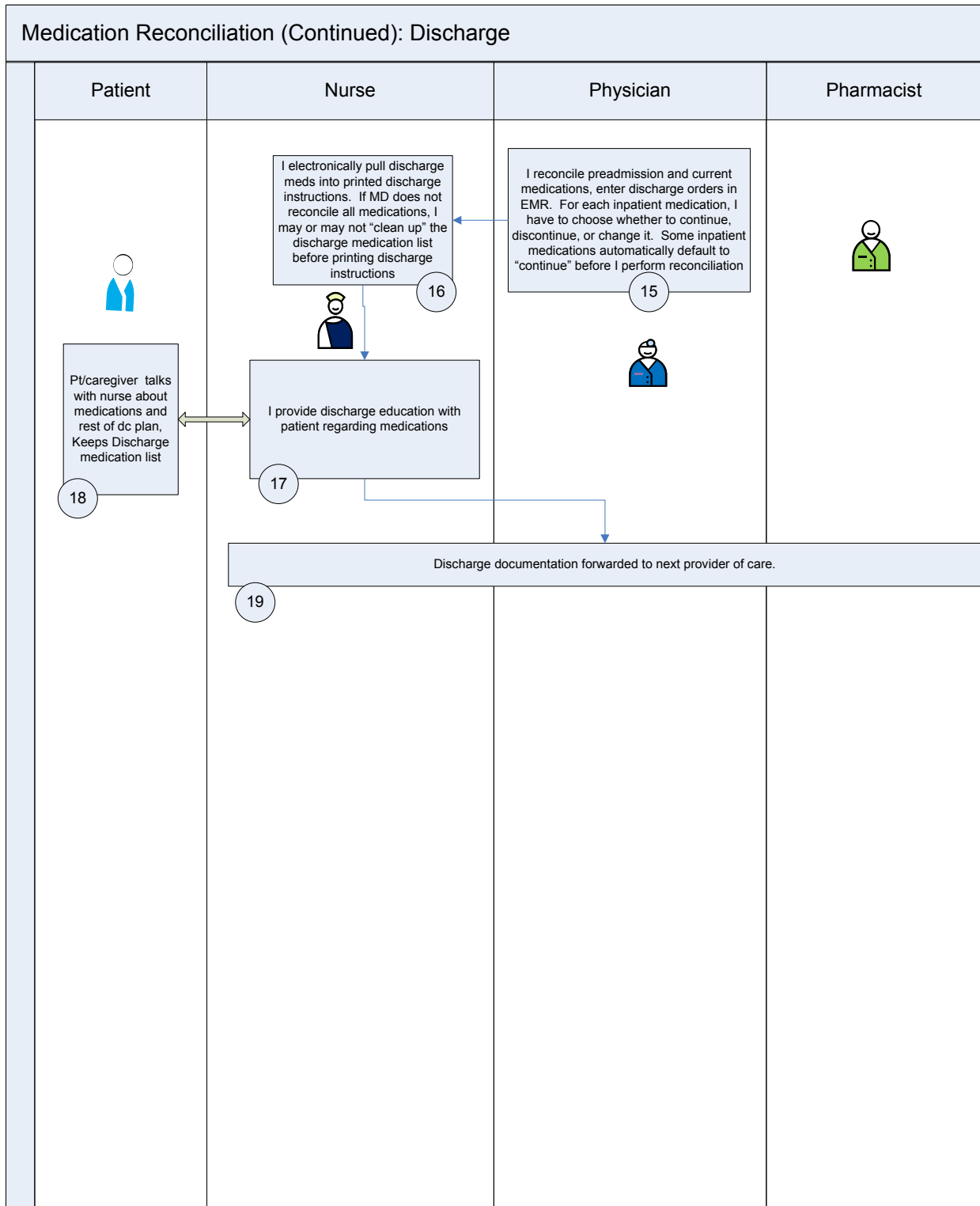
1. What steps are being performed?
2. Who is performing those steps?
3. When are those steps being performed (in relation to the patient's hospitalization and relative to the other steps in the process)?
4. Which steps are dependent on previous steps and which are not (e.g., what steps are performed 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), a 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. On the next page, we show swim-lane diagrams for the baseline medication reconciliation process at one of the MARQUIS sites for admission from the ED, admission to the floor and discharge home.



Medication Reconciliation Process – Average-Risk Patients





Swim-lane diagram illustrating baseline processes at one hospital.

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 and achieves its goal. For those steps that occur less than 100 percent 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.

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, pre-admission 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 stopped, changed or new medications
 - no standard approach or institutional expectation to educate patients about stopped, changed 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.

An additional consideration in analyzing the process map is developing an understanding of why variations occur. Variations in process can be attributable to system operation characteristics, highlighting resiliency rather than failure. The system often adapts to multiple circumstances (e.g., high workload). While there is often an inclination to focus on completing steps as outlined, there are opportunities to evaluate inefficiencies and promote teamwork through redesign efforts.

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

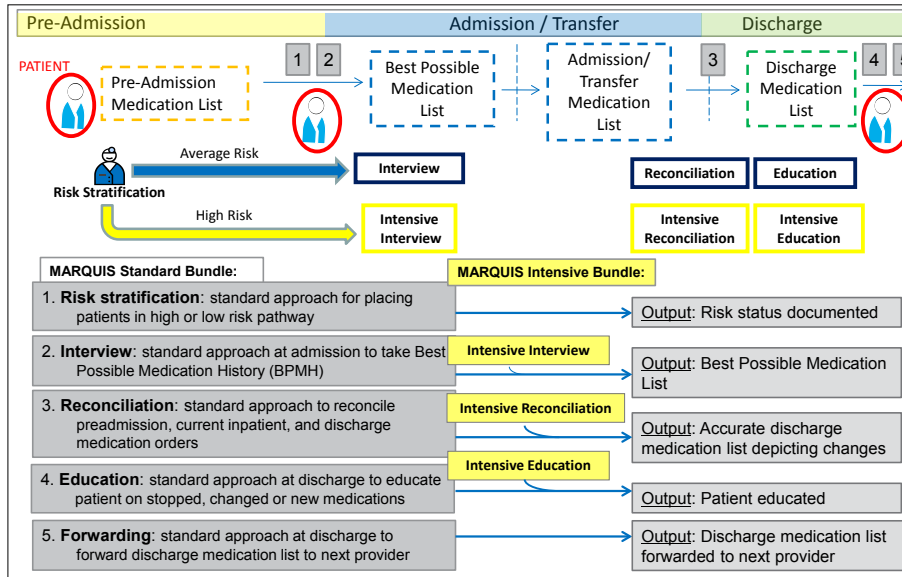
Ultimately you and your hospital care most about clinical outcomes, such as whether or not a patient develops a preventable ADE leading to harm and/or return to the hospital. Your chances to reduce ADEs begin the moment the patient is admitted and continues into the post-discharge period. To help your 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. Use 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 pre-admission, 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.

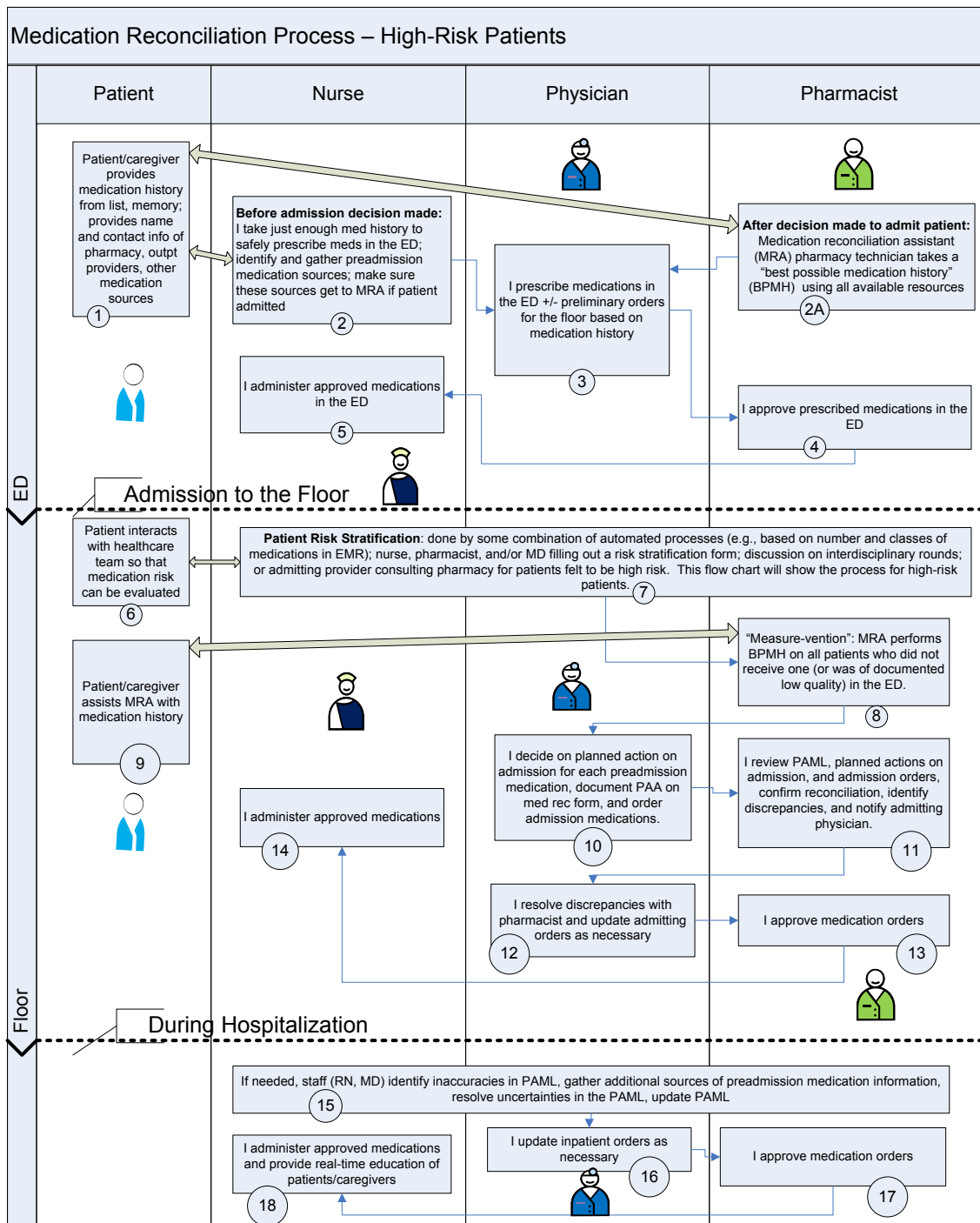
Map the Ideal Medication Reconciliation Process: MARQUIS

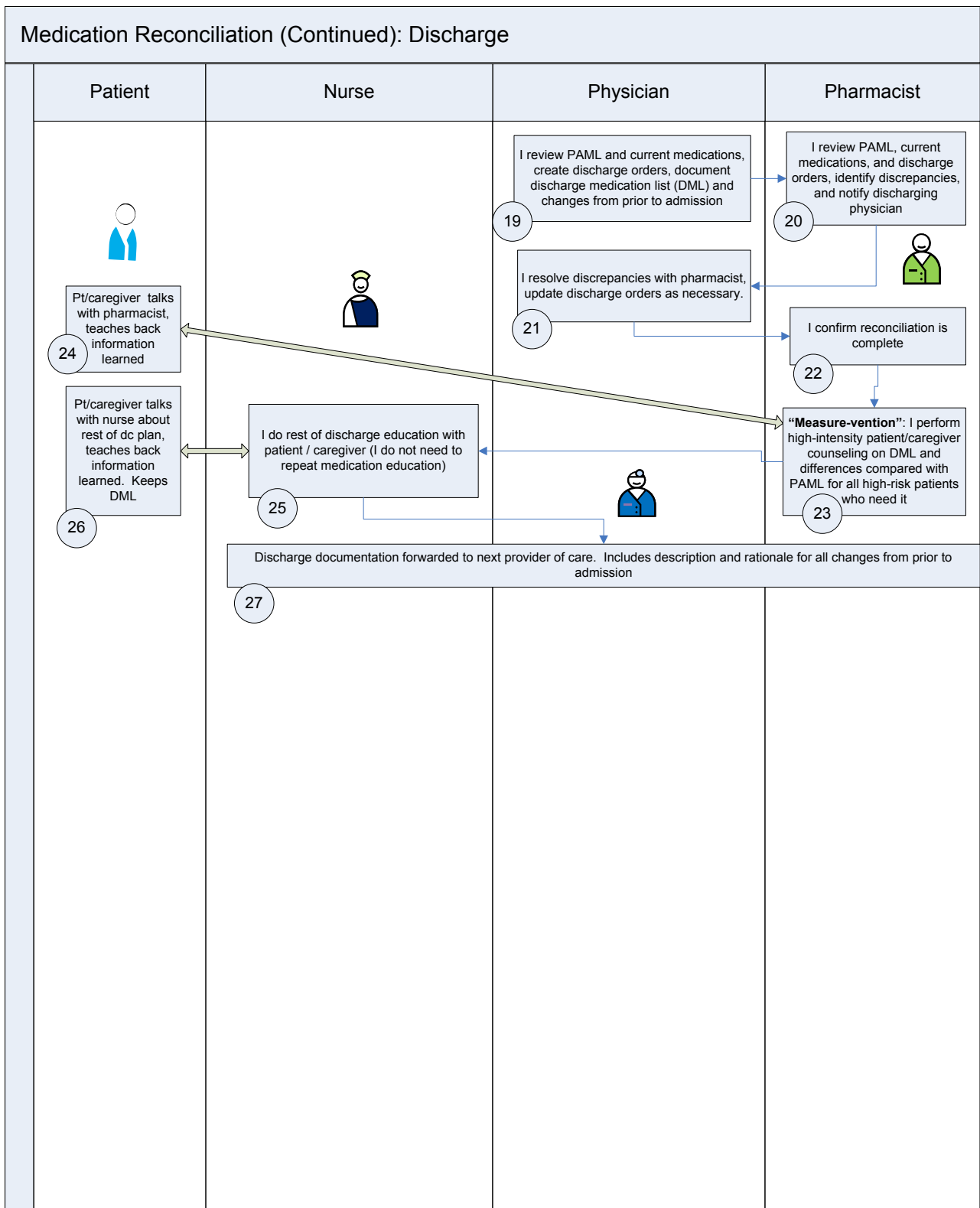
The MARQUIS Steering Committee, using inputs from a national expert advisory board, has outlined the ideal medication reconciliation process based on available evidence and best practice (see following pages). Note that the MARQUIS standard and intensive bundle each have the same core elements. The standard 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).

High Level Flow Diagram: MARQUIS



High-Level Flow Diagram of Ideal Medication Reconciliation: The following figure provides an example of how MARQUIS hospitals have created diagrams to vet, refine and later communicate the envisioned ideal medication reconciliation process. Note the format is a “swim-lane” diagram, where each lane represents a different type of provider, with thin blue arrows (and numbers in circles) showing the sequence of events and interactions among clinical personnel, and thick gray two-headed arrows showing interactions between patients and providers. The figure shows a typical medication reconciliation process for a high-risk patient.





Sample swim-lane diagram showing ideal medication reconciliation process for high-risk patients at one hospital.

E. 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 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 Best Possible Medication List could be produced and discussed during structured interdisciplinary rounds. The result of the discussion would be a plan to create a BPML 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.

We are recommending random sampling of patients within the population where you plan to conduct the intervention over the course of the study. If you initially focus efforts on one group of patients, we recommend over-sampling from that patient population (e.g., three-fourths of all patients evaluated) so that you have adequate power to determine whether your efforts are working.

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.

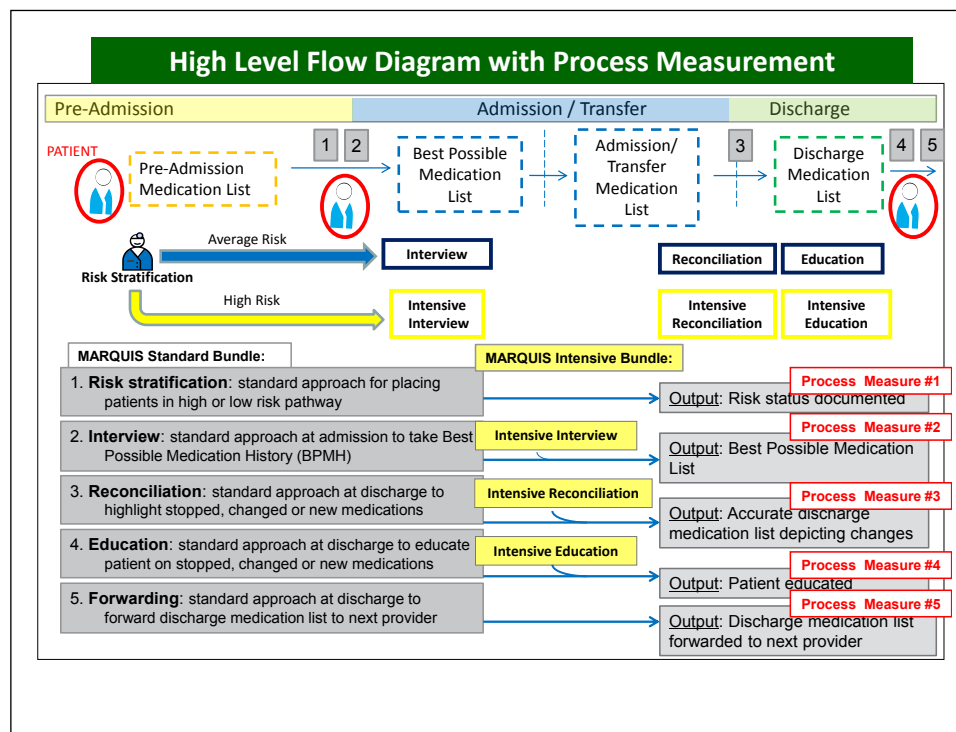
If possible, the team should designate an individual or two to collect, collate, plot and manage the data. Many improvement projects falter or die simply because data collection is inadequate. Available data collection resources may dictate methods and definitions in any given medical center.

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 have tools to easily enter data and create run charts, but general software like Excel can be used for such purposes.

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.



Your team can track the performance of one or more steps by treating each like an independent process measure.

We recommend making it possible to track the following MARQUIS process measures:

1. Process Measure #1: Prevalence of Risk Stratification
admitted patients with documented risk status/total # eligible admitted patients
2. Process Measure #2: Prevalence of Pre-Admission Medication List (Best Possible Medication List)
admitted patients with documented PAML (within 24 hours of admission)/total # eligible admitted patients
3. Process Measure #3: Prevalence of Reconciled Discharge Medication Lists
discharged patients with reconciled ML /total # eligible discharged patients
4. Process Measure #4: Prevalence of Patients Effectively Educated
discharged patients affirming comprehension of ML /total # eligible discharged patients
5. Process Measure #5: Prevalence of Forwarded Discharge Medication Lists
discharged patients with ML 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.

F. Turn General Goals into Specific Goals

Using these specific MARQUIS bundle elements, your team can transform its general aim from Part C 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:

Specific

Measurable

Aggressive yet Achievable

Relevant

Time-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 percent of high-risk medicine inpatients by [insert date].

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 percent by [insert date].

Example: The **Prevalence of PAMs among** admitted medicine patients will be >90 percent by [insert date].

Example: The **Prevalence of Reconciled Discharge Medication Lists (DML)** among discharged medicine patients will be >90 percent by [insert date].

Example: The **Prevalence of Patients Effectively Educated** among discharged medicine patients will be >90 percent by [insert date].

Example: The **Prevalence of Forwarded Discharge Medication Lists (DML)** among discharged medicine patients will be >90 percent by [insert date].

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 I: 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, we recommend that each site collect outcome data on a monthly basis, including several months of baseline data before you attempt any interventions. This will allow your site to track improvements caused by your intervention. It may also help your QI committee better understand baseline practices and where efforts need to be expended (e.g., whether reconciliation errors at admission are a high priority or not). We recommend measuring the following outcomes:

1. Total 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
4. Number of unintentional medication discrepancies per patient in admission orders
5. Number of unintentional medication discrepancies per patient in discharge orders
6. Percent of PAMLs built within 24 hours of admission
7. Emergency Department visits or readmissions to the hospital within 30 days of discharge

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

Example: By October 31, 2014, there will be a 50 percent reduction in unintentional medication discrepancies per patient.

The MARQUIS program has developed a data system for tracking outcomes 1-5 over time. The system also allows for every discrepancy to be adjudicated for potential harm (e.g., by a physician). While potentially harmful discrepancies is a much more relevant outcome than total discrepancies, this outcome also requires more effort and training to produce. The need to adjudicate all outcomes for potential for harm should thus be determined by your site's needs, i.e., what will be necessary to secure resources, motivate changes, sustain interventions, etc.

We have created a set of materials to train pharmacists in taking a "gold standard" medication history, comparing it to the team's PAML and to admission and discharge orders, identifying and categorizing all discrepancies in admission or discharge orders by type (e.g., omission, dose, frequency), timing (admission vs. discharge) and reason (history error vs. reconciliation error). These materials include slide decks, sample cases and a Frequently Asked Questions (FAQ) document. For sites enrolled in mentored implementation, the program also includes one-on-one training and periodic case review. Similar materials are available for physician adjudicators. See Appendix XII for complete details on how to train personnel to conduct outcome measurement.

G. 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 measure-vention 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 Plan-Do-Study-Act (PDSA)** to incrementally improve performance tracking (#3) and integration of the new protocol (#4). The most meaningful lessons happen through these cycles of action-oriented learning. Pay attention to what works, what does not, and make adjustments before trying again. Watch people work and talk to people about their work to figure out what to adjust.

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.

Principle #1	Keep things simple for the end user.
Principle #2	Do not interrupt the workflow.
Principle #3	Design reliability into the new process.
Principle #4	Perfect on a small scale before spreading widely.
Principle #5	Monitor adherence to the protocol.

Adherence to these principles requires systems thinking: standardize and simplify, make it easy for people to do the right thing, optimize teamwork, understand when and why things go wrong, manage change.

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:

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 more than one person).

H. Phased Implementation

Different Ways to Phase Implementation

Basic QI 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 unit, floor or service
2. By timing (admission or discharge)
3. By patient risk (e.g., focus on high-risk patients only)
4. 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, 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 and for a true BPML to be created that includes all of a patient's medications. The BPML needs to be a trusted list by all, and focusing solely on high-risk medications does not lead to a complete, trustworthy PAML.)

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 BPMH, 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 pre-admission medication information to providers.

Once several cycles of PDSA have been completed, it should become clear to the QI team whether the intervention is promising but requires further refinement, whether it is ready for spread to other locations or services within the hospital, or whether the intervention should be dropped in favor of something else (e.g., Adapt, Adopt or Abandon). Spread to other locations requires a clear plan for expansion, a timeline, resource allocation, institutional commitment, and local buy-in and support for the effort.

I. Complete MARQUIS Site Assessment

At this point, 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 III**, 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 the PILL Study Pharmacy Assessment Guide non-randomized study conducted by one of the MARQUIS investigators.⁴¹

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.

SECTION B: **MARQUIS Intervention Components**

I. Introduction

In this section, we discuss in detail the three distinct segments of the MARQUIS medication reconciliation intervention. Specifically, the three parts of the intervention include the bundle; improvement of access to medication information sources; and other high-risk, high-reward interventions.

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 quality improvement (QI) techniques described in Section A, 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.

A. Measurement

Each site should perform a detailed survey of achievement of “milestones” in the medication reconciliation intervention on a monthly basis. A sample of the survey is included in **Appendix V (MARQUIS Scoring System Survey)**. 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 also allows mentors to provide more customized guidance to each site. In each chapter of this section, we provide a brief discussion of how these milestones will be measured for each intervention component.

II. Component I: The MARQUIS Intervention Bundle: Intensive vs. Standard

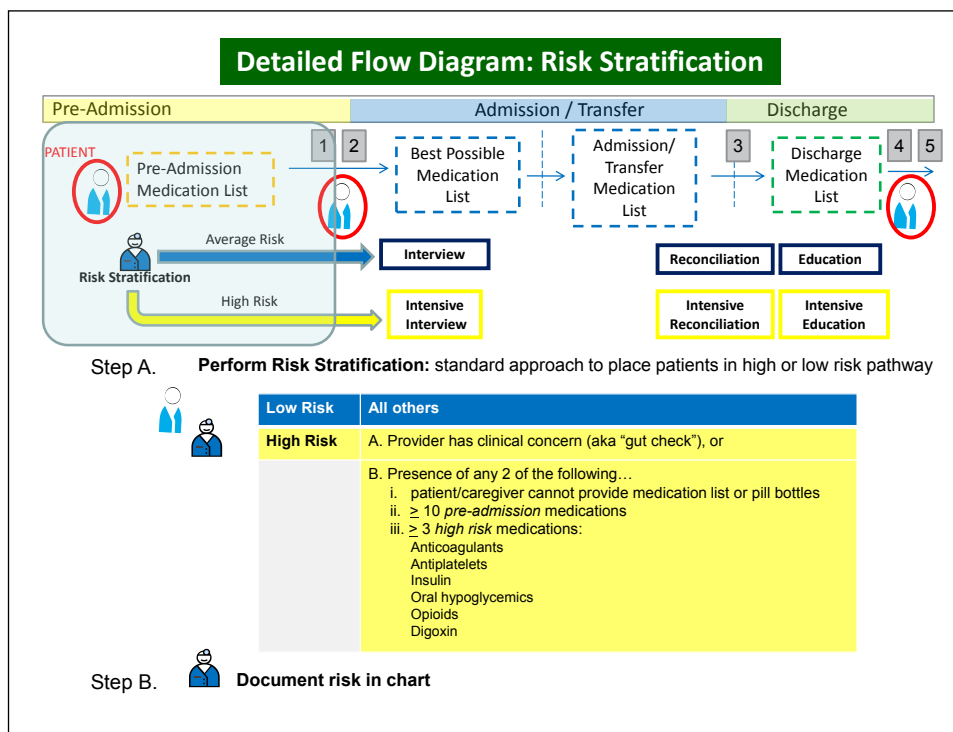
As noted in Section A when describing the various steps of medication reconciliation, one way to think about medication reconciliation QI is as a bundle of activities performed by various personnel working as a team. The tasks are the same for both the “standard” and “intensive” bundles, and they include the following components (see diagrams, below):

- Risk stratification
- Taking a Best Possible Medication History (BPMH) and documenting the Pre-Admission Medication List (PAML)
- Ordering and reconciling medications at discharge
- Counseling patients and families/caregivers regarding the discharge medication regimen
- Communicating the discharge medication regimen to the next providers of care

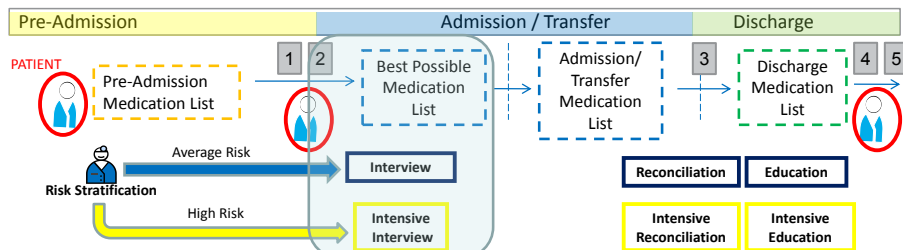
The main differences between the standard and intensive bundles are the following:

- 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 perform 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 detailed medication history will be taken, 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.



Detailed Flow Diagram: Interview



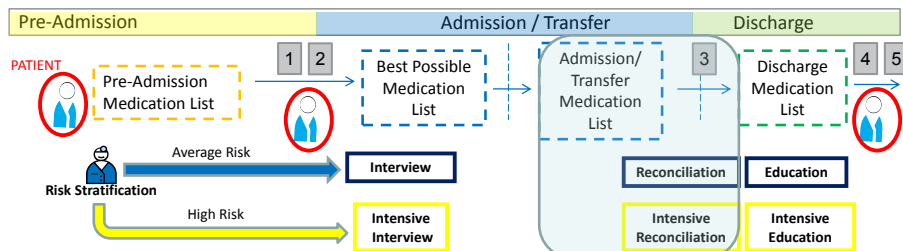
Step A. **Interview:** standard approach at admission to take best possible medication history

1. Should include at a minimum medication name, formulation, dose, route, frequency
2. Ask the patient open-ended questions about what medications s/he is taking (i.e., doesn't read the list and ask if it is correct)
3. Use probing questions to elicit additional information: non-oral meds, non-daily meds, PRN medications, non-prescription meds
4. Use other probes to elicit additional medications: common reasons for PRNs, meds for problems in the problem list, meds prescribed by specialists
5. Ask about adherence
6. Use at least two sources of medications, ideally one provided by the patient and one from another source (e.g., patient's own list and ambulatory EMR med list)
7. Know when to stop getting additional sources
8. Know when to get additional sources if available (e.g., If patients are not sure, relying on memory only, or cannot resolve discrepancies among the various sources of medication information)
9. When additional sources are needed, use available sources first (e.g. pill bottles if present), then pharmacy data, then additional sources (e.g., outpatient provider lists, pill bottles from home)
10. Use resources like Drugs.com to identify loose medications
11. Get help from other team members when needed

Step B. **Sign Best Possible Medication List in chart**

Adapted by Ed Etchless from: Safer Healthcare Now.
http://www.saferhealthcarenow.ca/EN/interventions/medrec_home/Pages/Resources.aspx

Detailed Flow Diagram: Discharge Reconciliation

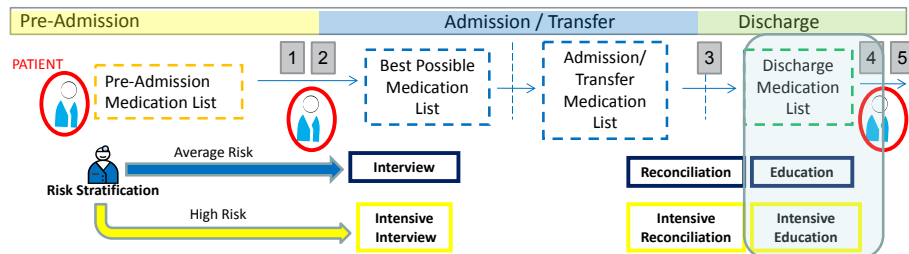


Step A. **Reconcile:** standard approach at discharge to highlight changed, discontinued, or new medications

1. Print a discharge medication list which clearly lists medications:
 - a. to continue unchanged
 - b. to continue with changes
 - c. to stop completely
 - d. to start new
2. On the discharge medication list, write the indication for each medication

Step B. **Sign discharge medication list document in chart**

Detailed Flow Diagram: Discharge Education



Step A. **Educate:** standard approach at discharge to educate patient on changed, discontinued, or new medications



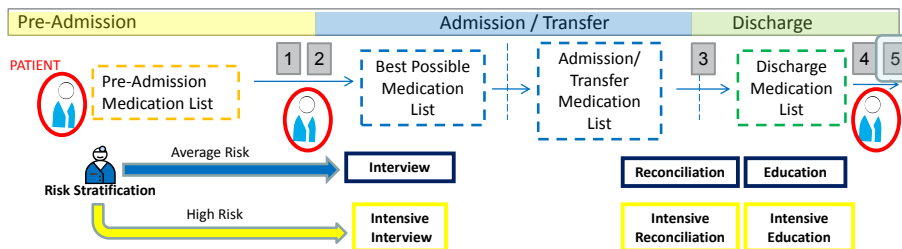
- I. Include the following information
 - Exactly how the discharge medication regimen differs from the preadmission regimen
 - Why these changes were made
 - The indications, directions and potential side effects of all new medications
 - What to watch out for and who to contact if problems arise
 - Importance of keeping an up-to-date medication list with them at all times
 - Confirmation of ability to pick up prescriptions
 - Review and address barriers to adherence
2. Use literacy sensitive materials
3. Use Teach Back to confirm patient understanding
4. Have patient sign discharge medication list after Teach Back

Step B.



Place patient-signed discharge medication list in chart attesting comprehension

Detailed Flow Diagram: Forwarding



Step A. **Forward:** standard approach at discharge to forward discharge medication list to next provider



1. Fax or send copy of patient-signed discharge medication list to next provider

Step B.



Place physician-signed discharge medication list in chart attesting forwarding to next provider

A. 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. 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 Plan-Study-Do-Act (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 (e.g., provider education, high-reliability interventions).

We include some guidelines below 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 Pre-Admission Medication List (PAML) only once if possible, i.e., when creating the PAML at the time of hospital admission.
2. The quality of the PAML (as estimated by the history-taker) and the information sources used to complete it should be clearly documented so that downstream providers know whether additional work is required to make the PAML as accurate as possible.
3. The PAML should “copy forward” so that the provider can use it to select medications to continue, hold or stop at admission.
4. The PAML and current medication list should also “copy forward” so providers can construct the Discharge Medication List (DML) from these two other lists (see the triplicate form from Aurora Health Care in **Appendix VI** for an example of how to accomplish these tasks).
5. 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).
6. The final DML should ideally sort medications into categories of unchanged, changed, new and stopped compared with the PAML.
7. Discharge medication forms should make it easy to write prescriptions.
8. Forms should accommodate having a second person verify the reconciliation process.
9. Forms should facilitate conversation among providers: why medication changes are being made, what information is unclear, what actions need to be taken.
10. 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.
11. In **Appendix VI**, we include examples of paper medication reconciliation forms used at various institutions (the form from Aurora Health Care 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.

B. Measurement

As noted in Section A, 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 DML 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 bundle components 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 feedback and are given sufficient time and staffing to conduct their responsibilities properly. See **Appendix V** for survey questions specific to the intensive bundle.

We now discuss ways to implement several of the bundle components in more depth.

C. Risk Stratification

One of the most important interventions to implement is a risk-stratification process with the provision to offer the 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 (ADEs) 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 ADEs 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)⁴⁴
- 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:

High-Risk Patient	Low-Intermediate-Risk Patient
<p>A. Physician concern about patient and medications on admission (“gut check”) OR</p> <p>B. At least 2 of the following:</p> <ol style="list-style-type: none"> 1. Patient/family/caregiver cannot provide medication list or pill bottles 2. ≥ 10 pre-admission medications 3. ≥ 3 high-risk medications: Anticoagulants Insulin Opioids Antiplatelets Oral hypoglycemics 	All other patients

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 the list of high-risk characteristics. Then you should research on-site resources available for 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 for the intensive bundle, consider the following:

1. If demand exceeds supply:
 - Raise the threshold for any particular high-risk characteristic
 - Require more than two 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 workflow 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 low/intermediate) 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 patient's 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 pre-admission 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 electronic medical record (EMR) calculate number and classes of pre-admission medications and use that to automatically trigger the intensive intervention.

One of the first MARQUIS sites was able to automatically identify high-risk patients by using data from their pharmacy system to trigger a BPMH as well as in-hospital discharge counseling from a clinical pharmacist. This is an excellent example of the use of “high-reliability” tools.

The next issue to be addressed is the notification of the pharmacist (or other equivalent personnel) of high-risk patients so that he or she 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 include the following:

- 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 or places an order for the high-risk pharmacist to consult on the patient.
- 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 or use of a high-intensity bundle form.

D. Provider Education: Guidelines for Taking a Best Possible Medication History

Taking an accurate pre-admission 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

A BPMH is the most accurate list of medications the patient should be taking and also includes medications the patient is actually taking prior to admission (i.e., documents adherence).

- 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
 - Purpose
 - Non-prescription medications (e.g., samples, over-the-counter drugs, vitamins, herbals, nutraceuticals and health supplements)
- It is important to learn both what the patient is supposed to be taking (i.e., the regimen prescribed by his or her providers), and what the patient actually takes.
- 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 BPMH, try to use at least two sources of information when possible and explore discrepancies between the different sources of information. Ideally, sources include one from the patient or family/caregiver and one from elsewhere. Possible sources include:

Source #1 = from patient

- Patient (from interview)
- Patient-owned medication lists
- Family members and other families/caregivers
- Pill bottles

Source #2 = from elsewhere

- Discharge medication orders from recent hospitalizations
- Medication lists and/or notes from outpatient providers
- Transfer orders from other facilities
- Pharmacy(ies) where patient fills prescriptions

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/caregiver. 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. The reason for this approach is two-fold: 1) it makes it more likely that the provider will uncover medication discrepancies, and 2) it provides an assessment of the patient's degree of understanding of his/her medications. 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. Best practices for taking a medication history with and without a medication list are modeled in videos that accompany this manual.

Follow this link to the Taking a Good Medication History video: <http://www.youtube.com/embed/lt8KfitBeeE>.

Questions to elicit a complete medication list:

Begin with an open-ended question that cannot simply be answered with a yes or no.

- 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 condition?
- 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 based on the patient's problem list.
 - 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 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? (This is especially important for antihypertensives, analgesics,

- anticoagulants, insulin and oral hypoglycemics.)
- 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 the patient uses a list or pill bottles and seems 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 the patient is not sure or is 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 he or she actually takes, then contact outpatient physician offices and/or have the family/caregiver bring in the pill bottles from home. At that point, if the patient was receiving the “standard bundle,” it may be time to ask additional personnel, such as a pharmacist, to help.

Additional Resources

In addition to the above description, we have provided a number of other resources to assist with provider training and assess competency:

1. BPMH Pocket Cards: The pocket cards are a condensed version of the questions above in an easy-to-carry format. You may access both versions of the pocket cards here:
http://tools.hospitalmedicine.org/resource_rooms/imp_guides/MARQUIS/Marquis_Pocket_card_BPMH_20120605.pdf
http://tools.hospitalmedicine.org/resource_rooms/imp_guides/MARQUIS/MARQUIS_Tri-Fold_FINAL.pdf
2. Taking a Good Medication History video: The video produced at Vanderbilt University demonstrates how to obtain a BPMH. Follow this link to Taking a Good Medication History video:
http://www.youtube.com/watch?feature=player_embedded&v=lt8KfitBeeE
3. A didactic slide deck on how to take a BPMH, for those sites that don't want to use the video or would like to customize the material (e.g., with sentinel events at their own sites) can be found here: http://tools.hospitalmedicine.org/resource_rooms/imp_guides/MARQUIS/Taking_a_BPMH_Final.ppt.
4. BPMH Simulation and Evaluation Tool for Certification: This is a case-based exercise to assess competency in performing a BPMH (see Appendix IV). In our experience, it is not enough to provide education on this topic and assume providers are now competent medication history-takers. This simulation exercise, based on Observed Structured Clinical Examination (OSCE) exercises often used in U.S. medical schools, provides a robust way to assess the acquisition of BPMH skills and also provides a useful opportunity to provide real-time feedback to providers.

A special word on the use of pharmacy technicians in medication history-taking

Several sites have employed the use of specially hired and trained pharmacy technicians, known as Medication Reconciliation Assistants (MRAs), often positioned in the Emergency Department (ED), to take medication histories of admitted patients. These MRAs usually have retail pharmacy experience, solid interpersonal skills and a strong desire to perform this work. MRA programs can be staffed for 24-7 or weekday coverage. The best MRA programs place an absolute premium on securing PAMLs. A well-used directory of area retail pharmacies, physician offices and nursing facility phone numbers, along with dedicated workspace and an email fax system, appear to be key success factors for a high-functioning MRA program. This model has several advantages, including reduced costs compared to a model that exclusively uses pharmacists to perform this step. By having patients arrive on the floor with a recognized high-quality PAML, it also greatly reduces downstream and redundant work. If this model is employed, front-line clinicians would only need to take a BPMH for patients not admitted through the ED (e.g., direct admissions, transfers), and would otherwise only need to quickly verify the accuracy of the PAML and fill in gaps when necessary (e.g., taking a history when it is communicated that the PAML was of poor quality due to lack of information sources at the time it was taken). SHM is working to establish such a national course (contact SHM directly for information regarding this course). Moreover, this does not obviate the need to educate other clinicians on how to take a BPMH, but it increases the reliability of the entire process by consolidating the task in a few trained individuals for the majority of admitted patients.

Measurement

Because of the importance of this step, measurement is essential. As noted in Section A, you should collect outcome data on about 25 patients per month such that you have a run chart of the number of history errors per patient (and subsequently, the number of discrepancies in admission or discharge orders due to those history errors).

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).

The Front-Line Survey includes provider-specific survey questions about taking a BPMH.

E. Discharge Counseling: Patient Education, Teach-Back and 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 percent of patients. Moreover, approximately 20 percent of patients are rehospitalized within 30 days. Many 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 families/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 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, adult, 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/caregiver's key concerns.
 - a. Patients/families/caregivers are generally most concerned with what they need to do. Highlight important instructions and changes to the medication regimen, such as started, stopped or new medications.
 - 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 and how 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 pre-admission 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 DML, 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 DMLs. This list is adapted from the ACP Foundation/Institute of Medicine recommendations for formatting prescription drug labels.

Recommendation	Example or Description
Use explicit text to describe dosage/interval in instructions.	"Take 2 in the morning, and 2 in the evening" rather than "Take two tablets twice daily."
Use a universal medication schedule (UMS) to convey and simplify dosage/use instructions.	A visual aid with standard intervals (e.g., morning, noon, evening, bedtime) can simplify dosing and reinforce text instructions.
Organize list in a patient-centered manner.	Patient-directed content (e.g., drug name, dosing instructions) should have greatest prominence.
When possible, include indication for use.	When feasible from a privacy standpoint, include the purpose of the medication.
Simplify language, avoiding unfamiliar words/medical jargon.	"High cholesterol" rather than "Hypercholesterolemia."
"How to take" rather than "sig."	
Improve typography: use larger, sans serif font.	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.
When applicable, use numeric instead of alphabetic characters.	"2" instead of "two."
Use typographic cues (bolding and highlighting) for patient content only.	Only information most relevant to patients, such as drug name and dose, should stand out.
Use horizontal text only.	Do not print some text perpendicular to other text.
Provide medication list in patient's preferred language.	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.

In **Appendix VII** 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.

Follow this link to the Good Discharge Counseling video: <http://www.youtube.com/embed/BE-9CVVeZpA>.

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 with most patients as well as literacy-sensitive tools.

The latter can also be assessed by direct observation and use of a paper trail as part of the intervention. Direct assessment of patients' understanding of their medications is obviously the gold standard — such tools exist but are much more labor intensive to use.

III. Component II: Improving Access to Pre-Admission Medication Sources

A. Introduction

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

- Patients and their families/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 medication list.
- Patients have many providers, and often 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 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 pre-admission medication sources
- Empowering patients and families/caregivers to own their medication lists
- Assigning responsibility to primary care providers (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 (as described above)
- Better information technology (IT) to process the sources of medication information in a coherent way

In this chapter, we will discuss two of these solutions: improving access to sources of pre-admission medication information, and empowering patients to own their medication lists.

B. Sources of Pre-Admission Medication Information

There are several potential sources of pre-admission medication information, each with its own advantages and disadvantages.

Source	Advantages	Disadvantages
Pharmacy prescription refill information	<ol style="list-style-type: none"> 1. Often only source for some medications, especially if patient is from outside own medical system 2. Provides information about adherence 	<ol style="list-style-type: none"> 1. Can be expensive or difficult to obtain 2. Difficult to integrate with other information sources 3. May be incomplete (e.g., for OTC medications)
Outpatient electronic medical record (EMR) medication list	<ol style="list-style-type: none"> 1. May be easy to obtain and integrate with Computerized Provider Order Entry (CPOE), especially if integrated EMR 	<ol style="list-style-type: none"> 1. Only accurate if maintained by outpatient providers 2. Doesn't work if patients are from practices that don't use that EMR
Non-electronic sources of info from primary care physician/outpatient paper chart/nursing facility	<ol style="list-style-type: none"> 1. May be easy to obtain 2. Could be an informative source 	<ol style="list-style-type: none"> 1. May not be a well-maintained source
Medication data from Health Information Exchanges (e.g., a Regional Health Information Organization-RHIO)	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Empowers patients/families/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 medications 	<ol style="list-style-type: none"> 1. Not widely used 2. Not widely maintained by patients/families/caregivers 3. Not widely integrated into outpatient EMRs and inpatient systems
Discharge Medication List from recent hospitalization	<ol style="list-style-type: none"> 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) 	<ol style="list-style-type: none"> 1. May be out of date 2. Access limited to discharges from same hospital or hospital system
Patient/family/caregiver's verbal report	<ol style="list-style-type: none"> 1. May be easy to obtain if patient communicative or family/caregiver available 2. Assesses patient/caregiver knowledge of medications 	<ol style="list-style-type: none"> 1. May be very inaccurate or incomplete 2. Not available in some cases (e.g., patient delirious, family/caregiver not available)
Medication list on paper from patient/family/caregiver	<ol style="list-style-type: none"> 1. Easy to obtain (if available) 2. A bridge to a long-term solution 	<ol style="list-style-type: none"> 1. May be very inaccurate or incomplete 2. Often not available

In this section, we will restrict ourselves to improving the availability of various 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.” 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 (RHIO) might choose to go the Health Information Exchange (HIE) 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 percent. 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.

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 percent 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.

Another possible route is to work with rehabilitation hospitals and nursing homes that refer many patients to your hospital (and vice-versa). One MARQUIS hospital signed memoranda of understanding and worked with leaders at several such institutions to facilitate the bi-directional transfer of medication information.

In all these cases, issues of patient privacy and Health Insurance Portability and Accountability Act (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 permission to obtain this information from pharmacy sources.

Improving access to other sources of medication information noted in the preceding table 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 pre-admission medication information, it will be important to figure out how to present 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 team leader surveys (**Appendix V**) ask about access to each data source, either electronically or via facilitated paper access. The survey asks what proportion of patients is affected by access to this source (e.g., if your hospital obtains access to the medication lists in one ambulatory 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.

C. Patient-Owned Medication Lists

Patient-owned medication lists can be represented in a number of formats. The most common is a medication list on paper provided by the patient or family/caregiver. These lists can be created and maintained by the patient/family/caregiver, or be provided by the patient's 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 DMLs are often provided to patients/families/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 effort. 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 Section B, Chapter IV 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.** In addition, if the first question of any medication history-taker at admission is “do you have your medication list with you,” then this sets the expectation that this is a responsibility of patients and families/caregivers.

Paper Forms

In **Appendix VII**, we include several examples of patient-friendly DMLs 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 VIII** 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 paper 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 VIII**, 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/caregivers 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. If your site does use a PHR linked to your EMR, then use of that record by patients or their families/caregivers should be encouraged, especially if it allows patients to “mark up” that list and facilitate the process by which providers can review that information and use it to keep the EMR up to date.

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 – any list, no matter how well designed, is only useful if it is accurate.

Additional Resources

There is additional guidance on how to foster a patient-centered approach to medication reconciliation. With funding from the Agency for Healthcare Research & Quality (AHRQ), Consumers Advancing Patient Safety (CAPS) and Aurora Health Care created the toolkit called How to Create an Accurate Medication List in the Outpatient Setting through a Patient-Centered Approach. The resource may be accessed here: <http://www.consumersadvancingpatientsafety.org/programs/partners-in-safety/aurora-health-care-medication-list-toolkit/>.

Additionally, the Washington Patient Safety Coalition (WPSC) has made multiple resources available through their My Medicine List campaign, which is intended to build public awareness of the need for patients to take an active role in managing their medicines. WPSC's website has a medication list campaign and resources that may be accessed here: <http://www.wapatientssafety.org/for-patients-families/your-medicines>.

Finally, Covenant Health created a resource for patients on the importance of maintaining a medication list that can be found here: <http://www.covenanthealth.org/For-Patients/My-Medication-List.aspx>.

Measurement

The monthly site leader 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. (See Appendix V.) 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. Component III: Other High-Risk/High-Cost but Potentially High-Reward Interventions

A. Improvements in Information Technology: Inpatient Electronic Medication Reconciliation Interventions

Information technology (IT) is certainly not the answer to all (or even most) medication reconciliation problems. It is essential to review your institution's existing workflow and understand how medication reconciliation functionalities are handled by your existing health information technology (HIT) systems. It is important to note that if technology is 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. Such technology 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 medication reconciliation product.
- Buy IT that is separate from EMR functions.

Notes About the Pros and Cons of Medication Reconciliation Software:

There is certainly evidence that IT can improve the medication reconciliation process.^{32, 34} However, it should be noted that most of these studies used proprietary technology carefully and specifically designed to improve the process. When designed well, HIT can help with the following:

- 1) Improve access to electronic sources of ambulatory medication lists and prescription information from which to construct the BPMH.
- 2) Eliminate transcription errors by allowing selected medications from the PAML to become admission orders and medications from the PAML and active hospital medications to become discharge orders.
- 3) Simplify medication reconciliation by comparing the PAML and admission orders (at admission) and the PAML, current hospital medication list and DML (at discharge).
- 4) Improve access to the DML for the next provider of care.
- 5) Clearly document for patients and providers how the discharge medication regimen differs from the pre-admission regimen.

However, there are potential problems with medication reconciliation software as well, especially as it currently exists within most major EHR vendor products. For example:

- 1) Most products do not allow the user to grade the quality of the PAML and the sources used to create it and then clearly document that information. Without this feature, it becomes difficult for downstream providers to know whether to trust the PAML and whether additional work is required to optimize it (e.g., access information sources that were not previously obtained).
- 2) In many systems, medications in the PAML cannot be separated from the sources on which they are based (e.g., ambulatory medication orders in the EHR). When this occurs, then non-licensed providers such as nurses or even pharmacists cannot make changes to the PAML because it appears that those providers are changing an order (even though all they are doing is changing documentation). These providers often resort to writing comments about changes that need to be made, but these do not reliably lead to appropriate changes to the PAML being made by ordering providers.
3. Some systems document how the discharge medication regimen differs from the PAML. However, this description is only accurate if the PAML is accurate. If an accurate and up-to-date PAML cannot be documented, for the technical reasons given above or because of workflow issues, then the description of changes can be completely misleading. Some sites have chosen not to turn on this comparison feature of their software for this reason. In other cases, the feature is available but is simply not used, and providers work around the software to document discharge medication regimens, bypassing all the safety features they may contain.

Ideal Medication Reconciliation HIT Features and 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. Again we should note that most commercial EHRs do not have many of these ideal features and functions. It is important to understand your existing and ideal workflows and how IT will and won't support these workflows. Where IT will not support existing or ideal workflows, then either the IT needs to be changed (i.e., by buying upgrades, customizing or otherwise altering the implementation of the existing software) and/or workflows may need to be modified to best integrate with the IT (these may include workarounds and other non-EHR steps to ensure a reliable process). Even where IT and workflows are compatible, steps will need to be taken to ensure that these "best practice" workflows and use of the technology is performed with high reliability. Note also that some paper systems may still need to exist in an EHR world to ensure optimal medication reconciliation processes (for example, if an ambulatory medication list does not fit on one screen of the computer system, it may be easier to print the list and use the printed list to review with the patient, take notes on paper about differences and then enter all of the changes into the BPML at once after the interview).

Ideal Features and Functions

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

2. Facilitates the comparison of various sources of pre-admission medication information
 - i. Each medication listed once
 - ii. Ability to:
 - a. see the source(s) of medication information
 - b. see differences in doses, frequencies, routes and formulations among sources for each medication
 - c. see dates prescribed/ordered as appropriate for each source
 - d. sort medications by medication name, class, date and source (of these, medication class is most useful)
3. Ability to show patient adherence to medications
 - i. Calculation of medication possession ratio and/or graphs of medication possession time based on pharmacy fill and refill data
 - ii. Access to any documented information from EMRs and PHRs regarding medication adherence, side effects, intolerances, etc.
4. Documentation of the Pre-Admission Medication List (PAML)
 - i. Ability to create a stand-alone PAML separate from the sources on which it is based
 - ii. Ability to pull medications from electronic sources into a PAML
 - iii. Ability to add new medications into the PAML based on other (non-electronic) sources of information
 - iii. Ability to document the quality of the PAML (from a list of choices) in the opinion of the history-taker and for that information to be clearly visible to any other provider who pulls up the medication list
 - iv. Ability to document the sources used to create the PAML from a list of coded choices and for that information to be clearly visible to any other provider who pulls up the medication list
 - v. Ability to update the PAML at any time during the hospitalization. Clinical personnel of various types, as determined by the institution, can edit the PAML, and this function is a separate role from the ability to prescribe medications
 - vi. Audit trail to document changes to the PAML made over the course of the hospitalization, including when and by whom (person and role)
5. Facilitation of PAML verification
 - i. Ability of a provider to sign-off that the PAML is ready for verification
 - ii. Ability to document verification of PAML by a second clinician
6. Facilitation of medication admission order writing based on the PAML
 - i. Ability to 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, pulling forward as much medication information as appropriate to minimize the amount of data that needs to be entered to create and activate the order
7. Facilitation of reconciliation at admission
 - i. Ability to display PAML and admission orders such that the two regimens can be easily compared and differences are easily highlighted or reported in some way
 - ii. Ability to document intentional reasons for changes from PAML to admission orders
 - iii. Ability to document verification of admission orders by a second clinician

8. Facilitation of medication ordering at intra-hospital transfer

- i. Ability to compare PAML to current (pre-transfer) inpatient medications (e.g., sorted by class, with differences in medications, dose, route, frequency or formulation highlighted)
- ii. Ability to order medications from either list as transfer orders, with or without further modification
- iii. Ability to add new medications at transfer (i.e., not on either list)

9. Facilitation of medication reconciliation at intra-hospital transfer

- i. Ability to compare PAML, pre-transfer medications and transfer orders, where differences are easily highlighted or reported in some way
- ii. Ability to document intentional reasons for changes made to transfer orders
- iii. Ability to document verification of transfer orders by a second clinician

10. Facilitation of medication ordering at hospital discharge

- i. Ability to compare PAML to current (pre-discharge) inpatient medications (e.g., sorted by class, with differences in medications, dose, route, frequency or formulation highlighted)
- ii. Ability to order medications from either list as discharge orders, with or without further modification
- iii. Ability to add new medications at discharge (i.e., not on either list)
- iv. Ability to run decision support on entire discharge medication regimen (e.g., for duplicate therapy)
- iv. Ability to print and sign prescriptions at discharge (from ordered medications)

11. Facilitation of medication reconciliation at hospital discharge

- i. Ability to compare PAML to discharge medications, with all differences highlighted or reported in some way
- ii. Ability to document reasons for intentional changes made to discharge orders (e.g., compared with the PAML)
- iii. Ability to document verification of discharge orders by a second clinician

12. Tools to facilitate patient/family/caregiver education

- i. Ability to print a final discharge medication list in patient-friendly language that clearly shows (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. Ability to clearly display the differences between pre-admission 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 pre-admission medications should be stopped
- iii. Ability to add standardized medication educational materials for high-risk medications (e.g., anticoagulants, diabetes medications, etc.)

13. Tools to facilitate communication with post-discharge providers

- i. Ability to clearly document the discharge medication regimen, including a clear explanation of changes compared with the pre-admission 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)

14. Tools to facilitate compliance with medication reconciliation process

- i. Ability to track timing of PAML documentation relative to time of admission
- ii. Ability to provide alerts, reminders and/or hard stops if PAML not completed in a timely manner
- iii. Ability to stop the discharge process unless PAML has been verified and every medication in the PAML and current inpatient regimen have been reconciled with the discharge medication regimen
- iv. Ability to generate real-time reports of all patients with discharge orders completed and in need of reconciliation

15. Tools to identify high-risk patients

- i. Ability to automatically identify and generate a report of patients 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 pre-admission to discharge medications) so that further action can be taken

In **Appendix IX** 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.

Measurement

This is a list of the key features and functions the application possesses based on the QI team's knowledge of the software. The monthly survey addresses key questions regarding site IT capabilities and access to key data sources. See Appendix V.

B. Social Marketing and Engagement of Community Resources

Social Marketing

Medication reconciliation, like most QI 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.⁴⁹ 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 simply a regulatory requirement that is someone else's job. It is 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 families/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 outpatients, the messages might include:

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

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., Lions 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 his or her 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.

Providers may also respond to local stories of patient harm due to errors in the medication reconciliation process and from testimonials from patients themselves. These can be incorporated into other social marketing efforts.

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 X**, 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/caregivers 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. See **Appendix V** survey questions specific to social marketing.

V. 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 local QI team while embarking on this very crucial patient safety project. With the expert guidance of your mentor, or on your own, this manual should assist your hospital in achieving success in improving medication safety during transitions in care.

Appendices

I. 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).⁴⁶ 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 local and national (we provide national data below), 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 of any cases that may have been brought to risk management that involve medication reconciliation errors.⁴⁷

However, even without local financial expertise, it should not be difficult to calculate some “back of the envelope” estimates of ROI using some basic hospital statistics (like the number of beds), the baseline medication reconciliation error rates (which you will be calculating anyway as part of this effort) and the guidance we provide below.

Keeping in mind that the size of the hospital drives the potential costs associated with adverse drug events (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 & 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 days⁴⁸ 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, capitated healthcare plans and for a hospital’s own employees)
 - Decrease in penalties from the Centers for Medicare & Medicaid Services (CMS) from higher-than-average readmission rates
 - Decrease in penalties under Pay-for-Performance contracts related to readmissions
 - Shared savings (or reduced losses) under Accountable Care Organization (ACO) arrangements
- 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 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)

Making the Case – Business Case for Medication Reconciliation

Model #1

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 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 \$10,375.¹³

Fairview's internal data show that an effective medication reconciliation process can detect and avert up to 85 percent 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:

Number of discrepancies per patient

- x Number of patients per year that one person can reconcile
- x Percent of patients with discrepancies that would result in an ADE
- x Percent effectiveness of process
- x Cost of an average ADE

To calculate the net cost savings, subtract the cost of the anticipated resource investment (staff, equipment, information technology (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 (1 person working to complete med rec at an average of 20 minutes/patient)
- 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.

Model #2

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	2.2
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)	~5 FTE
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;277:307-311.

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.

Time Requirements for Various Components of Medication Reconciliation

Below are the time requirements a provider would need to obtain medication histories and perform medication reconciliation. This information will be helpful if used to calculate the number of additional 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*	
Average time to obtain medication history	9 minutes/patient
Average time to obtain medication history and provide necessary interventions/documentation	12 minutes/patient
Average time for chart review prior to medication history, medication history interview and necessary interventions/documentation	21 minutes/patient

*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.

MARQUIS ROI Models

Based on the above models, the latest literature and an interactive ROI calculator from the American Society of Health-System Pharmacists (click on MedRec Return on Investment Model) (http://www.ashp.org/menu/PracticePolicy/ResourceCenters/PatientSafety/ASHPMedicationReconciliationToolkit_1/MedicationReconciliationBasics.aspx), **we have developed our own ROI Calculator**. Note that it includes two sources of savings (each in its own tab):

1. Savings from a reduction in inpatient ADEs by performing pharmacist-assisted medication histories and admission medication reconciliation
2. Savings from reduced hospital readmissions by performing pharmacist-assisted discharge medication reconciliation and patient counseling on the 25 percent highest-risk patients

As much as possible, each line in the spreadsheet is supported by data. Where uncertainty exists, such as the proportion of medication errors that can be corrected by medication reconciliation efforts, we chose to be as conservative as possible.

Sites are encouraged to use their own numbers based on local data wherever possible, for example, your hospital's annual number of admissions, 30-day readmission rates, local salaries for pharmacist personnel and any baseline data on discrepancy rates. Sites can also adjust the proportion of high-risk patients to receive pharmacist discharge counseling and/or replace some pharmacist staff with pharmacy technicians to take medication histories, which would lower costs but might reduce efficacy (although the latter is not known). As shown in the sample case provided, hospitals can expect a 2:1 – 3:1 return on investment, in this case approximately \$3.5 million in annual savings on a \$1.5 million investment.

II. MARQUIS Application for Prospective Sites

APPLICANT INFORMATION

Hospital/Institution affiliation:

Do you have training in quality improvement (QI)?

☐ Yes

☐ No

If yes, please describe:

Are you now or have you been active in QI work, either within your hospital medicine group or at the hospital where the Medication Reconciliation Improvement effort will be implemented?

☐ QI leader for hospitalist/medical group

☐ QI leader for hospital

☐ Participant in QI projects led by others

☐ None

☐ Other

If Other, please describe:

Do you serve on or chair any quality/safety committees at the hospital where the Medication Reconciliation Improvement effort will be implemented?

(please check all that apply)

☐ Quality

☐ Safety

☐ Pharmacy and Therapeutics

☐ None

☐ Other

If Other, please describe:

Who is your employer?

☐ Hospital or hospital corporation

☐ Academic institution

☐ Hospital medicine or multi-specialty group that contracts with hospital

☐ Independent hospitalist

☐ Other

If Other, please describe:

How long have you worked at the hospital where the Medication Reconciliation Improvement program will be implemented?	
How much of your time do you spend working at the hospital where the Medication Reconciliation Improvement program will be implemented? <i>(include clinical and non-clinical work)</i>	
Please provide the name and specialty/discipline of additional members of your team. <i>(up to 5)</i>	<p>1. Name:</p> <p>Discipline/Specialty:</p> <p>2. Name:</p> <p>Discipline/Specialty:</p> <p>3. Name:</p> <p>Discipline/Specialty:</p> <p>4. Name:</p> <p>Discipline/Specialty:</p> <p>5. Name:</p> <p>Discipline/Specialty:</p>

HOSPITAL INFORMATION	
Type of facility: (please check all that apply)	<input type="checkbox"/> University medical center <input type="checkbox"/> Community teaching hospital <input type="checkbox"/> Community hospital (non-teaching) <input type="checkbox"/> County or Publicly-funded Safety Net Hospital <input type="checkbox"/> Veterans Affairs (VA) Hospital <input type="checkbox"/> Other
If Other, please describe:	
Is the facility part of a system?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, system name:	
Do you have medical or surgical housestaff at your hospital?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Number of staffed beds:	
Does the hospital have computerized physician order entry?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Does the hospital have stand-alone medication reconciliation software?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Does the hospital have an electronic health (medical) record?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Please describe the status of the Medication Reconciliation improvement efforts at this site.	<input type="checkbox"/> No formal program in place <input type="checkbox"/> Thinking of launching a QI project <input type="checkbox"/> Active QI project, intervention not yet implemented <input type="checkbox"/> Active QI project, intervention implemented
If no program is in place, have there been prior attempts to improve medication reconciliation at the hospital?	<input type="checkbox"/> Yes <input type="checkbox"/> No

NEEDS ASSESSMENT QUESTIONS

Note: It is NOT required or expected that applicants will have completed the processes outlined in sections 1 through 8. However, please answer each question so we have an accurate description of your current program.

Section 1: Institutional Support

Are senior clinical/administrative leaders aware of your project?

☐ Yes

☐ No

Have you identified an executive champion for the program?

☐ Yes

☐ No

Is your project linked to the hospital's quality/safety reporting structure?

☐ Yes

☐ No

Is your project receiving support from any hospital departments (i.e., QI staff are assisting with development, implementation and evaluation tasks)?

☐ Yes

☐ No

Briefly summarize the institutional support that has been offered or provided to your project:

Section 2: Project Team	
Have you assembled your project team?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please indicate which roles/disciplines are represented: <i>(please check all that apply)</i>	<input type="checkbox"/> Facilitator/QI expert <input type="checkbox"/> Medication reconciliation expert <input type="checkbox"/> Hospitalist (any in addition to team leader) <input type="checkbox"/> Senior hospital administrator <input type="checkbox"/> Pharmacist <input type="checkbox"/> Pharmacy technician <input type="checkbox"/> QI staff <input type="checkbox"/> Informatics <input type="checkbox"/> Nurse supervisor/manager <input type="checkbox"/> Staff nurse <input type="checkbox"/> Social work <input type="checkbox"/> Case Manager <input type="checkbox"/> Other
If Other, please describe:	
Briefly summarize the strengths and weaknesses of your project team:	

Section 3: Goals, Aims and Scope	
Has your team developed specific goals and aims?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Do you have a goal that addresses reduction in the rate of medication reconciliation errors (i.e., "we will reduce medication reconciliation errors among our target patients by XX%")?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Are your goals time-specific (should be achieved by a specific date)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Have you defined the scope of your project (which hospital units or patient populations you will focus on)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Please indicate which hospital units you will focus on?	<input type="checkbox"/> Medical wards <input type="checkbox"/> Surgical wards <input type="checkbox"/> Other
If Other, please describe:	
Briefly summarize your project goals and the process used to develop them:	

Section 4: Process Mapping and Redesign

Have you mapped the current processes for medication reconciliation?

☐ Yes☐ No

Section 5: Risk Assessment and Intervention Recommendations

Have you selected a risk assessment model (a protocol or algorithm for identifying patients at increased risk for post-discharge adverse drug events)?

☐ Yes☐ No

If yes, have you developed recommendations for different levels of risk?

☐ Yes☐ No

Briefly summarize any work you have done to develop a risk assessment model and recommendations:

Section 6: Interventions to Date and in the Future

Have any of the following been implemented to improve medication reconciliation at your hospital?

(please check all that apply)

- ☐ Trained personnel in how to take a high-quality pre-admission medication history
- ☐ Hired or re-allocated staff to take a high-quality pre-admission medication history
- ☐ Trained personnel to perform discharge medication reconciliation or patient counseling regarding discharge medication regimens
- ☐ Clarified and assigned roles and responsibilities to different staff regarding the medication reconciliation process
- ☐ Provided audit and feedback to personnel regarding the quality with which they do their specific role(s) in medication reconciliation
- ☐ Implemented or improved software to assist with the medication reconciliation process
- ☐ Improved access to pre-admission medication data sources (e.g., pharmacy prescription fill information)
- ☐ Took steps to empower patients and/or caregivers to keep an updated medication list with them at all times
- ☐ Created infrastructure to identify and correct defects in the medication reconciliation process in real-time
- ☐ Developed social marketing tools to encourage patients or providers to adopt behaviors that promote high-quality medication reconciliation
- ☐ Engaged community resources to help medication reconciliation efforts more broadly

How likely do you think it is that your hospital would be willing to do the following interventions to improve medication reconciliation in the next 18 months (0: not likely, 10: extremely likely, DK: Don't Know)?

Training personnel in how to take a high-quality pre-admission medication history?

Hiring or re-allocating staff to take a high-quality pre-admission medication history?

Training personnel to perform discharge medication reconciliation or patient counseling regarding discharge medication regimens?

Clarifying and assigning roles and responsibilities to different staff regarding the medication reconciliation process?	
Providing audit and feedback to personnel regarding the quality with which they do their specific role(s) in medication reconciliation?	
Implementing or improving software to assist with the medication reconciliation process?	
Improving access to pre-admission medication data sources (e.g., pharmacy prescription fill information)?	
Empowering patients and/or caregivers to keep an updated medication list with them at all times?	
Creating infrastructure to identify and correct defects in the medication reconciliation process in real-time?	
Deploying social marketing tools to encourage patients or providers to adopt behaviors that promote high-quality medication reconciliation?	
Engaging community resources to help medication reconciliation efforts more broadly?	
Section 7: Measurement	
Have you collected baseline data describing any of the following? <i>(please check all that apply)</i>	<input type="checkbox"/> Medication reconciliation errors <input type="checkbox"/> Potentially harmful medication reconciliation errors <input type="checkbox"/> Adverse drug events <input type="checkbox"/> Medication-related readmissions <input type="checkbox"/> Patient knowledge of medications
Have you determined who will be responsible for collecting data on medication reconciliation?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Have you determined which stakeholders will want to see data describing project outcomes, and when and how you will report to them?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Section 8: Education and Outreach	
Have you measured baseline MD and hospital staff awareness of their role(s) in the medication reconciliation process?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Have you undertaken any educational efforts aimed at raising MD and hospital awareness of the need to improve the medication reconciliation process?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Briefly, summarize your education and outreach efforts, in particular efforts to promote awareness and buy-in from opinion leaders or skeptics:

Section 9: Summary Assessment

Strengths: List the attributes of your hospital or project team that will help you achieve your goals. These might be the personnel who are participating or leading the project, a culture that supports quality improvement, strong senior leader motivation to address this issue at this time, etc.

Weaknesses: List the aspects of your hospital or project team that might impede or prevent your success. This might be lack of protected time to pursue the effort, a history of failed attempts to improve the medication reconciliation process, strong opposition from opinion leaders or other stakeholders, etc.

What have been your successes to date?

Please describe any significant barriers your project has encountered:

Is there anything else you would like to tell us?

III. 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 include:

- A. **Front-Line Expertise** (those from the emergency room (ER) or inpatient unit who understand the current system and have the ability to make 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/caregiver 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 to help understand your performance (e.g., regarding the demographics of your patient population, your hospital’s readmission rate, variation in quality of medication reconciliation by unit or service).

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)

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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 pre-admission medication lists (upload/attach)

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Assessment Item 7: Access to Pre-Admission Medication Sources

A. Does your hospital have easy access to any of the following sources of pre-admission medication information?

* Community pharmacy prescription fill information

* Ambulatory EMR medication lists (if so, list which ones):

* Personal health record (PHR) 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 pre-admission 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 PHR?

* 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?

* 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/families/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).

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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**)

- * Risk stratification
- * Intensive bundle for high-risk patients, with adequate staffing and time to perform it
- * Training in taking medication histories
- * Improved access to pre-admission med sources (electronically or facilitated process on paper)
 - * Pharmacy prescription fill data
 - * Medication information from other facilities
 - * Patient-owned list (e.g., PHR, wallet card)
 - * Outpatient EMR medication lists
- * Patient discharge education
 - * Teach back
 - * Literacy-sensitive tools
 - * Standardized script
 - * Staff taught how to provide this education

- * Community resources
 - * Committed patient safety advisory board, hospital board or other governing body
- * 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 pre-admission, why changes were made, what to watch for
 - * Inpatients and 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 electronic pre-admission 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?

Taking the Medication History	Not Doing	Needs Improvement	Doing Well	N/A
Forms on which patients provide a medication history are formatted clearly.	1	2	3	9
Staff who take a medication history are trained in principles of clear health communication.	1	2	3	
The medication history is taken in a quiet environment.	1	2	3	
Sufficient time is dedicated to taking the medication history.	1	2	3	
If the patient's preferred language is not English, a trained interpreter or language line is always used to help obtain the medication history.	1	2	3	
Systems are in place to gather medication information from sources other than the patient (e.g., medical chart, community pharmacies).	1	2	3	
Discharge Medication List	Not Doing	Needs Improvement	Doing Well	N/A
Patients are provided a clearly formatted, patient-centered medication list at hospital discharge.	1	2	3	9
If the patient's preferred language is not English, the written discharge medication list is provided in the patient's preferred language.	1	2	3	
Patients receive a phone number that they can call if they have questions about their medicines after discharge.	1	2	3	9

Discharge Medication Counseling	Not Doing	Needs Improvement	Doing Well	N/A
Staff who provide discharge counseling are trained in principles of clear health communication.	1	2	3	
Discharge counseling is provided in a quiet environment.	1	2	3	
Sufficient time is dedicated to counseling patients about medications at hospital discharge.	1	2	3	
Discharge instructions include exactly how the medication regimen differs from the pre-admission regimen.	1	2	3	
Discharge instructions include the indications, directions and potential side effects of new medications.	1	2	3	
Discharge counseling explores possible barriers to medication adherence and how to overcome those barriers.	1	2	3	
When providing counseling, staff use plain language and avoid jargon.	1	2	3	
If the patient's preferred language is not English, a trained interpreter or language line is always used during discharge counseling.	1	2	3	
Family members or caregivers are included in discharge counseling.	1	2	3	
Patients are asked to teach back key information at the end of counseling.	1	2	3	

IV. Best Possible Medication History Simulation and Evaluation for Certification

Purpose: Healthcare institutions can utilize this case-based simulation and evaluation to standardize and affirm the competence of hospital professionals in medication safety.

High-Performance Behaviors

Interviewer: Taking a BPMH

- Asks the patient open-ended questions about what medications she or he is taking (i.e., doesn't read the list and ask if it is correct)
- Uses probing questions to elicit additional information: non-oral meds, non-daily meds, PRN medications, non-prescription meds
- Uses other probes to elicit additional medications: common reasons for PRNs, meds for problems in the problem list, meds prescribed by specialists
- Asks about adherence
- Uses at least two sources of medications, ideally one provided by the patient and one from another "objective" source (e.g., patient's own list and ambulatory EMR med list)
- Knows when to stop getting additional sources (e.g., if patient has a list or pill bottles and seems completely reliable and data are not that dissimilar from the other sources, and/or the differences can be explained)
- Knows when to get additional sources if available (e.g., if patient is not sure, relying on memory only or cannot resolve discrepancies among the various sources of medication information)
- When additional sources are needed, uses available sources first (e.g., pill bottles present). Then obtains pharmacy data. If the medication history is still not clear: obtains outpatient provider lists, pill bottles from home and/or other sources.
- Uses resources like Drugs.com to identify loose medications (i.e., for a bag of medications, not in their bottles, provided by a patient)
- Gets help from other team members when needed

Observed Structured Medication History Exercise

Case Study/Role Play of John Doe

Goal: Evaluate how well clinicians take a Best Possible Medication History.

Two roles:

1. Evaluator/patient
2. Clinician being evaluated, who interviews the patient

We have provided several resources to help with this exercise:

1. Interview script from J. Doe (i.e., what J would say about his or her medications if asked, when prompted and when not prompted)
2. J. Doe's discharge instructions from an admission six months ago (accessible from your hospital's system if the clinician asks for it)
3. J. Doe's outpatient medication list from the local pharmacy (if the clinician says he or she would call the pharmacy and ask for it)
4. J. Doe's outpatient medication list from the primary care provider's (PCP's) office (if the clinician says he or she would call the patient's PCP's office and ask for it)
5. J. Doe's bag of medications (if the clinician says he or she would call the patient's family and ask them to bring it in, clinician needs to say he or she would use a web-based tool to identify the loose medications in the bag)
6. The gold standard medication list (i.e., what J. Doe is actually taking), used as the answer key when grading the clinician and providing feedback

Evaluator/Patient Instructions

As the patient...

You are 68-year-old John/Jane Doe.

Interview Script:	
Chief complaint:	chest pain
Opening statement:	"My primary care doctor told to come to the emergency department."
History of the present illness:	You were diagnosed with coronary disease one year ago. You had a stent placed at that time. Your chest pain started two months ago and has been occurring more frequently in the last week (3-4 times a day), requiring more nitroglycerin for pain relief. At 4 a.m. on the day of admission, you had more intense chest pain that was only minimally improved with three nitroglycerin tablets. When the pain occurred, you had shortness of breath and sweats. You called your doctor and were told to go to the ED.
Past Medical History:	Coronary artery disease, 1 stent placed in 2012 - Hypertension - Diabetes - Gout - Asthma
Medications:	<p>The clinician should start by asking you what medications you take. You should respond:</p> <ul style="list-style-type: none"> • 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) • Glyburide (would recognize it as Diabeta if asked) 1 mg 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) <p>You would forget to mention Tylenol Arthritis and aspirin unless prompted about over-the-counter or non-prescription medications. If prompted, you should respond:</p> <ul style="list-style-type: none"> • Tylenol Arthritis a couple of tablets, a few 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 when last saw him) <p>You would forget nighttime medications unless prompted. If prompted, you should respond:</p> <ul style="list-style-type: none"> • 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") <p>You would forget nitroglycerin unless prompted about as-needed medications. If prompted, you should respond:</p> <ul style="list-style-type: none"> • Nitro 1-2 every day or every other day for chest pain (doesn't know how often could take it if needed, doesn't know dose, even if prompted) <p>You would forget albuterol unless prompted about inhalers or medications for asthma. If prompted, you should respond:</p> <ul style="list-style-type: none"> • Albuterol 2 puffs when needed – doesn't use often, doesn't know how often could take it if needed, would admit to having asthma if asked <p>You would not mention the following at all because you are not taking:</p> <ul style="list-style-type: none"> • Imdur (doesn't think taking it, not sure) • Advair – has never filled prescription

As the evaluator...

You should grade their behaviors against the checklist provided. Did you observe the specific behaviors listed? If so, answer yes for each behavior. If you did not observe the behavior, leave the checkbox blank.

- “Grade” their best possible medication list against the “gold standard” provided. See list below.
- Provide feedback to the clinician so that she or he can learn from the experience. The focus should include:
 - 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
 - When and how to access additional data sources
 - How to reconcile the various sources against each other, returning to the patient for final clarification

Clinician Instructions

You are seeing patient J. Doe, who came to the ED for worsening chest pain. You are to:

- Interview the patient regarding his medications using the techniques learned in the course, including the high-performance behaviors.
- “Think aloud” as you go through the process to make your thought process transparent to the patient.
- Access sources of medication data before or after seeing the patient as you normally would. You can ask for additional sources of data, then the patient will provide those sources if asked.
- At the end, you should compile and record the Best Possible Medication List.

J. Doe’s Bags of Medications (brought in by family)

Note: These are not in their bottles, so just say the family brought in 3 bags of pills – clinician would have to say they would use a source like Drugs.com to look each one up, then can give them this list.

Morning Ziplock:	Afternoon Ziplock:	PM Ziplock:	Also has:
Allopurinol 50 mg, 2 tablets: 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 Glyburide 1.25 mg tablet Toprol XL 50 mg tablet Amiloride 5 mg tablet Enalapril 20 mg tablet Tylenol Arthritis 650 mg, 2 tablets	Tylenol Arthritis 650 mg, 2 tablets	Colchicine 0.6 mg tablet Glyburide 1.25 mg tablet Simvastatin 80 mg tablet Warfarin 5 mg tablet Amiloride 5 mg tablet Enalapril 20 mg tablet Tylenol Arthritis 650 mg, 2 tablets	Nitroglycerin bottle of 0.4 mg tablets – usually takes 1 daily or every other day, more recently Albuterol inhaler: p.r.n. Does not use often. Does NOT have: Imdur Advair discus

John Doe's Discharge Orders/Instructions - From admission 6 months prior to current admission
Coumadin (Warfarin Sodium) 7.5 mg p.o. qPM
Allopurinol 50 mg p.o. Daily
Enteric Coated ASA 325 mg p.o. Daily
Plavix (Clopidogrel) 75 mg p.o. Daily
Colchicine 0.6 mg p.o. b.i.d.
Glyburide 1.25 mg p.o. b.i.d.
Imdur ER (Isosorbide mononitrate (SR)) 30 mg p.o. Daily
Metoprolol Succinate Extended Release 50 mg p.o. Daily
Zocor (Simvastatin) 80 mg p.o. Bedtime

John Doe's Pharmacy Medication List
Allopurinol 100 mg p.o. Daily (2 50 mg tabs)
Clopidogrel 75 mg p.o. Daily
Colchicine 0.6 mg p.o. b.i.d.
Glyburide 1.25 mg p.o. b.i.d.
Imdur 30 mg p.o. q.d. – Has not picked up his Imdur 30 mg p.o. Daily since 3 months + 10 days, though it was a 90-day supply
Metoprolol XL 50 mg p.o. Daily
Simvastatin 80 mg p.o. qhs
Warfarin 5 mg p.o. qPM
Amiloride 5 mg p.o. b.i.d. (last filled one month ago #120 tabs)
Enalapril 20 mg b.i.d. (last filled 3 months ago #180 tabs – 3-month supply per Walmart)
Nitro 0.4 mg SL p.r.n. chest pain as instructed
Albuterol inhaler p.r.n. shortness of breath as instructed
Advair 250/50 mg 1 puff b.i.d. – script that he has never picked up/filled

John Doe's Pharmacy Medication List — PCPs Office
Allopurinol 100 mg p.o. Daily
Aspirin 162.5 mg p.o. Daily
Clopidogrel 75 mg p.o. Daily
Colchicine 0.6 mg p.o. b.i.d.
Glyburide 1.25 mg p.o. b.i.d.
Imdur 30 mg p.o. Daily
Metoprolol XL 50 mg p.o. Daily
Simvastatin 80 mg p.o. qhs
Warfarin 5 mg p.o. qPM
Amiloride 5 mg p.o. b.i.d.
Enalapril 20 mg b.i.d.
Tylenol Arthritis (650 mg) 4-6 tabs per day p.r.n. knee pain
Nitro 0.4 mg SL p.r.n. chest pain as instructed
Albuterol inhaler p.r.n. shortness of breath as instructed
Advair 250/50mg 1 puff b.i.d.

John Doe's Pre-admission Medication List – Gold Standard “Answer Key”
Allopurinol 50-100 mg p.o. q.d. - (1-2 50 mg tabs.) – The patient states that he takes 1 or 2 tabs depending on if he has gout pain or not.
Aspirin 162.5 mg p.o. q.d. Dr. Weiser told him he should take 1/2 an adult aspirin per day instead of the full 325 mg q.d.
Clopidogrel 75 mg p.o. q.d.
Colchicine 0.6 mg p.o. b.i.d.
Glyburide 1.25 mg p.o. b.i.d.
Imdur 30 mg p.o. q.d. – Has not picked up his Imdur 30 mg p.o. q.d. 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. Might explain why he's been having more chest pain lately.
Metoprolol XL 50 mg p.o. q.d.
Simvastatin 80 mg p.o. qhs
Warfarin 5 mg p.o. qPM, or per warfarin clinic
Amiloride 5 mg p.o. b.i.d. (last filled 2 weeks PTA #120 tabs per Walmart)
Enalapril 20 mg b.i.d. (last filled 3 months PTA #180 tabs – 3-month supply per Walmart) – he is taking it
Tylenol Arthritis (650 mg) 4-6 tabs per day p.r.n. for his knees
Nitro 0.4 mg SL p.r.n. 0 uses 1 or 2 almost q.d. or q.o.d. at home per himself
Albuterol inhaler for p.r.n. use – does not use often
Advair 250/50 mg 1 puff b.i.d. script that he has never filled

Checklist of behaviors for taking a BPMH: John/Jane Doe

High Performance Behaviors Observed?	Yes
Asks the patient open-ended questions about what medications she or he is taking (i.e., doesn't read the list and ask if it is correct)	<input type="checkbox"/>
Uses probing questions to elicit additional information: non-oral meds, non-daily meds, PRN medications, non-prescription meds	<input type="checkbox"/>
Uses other probes to elicit additional medications: common reasons for PRNs, meds for problems in the problem list, meds prescribed by specialists	<input type="checkbox"/>
Asks about adherence	<input type="checkbox"/>
Uses at least two sources of medications, ideally one provided by the patient and one from another "objective" source (e.g., patient's own list and ambulatory EMR med list)	<input type="checkbox"/>
Determines need for additional sources because patient has no list, doesn't know all meds from memory, can't resolve discrepancies (from clinician thinking aloud)	<input type="checkbox"/>
Gets contact information for community pharmacy from patient	<input type="checkbox"/>
Asks for community pharmacy data (i.e., as if called up the pharmacy and asked them to fax Rx fill data)	<input type="checkbox"/>
Returns to patient and tries to resolve discrepancies between recent discharge summary, pharmacy data and patient account	<input type="checkbox"/>
Realizes will need additional sources of data, asks for family contact info	<input type="checkbox"/>
Realizes will need additional sources of data, asks for PCP contact info	<input type="checkbox"/>
Knows to access sources like Drugs.com to identify pills outside their bottles	<input type="checkbox"/>
Reconciles various sources of medication data	<input type="checkbox"/>
Returns to patient for final clarification	<input type="checkbox"/>
Feedback for the clinician:	

For a PowerPoint overview of taking a Best Possible Medication History, please go to this link to download:
http://tools.hospitalmedicine.org/resource_rooms/imp_guides/MARQUIS/marquis.html.

Note: Must download manual in order to access.

V. MARQUIS Monthly Surveys to Site Leaders Regarding Medication Reconciliation Interventions

Directions: If your interventions are different in different locations in the hospital, please complete one form for each location.

Have you instituted any of the following changes to your medication reconciliation processes since last completing this survey (i.e., in the last month)?	
Trained personnel in how to take a high-quality pre-admission medication history?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	
Hired or re-allocated staff to take a high-quality pre-admission medication history?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	
Trained personnel to perform discharge medication reconciliation or patient counseling regarding discharge medication regimens?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	
Clarified and assigned roles and responsibilities to different staff regarding the medication reconciliation process?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	
Provided audit and feedback to personnel regarding the quality with which they do their specific role(s) in medication reconciliation?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	
Created infrastructure to identify patients at high risk for medication-related problems after discharge?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	
Deployed a high-intensity medication reconciliation bundle in high-risk patients?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	

Implemented or improved software to assist with the medication reconciliation process?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	
Improved access to pre-admission medication data sources (e.g., pharmacy prescription fill information)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	
Took steps to empower patients and/or caregivers to keep an updated medication list with them at all times?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	
Created infrastructure to identify and correct defects in the medication reconciliation process in real-time?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	
Developed social marketing tools to encourage patients or providers to adopt behaviors that promote high-quality medication reconciliation?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	
Engaged community resources to help medication reconciliation efforts more broadly?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	
Have any other significant changes occurred that could have affected the quality of medication reconciliation (for better or worse) on the services and units in question? For example, turn-over in staff or leadership, deployment of an electronic medical record system, co-interventions that might have affected medication safety, etc.?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, please describe:	

In-depth Questions for Selected Components of the Medication Reconciliation Process

	Question	Site Lead Answer	Front-Line Survey Answer
Med Sources	Do you have access to sources of outpatient pharmacy data?		
	Is this electronic access?		
	Does this access affect <50%, 50-80%, or >80% of inpatients? Approximate percentage: ____ %		
	Do you have facilitated access to outpatient pharmacy data on paper (e.g., arrangement for pharmacies to fax data on demand)		
	Does this access affect <50%, 50-80%, or >80% of inpatients? Approximate percentage: ____ %		
	Do you have access to sources of outpatient EMR medication data?		
	Is this electronic access?		
	Does this electronic access affect <50%, 50-80%, or >80% of inpatients? Approximate percentage: ____ %		
	Do you have facilitated access to outpatient EMR medication data on paper		
	Does this access affect <50%, 50-80%, or >80% of inpatients? Approximate percentage: ____ %		

	Question	Site Lead Answer	Front-Line Survey Answer
Med Sources	Do you have access to sources of hospital discharge medication data?		
	Is this electronic access?		
	Does this electronic access affect <50%, 50-80%, or >80% of inpatients? Approximate percentage: ____ %		
	Do you have facilitated access to discharge medication data on paper?		
	Does this facilitated paper access affect <50%, 50-80%, or >80% of inpatients? Approximate percentage: ____ %		
	Do you have access to sources of personal health record data?		
	Is this electronic access?		
	Does this electronic access affect <50%, 50-80%, or >80% of inpatients? Approximate percentage: ____ %		
	Do you have facilitated access to patient personal health record data on paper?		
	Does this facilitated paper access affect <50%, 50-80%, or >80% of inpatients? Approximate percentage: ____ %		

	Question	Site Lead Answer	Front-Line Survey Answer
Pt Owned Lists	Is a standard form available to inpatients at the time of discharge for them to maintain and keep an accurate list of their medications?		
	Is it used in <50%, 50-80%, or >80% of inpatients? Approximate percentage: ____ %		
	Is a standard form available for high-risk outpatients to keep and maintain an accurate list of their medications?		
	Is it used in <50%, 50-80%, or >80% of high-risk outpatients? Approximate percentage: ____ %		
	Are systems in place for outpatients to keep their medication list updated between visits?		
	What % of patients keep their lists updated between visits? <50%, 50-80%, or >80% Approximate percentage: ____ %		
	Are pt.-owned medication lists used as a resource in the inpatient setting for medication reconciliation and discharge instructions?		
	Are they used in <50%, 50-80%, or >80% of the time? Approximate percentage: ____ %		

	Question	Site Lead Answer	Front-Line Survey Answer
Social Marketing	Does your organization use community resources in medication reconciliation efforts?		
	Does your facility engage your patient safety advisory board or other governing body in medication reconciliation efforts?		
	Does your organization use any social marketing in medication reconciliation efforts? <i>If no, then end</i>		
	Does your organization use SM techniques with inpatients (ask me 3, wallet card, etc.)?		
	Does your organization use SM techniques with inpatient providers and clinicians (why care about med rec)?		
	Does your organization use SM techniques with outpatient providers in community (how to talk with patients about med safety, why care about med rec etc.)?		
	Does your organization use SM techniques with outpatient high-risk patients in the community (bring list and meds to outpatient visits, keep a list)?		
	Does your organization use local media outlets for medication reconciliation awareness?		

	Question	Site Lead Answer	Front-Line Survey Answer
IT	1. Does your organization have the ability to compare various sources of pre-admission medication information? <i>If no, skip to #2</i>		
	a) Does your organization have the ability to see differences in doses, routes, frequencies, and formulations?		
	b) Does your organization have the ability to see dates prescribed/ordered for each source?		
	c) Does your organization have the ability to sort medications by name, class, date, and/or source?		
	2. Does your organization have access to patient adherence information? <i>If no, skip to #3</i>		
	a) Does your organization have the ability to calculate medication possession ratio or graphical representation of prescription fill patterns?		
	b) Does your organization have access to EMR or PHR information regarding medication information?		
	3. Does your organization have documentation of Best Possible Medication History (BPMH)? <i>If no, skip to #4</i>		
	a) Does your organization have the ability to move pre-admission medications into BPMH?		

	Question	Site Lead Answer	Front-Line Survey Answer
IT	b) Does your organization have the ability to document uncertainty about medications?		
	c) Does your organization have an audit trail to document changes made to BPMH during hospitalization?		
	4. Does your organization have the ability to verify BPMH? <i>If no, skip to #5</i>		
	a) Does your organization have the ability to sign off that BPMH is ready for verification?		
	b) Does your organization have the ability to document verification of BPMH?		
	5. Does your organization have facilitation of admission order-writing? <i>If no, skip to #6</i>		
	a) Does your organization have the ability to document planned action on admission for each BPMH medication?		
	b) Does your organization have the ability for continued medications to link to admission order entry?		
	6. Does your organization facilitate reconciliation at admission? <i>If no, skip to #7</i>		
	a) Does your organization have the ability to flag differences between BPMH and admission orders?		

	Question	Site Lead Answer	Front-Line Survey Answer
IT	b) Does your organization have the ability to document reasons for intentional discrepancies?		
	c) Does your organization have the ability to document verification of admission orders by a second clinician?		
	7. Does your organization facilitate medication ordering at discharge? <i>If no, skip to #8</i>		
	a) Does your organization have the ability to compare BPMH to current (pre-discharge) inpatient medications?		
	b) Does your organization have the ability to order medications from either list as discharge orders, with or without further changes?		
	8. Does your organization facilitate reconciliation at hospital discharge? <i>If no, skip to #9</i>		
	a) Does your organization have the ability to flag differences among BPMH, pre-discharge, and discharge orders?		
	b) Does your organization have the ability to document reasons for intentional discrepancies in discharge orders?		
	c) Does your organization have the ability to document verification of discharge orders by a second clinician?		
	9. Does your organization have tools to facilitate patient/family/caregiver education? <i>If no, skip to #10</i>		

	Question	Site Lead Answer	Front-Line Survey Answer
IT	a) Does your organization have the ability to print a discharge medication list in patient-friendly language?		
	b) Does your organization have the ability to clearly explain differences between pre-admission and discharge regimens, including which medications are new, changed, same, and which pre-admission medications are stopped?		
	10. Does your organization have tools to facilitate communication with post-discharge providers? <i>If no, skip to #11</i>		
	a) Does your organization have the ability to produce discharge paperwork that clearly documents changes in the discharge medication regimen compared with pre-admission and the reason for those changes?		
	b) Does your organization have the ability to transmit this information electronically to post-discharge providers?		
	11. Does your organization have other features to improve the reliability of the medication reconciliation process? <i>If no, skip to #12</i>		

	Question	Site Lead Answer	Front-Line Survey Answer
	a) Does your organization have the ability to provide alerts, reminders, and/or hard stops if BPMH not completed on time?		
	12. Does your organization have tools to identify high-risk patients?		
	a) Does your organization have the ability to automatically identify high-risk patients?		

MARQUIS Medication Reconciliation Study Pre-Intervention Survey

MARQUIS Medication Reconciliation Study Clinician Survey

MARQUIS Medication Reconciliation Study Clinician Survey

Please help us learn about medication reconciliation at your institution. The following survey is intended for staff directly responsible for the care of patients admitted to the hospital. **Please answer these questions based on your experience on your current rotation, service or unit.**

All answers are confidential, and participants will receive summary results.

By checking the box below and filling out the following survey, I consent to participation in the MARQUIS Medication Reconciliation Study.

- ☐ I consent to participation in this study.
- ☐ I do not consent to participation in this study.

Please enter the confidential survey code provided in the email linking you to this web survey (four numerals and two letters):

Medication Reconciliation

Do you know what the term "medication reconciliation" means?

- ☐ Yes
- ☐ No

If yes, please define it:

Do you know what your role is in medication reconciliation?

- ☐ Yes
- ☐ No

Medication Reconciliation

MARQUIS Medication Reconciliation Study Pre-Intervention Survey

If yes, what is your role:

- a) in general?
- b) at admission?
- c) at transfer?
- d) at discharge?

Do you know who on the medical team has overall responsibility for the accuracy of the medication reconciliation process?

- ☐ Yes
- ☐ No

If yes, who is it?

Medication History

Are you involved in taking a patient's medication history?

- ☐ Yes
- ☐ No

Medication History

Did you receive training in how to take a "best possible" medication history (i.e. the most accurate and complete history you could realistically obtain for any patient)?

- ☐ Yes
- ☐ No

If yes, did you feel that the training was adequate?

Do you feel that you are given sufficient time to take a "best possible" medication history?

- ☐ Yes
- ☐ No

Have you ever received feedback on the quality of your pre-admission medication histories?

- ☐ Yes
- ☐ No

MARQUIS Medication Reconciliation Study Pre-Intervention Survey

High-Intensity Interventions

Are you involved in the medication reconciliation process for patients you think are at highest risk for medication-related problems (whether or not those patients are formally identified)?

- ☐ Yes
☐ No

High-Intensity Interventions

Do you feel your hospital has enough staff allocated to do medication reconciliation well in high-risk patients?

- ☐ Yes
☐ No

Do you feel that you are given sufficient time to do medication reconciliation well in high-risk patients?

- ☐ Yes
☐ No

Discharge Counseling

Are you involved in counseling patients regarding their medications at the time of discharge?

- ☐ Yes
☐ No

Discharge Counseling

Do you have a form you give to patients at discharge so they can keep their own updated medication list with them?

- ☐ Yes
☐ No

If yes, what percent of patients receive that form?

MARQUIS Medication Reconciliation Study Pre-Intervention Survey

Do you use a standard script or template when providing discharge medication education?

☐ Yes

☐ No

If yes, what percent of patients receive that script or template?

Do you use special tools to ensure that patients with low health literacy understand their discharge medications (e.g., that use pictures of pills, times of day, indications, etc.)?

☐ Yes

☐ No

If yes, what percent of patients receive those tools?

Patient Communication

Were you ever trained in the process of "teach-back" to confirm patient understanding of what they have been taught?

☐ Yes

☐ No

What percent of patients receive "teach-back" from you as part of their discharge medication education?

Have you ever received training in how to effectively communicate with patients with low health literacy?

☐ Yes

☐ No

Medication Reconciliation

Please list 3 reasons why medication reconciliation is important to your hospital/practice.

MARQUIS Medication Reconciliation Study Pre-Intervention Survey

Medication Reconciliation Process

Please indicate your perceptions of the current medication reconciliation process.

	1. Never	2	3	4. It varies	5	6	7. Always
a) The medication reconciliation process provides reliable information.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) The medication reconciliation process is efficient.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Medication reconciliation reduces patient care errors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) The medication reconciliation process is easy to use.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) The medication reconciliation process slows me down.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) FOR ORDERING PROVIDER: the medication reconciliation process gives me the information I need to write better orders.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) FOR ALL OTHER STAFF: The medication reconciliation process leads to better medication orders being written.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h) The medication reconciliation process fits into my workflow.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i) The medication reconciliation process improves the quality of patient care.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j) When I have a problem with medication reconciliation, I just ask someone for help.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
k) I feel that I can benefit from refresher classes on medication reconciliation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Medication Reconciliation Process

The following questions pertain to your overall reactions to the medication reconciliation process.

Medication reconciliation is...

1. Difficult	2	3	4	5	6	7	8	9. Easy
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Medication reconciliation is...

1. Frustrating	2	3	4	5	6	7	8	9. Satisfying
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Medication reconciliation is...

1. Useless	2	3	4	5	6	7	8	9. Useful
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Perceptions of the Medication Reconciliation Software

MARQUIS Medication Reconciliation Study Pre-Intervention Survey

Please rate the following characteristics of the current medication reconciliation software

	1. Difficult	2	3	4	5	6	7	8	9. Easy
a) Learning to operate the system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Exploring new features by trial and error	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Remembering the names and use of commands	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rate the following characteristics of the current medication reconciliation software.

	1. Never	2	3	4	5	6	7	8	9. Always
a) Tasks can be performed in a straightforward manner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Experienced and inexperienced users' needs are taken into consideration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rate the following characteristics of the current medication reconciliation software.

	1. Unhelpful	2	3	4	5	6	7	8	9. Helpful
a) Help messages on screen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rate the following characteristics of the current medication reconciliation software.

	1. Confusing	2	3	4	5	6	7	8	9. Clear
a) Supplemental reference/training materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Overall Satisfaction with and Perceptions of the Medication Reconciliation ...

Please check the box that best reflects your satisfaction with the medication reconciliation process.

1. Dislike very much and don't want to use	2	3	4	5	6	7	8	9	10. Like very much and eager to use
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Senior Level / Middle Manager Support / Organizational Support for Medicati...

MARQUIS Medication Reconciliation Study Pre-Intervention Survey

Please indicate your agreement or disagreement with the following statements about the hospital.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
a) Hospital management provides a work climate that promotes medication reconciliation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) The actions of hospital management show that medication reconciliation is a top priority.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) Hospital management seems interested in medication reconciliation <u>only</u> after an adverse event.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) I am not willing to put myself out just to help the hospital.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) In my work, I like to feel like I am making some effort, not just for myself but also for the hospital, as well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) To know that my own work had made a contribution to the good of the hospital would please me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Perceptions of Errors and Recovery Related to Medication Reconciliation

The following questions deal with your perception of the frequency of errors that occur in the medication reconciliation process.

	Never	A few times a year or less	Once a month or less	A few times a month	Once a week	A few times a week	Every day
a) How often does an error occur in admission medication orders because of incorrect medication reconciliation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) How often does an error occur on the discharge medication list because of incorrect medication reconciliation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The following questions pertain to the frequency with which errors lead to adverse events.

	Never	Almost never	Rarely	Sometimes	Rather often	Nearly all the time	Always
a) If an error occurs on admission because of incorrect medication reconciliation, how often is it detected before it can lead to an adverse event?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) If an error occurs on the discharge medication list, how often is it detected before it can lead to an adverse event?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Work Area/Unit

MARQUIS Medication Reconciliation Study Pre-Intervention Survey

Please indicate your agreement or disagreement with the following statements about your work area/unit.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
a) People support one another in this unit.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) When a lot of work needs to be done quickly, we work together as a team to get the work done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) In this unit, people treat each other with respect.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) When one area in this unit gets really busy, others help out.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) Staff will freely speak up if they see something that may negatively affect patient care.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) Staff feel free to question decisions or actions of those with more authority.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) Staff are afraid to ask questions when something does not seem right.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Work Area/Unit

Please indicate your agreement or disagreement with the following statements about your work area/unit.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
a) We have enough staff to handle the workload.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) Staff in this unit work longer hours than is best for patient care.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) We use more agency/temporary staff than is best for patient care.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) We work in "crisis mode," trying to do too much too quickly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e) I have enough time to complete patient care tasks safely.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f) I usually have plenty to do, but I can always follow rules and procedures related to patient safety and standards of care.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g) In general, I am satisfied with the quality of care that I provide.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Overall Job Satisfaction

All in all, how satisfied would you say you are with your job?

☐ Not at all satisfied
 ☐ Not too satisfied
 ☐ Somewhat satisfied
 ☐ Very satisfied

MARQUIS Medication Reconciliation Study Pre-Intervention Survey

Using your own definition of "burnout," please select the statement that most closely describes how you feel.

- ☐ I enjoy my work. I have no symptoms of burnout.
- ☐ Occasionally I am under stress, and I don't always have as much energy as I once did, but I don't feel burnt out.
- ☐ I am definitely burning out and have one or more symptoms of burnout, such as physical and emotional exhaustion.
- ☐ The symptoms of burnout that I'm experiencing won't go away. I think about frustrations at work a lot.
- ☐ I feel completely burnt out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help.

In general, how much influence do you have over work and work-related factors (e.g. how many hours you work, the type of work that you do)?

- ☐ Very little ☐ A little ☐ Moderate ☐ Much ☐ Very much

Demographics

What is your gender?

- ☐ Male
- ☐ Female

How old are you?

- ☐ 34 or less
- ☐ 35-44
- ☐ 45-54
- ☐ 55+

What is your current position?

- ☐ Pharmacy Technician
- ☐ Pharmacist
- ☐ Nurse
- ☐ Nurse Practitioner (NP)
- ☐ Physician Assistant (PA)
- ☐ Resident / Fellow Physician
- ☐ Attending Physician

MARQUIS Medication Reconciliation Study Pre-Intervention Survey

For how long have you worked at (insert hospital)?

Years

Months

How long have you worked for (unit/department)?

Years

Months

How many hours do you work at your job in an average week?

☐ ALMC ☐ AMC-MC ☐ ASMC ☐ MHB ☐ WAMH
☐ AMC-WC ☐ AMC-O ☐ ASMMC ☐ SLMC ☐ Zilber Hospice
☐ AMC-K ☐ APH ☐ AVVMC ☐ SLSS

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

[illegible]

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

INDICATE IF ADDITIONAL FORMS _____ OF _____

Signature of Person
taking history_____

Date:

Physician

Signature: _____

Date _____

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

[illegible]

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.
- Use ballpoint pen. ***Cross out all unused lines before giving the patient a copy (before discharge) Signature required***



05403520

DISCHARGE PRESCRIPTIONS

DISCHARGE PRESCRIPTIONS
(Given to Patient as Prescription)

Page 2 - Patient's Pharmacy

AHC S25075 .j (Rev. 10/05) Page 2 of 3

☐ ALMC ☐ AMC-MC ☐ ASMC ☐ MHB ☐ WAMH
☐ AMC-WC ☐ AMC-O ☐ ASMMC ☐ SLMC ☐ Zilber Hospice
☐ AMC-K ☐ APH ☐ AVVMC ☐ SLSS

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

[illegible]

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

INDICATE IF ADDITIONAL FORMS _____ OF _____

PLEASE DO NOT WRITE IN THIS BOX.

[illegible]

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.
- Use ballpoint pen. **Cross out all unused lines before giving the patient a copy (before discharge)** Signature required



MEDICAL RECORD
(EDU / D/C Plan)

Page 3 - Medical Record Form if used

AHC S25075 .j (Rev. 10/05) Page 3 of 3

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.**

AHC S25075 .j (Rev. 10/05) Back

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

Brigham and Women's Hospital Example.

Note that this form is for double-checking of the process (e.g., by a pharmacist), not for ordering medications by a provider.

MEDICATION RECONCILIATION FORM															
ADMISSION MEDICATION RECONCILIATION															
Sources of Information															
<ul style="list-style-type: none"> • 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 (generic name) Dose and Frequency	Confirmed	Ordered on ADMISSION?					Comments on Admission Meds (please note changes from preadmission meds and any discrepancies)	Admit Meds Reconciled	Ordered on DISCHARGE?					Comments on Discharge meds (please note changes from preadmission meds and any discrepancies)	DC Meds Reconciled
Additional Medications															
Medication Dose and Frequency	Ordered on Admission?					Ordered on Discharge?					Comments				
Additional Comments on Admission Meds															
1.															
2.															
3.															
4.															
5.															
6.															
Additional Comments on Discharge Meds															
1.															
2.															
3.															
4.															
5.															
6.															

VII. Examples of Patient-Friendly Discharge Material

Example from IMAGE-CHD and PILL-CVD studies:

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

Medication Name and Dose	What It's For	Morning/ Breakfast	Afternoon/ Lunch	Evening/ Dinner	Night/ Bedtime	Common side effects	Special Instructions
Aspirin EC 325mg Take 1 pill in the morning	Heart	●				Rash, bleeding	Do not crush or chew.
Clopidogrel (Plavix) 75mg Take 1 pill in the morning	Heart	●				May cause a rash, swelling, bleeding, vomiting, constipation, diarrhea, or stomach pain.	
Atorvastatin (Lipitor) 40 mg Take 1 pill at night	Cholesterol				●	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.	Doctor will check blood test results to make sure they're ok. Do not drink grapefruit juice or Fresca.
Ezetimibe (Zetia) 10mg Take 1 pill in the morning	Cholesterol	●				May cause diarrhea.	
Metoprolol Succinate (Toprol XL) 150mg Take 1 pill in the morning	Blood pressure, heart	●				May make you feel tired or dizzy. May cause rash or problems with sex.	If you have diabetes, monitor your blood sugars closely. Do not crush or chew. Take with or immediately after meals.

Patient Name: _____

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

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

Medication to take only when you need it

Medication Name and Dose	What It's For	Morning/ Breakfast	Afternoon/ Lunch	Evening/ Dinner	Night/ Bedtime	Common side effects	Special Instructions
Albuterol inhaler (Proventil, ProAir HFA, Ventolin, Volmax) Take 2 puffs 4 times a day when needed to improve breathing	Trouble breathing						Shake well before use. Hold breath for up to 10 seconds before breathing out.
Alprazolam (Xanax, Niravam) 0.5 mg Take 1 pill when needed for anxiety, up to 3 times a day	Anxiety					Make you sleepy or dizzy	Avoid driving or operating heavy machinery when you take this. No alcohol while taking this. Do not suddenly stop taking this
needed for pain	Pain, Fever						tablets of 500 mg strength

Patient Name: _____

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

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
















Medication to stop taking



Lisinopril
Metformin



Project RED Example:

What time of day do I take this medicine?	Picture (the medicine from the pharmacy may not look exactly like this)	Medication Name Amount # of pills	How do I take this medicine?	Why am I taking this medication?
 Morning		Motrin® (Ibuprofen) 600mg 1 pill	by mouth with food	pain
		Zestril® (Lisinopril) 10mg 1 pill	by mouth	blood pressure
		Aprexide® (HCTZ) 25mg 1 pill	by mouth	blood pressure
		Nifedical XL® (Nifedipine) 30 mg 1 pill	by mouth	blood pressure
		Protonix® (Pantoprazole) 40 mg 1 pill	by mouth	indigestion
 Noon		Motrin® (Ibuprofen) 600mg 1 pill	by mouth with food	pain
		Flovent® (Fluticasone) 44mcg/puff 2 puffs	by inhalation through mouth	help breathing
 Evening		Motrin® (Ibuprofen) 600mg 1 pill	by mouth with food	pain
		Folic Acid 1mg 1 pill	by mouth	vitamin
 Bedtime		Flovent® (Fluticasone) 44mcg/puff 2 puffs	by inhalation through mouth	help breathing
If you need it for anxiety		Ativan® (Lorazepam) 0.5 mg 1 pill	by mouth 1x each day if needed	anxiety
Problem with anything in this pocket?				
Call Your Discharge Advocate, RN – Lynn, Michael, or Mary. (617)				
Serious health problem?				
Call your Doctor, Chris (617)				

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 26, 2010.

VIII. 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 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/caregivers 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 healthcare 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 – see Appendix X for examples.
- Start by encouraging inpatients to keep the discharge medication list with them at all times and to keep it updated.

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.

Front

My Medication List			
My Name:			
My Contact Information:	Address:	Telephone Number:	Emergency Contact Name and Telephone Number:
My Pharmacies:	Name	Telephone Number	City, State
My Doctors	Name	Why I See Them	Telephone Number
My Allergies	1.	2.	3.
	4.	5.	6.

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.

Back

My Medicines		
Medicine Name: (e.g., Atenolol)	Instructions (e.g., 100 mg tablet, 1 tablet 1 time a day OR 100 mg once a day)	Why I Take It: (e.g., high blood pressure)

Date I last updated this list: _____

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)

Electronic Patient-Owned Medication List

HealthVault


https://www.healthvault.com/us/en

- 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.)

MyMedSchedule.com





http://mymedschedule.com

- Sends reminders by text or email to take your medications
- Sets refill reminders
- Prints in English or Spanish
- Convenient wallet-size schedules to carry with you
- Pill box organizers and reminders
- Free

**MyMedSchedule.com™** Mi Programa Diario

John Doe


Revisado: 3/27/2009 at 4:02 PM

Tome Estos Medicamentos	A Estas Horas					
	7am	8am	12N	6pm	8pm	11pm
 Prilosec® (Omeprazole) 20mg Cápsula(s)	1 <small>Cápsula(s)</small>		1 <small>Cápsula(s)</small>		1 <small>Cápsula(s)</small>	
 Cymbalta® (Duloxetine HCl) 60mg Cápsulas de liberación prolongada		1 <small>Cápsulas de liberación prolongada</small>	1 <small>Cápsulas de liberación prolongada</small>			1 <small>Cápsulas de liberación prolongada</small>
 Aitace® (Ramipril) 2.5mg Cápsula(s)		1 <small>Cápsula(s)</small>				
 Coumadin® (Warfarin) 1mg Tableta(s)						1 <small>Tableta(s)</small>

Picture Rx

http://mypicturerx.com/

















- Evidence-based design uses pictures, icons and plain language to explain what a patient is taking, how to take it and why
- Ability to print out a wallet-sized PictureRx Card to carry
- Patient, family/caregiver, or provider creates list
- Ability to print in English or Spanish/English
- Demonstrated in randomized trial to improve medication understanding



Person: Fred Smith
Email: fred123@gmail.com

Prescriber: Dr. Robert Thompson
Location: Sunshine Pharmacy

Date Printed: Feb. 16, 2012

Pill Name	Used for?	Instructions	MORNING	NOON	EVENING	BEDTIME
 furosemide 40 mg	 Reduce Water	Take 2 pills in the morning and 2 pills in the evening.	 2 pills		 2 pills	
 lisinopril 10 mg	 High Blood Pressure	Take 1 pill in the morning.	 1 pill			
 metformin 500 mg	 Diabetes	Take 1 pill in the morning and 1 pill in the evening.	 1 pill		 1 pill	
 simvastatin 20 mg	 Cholesterol	Take 1 pill at bedtime.				 1 pill
 fluoxetine 10 mg	 Depression	Take 1 pill every morning for 2 weeks. Then, take 2 pills every morning.				





My Med Rec

<http://www.knowledgeisthebestmedicine.org/index.php/en/app>

- Portable up-to-date health record that can be easily shared with your family, doctor, nurse, pharmacist or anyone else involved in your healthcare
- Tracks patient's medications as well as medications taken by family members, and many other elements related to patient health
- Ability to create medication and wallet list



Features:

-  **Medication/Immunization Record**
Up-to-date medication list with you at all times
-  **Multiple Patient Profiles**
Easy access to your and your loved one's health information
-  **Dose/Refill Reminder**
Reminds you to take your medications on time and when they need to be refilled
-  **Email Information**
Keep your healthcare team, family etc. up-to-date by sending them information directly

My Medications

<http://www.ama-assn.org/ama/pub/about-ama/apps/my-medications.page>

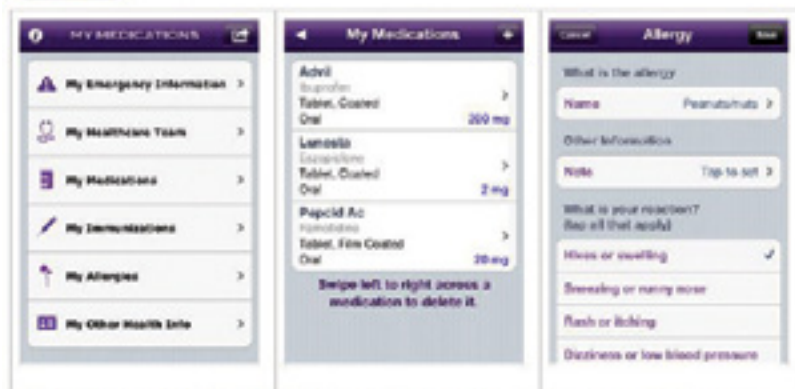
- Provides a place for patients to store their medical information and share it with their physicians
- Patients can create and update a list of medications, including dosing and schedule information
- Allows patients to email medical information to healthcare providers, family members or friends and also allows patients to maintain a list of their medical team's contact information

My Medications



With My Medications your patients can store, carry and share their critical medical information (i.e. medications, allergies, emergency contacts, etc.) in one secure place.

My Medications is available for the Apple iPhone®, iPad® and iPod Touch® on the [AMA iTunes store](#).



Requirements: Compatible with Apple iPhone®, iPad® and iPod Touch®. Requires OS version 4.0 or later

My Med List

<https://itunes.apple.com/us/app/mymedlist/id549867702?mt=8>

- An application developed at the National Library of Medicine
- Follows the HL7 standard for CDA/CCD and uses RxNorm data for prescription medications
- Personal medication list can be printed out to share, can be mailed to a relative, can serve as a reminder to the individual for taking medications, or be shown as reference information in doctor's offices or hospitals

Personal Medication Record

<https://play.google.com/store/apps/details?id=com.drugscom.epmr>

- Tracks patient medications and instantly assembles relevant medical information in a simple, easy-to-read personalized format
- Provides FDA alerts, drug interactions, plus food, allergy and medical condition interactions

IX: 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. 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: FDB MEDSTRACKER®

Website: <http://www.fdbhealth.com/fdb-medstracker/>

Features:

- Electronically manages medications at each step of the reconciliation process
- Compiles a list of the patient's home medications
- Efficiently reconciles home and new admission medications at admission
- Orders the reconciled medications
- Creates a discharge medication list

Product: ExitMeds Med RecCompany: 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 and patient discharge education

Product: Exit Writer

Company: Krames

Website: <http://www.exitwriter.com/>

Features:

- Provides way to document medications 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: 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 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: 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
- Provides 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>

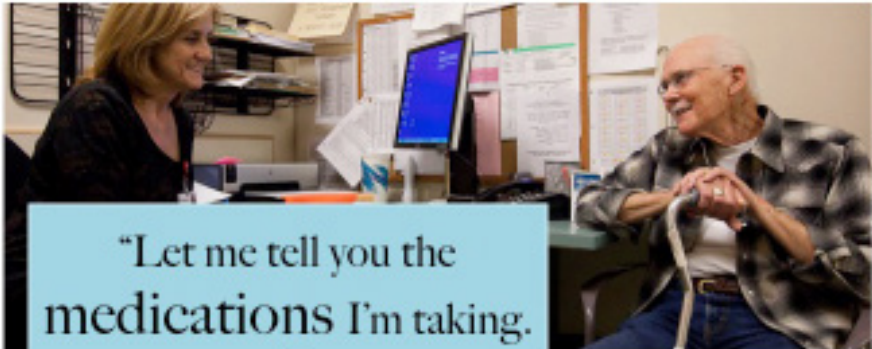
Features:

- 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

X. Samples of Social Marketing Materials

High-resolution versions of these figures are available for branding and local use upon request from SHM.

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

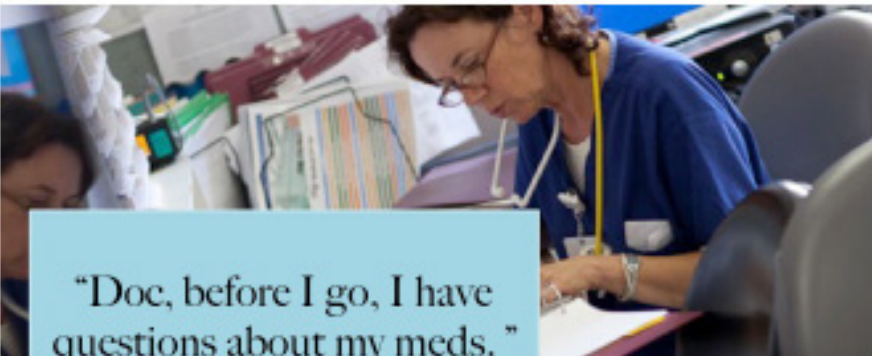


"Let me tell you the medications I'm taking."

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

Remember:

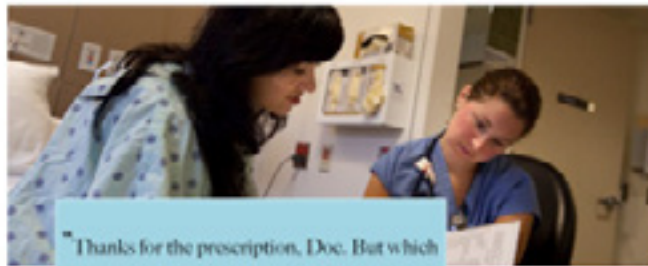
- Keep a list
- Keep it up to date
- Keep it with you



"Doc, before I go, I have questions about my meds."

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

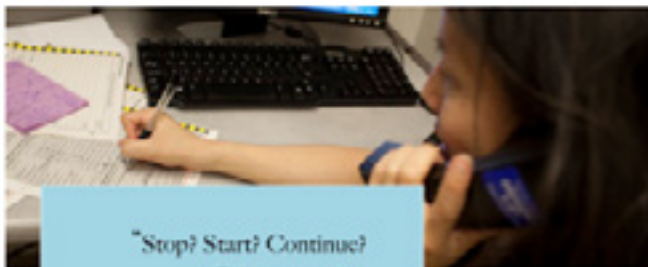
- How are my medicines different from what I was taking before?
- Why were these changes made?
- What do I need to watch out for?



"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:

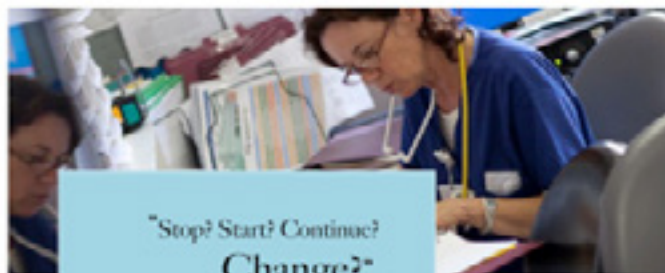
- How are my medicines different from what I was taking before?
- Why were these changes made?
- What do I need to watch out for?



"Stop? Start? Continue? Change?"

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?"

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



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 a 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 a 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 patient 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 patient about their
medications
before and after surgery.

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

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





XI. MARQUIS Task Checklist

This figure summarizes the various tasks for the QI team to complete that are mentioned in the Implementation Guide. This checklist can be used to help the team get started with the QI process and track its progress.

Marquis Task Checklist

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 or 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 I to assist with illustrating the importance of this project.	
TASK E (Team Leader): Fill out the names and contact information of members of your MARQUIS Team* and construct a team roster and group email to help the team communicate.	
TASK F: (QI Team Facilitator): Announce team rules and post a large, readable version at each team meeting.	
TASK G: Identify in-hospital QI resources.	
TASK H: Identify educational opportunities to learn more about QI principles and who should take advantage of these opportunities.	
TASK I: Develop a process measure for each step of your intervention to determine if your institution is completing each of the steps appropriately.	

XII. Pharmacy Training Materials

Procedure for Determination of Medication Discrepancies

1. Identify and Randomize Patients

- a. Who: Administrative assistant
- b. When: Each day
- c. Obtain list of admitted patients the day before on medicine or surgery
- d. Copy and paste list into an Excel worksheet
- e. Follow Steps in Randomization instructions
- f. Email list of names and room numbers to Study Pharmacist

2. Begin Process

- a. Who: Study Pharmacist
- b. When: After contacted by RA
- c. Go through list of patients in the order provided, and see them if available
- d. Fill out top of Medication Comparison form
 - i. MRN
 - ii. Patient name
 - iii. Admit date
 - iv. Comparison date (i.e., date taking the history)
 - v. Location
 - vi. Service
 - vii. Admitting provider
 - viii. Discharging provider if different from admitting provider

3. Collect Gold Standard (GS) Medication History

- a. Who: Study Pharmacist
- b. When: As soon after admission as possible
- c. Use all available sources of medication information:
 - i. Patient
 - ii. Family
 - iii. Pill bottles and/or medication lists from home, reviewed with patient/family/caregiver
 - iv. Outpatient EMR
 - v. Previous discharge summaries
 - vi. PCP's or other doctor's office medication list
 - vii. Community pharmacy
 - viii. National pharmacy claims database
- d. Exclude the following categories of medications:
 - i. PRNs except inhalers, nitroglycerin, opiates, muscle relaxants and sedatives
 - ii. Topical lotions/creams
 - iii. Normal saline nasal spray and eye drops
 - iv. Herbals, supplements
 - v. Vitamins
- e. Once GS Medication History is complete, enter final list into QuesGen form:
 - i. Medication
 - ii. Dose, Route, Frequency
 - iii. (When available): Check box if PRN, OTC
 - iv. Confidence in Accuracy of the information for each medication

4. Compare GS Medication History to medical team's Pre-Admission Medication List (PAML)

- a. Who: Study Pharmacist
- b. When: After taking GS Medication History
- c. Go to documented PAML (e.g., in admitting provider's admission note, in stand-alone medication reconciliation form or in EMR)
- d. For each medication in GS Medication History, compare to PAML done by medical team
- e. Enter results in QuesGen form
 - i. PAML Comparison: same, omission, different dose/route/freq (then enter what the different dose/route/freq is under Details), substitution (different med in class; then enter what the different med, dose/route/freq is under Details), formulation (then enter different formulation under Details), other (then explain in Details)
 - ii. If there is a question, note it in "PAML Questions for Provider" section (e.g., did they use some other source of information that study pharmacist didn't have?)
 - iii. If additional medication in team's PAML not in GS Medication History, then enter in form as an Additional medication (as opposed to a GS medication)
 1. Enter medication name, dose/route/frequency
 2. Check off Additional Medication
 3. Can add Question for Provider if not clear why
 4. Note sources of information medical team used for PAML, if known (especially if there is a discrepancy) under Comments in the medication column

5. Compare GS Medication History to Admission Orders

- a. Who: Study Pharmacist
- b. When: After discharge orders are written, but ideally before the patient leaves the hospital
- c. Access admission orders (e.g., from EMR, paper orders)
- d. For each medication in GS Medication History, compare to admission orders and document in QuesGen
 - i. Same
 - ii. Different dose/route/freq
 - iii. Omission
 - iv. Substitution (i.e., different medication in class)
 - v. Formulation
 - vi. Additional medication
 - vii. Other
- e. If the discrepancy is a different dose/route/frequency, omission, substitution, formulation or additional medication, provide the medication name, dose/route/frequency under Details
- f. If there is a discrepancy, decide on the reason and document in the Main Form
 - i. First, see if error is due an error in the PAML. If yes, then reason is "History Error"
 - ii. If not, look at admission note (or transfer note or transfer accept note) to see if there is a clinical explanation (then enter "Intentional" and check off Yes for documentation)
 - iii. If not, make note in "Admission Question for Provider" and ask why. Depending on answer, reason will either be "Reconciliation Error" or "Intentional" without documentation

6. Compare GS Medication History to Discharge Orders

- a. Who: Study Pharmacist
- b. When: After discharge orders are written, but ideally before the patient leaves the hospital
- c. Identifying who has discharge orders: Administrative assistant will ideally do this at each site and email the study pharmacists at noon each day.
 - i. Might need to contact case managers on the evaluation units to obtain more accurate information regarding pending discharges
- d. Access discharge orders
- e. For each medication in GS Medication History, compare to discharge orders and document in QuesGen
 - i. Same
 - ii. Different dose/route/freq
 - iii. Omission
 - iv. Substitution (i.e., different medication in class)
 - v. Formulation
 - vi. Additional medication
 - vii. Other
- f. If the discrepancy is a different dose/route/frequency, omission, substitution, formulation or additional medication, provide the medication name, dose/route/frequency
- g. If there is a discrepancy, decide on the reason and document in the Main Form
 - i. First, see if error is due an error in the PAML. If yes, then reason is "History Error"
 - ii. If not, look at last progress note in chart or discharge summary to see if there is a clinical explanation (then enter "Intentional" and check off Yes for Documentation)
 - iii. If not, make note in "Discharge Question for Provider" and ask why. Depending on answer, reason will either be "Reconciliation Error" or "Intentional" without documentation
- h. If there are serious unintentional discrepancies, need to contact inpatient provider to correct them before the patient leaves the hospital (or if the patient has left, also contact the PCP). If you do not hear or are not satisfied with the response, then contact your local site leader.

7. At any time, can add comments to the comments box for any medication

8. Questions for Provider:

- a. Call the admitting provider for questions about the PAML or admission orders and call the discharging provider for questions about the discharge orders
- b. Enter answers in Comments, complete reasons for discrepancies as needed (e.g., for Discrepancies in orders, whether reason is intentional and undocumented vs. reconciliation error)

9. If Need to Notify Team

- a. If the Study Pharmacist notifies a member of the medical team, document this in the “pharmacist comments” section of the datasheet
 - i. When did notification occur?
 - a. Before admission orders
 - b. After admission orders but before discharge orders
 - c. After discharge orders
 - ii. Also document:
 - a. Any recommended action by Study Pharmacist
 - b. Action taken by team (if any)
 - c. Other comments

Policies and Guidelines:

Guidelines for Collecting the Gold Standard Medication History:

1. Ways to save time:
 - a. Review previous discharge summary for discharge medications only if there is one from the last year, unless there is no information in the outpatient EMR (in which case can look at older discharge summaries)
 - b. In EMR, if last note is good/comprehensive, then no need to look at previous notes
 - c. In EMR medication list, scan inactive meds and non-meds, but don't spend a lot of time on them
2. Begin by gathering all easily accessible sources: outpatient EMR medication lists, recent hospital discharge summaries, electronically available prescription claims database, transfer orders, provider's admission note +/- recent EMR note and patient's own list
3. When reviewing these data sources with the patient/family/caregiver, specifically ask about differences among different lists and clarify what the patient is actually taking
4. Encourage patients to use more than just their memory, i.e., use a paper list, pill bottles, etc.
- 5. 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 differences can be explained), then other sources are not needed**
6. 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 other sources: community pharmacies, outpatient physician offices, having the family bring in the pill bottles, etc.
7. Pill bottles, reviewed with patient/family/caregiver, are preferable to pharmacist refill information if available and if the review with patient/family/caregiver seems reliable. Otherwise, pharmacy data is probably the next source to obtain.
8. It's not enough to rely on the provider's PAML as the main source of additional information
9. Use an interpreter with non-English speaking patients unless you are fluent in the other language
10. How to document non-adherence:
 - a. If completely non-adherent (on purpose or b/c didn't know to take medication), then leave off list and note it in general comments
 - b. If sporadically non-adherent, give general assessment of adherence in comments
 - c. If systematically non-adherent (e.g., always takes medicine once a day instead of 3 times a day), then note actual frequency taken in dose/route/freq and make note of discrepancy from prescribed frequency in comments.
11. If patient denies knowledge of a medication that is on another list (i.e., doesn't know why not taking it), keep track of these in comments

PAML Comparison:

1. (If have an electronic place to document PAML separate from admission note): What if the PAML has not been documented: return again > 24 hours after admission. If it still has not been documented, then use the list from the admission note if available. If still not available, then treat PAML as blank.
2. For transfers from within the hospital or from another acute care hospital, the PAML is what the patient was taking before the initial hospitalization. For admissions from a nursing home, the PAML is what the patient was taking at the nursing home (which may be in the transfer orders).
3. If medical team's PAML is completely different from GS medication history, then contact provider and find out what sources they are using and document in comments in main form. This is to make sure they didn't have a better source of information than you.
4. If the frequency is missing, how is that coded: as a change in dose/route/frequency, note "missing" in the details section.
5. If the PAML includes a medication that you did not include in the GS medication history because the patient was completely non-adherent with it (or didn't know s/he was supposed to take it), then mark it as an additional PAML medication and explain in the comments.
6. If the only reference to pre-admission meds is in the admission note history of present illness (e.g., "patient responded well to risperdal," without dates), does that count as a PAML med? No.

Admission Comparison

1. What are considered admission orders: all orders written from the time of admission until 8 am the following morning or until 8 hours after the time of admission, whichever comes first
2. Should admission medications that are later discontinued still be counted: yes.
3. For PRN meds, if the frequency is a range (e.g., q4-6h) and the medication is prescribed within that range (e.g., q6h), is that a discrepancy in frequency: No.
4. To save time, you can leave out the following additional admission orders (because they are intentional):
 - a. Those that are clearly related to the chief complaint (e.g., levofloxacin for pneumonia when that is the admitting diagnosis)
 - b. Those that are clearly documented (e.g., lovenox for DVT prophylaxis)
 - c. Those that are standard prn orders at your hospital (e.g., Tylenol prn if that is in the standard order set at your hospital)

Discharge Comparison

1. For discharge summaries, if says “continue all home meds,” does that count as a discharge order? Yes. But if says “continue to take all medications as instructed,” talk to the nurse to find out what the instructions were, and base the discharge comparison on that.

Questions for Provider

1. Should the provider be called for all discrepancies without documentation: no, just those that in your best judgment will have consequences for patient care. Consider the following partial list of high-risk medications worth calling about: Anticoagulants, Anti-platelets, Opioids, Insulin, Oral anti-diabetic medications, Sedative/hypnotics, NSAIDs, Digoxin, Anti-psychotics. Conversely, if the potential consequences are severe enough, you may want to clarify the discrepancy even if there is some documentation (i.e., did you really mean to do that?)
2. Especially important if the decision is between an undocumented intentional discrepancy vs. a reconciliation error (e.g., discharge summary has a different lasix dose than from the PAML and there's no mention of this in the last progress note or discharge summary).

Form for Documenting Medication Discrepancies

MRN: _____ Name (Last, First): _____ Admission Date: _____ Comparison Date/Time: _____

Location: _____ Service: _____ Admitting Provider: _____ Discharging Provider (if different): _____

Control Patient _____ No Home Meds _____

Intervention Patient _____

Intervention Level (if Intense/Standard bundle instituted) _____ Patient Understanding of Medications:
☐ Intense ☐ Standard ☐ High ☐ Medium ☐ Low

☐ Pharmacist reconciler ☐ Other trained staff _____ Intervention Provider (if Intense/Standard bundle instituted)
☐ Pharmacist reconciler ☐ Other trained staff _____

Medication	Confidence	PAML Comparison	Admit Comparison	Discharge Comparison	Pharmacist Comments
Name DRF PRN OTC Comments	High Medium Low	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Questions for provider Provider Response	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Reason Reconciliation Error History Error Patient Expired Intentional Documented Questions for provider Provider Response	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Reason Reconciliation Error History Error Patient Expired Intentional Documented Questions for provider Provider Response	Need to notify team Before admission orders After admission orders but before dc orders After discharge orders Recommended action: Action taken by team, if any: _____ Comments: _____
Gold Standard Additional Med					

All Sources Used: ☐ Patient ☐ Patient's Family ☐ Caregiver ☐ Pharmacy(s) ☐ Outpatient Provider(s) ☐ Pill Bottles ☐ Pt's Own Med List ☐ Past DC Summary
☐ Outpt Records ☐ EMR ☐ Other

General Comments :

Back Page of Med Comparison Worksheet/ Highlights of Procedure

Confidence: (How confident are you that the "Gold Standard" list is correct):

High: Pt and at least 2 corroborating sources agree

Med: Pt and at least/perhaps 1 corroborating source agree

Low: Anything not High or Med

Start w/ easily accessible sources. 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 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: community pharmacies, outpatient physician offices, having the family bring in the pill bottles, etc.

Patient understanding of medications:

High: understands indications, dose, strength, and frequency of most medications

Med: Inconsistent or incomplete understanding of indications, dose, strength, and frequency of medications; not high or low

Low: at most, can identify medications by name or indication but not both, has little understanding of dose (e.g., "I take the blue blood pressure pill once a day")

Documenting Adherence in Gold Standard list:

- If completely non-adherent (on purpose or b/c didn't know to take medication), then leave off list and note it in general comments
- If sporadically non-adherent, give general assessment of adherence in comments
- If systematically non-adherent (e.g., always takes medicine once a day instead of 3 times a day), then note actual frequency taken in dose/route/freq and make note of difference from prescribed frequency in comments
- If patient denies knowledge of a medication that is on another list (i.e., doesn't know why not taking it), keep track of these in comments

PAML Comparison:

1. (If have an electronic place to document PAML separate from admission note): What if the PAML has not been documented: return again > 24 hours after admission. If it still has not been documented, then use the list from the admission note if available. If still not available, then treat PAML as blank.
2. For transfers from within the hospital or from another acute care hospital, the PAML is what the patient was taking before the initial hospitalization. For admissions from a nursing home, the PAML is what the patient was taking at the nursing home (which may be in the transfer orders).
3. If meds are completely different from GS gold standard med hx, then contact provider and find out what sources they are using and document in comments in main form. This is to make sure they didn't have a better source of info than you.
4. If the frequency is missing, how is that coded: as a change in dose/route/frequency, note "missing" in the details section.
5. If the PAML includes a medication that you did not include in the gold standard hx because the patient was completely non-adherent with it (or didn't know s/he was supposed to take it), then mark it as an additional PAML med, error in PAML, and explain in the comments.
6. If the only reference to preadmission meds is in the admission note history of present illness (e.g., "patient responded well to risperdal," without dates), does that count as a PAML med? No.

Admission Comparison

1. What are considered admission orders: all orders written from the time of admission until 8 am the following morning or until 8 hours after the time of admission, whichever comes first
2. Should admission medications that are later discontinued still be counted: yes.
3. For PRN meds, if the frequency is a range (e.g., q4-6h) and the medication is prescribed within that range (e.g., q6h), is that a change in frequency: No.
4. To save time, you can leave out the following **additional** admission orders:
 - a. Those that are clearly related to the chief complaint (e.g., levofloxacin for pneumonia when that is the admitting diagnosis)
 - b. Those that are clearly documented (e.g., lovenox for DVT prophylaxis)
 - c. Those that are standard prn orders at your hospital (e.g., Tylenol prn if that is in the standard order set at your hospital)

SIMON SAYS:

- Sedatives
- Inhalers (includes nebs)
- Muscle relaxants
- OTCs – may leave off for this study if PRN unless pain medications (meds (i.e. "What do you take for pain when you have pain?")
- Nitroglycerin
- Stomach acid meds
- Aspirin
- eye drops (glaucoma) – may leave off artificial tear eye drops for this study
- Stool (colace/senna etc) – may leave off if PRN

Can exclude PRNs (things that would not need to go to adjudication):

Except – we ARE including PRN: inhalers, nitroglycerin, opiates, muscle relaxants, sedatives, analgesics (include Tylenol and NSAIDs)

Form for Documenting Medication Discrepancies (page 2)

MRN: _____ Name (Last, First): _____ Admission Date: _____ Comparison Date/Time: _____
 Location: _____ Service: _____ Admitting Provider: _____ Discharging Provider (if different): _____
 _____ No Home Meds
 Control Patient
 Intervention Patient
 Intervention Level (if Intense/Standard bundle instituted)
☐ Intense ☐ Standard ☐ Intervention Provider (if Intense/Standard bundle instituted)
 Pharmacist reconciler ☐ Other trained staff

Medication	Confidence	PAML Comparison	Admit Comparison	Discharge Comparison	Pharmacist Comments
Name DRF PRN OTC Comments Gold Standard Additional Med	High Medium Low	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Questions for provider:	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Reason Reconciliation Error History Error Intentional Documented Questions for provider:	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Reason Reconciliation Error History Error Intentional Documented Questions for provider:	Need to notify team Before admission orders After admission orders but before dc orders After discharge orders Recommended action: Action taken by team, if any: Comments:
Name DRF PRN OTC Comments Gold Standard Additional Med	High Medium Low	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Questions for provider:	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Reason Reconciliation Error History Error Intentional Documented Questions for provider:	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Reason Reconciliation Error History Error Intentional Documented Questions for provider:	Need to notify team Before admission orders After admission orders but before dc orders After discharge orders Recommended action: Action taken by team, if any: Comments:

Pharmacy Frequently Asked Questions (FAQs)

November 2013

*** When in doubt about how to categorize an error, just explain it in the Details section in as much detail as you can.*

*** Tip: You can search for a keyword(s) in this FAQ by holding down your “Ctrl” key and the “F” key. A find box will appear (usually at the bottom of your browser). Enter your keyword(s) in this box then select “Next” or “Find” or just press “Enter.”*

Topics in this FAQ Document

General Questions

- Q: Is there a time window after admission when a medication is considered part of the gold standard?
- Q: Who is the admitting provider?
- Q: What is the “true” admission time?
- Q: Can we use the registration time for the admission time?
- Q: How do you determine patient understanding of medications?
- Q: How long should we consider a patient no longer taking a medication when collecting the gold standard?
- Q: What categories of medications can be excluded from the gold standard history?

Comparison and Documentation Questions

- Q: If the gold standard medication history finds a patient on a combination drug (I.e. Diovan hct) and the patient is ordered for Diovan only (no HCTZ) on admission and discharge – how do we mark that on the comparison form?
- Q: “Failure to reconcile” vs. “PAML error?”
- Q: Examples of “intentional documented” vs. “intentional not documented” discrepancies?
- Q: Examples of errors in frequency?
- Q: How do I complete the discharge comparison if my patient expires?
- Q: Documenting sources used for all medications and/or each medication
- Q: Can I call a patient discharged and do the comparison if the patient has been discharged to an on-site rehab area?
- Q: How do I input comparisons for a patient who comes in with no home medications?
- Q: When should a medication be deemed an “additional med?”
- Q: In an electronic form, if a physician checks a “do not prescribe” button for a gold standard medication, is this considered a documented or undocumented intentional change?

Q: Residents take initial medication histories before putting in admission orders. Later, these histories may be corrected by an intervention pharmacist (IP). When comparing the study pharmacist (SP) gold standard med history to the PAML, which list should be used? The resident's, or the IP's?

Q: Using the pharmacist comment box and when to check the "need to notify team after discharge orders are written" box?

Q: How do I denote a medication if part of a multi-component drug is missing? (I.e. The vitamin d part of oscal-d)

Q: For a medication that is appropriately held during admission and is missing from the PAML, is this considered intentional or unintentional? How should this be marked?

Q: Should meds given as a one-time prior to admission be documented (e.g., pre-op)?

Q: How do I document the following:

- Missing units (e.g., "mg")
- Missing "QHS" for a PRN sleep medication
- Missing name of a medication
- Lack of specificity of a medication (e.g., "estrogen," and not "estradiol")
- Component of the medication that effects its duration (e.g., metoprolol succinate vs. Tartrate)
- Different medication in the same class
- QHS vs. QD

Q: What do I do if I discover that the gold standard medication list is wrong?

What if...?

Q: What if patients are seen by the study pharmacist before the intervention pharmacist? Can the intervention pharmacist ask for information obtained by the study pharmacist?

Q: What if the study pharmacist sees the patient after the intervention pharmacist? Am I allowed to get the information obtained by the intervention pharmacist?

Q: What if I encounter a medication discrepancy with potential for patient harm that needs to be corrected? When should I contact the team? Which member of the team should I contact?

Q: What if I am required to review admission orders and intervention before discharge orders are written?

Q: What if the team thinks a patient is taking a medication ("added med") but the patient is not, and the care team holds the medication on admission or discharge orders. How should this med be listed?

Q: What if a medication is intentionally changed and the reason is unstated, but the pharmacist, using clinical judgment, knows why it was altered? Is it considered documented or undocumented?

Q: What if a patient is prescribed many additional PAML medications that do not become additional orders?

Q: Who is the admitting provider?

Who would be considered the “admitting provider:” the resident who writes the note, the attending, the person who writes the order, the ultimate person responsible for the orders?

A: The Admitting Provider – this is the person you would ask questions of if you had a question on the admission orders (vs. PAML) usually the intern or resident who sees the patient and writes admit orders first.

Q: What is the “true” admission time?

Admission for a patient was a ~9pm but orders were written at 0830 next morning. The intention was that the 0830 orders be “admission” orders. What is considered the “true” admission time (i.e., should we use time in computer, or time patient leaves ED or arrives to floor, etc.)?

A: If you have the time the patient arrives on the floor (in some hospitals, it may be the nursing admission assessment note) you may use this as the admission time. The point of this rule is to specify when admission orders end if there are several sessions of them. If nothing has been written before 8 am or 8 hours after admission, then just go with the first ordering session after that time (but nothing after that).

Q: Can we use the registration time for the admission time?

QuesGen requires that we enter an admission time, as well as date. I initially was using the patient “registration” time as the admission time since it was much easier to determine, but now I’m trying to look at the location census and determine the actual time the patient is documented as transferring to a floor location. Otherwise, it is impossible to determine a true “admit” time. Is this appropriate?

A: Use the registration time. First, it’s easier to find. And second, once the patient is “officially” admitted, even if they are not on the floor, the clock starts ticking for a physician to write admission orders.

Q: How do you determine patient understanding of medications?

A: High: understands indications, dose, strength, and frequency of most medications

Low: at most can identify medications by name or indication but not both, has little understandign of dose (e.g., “I take the blue blood pressure pill once a day”)

Medium: inconsistent or incomplete understanding of indication, dose, strength, and frequency of medications; not high or low

Q: How long should we consider a patient no longer taking a medication when collecting the gold standard?

A: If a patient is not taking a prescribed medication for greater than 30 days, they should be considered no longer taking this medication. Therefore, if the team writes down that the patient is taking it, call it an additional medication.

Q: What categories of medications can be excluded from the gold standard history?

A: (Reference Procedure for Medication Reconciliation Study #3d)

a) PRNs except: inhalers, nitroglycerin, opiates, muscle relaxants, sedatives, analgesics (include Tylenol, and NSAIDs).

Note: diphenhydramine (Benadryl) should be considered a sedative and should not be excluded from the gold standard history

b) Topical lotions/creams

c) Saline nasal spray and artificial tear eye drops

d) Herbals, supplements (if not clinically relevant)

e) Vitamins (if not clinically relevant – can include Vit D)

Comparison and Documentation Questions

Q: If the gold standard medication history finds a patient on a combination drug (I.e. Diovan hct) and the patient is ordered for Diovan only (no HCTZ) on admission and discharge – how do we mark that on the comparison form?

A: We would call this an “Other” and note exactly what the difference is in the details section. You can also mark “dose” or any other field that applies to the particular comparison.

Q: “Failure to reconcile” vs. “PAML error?”

What is the major difference between “failure to reconcile” versus “PAML error?” I know that if I believe the error is because the pre-admission med list was incorrect and the physician just continued it, it would be PAML error. But what would be an instance of “failure to reconcile”?

A: A PAML error is when the difference in your comparison is generated from the PAML not being correct. For example, if the PAML listed lasix 20mg bid, but the pt really takes 40mg bid, and the pt is ordered for lasix 20mg bid, then the reason the admission order is likely wrong is b/c the PAML is wrong and thus a PAML error. The team did not have correct PAML so ‘did not know’ what pt was really taking, leading to differences in orders.

A Failure to Reconcile is when the PAML is correct (‘they knew’ at one point what the pt was actually taking) but did not order patient for what ‘they knew’. An example would be: Team states to continue patients home asa 325mg daily, but orders for 81 mg daily. If there is no documented reason for change, one could consider this a “failure to reconcile”. Sometimes this happens if there is a default dose in the computer (e.g., 81mg daily is the “default” dose). The MD when asked would say they had meant to order what the pt was on at home. (Basically ‘knew’ what they were on, wanted to order same thing, but didn’t.)

This kind of error is **more likely to happen at discharge** than at admission (because it’s several days later and discharge orders might be written by a different person than who took the history or wrote the admission orders). For example, a patient is taking ASA 325 mg at home, the team records it in the history, holds it on admission for a clinical reason, but forgets to restart it at discharge even though they should have restarted it. If the PAML is correct but the orders are wrong, sometimes it may be unclear whether it’s a failure to reconcile or whether the change was intentional (for clinical reasons that are not documented in the chart). That’s when it might be necessary to contact the team and ask.

Q: Examples of “intentional documented” vs. “intentional not documented” discrepancies?

How would you best define an “intentional documented” discrepancy? I believe on a few occasions I’ve listed intentional “documented” when I was thinking the handwritten order (i.e. new prescription) was enough documentation, but didn’t know if I specifically had to find it in the H&P or discharge summary. For example, a physician started a nicotine patch on a patient with a smoking history. There was no documentation that that was why it was started, but I assumed it was “intentional documented” since the patient had a smoking history. How would you classify this one?

A: This would be intentional, not documented. If there is no written wording in notes, or discharge summary that mentions a nicotine patch, then it is not documented.

Q: Examples of errors in frequency?

If a patient takes something PO BID PRN but it is listed in the PAML as PO BID (but not PRN) is this an example of an error in frequency?

A: Yes, this would be considered an error in frequency.

Q: How do I complete the discharge comparison if my patient expires?

A: Under the discharge comparison, choose “Other,” and enter “patient died/expired/passed away” in the comments box.

Q: Documenting sources used for all medications and/or each medication

For sources used, I have been documenting the sources used individually for each medication. In other words, if they have some of their med bottles I circle med bottle for only those medications. From the data entry, it looks like you only need ANY source used for any medication. So for clarification, are sources used a general statement rather than specific to any individual drug?

A: In the data entry tool, the place we have for sources of medication is on the first page and is for all medications rather than each medication. If you have more specific source information for each medication, in the “General Comments section” for that medication, you could state for example, “I did have the pill bottles for xyz, and not abc (especially for meds going to adjudication).”

Q: Can I call a patient discharged and do the comparison if the patient has been discharged to an on-site rehab area?

We have an onsite “rehab” facility. When a patient is discharged to this onsite rehab area, should I classify them as discharged and go ahead with the comparisons? The MD following writes DC summary, DC med list is sent as if normal discharge, etc, and patient discharged from computer system (however, shows up as admission on same date as discharge – to new “facility”). This is the SAME process if patient transferred hospital to hospital (Ortho to Main or vice versa). Patient gets a new chart too. When I had the patient that transferred hospital to hospital, I had to hunt down both charts.

For transfers from our Ortho hospital to our Main hospital, which are both onsite but separate locations (connected by skywalk), I have been counting them as still admitted because it's the same level of care (hospital to hospital), whereas the rehab facility is not quite the same.

A: You would classify the patient discharged to the onsite rehab area as discharged from the hospital (as long as there is no chance they could be randomized again as an admission on general medicine or surgery). The logic behind this is that you would classify the patient as discharged from your hospital if they went to another rehab facility.

Q: How do I input comparisons for a patient who comes in with no home medications?

A: If your patient does not have any medications at home, please select the “No Home Meds” box on the MARQUIS patient data form. This action will “complete” the patient if there are not additional medications

Q: When should a medication be deemed an “additional med?”

A: A medication is considered an additional medication if:

- The patient is not taking the med, but the team thinks s/he is, either because:
 - The patient is completely non-adherent
 - The team is using an old list, and the patient should not be on it
- If added at any time during the admission but is not clearly intentional for medical reasons
 - Medications that are intentionally added for clinical reasons DO NOT need to be documented
- A medication is added at discharge because of a reconciliation error, in which case the PAML and Admit comparisons should both be “Same,” as in same as nothing.

Q: In an electronic form, if a physician checks a “do not prescribe” button for a gold standard medication, is this considered a documented or undocumented intentional change?

A: This is considered a documented change.

Q: Residents take initial medication histories before putting in admission orders. Later, these histories may be corrected by an intervention pharmacist (IP). When comparing the study pharmacist (SP) gold standard medication history to the PAML, which list should be used? The resident’s, or the IP’s?

A: The principle here is to know the cause of discrepancies in admission orders. Admission orders are defined as those written within 8 hours of admission or by 8am, whichever comes first. So, the PAML to be used for evaluation is the most recent version done prior to admission orders. This could be either the resident’s version or the IP version depending on when the IP arrives. Then if the admission orders have discrepancies, you’ll know if it’s due to errors in the history (PAML errors).

Q: Using the pharmacist comment box and when to check the “need to notify team after discharge orders are written” box?

There are a few occasions where there were discrepancies but I did not notify prescriber. One example was valsartan ordered as 160/20. The correct drug/formulation is valsartan/hctz 160/25. I have used clinical judgment in these cases to not call the provider, since in all cases so far the patient has already been discharged for usually at least several days by the time I review it. The pharmacist comments box is sort of a new development, mainly to help document when I need to call a provider BEFORE the discharge, but want to make sure I’m using it correctly.

A: This is a good question. I think the valsartan/hctz 160/20 option is unusual since to my knowledge it doesn’t come in that formulation, and HCTZ wouldn’t be able to be 20mg. There could be a problem in getting that prescription filled, which in a worst-case scenario may delay therapy or there could be a change in therapy if the pharmacy filling the prescription called to get clarification on order and order was changed. It would be worth contacting the patient or the pharmacy to see what was filled and make sure this error didn’t result in the pt not getting the medication at all (easier than asking MD days later).

For the pharmacist comments box, you would still mark the box of “need to notify team after discharge orders are written”, even if patient has already been discharged.

Q: How do I denote a medication if part of a multi-component drug is missing? (I.e. The vitamin d part of Oscal-d)

A: Call that “Other,” and explain what is missing in the details.

Q: For a medication that is appropriately held during admission and is missing from the PAML, is this considered intentional or unintentional? How should this be marked?

A: If a medication is completely missing from a PAML, even if it’s appropriately held during the admission (e.g., for surgery), it’s hard to call that intentional, because the team may not even have known the patient was appropriately on it. It should be graded as an omission due to a PAML error.

Q: Should meds given as a one-time prior to admission be documented (e.g., pre-op)?

A: No, medications that are given as a one-time prior to admission do not need to be listed in the PAML.

Q: How do I document the following:

- Missing units (e.g., “mg”) – **dose** error
- Missing “QHS” for a prn sleep medication – **frequency** error
- Missing name of a medication – **other** error
- Lack of specificity of a medication (e.g., “estrogen,” and not “estradiol”) – **other** error
- Component of the medication that affects its duration (e.g., metoprolol succinate vs. Tartrate): – **formulation** error
- Different medication in the same class – **substitution** error
- QHS vs. QD – **frequency** error

Q: What do I do if I discover that the gold standard medication list is wrong?

A: If it becomes clear from the discharge summary and other medical record review that the pre-admission medication regimen was different than that recorded in the gold standard history (e.g., because of a reaction to a medication in the hospital), then the gold standard regimen should be changed. Evaluation of the team’s PAML, admission orders, and discharge orders should be updated accordingly.

What if...?

Q: What if patients are seen by the study pharmacist before the intervention pharmacist? Can the intervention pharmacist ask for information obtained by the study pharmacist?

A: The study pharmacist (SP) should see patients and take a gold standard med history after the intervention pharmacist (IP) so as to not interfere with the process. If the SP takes the GS history first, do NOT share what you learned with the IP. If the IP asks you for help, observe the following rules:

- If you have already evaluated the PAML and the admission orders (which is likely), your contact with the IP may still influence the discharge orders (by correcting the PAML before the discharge orders are written). If the discharge orders are about to be written (i.e., the patient’s discharge is imminent) and access to the pharmacy list or other information is now impossible (e.g., the pharmacy is closed), then tell the IP to do the best they can with what they have or can get on their own. After the discharge orders are written and you evaluate them, you can give the IP your information (see below about correcting errors).
- If the discharge is not imminent, it is safe to assume that if you didn’t provide a pharmacy list to the IP now, they would be able to get it on their own prior to discharge. In this case, go ahead and provide the list to the IP.
- If you obtained a pharmacy list or other information by direct contact (i.e., there is no paper trail), then the IP is going to have to repeat this process on their own (because they may do it differently than you).
- Needless to say, a pharmacist can’t be the SP and IP on the same patient

Q: What if the study pharmacist sees the patient after the intervention pharmacist? Am I allowed to get the information obtained by the intervention pharmacist?

A: Assuming that you have obtained all necessary information under all circumstances to take a gold standard med history and there is a paper trail (i.e. prescription history from a community pharmacy) obtained by the IP, you can ask for it to avoid bothering the pharmacy a second time. However, if you need additional information (i.e. about a specific med), you may need to contact the pharmacy directly. If the IP obtained the info by direct contact and there is no paper trail, you will need to contact the pharmacy on your own.

Q: What if I encounter a medication discrepancy with potential for patient harm that needs to be corrected? When should I contact the team? Which member of the team should I contact?

A: It depends on the potential severity and urgency of the discrepancy. If the potential severity and urgency are high (e.g., omission of dilantin orders), regardless of whether the IP has yet to be involved yet in the case, you should contact the team immediately to have the orders corrected. If the potential severity and urgency are low (e.g., omission of omeprazole orders), you should wait 24 hours to see if the orders would be corrected by normal processes (e.g., the IP taking a better history and contacting the team). If, after 24 hours, the issue has not been corrected, then contact the team. If it's not clear whether the IP has been involved yet, you should not contact the IP to ask if they have been involved – this would tell the IP they are being watched for this particular patient and may change their behavior. Just wait the 24 hours if you can based on the potential severity/urgency of the error.

When alerting the team about an error, you can contact the IP if there is one. This way, the team only has to interact with one pharmacist and acknowledges the IP as their pharmacist. If you do alert the team about an error, document in the form when you alerted the team so the adjudicator can ascertain whether the error would have perpetuated through to discharge orders had you not alerted the team. Note whether you alerted the team before or after the IP saw the patient.

Q: What if I am required to review admission orders and intervention before discharge orders are written?

A: At one of the MARQUIS sites the pharmacists are already reviewing PAML and admit orders early in the patient's admission process. If they see a discrepancy, they have to intervene (i.e., track down the admitting provider) to correct the issue. We are asking the teams that have to do this to record this and we will make a determination during the adjudication phase in terms of the likelihood of this error being perpetuated throughout the patient's stay.

Q: What if the team thinks a patient is taking a medication (“added med”) but the patient is not, and the care team holds the medication on admission or discharge orders. How should this med be listed?

A: This medication should be listed as “same” because the gold standard is nothing. In other words, it is the same as nothing.

Q: What if a medication is intentionally changed and the reason is unstated, but the pharmacist, using clinical judgment, knows why it was altered? Is it considered documented or undocumented?

A: The medication is considered undocumented if the reason is not explicitly stated.

Q: What if a patient is prescribed many additional PAML medications that do not become additional orders?

A: Although these errors do not cause discrepancies in orders, we would like to track them in some way. Please do one entry as an additional PAML medication, call the medication “Additional PAML Medications,” and under comments list all the medications

Patient Selection and Implementation

Q: Could a Friday patient be considered a “weekend patient?”

Is a patient admitted on Friday at 2:00pm considered a “weekend patient”?

A: No. As a general guideline, patients admitted after 5:00pm on a Friday should be considered a “weekend patient.”

Q: Implementation on a service vs. a unit?

A: You should choose which patients to randomize for data collection based on whatever makes the most sense. If it's easiest to get a list of admitted patients by unit, then include a certain number of units in your data collection. If it's easier to get a list by service, do it by service. It doesn't need to be the same way you choose where to do your intervention down the line. For the intervention, you will choose where to intervene based on where it makes the most sense clinically to implement your intervention. Again, let me know if we need to talk about this by phone.

Q: Should we exclude observation patients?

A: If the medication reconciliation process is very different from a traditional admission, you may exclude these patients. If they are excluded they should be excluded for the life of the study so we are consistent throughout the study.

Q: Should sites be more rather than less exclusive when choosing services/teams/floors to include in the data collection?

What is meant by “Sites should err on the side of being more rather than less inclusive when choosing services/teams/floors to include in data collection. It is okay if there are patients not getting any interventions at the beginning of the intervention period.”

A: I wouldn't necessary cherry-pick the units doing the best so far (in fact, you might want to pick the units currently doing the worst). Do you think you will ever expand your intervention beyond those two units during the 21 months of the intervention? If so, you might want to include 2 med and 2 surg units. In other words, you'll want to get “credit” for doing your intervention more broadly down the line.

Q: What determines whether a patient is “bundle instituted?”

A: A patient is “bundle instituted” if they are on a floor that is now receiving the MARQUIS intervention. The “bundle” is the package of intervention components that the site chooses to implement.

Q: What is the definition of a “control patient?”

A: A Control Patient is a patient during baseline data collection phase OR a patient who has been assigned to a floor or service line (area) that is NOT applying any elements of the MARQUIS intervention components.

Q: What is the definition of an “intervention patient?”

A: An Intervention Patient is any patient who has been assigned to a floor or service line (area) that is currently applying elements of the MARQUIS intervention components.

Q: What are the definitions of the “intervention providers?”

A: An Intervention provider is the individual who has performed the BPMH, Discharge Medication Counseling etc.

Pharmacist reconciler = a pharmacist trained in taking an in-depth BPMH, identifying and correcting medication discrepancies, and/or providing in-depth discharge medication counseling

Other trained staff = other staff (nurse, educator, pharmacy tech) who have been trained in taking a BPMH or providing Discharge Medication Counseling

Q: Our site is in the process of educating providers in taking a BPMH. Should I continue to enroll patients, and if so, should they be deemed control or intervention?

A: Yes – please continue to enroll patients, and deem them control. Once any education has begun on the unit in which a patient is assigned, this patient can then be considered intervention patients.

Q: Who is considered a “high risk patient?”

A: A patient is deemed high risk only after the risk stratification portion of the intervention has begun. This patient will have been deemed high risk using the risk stratification, and will be assigned personnel accordingly.

Q: Should I be preferentially enrolling intervention patients once the intervention has begun?

A: Yes – once the intervention has begun on a floor or unit, you should be enrolling 3 intervention patients for every control patient.

MARQUIS Study Pharmacist Training Guide

MARQUIS Site Workspace: Study Pharmacist Training: Self-Guided Study Pharmacist Training

Step # 1 : Review the study overview slide presentation - this will take about 30 minutes:

<http://www.youtube.com/watch?v=hzTbrk-1sFA&%20feature=youtu.be>

Step # 2: Review these MARQUIS study policies slides: MARQUIS Policies for Pharmacists. Refer to beginning of Appendix XII.

Step # 3: Familiarize yourself with the beginning of the John Doe case (starting on page 188). We ask that you complete Steps A through D below

A) Print the medication comparison form (starting on page 185)- you may want to make several copies of page 2.

Medication Comparison Sheet (1)

Medication Comparison Sheet (2)

B) Review the Admission note: John Doe's Admit Note Final (page 188)

C) Review the information from interviewing John Doe:

- Information known after Interviewing John Doe (page 191)
- John's medications he has brought with him: John Doe Bags of Medications Final (page 192)
- Discharge instructions from an admission John had six months ago: John Doe's Med List from Discharge Orders Final (page 192)
- The medication list from his local pharmacy: John Doe Pharmacy Med List Final (page 193)
- John's medication list from his PCP: John Doe PCP Med List Final (page 193)

D) Create your Gold Standard (GS) - or Best Possible Medication List (BPML) - on the medication comparison forms (starting on page 185)

E) Compare your GS/BPML with the admission orders for John Doe: John Doe's Admit Med Orders Final (page 194)

F) Document any medication discrepancies on your forms

G) Next, review the discharge summary and document any medication discrepancies with John Doe Discharge Summary Final (page 195)

H) Compare your final answers with the answer key starting on page 198

MARQUIS Medication Comparison Data Collection Sheet

MRN: _____ Name (Last, First): _____ Admission Date: _____
 Comparison Date/Time: _____ Location: _____ Service: _____
 Admitting Provider: _____ Discharging Provider (if different): _____
☐ Control Patient ☐ Intervention Patient Patient Understanding of Medications: ☐ High ☐ Medium ☐ Low

Medication	Confidence	PAML Comparison	Admit Comparison	Discharge Comparison	Pharmacist Comments
Name	High	Comparison/Difference	Comparison/Difference	Comparison/Difference	Need to notify team
DRF	Medium	Same	Same	Same	Before admission orders
		Omission	Omission	Omission	After admission orders but before dc orders
		Dose	Dose	Dose	After discharge orders
		Route	Route	Route	
		Frequency	Frequency	Frequency	
		Substitution	Substitution	Substitution	Recommended action:
		Additional med	Additional med	Additional med	_____
		Formulation	Formulation	Formulation	_____
		Other	Other	Other	_____
		Details	Details	Details	Action taken by team, if any:
PRN					_____
OTC					_____
Comments		Questions for provider	Reason	Reason	Comments:
			Failure to reconcile	Failure to reconcile	_____
			PAML Error	PAML Error	_____
			Intentional Documented	Intentional Documented	_____
		Provider Response	Questions for provider	Questions for provider	_____

			Provider Response	Provider Response	_____

All Sources Used:

☐ Patient ☐ Patient's Family ☐ Caregiver ☐ Pharmacy(s) ☐ Outpatient Provider(s) ☐ Pill Bottles ☐ Pt's Own Med List
☐ Past DC Summary ☐ Outpt Records ☐ EMR ☐ Other Details: _____

General Comments:

Start w/ easily accessible sources. 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 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: community pharmacies, outpatient physician offices, having the family bring in the pill bottles, etc.

Back Page of Med Comparison Worksheet/ Highlights of Procedure

Confidence: (How confident are you that the “Gold Standard” list is correct):

High: Pt and at least 2 corroborating sources agree

Med: Pt and at least/perhaps 1 corroborating source agree

Low: Anything not High or Med

Documenting Adherence in Gold Standard list:

- If completely non-adherent (on purpose or b/c didn’t know to take medication), then leave off list and note it in general comments
- If sporadically non-adherent, give general assessment of adherence in comments
- If systematically non-adherent (e.g., always takes medicine once a day instead of 3 times a day), then note actual frequency taken in dose/route/freq and make note of difference from prescribed frequency in comments
- If patient denies knowledge of a medication that is on another list (i.e., doesn’t know why not taking it), keep track of these in comments

PAML Comparison:

1. (If have an electronic place to document PAML separate from admission note): What if the PAML has not been documented: return again > 24 hours after admission. If it still has not been documented, then use the list from the admission note if available. If still not available, then treat PAML as blank.
2. For transfers from within the hospital or from another acute care hospital, the PAML is what the patient was taking before the initial hospitalization. For admissions from a nursing home, the PAML is what the patient was taking at the nursing home (which may be in the transfer orders).
3. If meds are completely different from GS gold standard med hx, then contact provider and find out what sources they are using and document in comments in main form. This is to make sure they didn’t have a better source of info than you.
4. If the frequency is missing, how is that coded: as a change in dose/route/frequency, note “missing” in the details section.
5. If the PAML includes a medication that you did not include in the gold standard hx because the patient was completely non-adherent with it (or didn’t know s/he was supposed to take it), then mark it as an additional PAML med, error in PAML and explain in the comments.
6. If the only reference to pre-admission meds is in the admission note history of present illness (e.g., “patient responded well to risperdal,” without dates), does that count as a PAML med? No.

Admission Comparison

1. What are considered admission orders: all orders written from the time of admission until 8 am the following morning or until 8 hours after the time of admission, whichever comes first
2. Should admission medications that are later discontinued still be counted: yes.
3. For PRN meds, if the frequency is a range (e.g., q4-6h) and the medication is prescribed within that range (e.g., q6h), is that a change in frequency: No.
4. To save time, you can leave out the following **additional** admission orders:
 - a. Those that are clearly related to the chief complaint (e.g., levofloxacin for pneumonia when that is the admitting diagnosis)
 - b. Those that are clearly documented (e.g., lovenox for DVT prophylaxis)
 - c. Those that are standard prn orders at your hospital (e.g., Tylenol prn if that is in the standard order set at your hospital)

SIMON SAYS:

- | | |
|--|---|
| • Sedatives | • Nitroglycerin |
| • Inhalers (includes nebs) | • Stomach acid meds |
| • Muscle relaxants | • Aspirin |
| • OTCs – may leave off for this study if PRN unless pain medications (i.e., “What do you take for pain when you have pain?”) | • eYe drops (glaucoma) – may leave off artificial tear eye drops for this study |
| | • Stool (colace/senna etc) – may leave off if PRN |

Can exclude PRNs (things that would not need to go to adjudication):

Except – we ARE including PRN: inhalers, nitroglycerin, opiates, muscle relaxants, sedatives, analgesics (include Tylenol, and NSAIDs)

Cards 4 PGY-1 Admit Note

Date of Admission:

Admitting Physician:

SOURCE: LMR, patient

CC: chest pain

HPI:

68M w/ h/o CAD s/p stent to RCA 8/08 p/w worsening CP to ED. Patient had stent to RCA 1 year PTA 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 3-5min, sharp, no radiation. CP has been occurring more frequently in last week (3-4x/d) and is requiring increasing amounts of SL NTG to achieve relief. At 4AM on DOA, pt had more intense CP that was only minimally improved with 3 SL NTG. A/w SOB/diaphoresis, no n/v, not a/w exertion. He called his PCP and was advised to come into ED.

In ED: VS 98.2 56 214/102 20 100%RA. CE neg x1. CXR negative. Pt was admitted for further work-up. Upon assessment in ED, pt was asymptomatic from elevated BP. Hydral 10mg IV x1 brought sBP down from 210 to 179 in ~30 min. However, BP started to rise again. Amlodipine 5mg was added to his anti-hypertensive regimen, which controlled his BP on the floor initially to 140s sBP.

On the floor, pt had another episode of CP while walking from the bathroom. The CP resolved w/ 2 SL NTG. EKG done during CP showed new biphasic Tw in I, aVL (priors showed inverted Tw), pseudonormalization of Tw in V5-V6 (priors showed TwI). Vitamin K 2.5 mg PO x1 was given to reverse coumadin and pt was started on heparin gtt (no bolus). Pt apparently has h/o GIB; guaiac obtained before starting heparin gtt was negative for occult blood.

ROS: Positive for subjective fever, no chills. Negative for SOB not a/w CP, n/v/d/abd pain, dysuria.

PMH:

Htn, h/o AFib (started on coumadin 2 years ago), DMII, morbid obesity, OSA on CPAP, atypical CP, asthma, s/p appy, DJD b/l knees

MEDICATIONS

Home:

1. COUMADIN (WARFARIN SODIUM) 5 MG PO QPM (started for AFib 12/06)
2. ALLOPURINOL 50 MG PO DAILY
3. ENTERIC COATED ASA 325 MG PO DAILY
4. PLAVIX (CLOPIDOGREL) 75 MG PO DAILY
5. COLCHICINE 0.6 MG PO BID
6. PEPCID (FAMOTIDINE) 20 MG PO BID
7. GLYBURIDE 1.25 MG PO BID
8. IMDUR ER (ISOSORBIDE MONONITRATE (SR)) 30 MG PO DAILY
9. METOPROLOL SUCCINATE EXTENDED RELEASE 50 MG PO DAILY
10. ZOCOR (SIMVASTATIN) 80 MG PO BEDTIME
11. TAMSULOSIN 0.4 MG PO DAILY

ALLERGIES: PCN, ERYTHROMYCINS

FHx: Brother: s/p CABG, Mother: DM

SHx: Lives with wife, former driver/salesman. No tob/EtOH/IVDU.

PE

Vital Signs: 98.2 56 214/102 20 100%RA

General: NAD

Skin: no rashes noted

HEENT: OP clear

Neck/Thyroid: no JVD

Pulm: CTAB

CV: RRR, 2/6 SEM at RUSB

Abd: +BS, s/nt, very obese abdomen

Extremities: WWP, no edema b/l

Neuro: A+Ox3

LABS (DATE OF ADMISSION)

NA 143, K 3.9 (#) [1], CL 112 (*), CO2 23, BUN 21, CRE 1.00, EGFR 74 [2], GLU 126 (*)

NA 141, K 5.1 (*#), CL 109 (*), CO2 23, BUN 16, CRE 0.81, EGFR 95 [1], GLU 110

ANION 8

ANION 9

CA 10.0, MG 2.2, TBILI 0.4, TP 6.6, ALB 3.8, GLOB 2.8

[1] MG 2.1

CA 9.4

ALT/SGPT 29 (#), AST/SGOT 24, ALKP 70, TBILI 0.4

CK-MB 1.8, TROP-I 0.04 [1]

[1] CK 113, CK-MB 2.0, TROP-I <0.04 (LESS THAN ASSAY RANGE) [2]

CK 146, CK-MB 1.9, TROP-I <0.04 (LESS THAN ASSAY RANGE) [1]

WBC 7.94, RBC 4.42 (*), HGB 13.6, HCT 39.3 (*), MCV 88.8, MCH 30.7, MCHC 34.5, PLT 156

WBC 6.91, RBC 4.51, HGB 14.0, HCT 39.8 (*), MCV 88.3, MCH 31.1, MCHC 35.2, PLT 135 (*)

RDW 13.8

RDW 13.6

%POLY-A 66.5, %LYMPH-A 24.6, %MONO-A 5.7, %EOS-A 2.9, %BASO-A 0.2

%POLY-A 64.6, %LYMPH-A 26.2, %MONO-A 6.6, %EOS-A 2.2, %BASO-A 0.3

PT 24.8 (*), PT-INR 2.2 (*), PTT 42.2 (*)

PT 24.3 (*), PT-INR 2.1 (*), PTT 38.1 (*)

STUDIES (DATE OF ADMISSION)

CXR: no acute abnormality

EKG A set: NSR at 55, old TwI I, aVL, V5-6

EKG B set: new biophasic Tw I-aVL, new pseudonormalization of Tw V5-6

ASSESSMENT:

68M w/ h/o CAD s/p stent to RCA 8/08 p/w worsening CP, found to have dynamic EKG changes in setting of CP on the floor, concerning for ACS.

PLAN:

Cv-I: History of CAD with PCI 1 year PTA, DES placed in RCA. Had follow-up cath on 15 days later following more CP, showing patent arteries but 50% proximal LAD lesion. Patient now with increasing CP with exertion relieved by NTG. Biomarkers negative x 2 but with e/o EKG changes. Will place on maximal medical therapy for ACS.

☐ continue ROMI

☐ hep gtt, plavix, asa, bblocker, lipitor, nitros prn

☐ reversing coumadin prior to cath in AM with vitamin K po x1

Cv-P: Last ECHO 1 year ago, Ef 65-70%.

☐ htn at home on nitrates, bblocker

☐ started ca-channel blocker (amlodipine), given increased BP in house (SBP at 200)

☐ If htn refractory, can titrate Ca-channel blocker up , consider clonidine

☐ ECHO prior to discharge

Cv-R: NSR, cont. tele

Endocrine/DM: glyburide at home

☐ sliding scale here

☐ re-check a1c

HEME: Anitcoagulated secondary to history of AFib

☐ hold prior to cath

Pulm: CPAP overnight for OSA

CODE *full*

Information Known after Interviewing John Doe:

I interviewed John Doe this afternoon. He is a very nice man who can not read very well, but can identify items on a script label when prompted.

He is going to the cath lab tomorrow as he had a positive stress test today.

His daughter lives in Walpole and picks up his meds for him. He is married and has a wife but he administers all his meds himself (has an AM, Afternoon, and PM ziplock bag of meds).

I gave him a pillbox. He will benefit from a pillcard as he really does not know any meds off the top of his head except for plavix, aspirin and coumadin.

He also takes Tylenol Arthritis (650mg) 4-6 tabs per day prn for his knees

The patient states that he takes 1 or 2 tabs of allopurinol depending on if he has gout pain or not.

(Both PCP and pharmacy have pt taking 100 mg po qd.)

Dr. Weiser told him he should take 1/2 an adult aspirin per day instead of the full 325 mg qd

Imdur 30 mg po qd – Has not picked up his Imdur 30 mg PO QD since 3 months 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.

(Intern used old DC summary to build PAML primarily per intern)

Nitroglycerin SL: - uses 1 or 2 almost QD or QOD at home per himself

Albuterol: Pt does not use often ~once per week

Advair 250/50 mg 1 puff BID script that he has never filled – he knows he has a script for this, but never picked it up was so concerned about his heart

His med list that he brings with to the hospital on admission is a list of medications from the last time he was discharged from the hospital, he has not updated it.

His Walmart pharm number is xxx-xxxx

His coumadin is followed by HVMA xxx-xx-xxx

John Doe's Bag of Medications

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 Amloride 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 Amloride 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
--	--	--	--

John Doe Discharge Orders/Instructions

From admission 6 months prior to current admission

Medications on Discharge

- | | |
|---|------------------|
| 1. COUMADIN (WARFARIN SODIUM) | 7.5 MG PO QPM |
| 2. ALLOPURINOL | 50 MG PO DAILY |
| 3. ENTERIC COATED ASA | 325 MG PO DAILY |
| 4. PLAVIX (CLOPIDOGREL) | 75 MG PO DAILY |
| 5. COLCHICINE | 0.6 MG PO BID |
| 6. PEPCID (FAMOTIDINE) | 20 MG PO BID |
| 7. GLYBURIDE | 1.25 MG PO BID |
| 8. IMDUR ER (ISOSORBIDE MONONITRATE (SR)) | 30 MG PO DAILY |
| 9. METOPROLOL SUCCINATE EXTENDED RELEASE | 50 MG PO DAILY |
| 10. ZOCOR (SIMVASTATIN) | 80 MG PO BEDTIME |
| 11. TAMSULOSIN | 0.4 MG PO DAILY |

WARFARIN

Indication for anticoagulation: Atrial fibrillation

Anticipated length of anticoagulation: Lifetime

INR Target Range: 2 to 3

Last 3 INR Results

John Doe's Pre-Admission Medication List – Pharmacy	
Allopurinol 100 mg po Daily (2 50 mg tabs)	
Clopidogrel 75 mg po Daily	
Colchicine 0.6 mg po BID	
Famotidine 20 mg po BID	
Glyburide 1.25 mg po BID	
Imdur 30 mg po qd –Has not picked up his Imdur 30 mg PO Daily since 3 months + 10 days, though it was a 90 day supply	
Metoprolol XL 50 mg po Daily	
Simvastatin 80 mg po QHS	
Tamsulosin 0.4 mg po Daily	
Warfarin 5 mg po QPM	
Amiloride 5 mg po BID (last filled one month ago #120 tabs)	
Enalapril 20 mg BID (last filled 3 months ago #180 tabs- 3 month supply per Walmart)	
Nitro 0.4 mg SL PRN chest pain as instructed	
Albuterol inhaler PRN shortness of breath as instructed	
Advair 250/50 mg 1 puff BID - script that he has never picked up/filled	

John Doe's Pre-Admission Medication List – PCP Office	
Allopurinol 100 mg po Daily	
Aspirin 162.5 mg po Daily	
Clopidogrel 75 mg po Daily	
Colchicine 0.6 mg po BID	
Famotidine 20 mg po BID	
Glyburide 1.25 mg po BID	
Imdur 30 mg po Daily	
Metoprolol XL 50 mg po Daily	
Simvastatin 80 mg po QHS	
Tamsulosin 0.4mg po Daily	
Warfarin 5 mg po QPM	
Amiloride 5 mg po BID	
Enalapril 20 mg BID	
Tylenol Arthritis (650 mg) 4-6 tabs per day prn knee pain	
Nitro 0.4 mg SL prn chest pain as instructed	
Albuterol inhaler prn shortness of breath as instructed	
Advair 250/50 mg 1 puff BID	

John Doe's Admit Medication Orders
Allopurinol 50 mg po qd
EC Aspirin 325 mg po qd
Clopidogrel 75 mg po qd
Colchicine 0.6 mg po BID
Famotidine 20 mg po BID
Isordil 10 mg PO TID
Metoprolol 12.5 mg po Q6H
Atorvastatin 80 mg po qd
Tamsulosin 0.4 mg po qd
Amlodipine 5 mg po qd
Insulin Aspart Sliding Scale sc qac
Heparin 1,200 units/hr

Final Discharge Orders

Admission Date:

Discharge Date:

***** FINAL DISCHARGE ORDERS *****

M68

Service: CAR

DISCHARGE PATIENT ON: AT 05:00 PM

CONTINGENT UPON HO evaluation

WILL D/C ORDER BE USED AS THE D/C SUMMARY: YES

Attending: VAZIRI,SONYA M., M.D.

CODE STATUS: Full code

DISPOSITION: Home

MEDICATIONS ON ADMISSION:

1. WARFARIN SODIUM 5 MG PO QPM
2. ALLOPURINOL 50 MG PO QD
3. ASPIRIN ENTERIC COATED 325 MG PO QD
4. CLOPIDOGREL 75 MG PO QD
5. COLCHICINE 0.6 MG PO BID
6. FAMOTIDINE 20 MG PO BID
7. GLYBURIDE 1.25 MG PO BID
8. ISOSORBIDE MONONITRATE (SR) 30 MG PO QD
9. METOPROLOL SUCCINATE EXTENDED RELEASE 50 MG PO QD
10. SIMVASTATIN 80 MG PO QHS
11. TAMSULOSIN 0.4 MG PO QD

MEDICATIONS ON DISCHARGE:

1. COUMADIN (WARFARIN SODIUM) 5 MG PO QPM
2. ALLOPURINOL 50 MG PO DAILY
3. AMLODIPINE 10 MG PO DAILY
4. ASPIRIN ENTERIC COATED 81 MG PO DAILY
5. CLOPIDOGREL 75 MG PO DAILY
6. COLCHICINE 0.6 MG PO DAILY
7. FAMOTIDINE 20 MG PO BID
8. GLYBURIDE 1.25 MG PO DAILY
9. IMDUR ER (ISOSORBIDE MONONITRATE (SR)) 30 MG PO DAILY
10. TOPROL XL (METOPROLOL SUCCINATE EXTENDED RELEASE)
50 MG PO DAILY
11. SIMVASTATIN 80 MG PO BEDTIME
12. TAMSULOSIN 0.4 MG PO DAILY

WARFARIN

Indication for anticoagulation: atrial fibrillation

Anticipated length of anticoagulation: Lifetime

INR Target Range: 2-3

Last 3 INR Results:

02/25/09: 1.3*

02/24/09: 1.6*

02/24/09: 1.8*

INR should next be drawn on:

INR will be followed by: Dr. Bae

DIET: House / Low chol/low sat. fat

ACTIVITY: Resume regular exercise

FOLLOW UP APPOINTMENT(S):

1. WEISER, GARY ALAN, M.D., Primary Care
Addr: 133 BROOKLINE AVE., BOSTON, MA
Scheduled date and time: 10:00 AM
Reasons for Seeing/Tasks to be Accomplished at Visit:
F/U hospitalization, hypertension, INR check
2. BAE, JANE S., M.D., Cardiology
Addr: 133 BROOKLINE AVENUE, BOSTON, MA
Scheduled date and time: 09:30 AM
Reasons for Seeing/Tasks to be Accomplished at Visit:
f/u hospitalization

ALLERGY: Penicillins, Erythromycins

ADMIT DIAGNOSIS:

CHEST PAIN

PRINCIPAL DISCHARGE DIAGNOSIS; Responsible After Study for Causing Admission

HYPERTENSION

OTHER DIAGNOSIS; Conditions, Infections, Complications, affecting Treatment/Stay

htn (hypertension) DMII

morbid obesity (obesity) OSA on CPAP (sleep apnea) atypical CP

(atypical chest pain) asthma

(asthma) s/p appy (S/P appendectomy) DJD b/l knees (OA of knees)

OPERATIONS AND PROCEDURES:

none

OTHER TREATMENTS/PROCEDURES (NOT IN O.R.)

none

BRIEF RESUME OF HOSPITAL COURSE:

CC: Chest pain

HPI:

68M w/ h/o CAD s/p stent to RCA 1 year PTA p/w worsening CP to ED. Patient had stent to RCA for 80% lesion. On repeat cath 2 weeks later 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 3-5min, sharp, no radiation. CP has been occurring more frequently in last week (3-4x/d) and is requiring increasing amounts of SL NTG to achieve relief. At 4AM on DOA, pt had more intense CP that was only minimally improved with 3 SL NTG. A/w SOB/diaphoresis, no n/v, not a/w exertion. He called his PCP and was advised to come into ED.

In ED: VS 98.2 56 214/102 20 100%RA. CE neg x1. CXR negative. Pt was admitted for further work-up. Upon assessment in ED, pt was asymptomatic from elevated BP. Hydral 10mg IV x1 brought sBP down from 210 to 179 in ~30 min. However, BP started to rise again. Amlodipine 5mg was added to his anti-hypertensive regimen.

Assessment: 68 yo M w/morbid obesity, HTN, CAD s.p. RCA stent on 8/08, who p/w CP x 2-3 weeks with exertion. Pain generally relieved with NTG. Today pain was persistent so presented to ED.

Hospital Course by problem:

1) Cv-I: history of CAD with PCI 1 year ago, DES placed in RCA. Had follow-up cath on 2 weeks later following more CP. Patient p/w with increasing CP with exertion relieved by NTG. Biomarkers negative x 3. No evidence of ecg changes. On the floor, pt had another episode of CP while walking from the bathroom. The CP resolved w/ 2 SL NTG. EKG done during CP showed new biphasic Tw in I, aVL (priors showed inverted Tw), with question of pseudonormalization of Tw in V5-V6 (priors showed TwI). Vitamin K 2.5mg PO x1 was given to reverse coumadin and pt was started on heparin gtt (no bolus). Pt apparently has h/o GIB; guaiac obtained before starting heparin gtt was negative for occult blood. The patient's third set of enzymes remained negative and his C-set EKG had returned to baseline. Decision was made to obtain a stress/PET which showed a likely small sized perfusion defect. Given the patient's frequent presentations for pain and the atypical nature as well as the normal ecg's and negative troponins, the decision was made to continue medical therapy at this time. Furthermore, it was felt that the patient was likely symptomatic from his uncontrolled HTN and his chest pain was secondary to demand. As a result, the patient's medication regimen was optimized and he was started on amlodipine with good effect. At the time of discharge, the patient was pain free both at rest and with exertion, furthermore, the patient's blood pressure was well controlled with the addition of amlodipine.

Type 2 Diabetes: The patient's home medication regimen was held and the patient was started on a insulin sliding scale while in house. He had good glycemic control and will be discharged home back on his home regimen.

Discharge Physical Exam:

Afebrile. BP 130/80's.

Gen: NAD

Pulm: CTAB. No crackles, rhonci.

Cor: Regular. Distant heart sounds however, no murmurs, rubs or gallops.

Abd: Obese. soft,nt,nd, +BS.

Ext: Warm. No edema. No clubbing.

Consulting Services: None

Relevant PMHx:

OSA, HTN, cad s/p stent as above, NIDDM, Asthma, s/p appy, morbid obesity

ADDITIONAL COMMENTS:

You were admitted secondary to chest pain. This chest pain was likely secondary to your high blood pressure. Please make sure to take your medications as prescribed. Please make sure to follow-up with your PCP next week and with your cardiologist in 2-4 weeks. Please make sure to call with any new chest pain, shortness of breath or with any other symptoms that are new or concerning.

DISCHARGE CONDITION: Stable

TO DO/PLAN:

- 1) Please follow-up on the patient's hypertension (patient was started on amlodipine while in house)
- 2) Please follow-up on the patient's chest pain and consider further evaluation if chest pain returns
- 3) Please follow-up the patient's INR (coumadin was briefly held)

Thank you.

No dictated summary

ENTERED BY:

***** END OF DISCHARGE ORDERS *****

MRN: _____ Name (Last, First): _____ Doe, John _____ Admission Date: _____ Comparison Date/Time: _____
 Location: _____ Service: _____ Admitting Provider: _____ Discharging Provider (if different): _____

Medication	Confidence	PAML Comparison	Admit Comparison	Discharge Comparison	Pharmacist Comments
Name Allopurinol DRF 50-100mg po daily - (2 50mg tabs.)	High Medium Low	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details 50mg po daily Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details 50mg po daily Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details 50mg po daily Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____
Comments The patient states that he takes 1 or 2 tabs depending on if he has gout pain or not. Both PCP and pharmacy have pt taking 100mg po daily.					

General Comments (Information may be continued on back):

His Walmart pharm number is xxx-xxxx

I interviewed John Doe this afternoon. He is a very nice man who can not read very well, but can identify items on a script label when prompted.

He is going to the cath lab tomorrow as he had a positive stress test today..

His daughter lives in Walpole and picks up his meds for him. He is married and has a wife but he administers all his meds himself (has an AM, Afternoon, and PM ziplock bag of meds.) I gave him a pillbox. He will benefit from a pillcard as he really does not know any meds off the top of his head except for plavix, aspirin, and coumadin

NOTES:

- Imdur 30mg po daily –Has not picked up his Imdur 30mg PO daily since 3 months and 10 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.
- Advair 250/50mg 1 puff BID script that he has never filled

MRN: _____ Name (Last, First): __Doe, John__ Admission Date: _____ Comparison Date/Time: _____
 Location: _____ Service: _____ Admitting Provider: _____ Discharging Provider (if different): _____

Name Aspirin DRF 162.5mg po daily PRN OTC X Comments Dr. Weiser told him he should take 1/2 an adult aspirin per day instead of the full 325mg daily.	High Medium Low	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details EC 325 mg po daily Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details EC 325 mg po daily Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details EC 81 mg po daily Reason Failure to reconcile PAML Error Intentional Documented Questions for provider Intentional decrease?	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____
Name Clopidogrel DRF 75mg po daily PRN OTC Comments	High Medium Low	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____

MRN: _____ Name (Last, First): __ Doe, John _____ Admission Date: _____ Comparison Date/Time: _____
 Location: _____ Service: _____ Admitting Provider: _____ Discharging Provider (if different): _____

Name Colchicine DRF 0.6mg po BID PRN OTC Comments	High Medium Low	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details 0.6 mg PO daily Reason Failure to reconcile PAML Error Intentional Documented Questions for provider Intentional?	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____
Name Famotidine DRF 20mg po BID PRN OTC Comments	High Medium Low	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____

MRN: _____ Name (Last, First): _____ Doe, John _____ Admission Date: _____ Comparison Date/Time: _____
 Location: _____ Service: _____ Admitting Provider: _____ Discharging Provider (if different): _____

Name Glyburide DRF 1.25mg po BID PRN OTC Comments	High Medium Low	Comparison/Difference Same Dose Omission Frequency Route Additional med Substitution Other Formulation Details Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Formulation Details Insulin Aspart Sliding Scale qac	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Formulation Details Glyburide 1.25mg po daily	Reason Failure to reconcile PAML Error Intentional Documented Questions for provider Intentional?	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____
Name DRF PRN OTC Comments Imdur 30mg po daily –Has not picked up his Imdur 30mg PO daily since 3 months + 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. Intern used old DC summary to build PAML primarily per intern.	High Medium Low	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Formulation Details Imdur 30mg po daily Do not note not taking Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Formulation Details Isordil 10mg PO TID Even though pt was not taking at home, was having chest pain frequently, using NTG frequently – likely should be on.	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Formulation Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Reason Failure to reconcile PAML Error Intentional Documented Questions for provider Intentional?	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____

MRN: _____ Name (Last, First): __Doe, John__ Admission Date: _____ Comparison Date/Time: _____
 Location: _____ Service: _____ Admitting Provider: _____ Discharging Provider (if different): _____

Name Metoprolol XL DRF 50mg po daily PRN OTC Comments	High Medium Low	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details 12.5 mg po q6h Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____
Name Simvastatin DRF 80mg po qhs PRN OTC Comments	High Medium Low	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Atorvastatin 80mg daily Reason Failure to reconcile PAML Error Intentional Documented X Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____

MRN: _____ Name (Last, First): Doe, John Admission Date: _____ Comparison Date/Time: _____
 Location: _____ Service: _____ Admitting Provider: _____ Discharging Provider (if different): _____

Name Tamsulosin DRF 0.4mg po daily PRN OTC Comments	High Medium Low	Comparison/Difference Same Dose Omission Frequency Route Substitution Additional med Formulation Other Details Questions for provider	Comparison/Difference Same Dose Omission Frequency Route Substitution Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Comparison/Difference Same Dose Omission Frequency Route Substitution Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____
Name Warfarin DRF 5mg po qpm PRN OTC Comments	High Medium Low	Comparison/Difference Same Dose Omission Frequency Route Substitution Additional med Formulation Other Details Questions for provider	Comparison/Difference Same Omission Dose Route Frequency Substitution Additional med Formulation Other Details Heparin 1,200 units/hr Reason Failure to reconcile PAML Error Intentional Documented X Questions for provider	Comparison/Difference Same Dose Omission Frequency Route Substitution Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____

His coumadin is followed by HVMA

Does provider's response differ from expectation?

Yes No

If Yes, please specify:

Intentional → Failure to Reconcile

Failure to Reconcile → Intentional

Other _____

MRN: _____ Name (Last, First): _Doe, John_ Admission Date: _____ Comparison Date/Time: _____
 Location: _____ Service: _____ Admitting Provider: _____ Discharging Provider (if different): _____

Name Amiloride DRF 5mg po bid PRN OTC Comments	High Medium Low	Comparison/Difference Same Dose Frequency Additional med Other Details	Comparison/Difference Same Dose Frequency Additional med Other Details	Comparison/Difference Same Dose Frequency Additional med Other Details	Comparison/Difference Same Dose Frequency Additional med Other Details	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____
Name Enalapril DRF 20mg BID PRN OTC Comments	High Medium Low	Comparison/Difference Same Dose Frequency Additional med Other Details	Comparison/Difference Same Dose Frequency Additional med Other Details	Comparison/Difference Same Dose Frequency Additional med Other Details	Comparison/Difference Same Dose Frequency Additional med Other Details	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____

MRN: _____ Name (Last, First): _____ Doe, John _____ Admission Date: _____ Comparison Date/Time: _____
 Location: _____ Service: _____ Admitting Provider: _____ Discharging Provider (if different): _____

Name Nitroglycerin DRF 0.4 mg SL *1 prn chest pain/pressure, may repeat in 5 min as instructed PRN X OTC Comments - uses 1 or 2 almost daily or every other day at home per himself	High Medium Low	Comparison/Difference Same Dose Route Substitution Omission Frequency Additional med Formulation Other Details Questions for provider	Comparison/Difference Same Dose Route Substitution Omission Frequency Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Comparison/Difference Same Dose Route Substitution Omission Frequency Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	(note: rule 6 in PAML: If the only reference to preadmission meds is in the admission note history of present illness (e.g., "patient responded well to risperdal," without dates), does that count as a PAML med? No) Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____
Name Albuterol inhaler DRF 1-2 puffs qid prn PRN X OTC Comments Pt does not use often ~ once a week	High Medium Low	Comparison/Difference Same Dose Route Substitution Omission Frequency Additional med Formulation Other Details Questions for provider	Comparison/Difference Same Dose Route Substitution Omission Frequency Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Comparison/Difference Same Dose Route Substitution Omission Frequency Additional med Formulation Other Details Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____

MRN: _____ Name (Last, First): _____ Doe, John _____ Admission Date: _____ Comparison Date/Time: _____
 Location: _____ Service: _____ Admitting Provider: _____ Discharging Provider (if different): _____

Name Tylenol Arthritis DRF 650-1300 mg bid or tid prn for his knees PRN X OTC X Comments Tylenol Arthritis (650mg) pt states he takes 4-6 tabs per day prn for his knees	High Medium Low	Comparison/Difference Same Dose Frequency Additional med Other Details	Comparison/Difference Same Dose Frequency Additional med Other Details	Comparison/Difference Same Dose Frequency Additional med Other Details	Comparison/Difference Same Dose Frequency Additional med Other Details	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____
Name DRF PRN OTC Comments Advair 250/50mg 1 puff BLD script that he has never filled.	High Medium Low	Comparison/Difference Same Dose Frequency Additional med Other Details	Comparison/Difference Same Dose Frequency Additional med Other Details	Comparison/Difference Same Dose Frequency Additional med Other Details	Comparison/Difference Same Dose Frequency Additional med Other Details	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____

MRN: _____ Name (Last, First): _____ Doe, John _____ Admission Date: _____ Comparison Date/Time: _____
 Location: _____ Service: _____ Admitting Provider: _____ Discharging Provider (if different): _____

Medication	Confidence	PAML Comparison	Admit Comparison	Discharge Comparison	Pharmacist Comments
Name Allopurinol DRF 50-100mg po daily - (2 50mg tabs.)	High Medium Low	Comparison/Difference Same Omission Dose Route Substitution Frequency Additional med Formulation Other Details 50mg po daily Questions for provider	Comparison/Difference Same Omission Dose Route Substitution Frequency Additional med Formulation Other Details 50mg po daily Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Comparison/Difference Same Omission Dose Route Substitution Frequency Additional med Formulation Other Details 50mg po daily Reason Failure to reconcile PAML Error Intentional Documented Questions for provider	Does provider's response differ from expectation? Yes No If Yes, please specify: Intentional → Failure to Reconcile Failure to Reconcile → Intentional Other _____
Comments The patient states that he takes 1 or 2 tabs depending on if he has gout pain or not. Both PCP and pharmacy have pt taking 100mg po daily.					

General Comments (Information may be continued on back):

His Walmart pharm number is xxx-xxxx

I interviewed John Doe this afternoon. He is a very nice man who can not read very well, but can identify items on a script label when prompted. He is going to the cath lab tomorrow as he had a positive stress test today..

His daughter lives in Walpole and picks up his meds for him. He is married and has a wife but he administers all his meds himself (has an AM, Afternoon, and PM ziplock bag of meds.) I gave him a pillbox. He will benefit from a pillcard as he really does not know any meds off the top of his head except for plavix, aspirin, and coumadin

NOTES:

- Imdur 30mg po daily –Has not picked up his Imdur 30mg PO daily since 3 months and 10 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.
- Advair 250/50mg 1 puff BID script that he has never filled

XIII. Selected References

1. Tam VC, Knowles SR, Cornish PL, Fine N, Marchesano R, Etchells EE. Frequency, type and clinical importance of medication history errors at admission to hospital: a systematic review. *CMAJ*. Aug 30 2005;173(5):510-515.
2. Salanitro AH, Kripalani S, Resnic J, Mueller SK, Wetterneck TB, Taylor-Haynes K, Stein J, Kaboli PJ, Labonville S, Etchells E, Coughlin DJ, Hanson D, Greenwald JL, Williams MV, Schnipper JL. Rationale and design of the Multicenter Medication Reconciliation Quality Improvement Study (MARQUIS). *BMC Health Services Research*. 2013, 13:23.
3. Mueller SK, Kripalani S, Stein J, Kaboli P, Wetterneck TB, Salanitro AH, Greenwald JL, Williams MV, Etchells E, Coughlin DJ, Halasyamani L, Labonville S, Hanson D, Shabbir H, Gardella J, Largent R, Schnipper J. A toolkit to disseminate best practices in inpatient medication reconciliation: multi-center medication reconciliation quality improvement study (MARQUIS). *Jt Comm J Qual Patient Saf*. Aug 2013;39(8):371-382.
4. Pippins JR, Gandhi TK, Hamann C, et al. Classifying and predicting errors of inpatient medication reconciliation. *J Gen Intern Med*. Sep 2008;23(9):1414-1422.
5. Beers MH, Munekata M, Storrie M. The accuracy of medication histories in the hospital medical records of elderly persons. *J Am Geriatr Soc*. Nov 1990;38(11):1183-1187.
6. Bobb A, Gleason K, Husch M, Feinglass J, Yarnold PR, Noskin GA. The epidemiology of prescribing errors: the potential impact of computerized prescriber order entry. *Arch Intern Med*. Apr 12 2004;164(7):785-792.
7. Dobrzanski S, Hammond I, Khan H, Holdsworth H. The nature of hospital prescribing errors. *British Journal of Clinical Governance*. 2002;7(3):7.
8. Bell CM, Rahimi-Darabad P, Orner AI. Discontinuity of chronic medications in patients discharged from the intensive care unit. *J Gen Intern Med*. Sep 2006;21(9):937-941.
9. Burda S, Hobson D, Pronovost P.J. What is the patient really taking? Discrepancies between surgery and anesthesiology preoperative medication histories. *Qual Saf Health Care*. 2005;14(6):414-416.
10. Sullivan C, Gleason KM, Rooney D, Groszek JM, Barnard C. Medication reconciliation in the acute care setting: opportunity and challenge for nursing. *J Nurs Care Qual*. Apr-Jun 2005;20(2):95-98.
11. Bero LA, Lipton HL, Bird JA. Characterization of geriatric drug-related hospital readmissions. *MedCare*. Oct 1991;29(10):989-1003.
12. Gillespie U, Alassaad A, Henrohn D, et al. A comprehensive pharmacist intervention to reduce morbidity in patients 80 years or older: a randomized controlled trial. *Arch Intern Med*. May 11 2009;169(9):894-900.
13. Koehler BE, Richter KM, Youngblood L, et al. Reduction of 30-day postdischarge hospital readmission or emergency department (ED) visit rates in high-risk elderly medical patients through delivery of a targeted care bundle. *J Hosp Med*. Apr 2009;4(4):211-218.
14. Bates DW, Spell N, Cullen DJ, et al. The costs of adverse drug events in hospitalized patients. Adverse Drug Events Prevention Study Group. *JAMA*. 1997;277(4):307-311.
15. Jha AK, Kuperman GJ, Rittenberg E, Teich JM, Bates DW. Identifying hospital admissions due to adverse drug events using a computer-based monitor. *Pharmacoepidemiol Drug Saf*. Mar-Apr 2001;10(2):113-119.
16. Organizations JCoAoH. Hospital Accreditation Standards. 2011.

References- Literature Review References

17. Mueller SK, Cunningham Sponsler K, Kripalani S, Schnipper JL. Hospital-based medication reconciliation practices: a systematic review. *Arch Intern Med.* 2012;172 (14):1057-1069.
18. Michels RD, Meisel SB. Program using pharmacy technicians to obtain medication histories. *Am J Health Syst Pharm.* Oct 1 2003;60(19):1982-1986.
19. Bolas H, Brookes K, Scott M, McElroy J. Evaluation of a hospital-based community liaison pharmacy service in Northern Ireland. *Pharm World Sci.* Apr 2004;26(2):114-120.
20. Nickerson A, MacKinnon NJ, Roberts N, Saulnier L. Drug-therapy problems, inconsistencies and omissions identified during a medication reconciliation and seamless care service. *Healthc Q.* 2005;8 Spec No:65-72.
21. Schnipper JL, Kirwin JL, Cotugno MC, et al. Role of pharmacist counseling in preventing adverse drug events after hospitalization. *Arch Intern Med.* Mar 13 2006;166(5):565-571.
22. Kwan Y, Fernandes OA, Nagge JJ, et al. Pharmacist medication assessments in a surgical preadmission clinic. *Arch Intern Med.* May 28 2007;167(10):1034-1040.
23. Bergkvist A, Midlov P, Hoglund P, Larsson L, Bondesson A, Eriksson T. Improved quality in the hospital discharge summary reduces medication errors--LIMM: Landskrona Integrated Medicines Management. *Eur J Clin Pharmacol.* Oct 2009;65(10):1037-1046.
24. Vasileff HM, Whitten LE, Pink JA, Goldsworthy SJ, Anglely MT. The effect on medication errors of pharmacists charting medication in an emergency department. *Pharm World Sci.* Jun 2009;31(3):373-379.
25. Walker PC, Bernstein SJ, Jones JN, et al. Impact of a pharmacist-facilitated hospital discharge program: a quasi-experimental study. *Arch Intern Med.* Nov 23 2009;169(21):2003-2010.
26. Eggink RN, Lenderink AW, Widdershoven JW, van den Bemt PM. The effect of a clinical pharmacist discharge service on medication discrepancies in patients with heart failure. *Pharm World Sci.* Dec 2010;32(6):759-766.
27. Lisby M, Thomsen A, Nielsen LP, et al. The effect of systematic medication review in elderly patients admitted to an acute ward of internal medicine. *Basic Clin Pharmacol Toxicol.* May 2010;106(5):422-427.
28. Mills PR, McGuffie AC. Formal medicine reconciliation within the emergency department reduces the medication error rates for emergency admissions. *Emerg Med J.* Dec 2010;27(12):911-915.
29. Hellstrom LM, Bondesson A, Hoglund P, et al. Impact of the Lund Integrated Medicines Management (LIMM) model on medication appropriateness and drug-related hospital revisits. *Eur J Clin Pharmacol.* Jul 2011;67(7):741-752.
30. Marotti SB, Kerridge RK, Grimer MD. A randomised controlled trial of pharmacist medication histories and supplementary prescribing on medication errors in postoperative medications. *Anaesth Intensive Care.* Nov 2011;39(6):1064-1070.
31. Poole DL, Chainakul JN, Pearson M, Graham L. Medication reconciliation: a necessity in promoting a safe hospital discharge. *J Healthc Qual.* May-Jun 2006;28(3):12-19.
32. Agrawal A, Wu WY. Reducing medication errors and improving systems reliability using an electronic medication reconciliation system. *Jt Comm J Qual Patient Saf.* Feb 2009;35(2):106-114.
33. Murphy EM, Oxencis CJ, Klauck JA, Meyer DA, Zimmerman JM. Medication reconciliation at an academic medical center: implementation of a comprehensive program from admission to discharge. *Am J Health Syst Pharm.* Dec 1 2009;66(23):2126-2131.
34. Schnipper JL, Hamann C, Ndumele CD, et al. Effect of an electronic medication reconciliation application and process redesign on potential adverse drug events: a cluster-randomized trial. *Arch Intern Med.* Apr 27 2009;169(8):771-780.

35. Boockvar KS, Blum S, Kugler A, et al. Effect of admission medication reconciliation on adverse drug events from admission medication changes. *Arch Intern Med.* May 9 2011;171(9):860-861.
36. Showalter JW, Rafferty CM, Swallow NA, Dasilva KO, Chuang CH. Effect of standardized electronic discharge instructions on post-discharge hospital utilization. *J Gen Intern Med.* Jul 2011;26(7):718-723.
37. Varkey P, Cunningham J, O'Meara J, Bonacci R, Desai N, Sheeler R. Multidisciplinary approach to inpatient medication reconciliation in an academic setting. *Am J Health Syst Pharm.* Apr 15 2007;64(8):850-854.
38. Midlov P, Deierborg E, Holmdahl L, Hoglund P, Eriksson T. Clinical outcomes from the use of Medication Report when elderly patients are discharged from hospital. *Pharm World Sci.* Dec 2008;30(6):840-845.
39. Chan AH, Garratt E, Lawrence B, Turnbull N, Pratapsingh P, Black PN. Effect of education on the recording of medicines on admission to hospital. *J Gen Intern Med.* Jun 2010;25(6):537-542.
40. Tessier EG, Henneman EA, Nathanson B, Plotkin K, Heelon M. Pharmacy-nursing intervention to improve accuracy and completeness of medication histories. *Am J Health Syst Pharm.* Apr 15 2010;67(8):607-611
41. De Winter S, Vanbrabant P, Spriet I, et al. A simple tool to improve medication reconciliation at the emergency department. *Eur J Intern Med.* Aug 2011;22(4):382-385.
42. Doumit G, Gattellari M, Grimshaw J, O'Brien MA. Local opinion leaders: effects on professional practice and health care outcomes. *Cochrane database of systematic reviews.* 2007(1):CD000125.
43. Schnipper JL, Roumie CL, Cawthon C, et al. The rationale and design of the Pharmacist Intervention for Low Literacy in Cardiovascular Disease (PILL-CVD) study. *Circ Cardiovasc Qual Outcomes.* 2010;In press
44. Budnitz DS, Lovegrove MC, Shehab N, Richards CL: Emergency hospitalizations for adverse drug events in older Americans. *N Engl J Med* 2011; 365: 2002–12 .
45. Fernandes OA. Impact of a centralized provincial drug profile viewer on the quality and efficiency of patient admission medication reconciliation. Paper presented at: Optimizing medication safety at care transitions; Feb 10, 2011; Toronto, ON.
46. Leatherman S, Berwick D, Iles D, et al. The business case for quality: case studies and an analysis. *Health affairs.* Mar-Apr 2003;22(2):17-30.
47. Woodward-Hagg H, Suskovich D, Workman-Germann J, Scachitti S. Making the business case: integration of healthcare-based economic evaluation methodologies within hospital QI programs. <http://www.docstoc.com/docs/69096294/Making-the-Business-Case--Integration-of-Healthcare- Based-Economic>. Accessed September 1, 2011.
48. AHRQ. Reducing and Preventing Adverse Drug Events to Decrease Hospital Costs. *Research in Action.* 2001(1).
49. Available at: The National Social Marketing Centre. About Us. <http://thensmc.com/content/what-social-marketing-0>. Accessed September 9, 2011.

