NATIONAL QUALITY FORUM

Measure Information

This document contains the information submitted by measure developers/stewards, but is organized according to NQF's measure evaluation criteria and process. The item numbers refer to those in the submission form but may be in a slightly different order here. In general, the item numbers also reference the related criteria (e.g., item 1b.1 relates to subcriterion 1b).

Brief Measure Information

NQF #: 2456
De.2. **Measure Title:** Medication Reconciliation: Number of Unintentional Medication Discrepancies per Patient
Co.1.1. **Measure Steward:** Brigham and Women´s Hospital
De.3. **Brief Description of Measure:** This measure assesses the actual quality of the medication reconciliation process by identifying errors in admission and discharge medication orders due to problems with the medication reconciliation process. The target population is any hospitalized adult patient. The time frame is the hospitalization period.

At the time of admission, the admission orders are compared to the preadmission medication list (PAML) compiled by trained pharmacist (i.e., the gold standard) to look for discrepancies and identify which discrepancies were unintentional using brief medical record review. This process is repeated at the time of discharge where the discharge medication list is compared to the PAML and medications ordered during the hospitalization.
1b.1. **Developer Rationale:** This measure will drive hospitals to implement interventions to truly improve their medication reconciliation processes. To date, Joint Commission requirements for medication reconciliation have led mostly to pro forma compliance, for example, checking a box saying that medication reconciliation has been performed, without knowing whether clinical care has been affected. By directly measuring error rates in medication orders, this new measure will enable hospitals to better understand where their errors are occurring and the types of errors that exist. This will enable them to implement targeted interventions that actually reduce error rates. The result will be true improvements in medication safety during transitions in care. The rate of unintentional discrepancies per patient is unacceptably high in this country, and there is variation by site. In the six sites studied using the proposed methodology, the range was 2.78 to 4.57 discrepancies per patient (average of 3.44 per patient), thus making medication reconciliation errors the single biggest source of medication errors in the hospital (i.e., as opposed to errors in prescribing, transcribing, or administration).
Studies of medication reconciliation interventions demonstrate that improvements in important outcomes are indeed possible. In a recent systematic review conducted by our group (2), we identified 26 studies. Studies consistently demonstrated a reduction in medication discrepancies (17/17 studies), potential adverse drug events (5/6), and adverse drug events (2/2), and 2/8 studies showed a reduction in health care utilization.

Citations for 1b.1:
1. Salanitro AH, Kripalani S, Resnic J, et al. Rationale and design of the Multicenter Medication Reconciliation Quality Improvement Study (MARQUIS). BMC health services research. 2013;13:230.
2. Mueller SK, Sponsler KC, Kripalani S, Schnipper JL. Hospital-Based Medication Reconciliation Practices: A Systematic ReviewHospital-Based Medication Reconciliation Practices. Arch Intern Med. Jun 25 2012:1-13.

S.4. **Numerator Statement:** For each sampled inpatient in the denominator, the total number of unintentional medication discrepancies in admission orders plus the total number of unintentional medication discrepancies in discharge orders.
S.7. **Denominator Statement:** The patient denominator includes a random sample of all potential adults admitted to the hospital. Our recommendation is that 25 patients are sampled per month, or approximately 1 patient per weekday.

So, for example, if among those 25 patients, 75 unintentional discrepancies are identified, the measure outcome would be 3 discrepancies per patient for that hospital for that month.
S.10. **Denominator Exclusions:** Patients that are discharged or expire before a gold standard medication list can be obtained.

De.1. **Measure Type:** Outcome
S.23. **Data Source:** Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Pharmacy, Healthcare Provider Survey, Other, Paper Medical Records, Patient Reported Data/Survey
S.26. **Level of Analysis:** Facility

IF Endorsement Maintenance – Original Endorsement Date: Most Recent Endorsement Date:

IF this measure is included in a composite, NQF Composite#/title:

IF this measure is paired/grouped, NQF#/title:

De.4. **IF PAIRED/GROUPED, what is the reason this measure must be reported with other measures to appropriately interpret results?** N/A

1. Evidence, Performance Gap, Priority – Importance to Measure and Report

Extent to which the specific measure focus is evidence-based, important to making significant gains in healthcare quality, and improving health outcomes for a specific high-priority (high-impact) aspect of healthcare where there is variation in or overall less-than-optimal performance. ***Measures must be judged to meet all subcriteria to pass this criterion and be evaluated against the remaining criteria.***

1a. Evidence to Support the Measure Focus – See attached Evidence Submission Form
MeasSubm_Evidence_2013-08-20_MARQUIS_12182013_Final-635231586069665852.docx

1b. Performance Gap

Demonstration of quality problems and opportunity for improvement, i.e., data demonstrating:

- considerable variation, or overall less-than-optimal performance, in the quality of care across providers; and/or
- disparities in care across population groups.

1b.1. **Briefly explain the rationale for this measure** *(e.g., the benefits or improvements in quality envisioned by use of this measure)*
This measure will drive hospitals to implement interventions to truly improve their medication reconciliation processes. To date, Joint Commission requirements for medication reconciliation have led mostly to pro forma compliance, for example, checking a box saying that medication reconciliation has been performed, without knowing whether clinical care has been affected. By directly measuring error rates in medication orders, this new measure will enable hospitals to better understand where their errors are occurring and the types of errors that exist. This will enable them to implement targeted interventions that actually reduce error rates. The result will be true improvements in medication safety during transitions in care.
The rate of unintentional discrepancies per patient is unacceptably high in this country, and there is variation by site. In the six sites studied using the proposed methodology, the range was 2.78 to 4.57 discrepancies per patient (average of 3.44 per patient), thus making medication reconciliation errors the single biggest source of medication errors in the hospital (i.e., as opposed to errors in prescribing, transcribing, or administration).
Studies of medication reconciliation interventions demonstrate that improvements in important outcomes are indeed possible. In a recent systematic review conducted by our group (2), we identified 26 studies. Studies consistently demonstrated a reduction in medication discrepancies (17/17 studies), potential adverse drug events (5/6), and adverse drug events (2/2), and 2/8 studies showed a reduction in health care utilization.

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1. Salanitro AH, Kripalani S, Resnic J, et al. Rationale and design of the Multicenter Medication Reconciliation Quality Improvement Study (MARQUIS). BMC health services research. 2013;13:230.
2. Mueller SK, Sponsler KC, Kripalani S, Schnipper JL. Hospital-Based Medication Reconciliation Practices: A Systematic ReviewHospital-Based Medication Reconciliation Practices. Arch Intern Med. Jun 25 2012:1-13.

1b.2. **Provide performance scores on the measure as specified (current and over time) at the specified level of analysis.** *(This is required for endorsement maintenance. Include mean, std dev, min, max, interquartile range, scores by decile. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included).*

This information also will be used to address the subcriterion on improvement (4b.1) under Usability and Use.
See Appendix

1b.3. **If no or limited performance data on the measure as specified is reported in 1b2, then provide a summary of data from the literature that indicates opportunity for improvement or overall less than optimal performance on the specific focus of measurement.**

1b.4. **Provide disparities data from the measure as specified (current and over time) by population group, e.g., by race/ethnicity, gender, age, insurance status, socioeconomic status, and/or disability.** *(This is required for endorsement maintenance. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities include.) This information also will be used to address the subcriterion on improvement (4b.1) under Usability and Use.*

1b.5. **If no or limited data on disparities from the measure as specified is reported in 1b4, then provide a summary of data from the literature that addresses disparities in care on the specific focus of measurement. Include citations.**
There are no known disparities by race, ethnicity or gender that have been reported in the literature in relation to medication reconciliation. Several studies have shown that the main predictors of discrepancies are older age and number of medications.(1-5) However, at least some evidence suggests that the very old (over 85) may actually have a lower risk of potentially harmful medication discrepancies.(2)Other risk factors for discrepancies may include low patient understanding of their medications, while having a recent medication list in the electronic medication record has been shown to be protective.(4)

Citations for 1b.5.
1. Climente-Marti M, Garcia-Manon ER, Artero-Mora A, Jimenez-Torres NV. Potential risk of medication discrepancies and reconciliation errors at admission and discharge from an inpatient medical service. Ann Pharmacother. 2010;44(11):1747-1754.
2. Pippins JR, Gandhi TK, Hamann C, et al. Classifying and predicting errors of inpatient medication reconciliation. J Gen Intern Med. 2008;23(9):1414-1422.
3. Gleason KM, McDaniel MR, Feinglass J, et al. Results of the Medications At Transitions and Clinical Handoffs (MATCH) Study: An Analysis of Medication Reconciliation Errors and Risk Factors at Hospital Admission. J Gen Intern Med. 2010.
4. Salanitro AH, Osborn CY, Schnipper JL, et al. Effect of patient- and medication-related factors on inpatient medication reconciliation errors. J Gen Intern Med. 2012; 27(8):924-932.
5. Unroe KT, Pfeiffenberger T, Riegelhaupt S, Jastrzembski J, Lokhnygina Y, Colon-Emeric C. Inpatient medication reconciliation at admission and discharge: A retrospective cohort study of age and other risk factors for medication discrepancies. Am J Geriatr Pharmacother. 2010;8(2):115-126.

1c. High Priority (previously referred to as High Impact)
The measure addresses:
- a specific national health goal/priority identified by DHHS or the National Priorities Partnership convened by NQF; OR
- a demonstrated high-priority (high-impact) aspect of healthcare (e.g., affects large numbers of patients and/or has a substantial impact for a smaller population; leading cause of morbidity/mortality; high resource use (current and/or future); severity of illness; and severity of patient/societal consequences of poor quality).

1c.1. **Demonstrated high priority aspect of healthcare**
Affects large numbers, A leading cause of morbidity/mortality
1c.2. **If Other:**

1c.3. **Provide epidemiologic or resource use data that demonstrates the measure addresses a high priority aspect of healthcare. List citations in 1c.4.**
Patients often have problems after they leave the hospital; in part because errors are made in the medications they are prescribed.

Efforts to improve the quality and safety of health care include attention to unintentional medication discrepancies during transitions in care.(1) Discrepancies are highly prevalent: from 10 to 67% of inpatients have at least one unexplained discrepancy in their prescription medication history at the time of admission,1 and 25-71% have at least one medication error at discharge.(2-4) A recent study at Partners Healthcare found that on average each general medical patient had 5.2 discrepancies in either admission or

discharge medication orders, of which 1.4 per patient had potential for patient harm.(5) The reasons for medication discrepancies among hospitalized patients are of two major types: 1) "history errors," are errors in taking or documenting the patient's preadmission medication history (e.g., not including aspirin on the preadmission medication list, thus explaining why it is not ordered at discharge); and 2) "reconciliation errors," are errors of reconciling the medication history with medication orders (e.g., aspirin is on the preadmission medication list, held at admission for a clinical reason, but not restarted at discharge despite being clinically indicated at that time). Approximately 70% of potentially harmful discrepancies are due to history errors, usually errors of omission resulting from not documenting that a patient was taking a medication prior to admission).(5)

To develop a more accurate and safe medication process when patients enter and leave the hospital, we need a better understanding of the current rate of errors in medication orders.

1c.4. **Citations for data demonstrating high priority provided in 1a.3**

Citations for Evidence of High Priority Aspect of Healthcare Cited

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. 2005;173(5):510-515.
2. Climente-Marti M, Garcia-Manon ER, Artero-Mora A, Jimenez-Torres NV. Potential risk of medication discrepancies and reconciliation errors at admission and discharge from an inpatient medical service. Ann Pharmacother. 2010;44(11):1747-1754.
3. Vira T, Colquhoun M, Etchells E. Reconcilable differences: correcting medication errors at hospital admission and discharge. Qual Saf Health Care. 2006;15(2):122-126.
4. Wong JD, Bajcar JM, Wong GG, et al. Medication reconciliation at hospital discharge: evaluating discrepancies. Ann Pharmacother. 2008;42(10):1373-1379.
5. Pippins JR, Gandhi TK, Hamann C, et al. Classifying and predicting errors of inpatient medication reconciliation. J Gen Intern Med. 2008;23(9):1414-1422.

1c.5. **If a PRO-PM (e.g. HRQoL/functional status, symptom/burden, experience with care, health-related behaviors), provide evidence that the target population values the measured PRO and finds it meaningful.** *(Describe how and from whom their input was obtained.)*

2. Reliability and Validity—Scientific Acceptability of Measure Properties

Extent to which the measure, as specified, produces consistent (reliable) and credible (valid) results about the quality of care when implemented. ***Measures must be judged to meet the subcriteria for both reliability and validity to pass this criterion and be evaluated against the remaining criteria.***

2a.1. Specifications The measure is well defined and precisely specified so it can be implemented consistently within and across organizations and allows for comparability. eMeasures should be specified in the Health Quality Measures Format (HQMF) and the Quality Data Model (QDM).

De.5. **Subject/Topic Area** *(check all the areas that apply):*

De.6. **Cross Cutting Areas** *(check all the areas that apply):*
Care Coordination, Patient and Family Engagement, Safety : Medication Safety

S.1. **Measure-specific Web Page** *(Provide a URL link to a web page specific for this measure that contains current detailed specifications including code lists, risk model details, and supplemental materials. Do not enter a URL linking to a home page or to general information.)*
We are in the process of developing a webpage.

S.2a. **If this is an eMeasure**, HQMF specifications must be attached. Attach the output from the eMeasure authoring tool (MAT) - if the MAT was not used, contact staff. (Use the specification fields in this online form for the plain-language description of the specifications)
Attachment:

S.2b. **Data Dictionary, Code Table, or Value Sets** *(and risk model codes and coefficients when applicable) must be attached. (Excel or csv file in the suggested format preferred - if not, contact staff)*
Attachment:

S.3. **For endorsement maintenance**, please briefly describe any changes to the measure specifications since last endorsement date and explain the reasons.

S.4. **Numerator Statement** *(Brief, narrative description of the measure focus or what is being measured about the target population, i.e., cases from the target population with the target process, condition, event, or outcome)*
IF an OUTCOME MEASURE, state the outcome being measured. Calculation of the risk-adjusted outcome should be described in the calculation algorithm.
For each sampled inpatient in the denominator, the total number of unintentional medication discrepancies in admission orders plus the total number of unintentional medication discrepancies in discharge orders.

S.5. **Time Period for Data** *(What is the time period in which data will be aggregated for the measure, e.g., 12 mo, 3 years, look back to August for flu vaccination? Note if there are different time periods for the numerator and denominator.)*
The time period is from the time of hospital admission to discharge.

S.6. **Numerator Details** *(All information required to identify and calculate the cases from the target population with the target process, condition, event, or outcome such as definitions, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b)*
IF an OUTCOME MEASURE, describe how the observed outcome is identified/counted. Calculation of the risk-adjusted outcome should be described in the calculation algorithm.
First, a "gold-standard" preadmission medication history is taken by a trained study pharmacist at each site, following a strict protocol and using all available sources of information, including subject and family/caregiver interviews, prescription pill bottles, outpatient electronic medical records, hard copies of forms/patient lists, previous hospital discharge orders, outpatient providers, and outpatient pharmacies (see Appendix A for complete protocol). The resulting preadmission medication list is then compared with the medical team's documented preadmission medication list and with all admission and discharge medication orders. Any discrepancies between the gold-standard history and medication orders are identified and reasons for these changes sought from the medical record. Pharmacists may also need to communicate directly with the medical team to clarify reasons for discrepancies, as needed. Medication discrepancies that are not clearly intentional are then recorded, along with the reason for the discrepancy:
1. History error: the order is incorrect because the medical team's preadmission medication list is incorrect (e.g., the team did not know the patient was taking aspirin prior to admission, does not record it in the preadmission medication list, and therefore does not order it at admission)
2. Reconciliation error: the medical team's preadmission medication list is correct, but there is still an error in the orders. For example, the team knew the patient was taking aspirin prior to admission and documents it in the preadmission medication list. The team decides to hold the aspirin on admission for a clinical reason such as bleeding, but the team forgets to restart the aspirin at discharge. The admission discrepancy would be considered intentional (no error, not counted in the numerator), but the discharge discrepancy would be counted as a reconciliation error.

The type of error should also be recorded: omission, discrepancy in dose, route, frequency, or formulation, or an additional medication.
Lastly, the time of the error should be recorded: admission vs. discharge.

S.7. **Denominator Statement** *(Brief, narrative description of the target population being measured)*
The patient denominator includes a random sample of all potential adults admitted to the hospital. Our recommendation is that 25 patients are sampled per month, or approximately 1 patient per weekday.

So, for example, if among those 25 patients, 75 unintentional discrepancies are identified, the measure outcome would be 3 discrepancies per patient for that hospital for that month.

S.8. **Target Population Category** *(Check all the populations for which the measure is specified and tested if any):*
Senior Care

S.9. **Denominator Details** *(All information required to identify and calculate the target population/denominator such as definitions, specific data collection items/responses , code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b)*
Patients are randomly selected each day from a list of admitted patients the day before. A target number of patients are selected(e.g. one patient per weekday) and these patients are interviewed by the pharmacist.

S.10. **Denominator Exclusions** *(Brief narrative description of exclusions from the target population)*
Patients that are discharged or expire before a gold standard medication list can be obtained.

S.11. **Denominator Exclusion Details** *(All information required to identify and calculate exclusions from the denominator such as definitions, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b)*
Please see exclusion listed above in S.10.

S.12. **Stratification Details/Variables** *(All information required to stratify the measure results including the stratification variables, definitions, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format with at S.2b)*
Stratification could be done by service if desired by NQF, for example: non-ICU medicine, non-ICU surgery, ICU, and other.

S.13. **Risk Adjustment Type** (Select type. Provide specifications for risk stratification in S.12 and for statistical model in S.14-15)
No risk adjustment or risk stratification
If other:

S.14. **Identify the statistical risk model method and variables** *(Name the statistical method - e.g., logistic regression and list all the risk factor variables. Note - risk model development and testing should be addressed with measure testing under Scientific Acceptability)*
N/A

S.15. **Detailed risk model specifications** *(must be in attached data dictionary/code list Excel or csv file. Also indicate if available at measure-specific URL identified in S.1.)*
Note: Risk model details (including coefficients, equations, codes with descriptors, definitions), should be provided on a separate worksheet in the suggested format in the Excel or csv file with data dictionary/code lists at S.2b.

S.15a. **Detailed risk model specifications** (*if not provided in excel or csv file at S.2b*)

S.16. **Type of score:**
Continuous variable, e.g. average
If other:

S.17. **Interpretation of Score** *(Classifies interpretation of score according to whether better quality is associated with a higher score, a lower score, a score falling within a defined interval, or a passing score)*
Better quality = Lower score

S.18. **Calculation Algorithm/Measure Logic** *(Describe the calculation of the measure score as an ordered sequence of steps including identifying the target population; exclusions; cases meeting the target process, condition, event, or outcome; aggregating data; risk adjustment; etc.)*
See Appendix Attached

S.19. **Calculation Algorithm/Measure Logic Diagram URL or Attachment** *(You also may provide a diagram of the Calculation Algorithm/Measure Logic described above at measure-specific Web page URL identified in S.1 OR in attached appendix at A.1)*
Available in attached appendix at A.1

S.20. Sampling *(If measure is based on a sample, provide instructions for obtaining the sample and guidance on minimum sample size.)*
IF a PRO-PM, identify whether (and how) proxy responses are allowed.
IDENTIFY AND RANDOMLY SELECT PATIENTS
1. Who: administrator
2. When: Each day
3. Obtain list of admitted patients the day before
4. Using Excel, assign a random number to each patient on this list and then randomly sort this list
5. Select the first 5 patients on this randomized list (you may not need all these patients each day, but this is in case some patients refuse, are not available, or are not eligible).
a. You can include observation patients if they end up staying > 24 hours.
b. You can include elective surgery cases.
6. Repeat Steps 3-5 for each service you are sampling if stratifying by service.
7. Email list of selected patient names and room numbers, in order, to study pharmacist.

GENERAL RULES FOR STUDY PHARMACISTS
1. If stratifying by service, alternate among different service lists so that an equal number of patients from each service is enrolled each month.
2. The goal is to enroll 1 patient patient per weekday possible.
3. Go down the list given to you by the administrator and contact the first patient on the list.
a. Try to contact the first patient on the list early in the morning. If they can´t be reached (e.g., off the floor), try later in the morning and if they still can´t be reached, then go on to the next patient on the list.
b. If the patient is not available or has already been discharged, keep going down the list until a patient is available.
c. If no one on the list is available, switch to the list for the other service(s).
4. Each week, 1-2 patients admitted over the weekend should be enrolled such that 6-7 are enrolled each month. This may require that some weeks you enroll more than 5 patients, or that on some days you don't enroll any patients so that you save an enrollment "slot" for a weekend patient.
5. As a rule, enroll patients who were admitted the day before (and not 2-3 days before) so we don't bias our enrollment towards patients with longer lengths of stay.

S.21. Survey/Patient-reported data *(If measure is based on a survey, provide instructions for conducting the survey and guidance on minimum response rate.)*
IF a PRO-PM, specify calculation of response rates to be reported with performance measure results.
N/A

S.22. Missing data (specify how missing data are handled, e.g., imputation, delete case.)
Required for Composites and PRO-PMs.
N/A

S.23. Data Source *(Check ONLY the sources for which the measure is SPECIFIED AND TESTED).*
If other, please describe in 2a1.26.
Electronic Clinical Data, Electronic Clinical Data : Electronic Health Record, Electronic Clinical Data : Pharmacy, Healthcare Provider Survey, Other, Paper Medical Records, Patient Reported Data/Survey

S.24. Data Source or Collection Instrument *(Identify the specific data source/data collection instrument e.g. name of database, clinical registry, collection instrument, etc.)*
IF a PRO-PM, identify the specific PROM(s); and standard methods, modes, and languages of administration.
MARQUIS Medication Comparison Data Collection Sheet -Attachment of medication med comparison sheet to electronic application. (See Appendix)

S.25. Data Source or Collection Instrument *(available at measure-specific Web page URL identified in S.1 OR in attached appendix at A.1)*
Available in attached appendix at A.1

S.26. **Level of Analysis** *(Check ONLY the levels of analysis for which the measure is SPECIFIED AND TESTED)*
Facility

S.27. **Care Setting** *(Check ONLY the settings for which the measure is SPECIFIED AND TESTED)*
Hospital/Acute Care Facility
If other:

S.28. **COMPOSITE Performance Measure** - Additional Specifications *(Use this section as needed for aggregation and weighting rules, or calculation of individual performance measures if not individually endorsed.)*

2a. Reliability – See attached Measure Testing Submission Form
2b. Validity – See attached Measure Testing Submission Form
MeasSubm_MeasTesting_12_192013_Final.docx

3. Feasibility

Extent to which the specifications including measure logic, require data that are readily available or could be captured without undue burden and can be implemented for performance measurement.

3a. Byproduct of Care Processes

For clinical measures, the required data elements are routinely generated and used during care delivery (e.g., blood pressure, lab test, diagnosis, medication order).

3a.1. **Data Elements Generated as Byproduct of Care Processes.**
Generated or collected by and used by healthcare personnel during the provision of care (e.g., blood pressure, lab value, diagnosis, depression score)
If other:

3b. Electronic Sources

The required data elements are available in electronic health records or other electronic sources. If the required data are not in electronic health records or existing electronic sources, a credible, near-term path to electronic collection is specified.

3b.1. **To what extent are the specified data elements available electronically in defined fields?** *(i.e., data elements that are needed to compute the performance measure score are in defined, computer-readable fields)*
Some data elements are in defined fields in electronic sources

3b.2. **If ALL the data elements needed to compute the performance measure score are not from electronic sources, specify a credible, near-term path to electronic capture, OR provide a rationale for using other than electronic sources.**
Data elements are in defined fields.

3b.3. **If this is an eMeasure, provide a summary of the feasibility assessment in an attached file or make available at a measure-specific URL.**
Attachment:

3c. Data Collection Strategy

Demonstration that the data collection strategy (e.g., source, timing, frequency, sampling, patient confidentiality, costs associated with fees/licensing of proprietary measures) can be implemented (e.g., already in operational use, or testing demonstrates that it is ready to put into operational use). For eMeasures, a feasibility assessment addresses the data elements and measure logic and demonstrates the eMeasure can be implemented or feasibility concerns can be adequately addressed.

3c.1. **Describe what you have learned/modified as a result of testing and/or operational use of the measure regarding data collection, availability of data, missing data, timing and frequency of data collection, sampling, patient confidentiality, time and cost of data collection, other feasibility/implementation issues.**
IF a PRO-PM, consider implications for both individuals providing PROM data (patients, service recipients, respondents) and those whose performance is being measured.

1. When some sites started to use "intervention pharmacists" separate from "study pharmacists," sites needed to make sure that the measurement process interfered as little as possible with the intervention (e.g., by approaching patients later, not providing intervention pharmacists with information, etc.)
2. Some sites needed to work on logistics so that under most circumstances, evaluation was done after discharge orders were written but either before or not much after patient discharge. This improved access to discharge orders and the ability to contact providers in case serious errors were identified that needed to be corrected.
3. Sites have found it easier to build this evaluation into the daily work of a pharmacist. That way, if a patient is unavailable, the pharmacist can continue with their other clinical responsibilities.
4. There are efficiencies to having the same pharmacist perform admission and discharge comparisons on the same patient and do them at the same time. However, if preferable logistically, this could be a separate person from the pharmacist who collects the gold standard medication history.
5. This process takes about an hour per patient, but can take more or less depending on the patient.
6. The main barrier to data collection has been the availability of a study pharmacist at each site. If this measure were to be endorsed by NQF, then this resource would be required for each hospital, and this problem would be solved, much in the same way that all hospitals hire study nurses to collect data for NSQIP.

3c.2. **Describe any fees, licensing, or other requirements to use any aspect of the measure as specified** *(e.g., value/code set, risk model, programming code, algorithm)*.

4. Usability and Use

Extent to which potential audiences (e.g., consumers, purchasers, providers, policy makers) are using or could use performance results for both accountability and performance improvement to achieve the goal of high-quality, efficient healthcare for individuals or populations.

4a. Accountability and Transparency

Performance results are used in at least one accountability application within three years after initial endorsement and are publicly reported within six years after initial endorsement (or the data on performance results are available). If not in use at the time of initial endorsement, then a credible plan for implementation within the specified timeframes is provided.

4.1. **Current and Planned Use**

NQF-endorsed measures are expected to be used in at least one accountability application within 3 years and publicly reported within 6 years of initial endorsement in addition to performance improvement.

Planned	Current Use (for current use provide URL)
Quality Improvement (Internal to the specific organization)	

4a.1. **For each CURRENT use, checked above, provide:**

- Name of program and sponsor
- Purpose
- Geographic area and number and percentage of accountable entities and patients included

4a.2. **If not currently publicly reported OR used in at least one other accountability application (e.g., payment program, certification, licensing) what are the reasons?** (*e.g., Do policies or actions of the developer/steward or accountable entities restrict access to performance results or impede implementation?*)

To date, the measure has been used in research studies and is not publicly reported. There are no policies or actions of the measure developer that would restrict access or impede implementation.

4a.3. **If not currently publicly reported OR used in at least one other accountability application, provide a credible plan for implementation within the expected timeframes -- any accountability application within 3 years and publicly reported within 6**

years of initial endorsement. (*Credible plan includes the specific program, purpose, intended audience, and timeline for implementing the measure within the specified timeframes. A plan for accountability applications addresses mechanisms for data aggregation and reporting.*)
Year 1: announcement of measure, public response period, further refinement of measure as needed
Year 2: recruitment of sites to report this measure on a volunteer basis, training of pharmacists in the data collection process
Year 3: active data collection and public reporting of measure by volunteer sites, solicitation of feedback on process
Year 4: analysis of data and any unintended consequences, refinement of measure based on feedback
Year 5: required public reporting of refined measure, including training of pharmacists in the data collection process

4b. Improvement

Progress toward achieving the goal of high-quality, efficient healthcare for individuals or populations is demonstrated. If not in use for performance improvement at the time of initial endorsement, then a credible rationale describes how the performance results could be used to further the goal of high-quality, efficient healthcare for individuals or populations.

4b.1. **Progress on Improvement. (Not required for initial endorsement unless available.)**
Performance results on this measure (current and over time) should be provided in 1b.2 and 1b.4. Discuss:

- **Progress (trends in performance results, number and percentage of people receiving high-quality healthcare)**
- **Geographic area and number and percentage of accountable entities and patients included**

Since the last time this measure was submitted to NQF, the number of patients measured and our experience with measurement have grown greatly. As noted above, we now have data on over 1200 patients across 6 sites.

In addition, several sites have shown improvement in this metric using the MARQUIS intervention.
For example, one site, after over 2 years of data collection and 18 months of a quality improvement intervention, demonstrated a 35% relative reduction in unintentional discrepancies per patient, from 3.1 to 2.0, which was highly statistically significant (p=0.009). Of note, and related to the issue of validity, this reduction in discrepancies was associated with a 71% relative reduction in potentially harmful discrepancies per patient based on physician adjudication (from 0.21 to 0.06, p=0.04). This site was also able to detect statistically significant reductions in discrepancies due to reconciliation errors.(1)

References:
1.Got Med Wreck? Targeted repairs from the Multi-Center Medication Reconciliation Quality Improvement Study (MARQUIS)/Workshop presented at the Society of Hospital Medicine Annual Meeting, National Harbor, MD.

4b.2. **If no improvement was demonstrated, what are the reasons? If not in use for performance improvement at the time of initial endorsement, provide a credible rationale that describes how the performance results could be used to further the goal of high-quality, efficient healthcare for individuals or populations.**

4c. Unintended Consequences

The benefits of the performance measure in facilitating progress toward achieving high-quality, efficient healthcare for individuals or populations outweigh evidence of unintended negative consequences to individuals or populations (if such evidence exists).

4c.1. **Were any unintended negative consequences to individuals or populations identified during testing; OR has evidence of unintended negative consequences to individuals or populations been reported since implementation? If so, identify the negative unintended consequences and describe how benefits outweigh them or actions taken to mitigate them.**
None

5. Comparison to Related or Competing Measures

If a measure meets the above criteria and there are endorsed or new related measures (either the same measure focus or the same target population) or competing measures (both the same measure focus and the same target population), the measures are compared to address harmonization and/or selection of the best measure.

5. Relation to Other NQF-endorsed Measures
Are there related measures (conceptually, either same measure focus or target population) or competing measures (conceptually

both the same measure focus and same target population)? If yes, list the NQF # and title of all related and/or competing measures.
No

5.1a. **List of related or competing measures (selected from NQF-endorsed measures)**

5.1b. **If related or competing measures are not NQF endorsed please indicate measure title and steward.**

5a. Harmonization

The measure specifications are harmonized with related measures;
OR
The differences in specifications are justified

5a.1. **If this measure conceptually addresses EITHER the same measure focus OR the same target population as NQF-endorsed measure(s):**
Are the measure specifications completely harmonized?
No

5a.2. **If the measure specifications are not completely harmonized, identify the differences, rationale, and impact on interpretability and data collection burden.**
There is no measure part to harmonize with.

5b. Competing Measures

The measure is superior to competing measures (e.g., is a more valid or efficient way to measure);
OR
Multiple measures are justified.

5b.1. **If this measure conceptually addresses both the same measure focus and the same target population as NQF-endorsed measure(s):**
Describe why this measure is superior to competing measures (e.g., a more valid or efficient way to measure quality); OR provide a rationale for the additive value of endorsing an additional measure. (Provide analyses when possible.)
N/A

Appendix

A.1 Supplemental materials may be provided in an appendix. All supplemental materials (such as data collection instrument or methodology reports) should be organized in one file with a table of contents or bookmarks. If material pertains to a specific submission form number, that should be indicated. Requested information should be provided in the submission form and required attachments. There is no guarantee that supplemental materials will be reviewed.
Attachment **Attachment:** MARQUIS_NQF_Application_Appendix.pdf

Contact Information

Co.1 **Measure Steward (Intellectual Property Owner):** Brigham and Women´s Hospital
Co.2 **Point of Contact:** Jeffrey, Schnipper, jschnipper@partners.org, 617-732-6201-
Co.3 **Measure Developer if different from Measure Steward:** Veterans Rural Health Resource Center-Central Region, VA Office of Rural Health
Co.4 **Point of Contact:** Peter, Kaboli, peter.kaboli@va.gov, 319-338-0581-7716

Additional Information

Ad.1 **Workgroup/Expert Panel involved in measure development**
Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.

• Jeffrey L. Schnipper, MD, MPH, FHM, Director of Clinical Research, BWH Hospitalist Service, Associate Physician, Division of General Medicine, Brigham and Women´s Hospital, Associate Professor of Medicine, Harvard Medical School, Boston, MA. MARQUIS Principal Investigator
Primary developer of the measure, used in several studies he has conducted
• Peter Kaboli, MD, FHM, Director, Midwest Rural Health Resource Center, VA Office of Rural Health, Iowa City VA Medical Center, Iowa City, IA. MARQUIS Co-Investigator
Expert on inpatient medication safety and roles of pharmacists. Developer of the measure with Dr. Schnipper
• Stephanie Mueller, MD, General Medicine Fellow, Division of General Medicine, Brigham and Women's Hospital, Boston, MA. MARQUIS Co-Investigator
Led systematic review of medication reconciliation interventions
• Stephanie Labonville, Pharm D. Pharmacy Services, Brigham and Women's Hospital, Boston, MA. MARQUIS Study Pharmacist
Has led implementation of measurement protocol and on-site training and evaluation of study pharmacists for MARQUIS and previous studies using this protocol led by Dr. Schnipper.
• JoAnne Resnic, MBA, BSN, RN, Former Senior Manager, Center for Hospital Innovation and Improvement, Society of Hospital Medicine, Philadelphia, PA. MARQUIS Project Manager
Project Manager for initial NQF measure application
Jenna Goldstein, MA, Senior Manager, Center for Hospital Innovation and Improvement, Society of Hospital Medicine, Philadelphia, PA. MARQUIS Project Manager
Project Manager for NQF care coordination re-submission
• Peter B. Angood, MD, FRCS(C), FACS, FCCM, Senior Advisor on Patient Safety, National Quality Forum, Washington, DC. MARQUIS Steering Committee Member
Advisor to MARQUIS, especially regarding measure development

Other Advisors:
• Daniel Cobaugh, PharmD, FAACT, DABAT, Vice President, ASHP Research and Education Foundation, Bethesda, MD. MARQUIS Steering Committee Member
• Jeff Greenwald, MD, SFHM, Inpatient Clinician Educator Service, Department of Medicine, Massachusetts General Hospital and Associate Professor of Medicine, Harvard Medical School, Co-Investigator Project RED and Project BOOST, Boston, MA. Chair, MARQUIS Steering Committee
•Sunil Kripalani, MD, MSc, SFHM, Associate Professor, Chief, Section of Hospital Medicine, Associate Director, Effective Health Communication Program, Emphasis Program Area Director, Healthcare and Public Health Research and Management, Vanderbilt University Medical Center, Nashville, TN. MARQUIS Co-Investigator
• Nyryan V. Nolido, MA, Research Project Manager, Brigham and Women´s Hospital, Boston, MA. MARQUIS Data Project Manager
• Amanda Salanitro, MD, MPH, Instructor, Geriatric Research, Education and Clinical Center, Tennessee Valley VA Healthcare System and Section of Medicine at Vanderbilt University, Nashville, TN. MARQUIS Co-Investigator
• Mark Williams, MD, FACP, Professor of Medicine & Chief, Division of Hospital Medicine, Northwestern University Feinberg School of Medicine, Chicago, IL. MARQUIS Steering Committee Member

Measure Developer/Steward Updates and Ongoing Maintenance

Ad.2 **Year the measure was first released:** 2012

Ad.3 **Month and Year of most recent revision:** 11, 2013

Ad.4 **What is your frequency for review/update of this measure?** The frequency of review is once every one to two years.

Ad.5 **When is the next scheduled review/update for this measure?** 11, 2014

Ad.6 **Copyright statement:**

Ad.7 **Disclaimers:**

Ad.8 **Additional Information/Comments:** Additional References

1. Greenwald JL, Halasyamani L, Greene J, et al. Making inpatient medication reconciliation patient centered, clinically relevant and implementable: a consensus statement on key principles and necessary first steps. J Hosp Med. 2010;5(8):477-485.