

Methodology Report

Medication Reconciliation on Admission
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PREPARED FOR THE CENTERS FOR MEDICARE & MEDICAID SERVICES (CMS) BY HEALTH SERVICES ADVISORY GROUP, INC. (HSAG)

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Executive Summary

Background

A complete medication reconciliation process is important in the inpatient psychiatric facility (IPF) setting because pharmacotherapy is a primary form of treatment for patients with severe psychiatric illnesses. Medication discrepancies in inpatient settings occur frequently and can lead to preventable adverse drug events (ADEs). Studies in both the psychiatric and non-psychiatric settings have found that medication discrepancies are present in more than half of medical records for inpatient stays.¹⁻⁴

There is evidence to suggest that a robust medication reconciliation process to identify and reconcile prior to admission (PTA) medications can reduce medication discrepancies in inpatient treatment.⁵ The Multicenter Medication Reconciliation Quality Improvement Study (MARQUIS), which was conducted in six U.S. hospitals, reported an average of 3.35 unintentional medication discrepancies per patient with most medication discrepancies (2.12 per patient) resulting from failure to accurately identify the patient's PTA medications.⁶ The Medications At Transitions and Clinical Handoff (MATCH) study evaluated 651 inpatient stays and found that as many as 85% of admissions with medication errors had errors that originated from incomplete collection of the medication history.⁷ While not all medication discrepancies lead to ADEs, a systematic review published in 2012 examined 26 controlled studies related to hospital-based medication reconciliation practices and found that medication reconciliation leads to a reduction in medication discrepancies (17/17 studies), potential ADEs (5/6 studies), and ADEs (2/3 studies).⁷ A separate study specific to the psychiatric setting presented examples of medication discrepancies identified through medication reconciliation, which included omission of PTA medications and unnecessary use of medications like methadone and clozapine that carry serious risks.⁸

Measure Overview

The goal of this project was to develop an overall process measure that assesses whether a robust medication reconciliation process was completed at the beginning of inpatient psychiatric hospitalizations. The measure is constructed to align with two of the five elements of performance of The Joint Commission's National Patient Safety Goal (NPSG.03.06.01)⁹ on medication safety. The two elements of performance for NPSG.03.06.01 that are relevant to the admission process are:

- Obtain information on the medications the patient is currently taking when he or she is admitted to the hospital or is seen in an outpatient setting. This information is documented in a list or other format that is useful to those who manage medications.
- Compare the medication information the patient brought to the hospital with the medications ordered for the patient by the hospital in order to identify and resolve discrepancies.

Based on extensive feedback from clinical experts, the Technical Expert Panel (TEP), and other key stakeholder groups, the measure operationalizes the two elements of NPSG.03.06.01 into one overall pass/fail measure composed of three criteria:

1. Medications taken by the patient prior to admission are documented on a designated PTA medication list.
2. The PTA medication list is generated using at least one source external to the facility's records to identify the medications taken by the patient prior to admission.
3. All medications listed on the PTA medication list have a reconciliation action to continue, discontinue, or modify by the end of Day 2 of the hospitalization.

Measure scores from nine test facilities confirmed that there are quality gaps in the medication reconciliation process on admission and that there is significant variation in performance across facilities. The average measure score was 49% with a range of 7% for the lowest performing facility to 98% for the highest performing facility. The data elements used to calculate the measure scores were determined to be reliably collected with high levels of agreement between abstractors. The measure scores were determined to be highly reliable indicators of the quality of the medication reconciliation process at each facility.

Conclusion

CMS envisions the addition of this measure to the suite of measures for IPFs will provide valuable information to consumers and providers on the quality of care patients receive at those facilities. The *Medication Reconciliation on Admission* measure provides information related to existing quality gaps in the medication reconciliation processes and can easily be adapted for use in other inpatient settings. By collecting adequate information about a patient's PTA medications, recording the information in a single location in the medical record for easy reference, and reconciling this information in a timely manner, clinicians can avoid potentially harmful medication discrepancies. Therefore, the implementation of a sound medication reconciliation process as outlined by this measure is anticipated to lead to improvement in quality of care and reduction in preventable harm to patients. Patients interviewed about this measure concept agreed that a measure score related to the medication reconciliation process would be important and easy for them to interpret.

Implementation of this measure would help CMS achieve two of its Quality Strategy goals. The reduction in medication discrepancies supports Goal 1, which is to make care safer by reducing harm caused in the delivery of care. By ensuring that medication information is recorded in a single location, reconciled in a timely fashion, and that reconciliation actions are documented, the measure supports Goal 3, which is to promote effective communication and coordination of care. By reducing harm from preventable ADEs and improving care coordination, the measure can reduce the need for costly and unnecessary medical care. The National Academy of Medicine (NAM), formerly called the Institute of Medicine (IOM), estimates that ADEs across settings contribute an additional \$3.5 billion (in 2006 dollars) to U.S. health care costs. While ADEs in the IPF setting represent only a subset of those costs, the strong reliance on psychotropic medications in treating mental illness combined with the need for additional pharmacotherapy for other comorbidities results in a substantial potential for cost savings.

1. Introduction

The Centers for Medicare & Medicaid Services (CMS) has contracted with Health Services Advisory Group, Inc. (HSAG) to develop, maintain, reevaluate, and support the implementation of quality process and outcome measures for the CMS Inpatient Psychiatric Facility Quality Reporting (IPFQR) Program. As part of this contract, HSAG in collaboration with the University of Florida, developed a process measure, *Medication Reconciliation on Admission*, to assess whether a robust medication reconciliation process was completed at the beginning of inpatient psychiatric hospitalizations.

This report provides a description of the measure development process and the final measure specifications. The introductory section summarizes the literature that supports the measure focus and delineates the anticipated impact of measure implementation in the inpatient psychiatric facility (IPF) setting. Section 2 describes the methodology for the development and testing of the measure. Section 3 presents results of measure testing. The report concludes with the final assessment of the measure and the final measure specifications in Sections 4 and 5. For reference, all acronyms and abbreviations used in this report are included in *Appendix A. List of Acronyms and Abbreviations*.

1.1 Background

The Institute for Healthcare Improvement defines medication reconciliation as “the process of creating the most accurate list possible of all medications a patient is taking...and comparing that list against the physician’s admission, transfer, and/or discharge orders, with the goal of providing correct medications to the patient at all transition points within the hospital.”¹⁰ While medication reconciliation should occur at all transition points during the inpatient stay, this measure focuses on medication reconciliation on admission because information collected at this transition point is critical to inform treatment decisions during the inpatient stay and at discharge. By collecting adequate information about a patient’s PTA medications, recording the information in a single location in the medical record for easy reference, and reconciling this information in a timely manner, clinicians can avoid potentially harmful medication discrepancies. A thorough reconciliation process is important in the IPF setting because pharmacotherapy is a primary form of treatment for patients with severe psychiatric illnesses and the accuracy of self-reported PTA medications may be compromised by severe psychiatric symptoms. Patients interviewed about this measure concept agreed that comprehensive gathering of PTA medications is very important to their quality of care.

Studies in both the psychiatric and non-psychiatric settings have found that medication discrepancies are present in more than half of medical records for inpatient stays.¹⁻⁴ There is evidence to suggest that most medication discrepancies in inpatient medical records result from the failure to collect and reconcile PTA medications. The Multicenter Medication Reconciliation Quality Improvement Study (MARQUIS), which was conducted in six U.S. hospitals, reported an average of 3.35 unintentional medication discrepancies per patient with most medication discrepancies (2.12 per patient) resulting from failure to accurately identify the patient’s PTA medications.⁵ The Medications At Transitions and Clinical Handoff (MATCH) study evaluated 651 inpatient stays and found that as many as 85% of admissions with medication errors had errors that originated from incomplete collection of the medication history.⁶

To reduce discrepancies that result from inadequate collection and reconciliation of PTA medications, the *Medication Reconciliation on Admission* measure is constructed to align with the two elements of performance of The Joint Commission’s National Patient Safety Goal (NPSG.03.06.01) on medication safety that are relevant to the admission process. These elements are:

- Obtain information on the medications the patient is currently taking when he or she is admitted to the hospital or is seen in an outpatient setting. This information is documented in a list or other format that is useful to those who manage medications.
- Compare the medication information the patient brought to the hospital with the medications ordered for the patient by the hospital in order to identify and resolve discrepancies.

The Measure Developer evaluated existing measures in the National Quality Forum (NQF) portfolio to determine whether the *Medication Reconciliation on Admission* measure would compete with existing measures. Among the five NQF-endorsed measures that evaluate the medication reconciliation process, three are specified for the outpatient setting and the two that are specified for the inpatient setting focus on communication of information at discharge. Therefore, the *Medication Reconciliation on Admission* measure is the only measure that evaluates medication reconciliation on admission to an inpatient facility.

1.2 Measure Impact

Evidence indicates that the *Medication Reconciliation on Admission* measure could reduce the incidence of preventable adverse drug events (ADEs). A systematic review published in 2012 examined 26 controlled studies related to hospital-based medication reconciliation practices and found that medication reconciliation leads to a reduction in medication discrepancies (17/17 studies), potential ADEs (5/6 studies), and ADEs (2/3 studies).⁶ A subsequent literature review conducted by the measure developer identified an additional 16 studies published from 2012 to present and confirmed the results from the previous systematic review. Among these studies, performing medication reconciliation at admission significantly decreased medication discrepancies (10/13 studies)^{11,12 13-23}, potential ADEs (2/3 studies)^{18,22,24}, and ADEs (3/3 studies)^{12,25,26} in the hospital setting. The studies that evaluated ADEs reported a mean reduction in ADE rates of 74.0% with a range from 42.9% to 90.9% reduction. Some studies also quantified the relative reduction in the odds of ADEs in patients exposed to medication reconciliation with odds ratios that ranged from 0.38 to 0.57.^{26,27}

While the studies in the literature reviews cited were not limited to the IPF setting, reconciling medications is particularly important for patients admitted to IPFs. According to a multicenter study in three psychiatric facilities, medication discrepancies identified at admission were five times more likely to be associated with potential ADEs than medication discrepancies identified later during transitions or at discharge (OR 5.39 95% CI: 2.72 - 10.69)²⁸. A study conducted in the United Kingdom involving multiple psychiatric hospitals found that discrepancies can include omission of PTA medications or unnecessary use of psychiatric medications. Omitted medications such as depot antipsychotics, anti-epileptics, and other medications to treat comorbid medical conditions can cause serious ADEs if not continued during the inpatient stay. Psychiatric medications that were prescribed unnecessarily included examples such as aripiprazole, amisulpride, methadone, and clozapine, which are medications that should only be taken if benefits of treatment outweigh the high risks of severe side effects. Several studies have quantified the number of discrepancies with potential to cause harm. One study found that more than 76% of discrepancies in a psychiatric unit were considered potentially harmful at the moderate-to-severe level if medications were not properly reconciled.² Another study of 50 psychiatric inpatients identified that 82% of discrepancies had the potential to cause moderate or severe harm and that 17% of those discrepancies resulted in ADEs, including manifestation of affective symptoms, rebound symptoms, progressive psychosis, unmanaged parkinsonism, increased pain, constipation, hypertension, stomach perforation, and nausea.³ Collectively, these findings highlight that medication discrepancies are important targets of medication reconciliation on admission to reduce the rate of ADEs and improve patient safety in the IPF setting.

Implementation of this measure will help CMS achieve two of its Quality Strategy goals.²⁹ The reduction in medication discrepancies supports Goal 1, which is to make care safer by reducing harm caused in the delivery of care. By ensuring that medication information is recorded in a single location, reconciled in a timely fashion, and that reconciled actions are clearly documented, the measure also supports Goal 3, which is to promote effective communication and coordination of care. By reducing harm from preventable ADEs and improving care coordination, the measure could reduce the need for costly and unnecessary medical care. The NAM estimates that ADEs across settings contribute an additional \$3.5 billion (in 2006 dollars) to United States health care costs.³⁰ While ADEs in the IPF setting represent only a subset of those costs, the strong reliance on psychotropic medications in treating mental illness combined with the need for additional pharmacotherapy for other comorbidities results in a substantial potential for cost savings.

The *Medication Reconciliation on Admission* measure provides valuable information to facilities related to existing quality gaps in the medication reconciliation processes. A study conducted in an IPF found that updating

and standardizing its medication reconciliation process resulted in increased accuracy of medications from 45% to 80%.³¹ This is supported by communication from two sites that participated in the field testing of the *Medication Reconciliation on Admission* measure, which indicated that abstracting the information allowed them to identify opportunities for improvement in the medication reconciliation processes in their facilities. The Technical Expert Panel (TEP) agreed that the measure would improve the quality of care provided to patients treated in IPFs for severe mental illness. In addition to improving communication and reducing medication discrepancies, they indicated that the measure could have the following benefits:

- Identifying medication regimens that were unsuccessful in the past, so they are not repeated
- Decreasing unnecessary polypharmacy, especially related to controlled substances that can lead to substance use disorders
- Encouraging engagement with patients to increase their knowledge of their medications and treatment plans

Finally, the Measure Developer sought input from patients and caregivers to determine if the measure would be important and informative from their perspectives. They indicated that the measure addressed an issue that was important to them and that the measure score would be easy to understand. In summary, implementation of this measure will be informative to both providers and patients and is anticipated to lead to improvements in the quality of care provided to patients admitted to IPFs.

2. Methods

The *Medication Reconciliation on Admission* measure uses chart-abstracted data to calculate the measure score. The measure score assesses whether the medication reconciliation process was completed according to three explicit criteria at the beginning of inpatient psychiatric admissions. This section of this report describes the approach to developing and operationalizing the measure specifications and scoring methodology. This section also includes the results of measure reliability and validity testing.

2.1 Data Sources

2.1.1 Measure Testing

The measure was developed and tested using chart-abstracted data obtained from admissions that occurred between January 4, 2013, and August 17, 2016. A sample of nine IPFs from eight states was used to perform the field testing of the measure. Both freestanding facilities and hospital-based units of various sizes and with different types of medical record systems were included in the testing. Table 1 provides a breakdown of the characteristics of the IPFs included in the field testing.

Table 1. Field Testing Hospital Characteristics

IPF ID	Location	Type	Bed Size	Data Source
1	West Virginia	Unit	70	EPIC
2	Michigan	Unit	28	McKesson
3	Arizona	Freestanding	90	Paper Medical Records
4	Arizona	Freestanding	75	Paper Medical Records
5	Maryland	Freestanding	322	Allscripts®
6	California	Unit	12	Cerner
7	Louisiana	Unit	38	EPIC
8	Colorado	Freestanding	24	Netsmart TIER® CareRecord™
9	Wisconsin	Freestanding	168	Cerner

Each of the nine IPFs were asked to abstract information from 100 admissions that met the testing criteria using one of two sampling approaches: (1) selection of the most recent admissions or (2) random selection of admissions. Admissions included in the sample had to be from home, outpatient, emergency, or long-term care. A minimum length of stay of 24 hours was required to be included in the sample because the Measure Developer anticipated that most facilities would need at least 24 hours to adequately complete the medication reconciliation process. The testing sample included adult and pediatric patients and had no restriction on insurance type.

Table 2 and Table 3 show the demographic characteristics of the sample by IPF. IPFs varied notably in the distribution of patients by age and race/ethnicity.

Table 2. Age and Gender of Field Testing Population (in percent)

	IPF 1	IPF 2	IPF 3	IPF 4	IPF 5	IPF 6	IPF 7	IPF 8	IPF 9
No. Records	100	100	100	100	100	100	100	100	100
0-18	0	2	10	45	40	0	4	34	50
19-24	4	20	10	18	12	0	8	5	8
25-34	12	29	28	9	18	0	36	6	7
35-44	18	12	22	11	10	0	23	7	5
45-54	28	19	17	11	9	2	16	12	3
55-64	18	12	11	3	6	5	11	16	2
>65	20	5	1	3	5	93	2	20	25
Male	50	59	55	43	55	44	68	51	44

Table 3. Race/Ethnicity of Field Testing Population (in percent)

	IPF 1	IPF 2	IPF 3	IPF 4	IPF 5	IPF 6	IPF 7	IPF 8	IPF 9
White	96	72	89	89	60	87	40	93	71
Black	3	7	5	4	31	1	57	3	22
Asian/ Pacific Islander	0	0	1	2	3	6	0	1	0
American Indian/ Alaska Native	0	1	5	4	3	1	0	0	1
Other	1	2	0	1	3	5	3	3	0
Unknown Race	0	18	0	0	0	0	0	0	6
Hispanic	1	2	19	24	1	2	3	7	6
Unknown Ethnicity	0	19	0	1	5	55	1	0	4

At the start of testing, each test site received a one-hour training on the abstraction instructions and a one-hour follow-up meeting after review of the first 10 medical records to provide clarifications, if needed. For each IPF field testing site, two trained abstractors collected data from 50 admissions each, resulting in a total of 100 unique patient records per site. In addition, 20% of each abstractor’s admission records were randomly assigned to the other abstractor to assess the reliability of abstractions.

2.1.2 Measure Implementation

If implemented, this measure will rely on abstraction of a sample of medical records by the IPF. The sampling approach will be aligned with the sampling approach used for existing measures in the IPFQR program to minimize the burden of data collection for facilities. After the measure logic and abstraction tool were finalized based on the results of testing, the Measure Developer tested the average time to abstract each record using abstracted data from a total of 36 records from the alpha testing sites. The average time to abstract the required data elements was 5.9 minutes.

2.2 Denominator Definition

2.2.1 Development of Denominator Inclusion Criteria

The measure development workgroup and TEP explored whether there were any types of admissions for which medication reconciliation would not be appropriate on admission. Medication reconciliation on admission was deemed to be important for all admissions to an IPF.

2.2.2 Development of Denominator Exclusion Criteria

The measure applies two exclusion criteria to ensure that it is feasible to complete the medication reconciliation process on admission to the IPF. The first exclusion criterion applies to admissions that result from a transfer from an acute care setting, such as another inpatient facility or inpatient unit. This exclusion is applied because medication reconciliation with outpatient medications may have been done at the transferring facility and different medication reconciliation processes are required at the receiving IPF for those admissions to focus on the regimen that was used in the transferring facility. Admissions from long-term care facilities and emergency departments are not considered transfers and are included in the denominator for the measure.

The second exclusion criterion applies to admissions with lengths of stay shorter than the time needed to adequately complete the medication reconciliation process. The timeframe from admission needed to complete the medication reconciliation process was discussed with the TEP, which recommended a requirement to complete reconciliation by the end of Day 2 if the day of admission is Day 0. They cited instances where patients are admitted on weekends and outpatient providers are not available to ascertain PTA medications or where patients are not stable enough to provide information immediately upon admission. The Measure Developer used the field testing data to empirically evaluate when medication reconciliation actions were completed relative to the day of admission. Table 4 contains all records with complete medication reconciliation for all medications on the PTA

medication list (467 records with a range of 15 to 79 per facility). The table shows the percentage of those records that had completed the medication reconciliation in one day increments of time from admission. Results show that 90.2% of records were completely reconciled by the end of Day 2. In other words, if medication reconciliation was completed, turn-around time rarely exceeded three calendar days from admission (or beyond the end of Day 2). Based on these results and the recommendation from the TEP, the measure excludes admissions that are discharged on or before Day 2 of the admission to ensure medication reconciliation can be feasibly completed for the majority of patients.

Table 4. Percentage of Records with Completed Medication Reconciliation Actions by Day When All PTA Medications in the Record Were Reconciled

Days	IPF 1 n=68	IPF 2 n=65	IPF 3 n=58	IPF 4 n=69	IPF 5 n=49	IPF 6 n=15	IPF 7 n=44	IPF 8 n=79	IPF 9 n=20	Facility Avg	% Across Records	Cumulative % Across Records
Day 0	30.9	7.7	27.6	95.7	4.1	0.0	95.5	25.3	10.0	33.0	37.3	37.3
Day 1	66.2	75.4	25.9	2.9	61.2	26.7	4.6	73.4	55.0	43.5	46.3	83.5
Day 2	2.9	9.2	12.1	0.0	18.4	20.0	0.0	1.3	15.0	8.8	6.6	90.2
Day 3	0.0	0.0	6.9	0.0	4.1	6.7	0.0	0.0	5.0	2.5	1.7	91.9
≥ Day 4	0.0	7.7	27.6	1.5	12.2	0.0	0.0	0.0	15.0	7.1	6.6	98.6
Records with incomplete times	0.0	0.0	0.0	0.0	0.0	46.7	0.0	0.0	0.0	5.2	1.5	100.0

2.3. Numerator Definition

The numerator is defined as the number of admissions with a designated PTA medication list generated by referencing one or more external sources of PTA medications for which all PTA medications have a documented reconciliation action by the end of Day 2 of the hospitalization. The numerator is operationalized into three key criteria of the medication reconciliation process that must be met.

1. Medications taken by the patient prior to admission are documented on a designated PTA medication list.
2. The PTA medication list is generated using at least one external source to identify the medications taken by the patient prior to admission.
3. All medications listed on the PTA medication list have a reconciliation action to continue, discontinue, or modify by the end of Day 2 of the hospitalization, or if there are no medications on the PTA medication list, the prescriber has signed the document by the end of Day 2 of the hospitalization to indicate his/her review of the PTA medication list.

2.3.1 Numerator Details

The first criterion requires that the medical record contain a designated PTA Medication List to document medications that the patient is taking prior to admission. Documenting PTA medications in a designated location eliminates the potential for duplicative or inconsistent documentation of medication histories, avoids the potential for omitted medications, and provides a master source of PTA medication for easy reference by providers. PTA medications may include prescriptions, over-the-counter medications, herbals, vitamin/mineral/dietary (nutritional) supplements, and/or medical marijuana. This criterion aligns with one of the five elements of The Joint Commission’s National Patient Safety Goal (NPSG.03.06.01)⁹ on medication reconciliation.

The second criterion requires that facilities consult at least one source external to the facility’s records to increase comprehensive capture of all active medications on the PTA medication list. Incomplete or inaccurate PTA medication lists may result in inadequate medication reconciliation actions by the prescriber, which may lead to medication errors and ADEs. Given the absence of a single, accurate source of information on PTA medications

(gold standard), the measure establishes a minimum standard for compiling PTA medication information rather than being prescriptive regarding which sources should be referenced. This requirement also aligns with other existing NQF-endorsed measures that focus on medication reconciliation. The measure allows for a wide-range of external sources to account for situations where the routinely consulted source fails to generate the information needed. For example, the patient may not be able or willing to provide information on PTA medications or a retail pharmacy may be closed or not willing to disclose PTA medications without obtaining prior patient consent. Therefore, to meet the *External Source* requirement, the facility can reference one or more of the following sources to compile the PTA medication list:

- Interview of the patient or patient proxy such as a caregiver
- Medication container brought in by patient or patient proxy
- Medication list brought by patient or patient proxy
- Patient support network, such as a group home
- Nursing home
- Outpatient prescriber or emergency department
- Retail pharmacy
- Prescription Drug Monitoring Program (PDMP)
- Electronic prescribing network system (e.g., Allscripts®, Surescripts®) or aggregate pharmacy billing records (such as, claims data using state/federal healthcare plans)

The third and final criterion requires that a licensed prescriber reconciles each medication on the PTA Medication List by the end of Day 2 of the hospitalization and documents whether the medication should be continued, discontinued, or modified. If there are no medications on the PTA medication list, the prescriber must sign the document by the end of Day 2 of the hospitalization to indicate his or her review of the PTA medication list for consideration in future treatment decisions. For example, information that indicates the patient is not taking any medications may be important to communicate to the treatment team because there may be a need to initiate treatment of indications that are discovered during admission. Signing the PTA medication list by the end of Day 2 of the hospitalization also helps to improve communication between members of the care team and other providers during care transitions. To simplify chart abstraction and prevent abstractors from having to distinguish between medications, herbal supplements, and other remedies a patient might take, all entries on the PTA medication list must be reconciled to meet the requirements of the third criterion.

For additional details on each of the data elements included in the measure construct, refer to *Appendix B. Data Dictionary* and *Appendix C. Data Collection Tool*.

2.4 Measure Scoring Methodology

2.4.1 Measure Calculation

The three criteria were summarized into one overall pass/fail measure score at the record level to allow for a simple and intuitive interpretation of the facility-level performance score. All three criteria must be met for a given record to pass the measure. To obtain facility-level measure scores, the measure calculates the percentage of records in the denominator that pass the measure. For more details on the scoring methodology, refer to the measure algorithm under Section 5.3 of this report.

2.4.2 Statistically Significant and Meaningful Differences in Performance

To determine statistically significant differences across the small sample of testing facilities, the Measure Developer calculated the final scores and 95% confidence intervals for each facility using the following formula:

$$S_{\text{final score}} = 100 * p$$

$Se_{\text{final score}} = 100 * \sqrt{\frac{p(1-p)}{n}}$, where p represents the proportion of patients meeting all four criteria in the study population and follows a binomial distribution. The 95% confidence interval for the final score is: $S_{\text{final score}} \pm 1.96 * Se_{\text{final score}}$.

Visual examination of a forest plot depicting measure scores and 95% confidence intervals for each facility was used to illustrate whether a given pair of IPFs has statistically significant differences in performance.

2.5 Measure Harmonization

Throughout the development process, the Measure Developer harmonized the measure specifications to the extent possible with existing measures that contain similar data elements. Measures with the same focus or target population that have disparate specifications can create confusion among healthcare consumers and providers with not only the interpretation of the measure results across settings or patient populations, but also with how the measure scores are calculated.

To align definitions with other measures that establish a designated timeframe by which a given process must be completed from admission, the Measure Developer harmonized the *Medication Reconciliation on Admission* measure with the technical specifications of SUB-1 Alcohol Use Screening (NQF 1661) and TOB-1 Tobacco Use Screening (NQF 1651), developed by The Joint Commission. Both measures define the length of stay in calendar days. Standardizing definitions for calculating length of stay using the admission and discharge dates without factoring-in the admission and discharge times will not only help reduce confusion across measures but also help to improve the reliability of the measure scores by eliminating the need to capture times, which were found to be unreliable during field testing. The measure is also aligned in the calculation of the process relative to the admission day. Per the data definitions of NQF 1661 and NQF 1651 measures, the admission day is considered Day 0, the next hospitalization day is Day 1, and so forth. For this measure, the process is required by the end of Day 2.

The Measure Developer aligned (where feasible) the *Transfer From an Acute Care Setting* data element of this measure with the data definition of the data element *Transfer From Another Hospital or ASC* used in the SEP-1 Early Management Bundle, Severe Sepsis/Septic Shock measure, included in the Inpatient Quality Reporting (IQR) program.

To develop the three data elements associated with the medication reconciliation process, the Measure Developer compared the conceptual descriptions and definitions of five NQF-endorsed measures (NQF 0553, NQF 2988, NQF 0293, NQF 0646, and NQF 0097) that evaluate the medication reconciliation process. Four of the five measures explicitly require a designated medication list. For this measure, the Measure Developer operationalized that requirement with the *Designated PTA Medication List* data element. Of the three measures that required collection of medications, two had requirements for the types of sources that should be referenced to compile the list. For the *Medication Reconciliation on Admission* measure, the Measure Developer set to establish a minimum standard and aligned with the approach to require “one or more external sources.” While several measures required the type of information to be collected on each medication, the Measure Developer decided not to include those data elements in this measure given the high performance and low variation for those data elements in testing. Each of the measures defines the process of reconciling the medications on the list differently. The Measure Developer incorporated aspects of each definition that are most applicable to the IPF setting. For example, the Measure Developer aligned with measures that require that the reconciliation be completed by a prescriber and that there be documentation of whether each medication be continued, modified, or discontinued.

Finally, the Measure Developer considered different approaches to scoring the measure. Four of the five NQF-endorsed measures require that all aspects of the medication reconciliation process be completed for a patient to pass the measure. The fifth measure evaluates the number of patient months for which the medication reconciliations were completed, however, this is only applicable in the outpatient setting. Therefore, the Measure Developer aligned the scoring approach to produce measure scores that represent the percentage of admissions that meet all the medication reconciliation criteria.

2.6 Reliability and Validity Testing

2.6.1 Reliability

2.6.1.1 Data Element Reliability

Two trained abstractors at each IPF independently completed data ascertainment for all measure elements using a random subset of approximately 20 patient records per facility for a total subsample of 175 patient records (Table 5). There were five cases that could not be used for the inter-rater reliability (IRR) testing because these cases had differing admission dates and/or times and could not be matched to cases reviewed by both abstractors.

Table 5. Distribution of Records Available for Inter-rater Reliability Analysis Across IPFs

	IPF 1	IPF 2	IPF 3	IPF 4	IPF 5	IPF 6	IPF 7	IPF 8	IPF 9	Total
IRR cases	19	20	18	20	20	20	19	19	20	175

Paired abstractors used a structured medical record abstraction tool developed in Microsoft Excel to independently collect data elements used to define the measure population and to calculate the measure score. Inter-rater reliability between the two abstractors at each site and for each data element used to calculate the measure score was assessed using percent overall agreement and Cohen's Kappa statistic. "Agreed" means the two abstractors provided consistent answers to the same data element question. Cohen's Kappa is a measure of inter-rater agreement that accounts for abstractors' agreement by chance alone. It is standardized on a -1 to 1 scale, where 1 is perfect agreement, 0 is exactly what would be expected by chance, and negative values indicate agreement less than by chance (such as, systematic disagreement between abstractors). A common scale is used to interpret Kappa statistics: 0.01–0.20 is considered slight agreement; 0.21–0.40 is fair agreement; 0.41–0.60 is moderate agreement; 0.61–0.80 is substantial agreement; 0.81–0.99 is almost perfect agreement.³²

To calculate Cohen's Kappa, the abstractors' responses for all patients were organized into four categories (P_{11} : (1, 1), P_{10} : (1, 0), P_{01} : (0, 1) and P_{00} : (0, 0)) for each facility. For each IPF, overall agreement and Cohen's Kappa were calculated.

Cohen's Kappa was calculated based on the following formula:

$$\text{Cohen's Kappa} = \frac{P_o - P_e}{1 - P_e}$$

In which P_o is the observed proportion of agreement and P_e is the expected proportion of agreement.

$$P_o = P_{11} + P_{00}$$

$$P_e = (P_{11} + P_{10}) * (P_{11} + P_{01}) + (P_{00} + P_{10}) * (P_{00} + P_{01})$$

Kappa is reported as aggregate across facilities.

$$\text{Pooled Kappa} = \frac{\bar{P}_o - \bar{P}_e}{1 - \bar{P}_e}$$

In which \bar{P}_o is the mean of the P_o s and \bar{P}_e is the mean of the P_e s across the nine IPFs. The 95% confidence interval of the pooled kappa is $K \pm 1.96 * SE_k$, in which $SE_k =$

$$\sqrt{\frac{\bar{P}_o(1 - \bar{P}_o)}{n * (1 - \bar{P}_e)^2}}$$

2.6.1.2 Performance Measure Score Reliability

The Measure Developer used the following formula to calculate the reliability of the score for each IPF, reflecting a signal-to-noise ratio.

$$\text{Reliability} = \frac{\sigma_{\text{Between-IPFs}}^2}{\sigma_{\text{Between-IPFs}}^2 + \sigma_{\text{Within-IPFs}}^2}$$

In which $\sigma_{\text{Between-IPFs}}^2$ is the variance of scores between IPFs and $\sigma_{\text{Within-IPFs}}^2$ is the variance within IPFs.

2.6.2 Validity

2.6.2.1 Systematic Assessment of Face Validity

Face validity of the measure score was obtained by a TEP vote at the conclusion of measure refinement. The TEP was provided with the final measure specifications and presented the results of field testing. After review and discussion, HSAG asked the TEP members to indicate whether they agree, disagree, or are unable to rate the following face validity statement:

“The performance scores resulting from the Medication Reconciliation on Admission measure, as specified, can be used to distinguish good from poor facility-level quality related to the process of collecting and reconciling medications on admission to an inpatient facility.”

3. Results

This section provides the results of analyses that informed the final measure specifications, including analyses of denominator exclusions and analyses to evaluate reliability of measure scores.

3.1 Denominator Exclusions

The Measure Developer empirically evaluated the impact of both of the exclusion criteria on the measure denominator. Based on preliminary analyses of Medicare fee-for-service (FFS) claims data, there were 443,708 Medicare IPF admissions between October 1, 2015, and September 30, 2016. Of these, 6.1% (26,936/443,708) were admissions with a length of stay less than two days and 26.3% (116,545/443,708) were admissions from transfers from an acute care setting. This information may not be completely generalizable to IPF admissions reimbursed by other insurers or to uninsured patients. However, because the measure will be abstracted using a sample rather than the entire population, the Measure Developer anticipates that the narrower measure population will have a minimal impact on the facility-level denominators.

3.2 Measure Scores

3.2.1 Results and Interpretation

The range of scores for each of the three criteria of the medication reconciliation process is shown in Table 6. The percentage of admissions in the cohort with a designated PTA Medication List (Criterion 1) ranged from 70% to 100%. The percentage of admissions with one or more external sources referenced to generate the PTA Medication List (Criterion 2) ranged from 20% to 100% across facilities. If the measure is implemented, the Measure Developer anticipates that most facilities will improve on these first two criteria by incorporating designated PTA medication list forms with standardized ways of documenting the sources referenced to generate the list into their electronic or paper medical records.

The percentage of admissions for which all PTA medications have a reconciliation action of continue, discontinue, or modify by the end of Day 2 of the hospitalization, or for which the designated PTA medication list was signed by the end of Day 2 of the hospitalization if there were no medications on the PTA medication list (Criterion 3), ranged from 8% to 98% across facilities. Note that the original field testing used a 24-hour timeframe from admission to sign forms without PTA medications and no timestamps were ascertained to allow for re-calculation using the end of Day 2 cutoff. Therefore, the results for Criterion 3 reflect a more stringent timeframe for records with no PTA medications than will be used if the measure is implemented.

The average measure score was 50% with a standard deviation of 32% and ranged from 7% to 98% across the nine facilities.

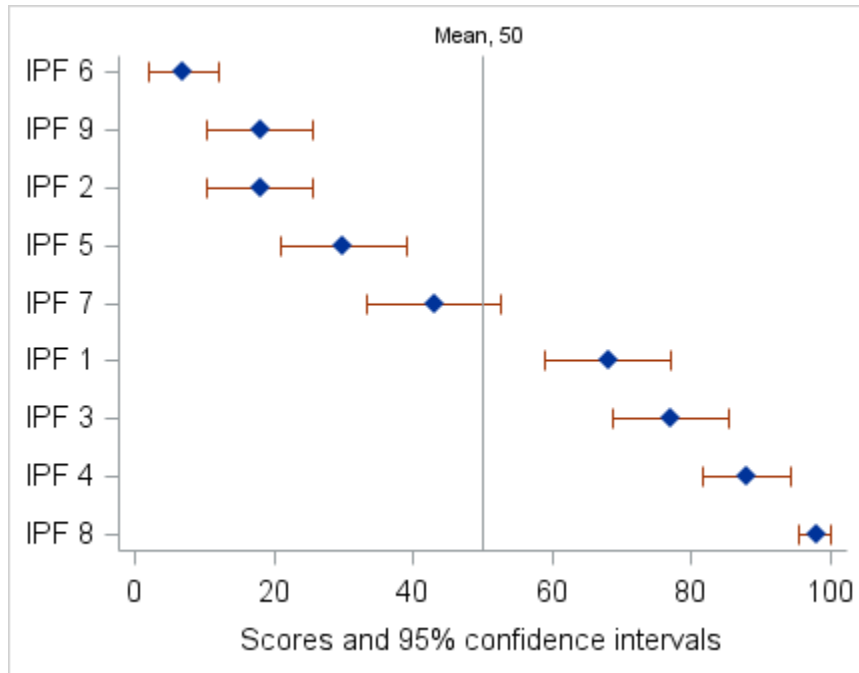
Table 6. Overall Measure Performance Score

	IPF 1	IPF 2	IPF 3	IPF 4	IPF 5	IPF 6	IPF 7	IPF 8	IPF 9	Avg	Range
% Designated PTA Medication List (Criterion 1)	100	70	100	100	71	89	100	100	77	90	70–100
% External Source (Criterion 2)	97	20	100	100	40	73	88	100	74	77	20–100
% Action by the end of Day 2 or PTA Med List signed within 24-hours if no meds (Criterion 3)	69	62	77	88	55	8	44	98	18	58	8–98
Measure Score	68	18	77	88	30	7	43	98	18	50	7–98
95% CI	59, 77	10, 26	69, 85	82, 94	21, 39	2, 12	33, 53	95, 100	10, 26	N/A	N/A

3.2.2 Statistically Significant and Meaningful Differences in Performance

Figure 1 displays facility scores with 95% confidence intervals (CI) sorted by score. Owing to the broad range of facility-level results, the forest plot illustrates that scores readily discern high- and low-performing facilities. Each facility had scores that were statistically significantly different from at least five of the eight other facilities. All but one facility had scores that were statistically significantly different from the mean measure score. The clinical interpretation of these results suggests substantial differences and ample opportunity for improvement across IPFs in the completeness and timeliness of the medication reconciliation process. This is expected to translate into clinically meaningful differences in reduction of medication discrepancies and preventable ADEs.

Figure 1. Facility Measure Scores with 95% Confidence Intervals



3.3 Reliability and Validity Testing

3.3.1 Reliability

3.3.1.1 Data Element Reliability Results and Interpretation

Inter-rater reliability results are shown in Table 7. For simplicity and computational efficiency, a normal distribution of data was assumed to establish confidence intervals. The confidence intervals for the pooled Cohen’s Kappa may therefore generate upper limits smaller than -1.00 or greater than 1.00, which were truncated to -1.00 and 1.00, respectively.

Table 7. Percent of Agreement and Cohen’s Kappa for Measure Score Data Elements

Data Element	All Records	Agreed	% Agreement	Cohen’s Kappa (Confidence Interval)
Designated PTA Medication List	175	166	94.9	0.67 (0.46, 0.88)
External Source	175	131	74.9	0.18 (-0.04, 0.39)
Reconciliation Action	126	118	93.7	0.66 (0.40, 0.91)

Data Element	All Records	Agreed	% Agreement	Cohen's Kappa (Confidence Interval)
Reconciliation Action by End of Day 2 or PTA Medication List signed within 24-hours if no medications	175	157	89.7	0.53 (0.28, 0.77)
Total data elements	651	572	87.9	0.61 (0.53, 0.69)

The percentage of overall agreement across the four scoring data elements was 87.9%. The pooled Cohen's Kappa score for the data elements across all nine facilities was 0.61 (95% CI: 0.53, 0.69), indicating substantial agreement (Table 8).³² The data element with the lowest agreement and Cohen's Kappa score was *External Source* (Criterion 2).

The relatively lower agreement rate for Criterion 2 is likely inherent in current medical record documentation practices, which do not require specification of which sources were used to ascertain PTA medications. Thus, abstractors had to read through admission and progress notes to identify potential sources of PTA medications. It is likely that IPFs will integrate designated fields or check boxes into their medical records if the measure were implemented. This would simplify and standardize data ascertainment and improve communication with other members of the care team and providers about the source of medications on the PTA medication list.

Table 8 provides the Cohen's Kappa score for each facility except IPF 8, which could not be calculated due to perfect agreement between abstractors. Based on the standard interpretation of the scores, IPF 5 had slight agreement, IPF 6 and IPF 7 had moderate agreement, IPF 3 had substantial agreement, and IPF 1, IPF 2, IPF 4, and IPF 9 had perfect agreement. Facility 5 identified several reasons for discrepancies, including how each abstractor handled inconsistent documentation (such as, the reconciliation action was dated after discharge, which was corrected by one abstractor but used verbatim by the other). Discrepancies at IPF 3 and IPF 7 can be explained in part by different interpretations of admission time, which led to different responses to whether some cases completed the medication reconciliation by the end of Day 2 of the hospitalization. Instructions to use the time of the physician admission order have been added to the abstraction instructions to eliminate the need for interpretation and clarify which timestamp should be used.

Table 8. Cohen's Kappa within Facilities

	IPF 1	IPF 2	IPF 3	IPF 4	IPF 5	IPF 6	IPF 7	IPF 8	IPF 9	Pooled Kappa
Total data elements (95% CI)	0.65 (0.45, 0.85)	0.82 (0.69, 0.96)	0.18 (-0.14, 0.49)	0.85 (0.56, 1.00)	0.32 (0.11, 0.53)	0.57 (0.39, 0.75)	0.37 (0.10, 0.64)	N/A	1.00 (1.00, 1.00)	0.61 (0.53, 0.69)

3.3.1.2 Performance Measure Score Reliability Results and Interpretation

The reliability for each IPF measure score is shown in Table 9. The high coefficients reflect small variances within IPF scores and large variance of scores across facilities and indicate that the measure score is highly reliable with a sample of 100 records.

Table 9. Reliability for Each IPF Final Measure Score

	IPF 1	IPF 2	IPF 3	IPF 4	IPF 5	IPF 6	IPF 7	IPF 8	IPF 9
Between IPFs σ^2	1143	1143	1143	1143	1143	1143	1143	1143	1143
Within IPF σ^2	21.8	14.8	17.7	10.6	21	6.5	24.5	2.0	14.8
Reliability	0.9813	0.9873	0.9847	0.9908	0.9820	0.9943	0.9790	0.9983	0.9873

3.3.2 Validity

3.3.2.1 Systematic Assessment of Face Validity Results and Interpretation

The measure developer obtained a face validity vote during the July 2017 TEP meeting. All 19 of the 21 TEP members in attendance at the meeting voted in favor that the performance scores resulting from the *Medication Reconciliation on Admission* measure, as specified, can be used to distinguish good from poor facility-level quality related to the process of collecting and reconciling medications on admission to an inpatient facility. The results of the votes are shown in Table 10.

Table 10. Face Validity Results by Agreement Category

Agreement Category	Number of Votes	Percent
Agree	19	90.5%
Disagree	0	0%
Unable to rate	2	9.5%

3.4 Limitations

Since minor changes to the measure specifications were made based on the results of testing and at the request of the TEP, the following limitations of the results presented in this section should be noted.

1. Excluding admissions with length of stay shorter than 2 calendar days could not be operationalized since the discharge date was not collected during field testing. Therefore, only admissions <24 hours were excluded.
2. For admissions with no medications on the PTA medication list, abstractors were only asked to indicate whether the PTA medication list was signed within 24 hours of admission and no detail on the date/time of the signature was collected during field testing. Thus, measure scores for records with no PTA medications reflect the more stringent 24-hour turn-around time for the medication reconciliation action (29% of all charts with a range of 3%-47%).

Due to these limitations in the data, the results presented may be slightly underestimated. However, the changes to the specifications improve both usability and feasibility of the measure.

4. Summary

The *Medication Reconciliation on Admission* measure assesses whether three essential criteria of the medication reconciliation process are completed at the beginning of the inpatient psychiatric hospitalization. All three of the following criteria of the medication reconciliation process must be met for a record to pass the measure:

1. Medications taken by the patient prior to admission are documented on a designated PTA medication list.
2. A PTA medication list is generated using at least one external source to identify the medications taken by the patient prior to admission.
3. All medications listed on the PTA medication list have a reconciliation action by the end of Day 2 of the hospitalization, or if there are no medication on the PTA medication list, the prescriber has signed the document by the end of Day 2 of the hospitalization to indicate his or her review of the PTA medication list.

The data used to calculate the measure can be reliably abstracted and measure rates were highly reliable with a sample of 100 records per facility. Measure performance rates from nine test facilities found significant variation in performance across facilities and confirmed that there is ample opportunity for improvement in the medication reconciliation process. The average measure score was 45% with a range from 7% for the lowest performing facility to 98% for the highest performing facility. The range in scores allows for low- and high-quality care related to this process to be easily discernable.

Implementation of the *Medication Reconciliation on Admission* measure can provide valuable information to facilities related to existing quality gaps in the medication reconciliation processes, which could lead to a reduction in medication discrepancies and ADEs. A comprehensive medication reconciliation process is particularly important for the psychiatric population whose conditions often require pharmacotherapy and who may not always be able to report PTA medications on admission to an inpatient setting. CMS envisions the addition of this measure to the suite of measures for IPFs will provide valuable information to consumers and providers on the quality of care patients receive at those facilities.

5. Final Measure Specifications

5.1 Measure Information Form

Performance Measure Name: Medication Reconciliation on Admission

Description: Percentage of admissions with documentation of a completed medication reconciliation by the end of Day 2 of the hospitalization.

Rationale: The Institute for Healthcare Improvement defines medication reconciliation as “the process of creating the most accurate list possible of all medications a patient is taking...and comparing that list against the physician’s admission, transfer, and/or discharge orders, with the goal of providing correct medications to the patient at all transition points within the hospital.” (Institute for Healthcare Improvement, 2017). While medication reconciliation should occur at all transition points during the inpatient stay, this measure focuses on medication reconciliation on admission because information collected at this transition point is critical to inform treatment decisions during the inpatient stay and at discharge. By collecting adequate information about a patient’s PTA medications, recording the information in a single location in the medical record for easy reference, and reconciling this information in a timely manner, clinicians can avoid potentially harmful medication discrepancies. A thorough reconciliation process is important in the IPF setting because pharmacotherapy is a primary form of treatment for patients with severe psychiatric illnesses and the accuracy of self-reported PTA medications may be compromised by severe psychiatric symptoms.

Studies in both the psychiatric and non-psychiatric settings have found that medication discrepancies are present in more than half of medical records for inpatient stays. (Brownlie, 2014; Cornish, 2005). There is evidence to suggest that most medication discrepancies in inpatient medical records result from the failure to collect and reconcile PTA medications. The Multicenter Medication Reconciliation Quality Improvement Study (MARQUIS), which was conducted in six U.S. hospitals, reported an average of 3.35 unintentional medication discrepancies per patient with most medication discrepancies (2.12 per patient) resulting from failure to accurately identify the patient’s PTA medications (Salanitro, 2013). The Medications At Transitions and Clinical Handoff (MATCH) study evaluated 651 inpatient stays and found that as many as 85% of admissions with medication errors had errors that originated from incomplete collection of the medication history (Gleason, 2010).

To reduce discrepancies that result from inadequate collection and reconciliation of PTA medications, the *Medication Reconciliation on Admission* measure is constructed to align with the two elements of performance of The Joint Commission’s National Patient Safety Goal (NPSG.03.06.01) on medication safety that are relevant to the admission process (The Joint Commission, 2017). These elements are:

- Obtain information on the medications the patient is currently taking when he or she is admitted to the hospital or is seen in an outpatient setting. This information is documented in a list or other format that is useful to those who manage medications.
- Compare the medication information the patient brought to the hospital with the medications ordered for the patient by the hospital in order to identify and resolve discrepancies.

Type of Measure: Process

Improvement Noted As: Increase in percentage

Numerator Statement: Number of admissions with a designated PTA medication list generated by referencing one or more external sources of medications for which all PTA medications have a documented reconciliation action by the end of Day 2 of the hospitalization.

Data Elements:

- Admission Date
- Designated PTA Medication List

- Discharge Date
- External Source
- Length of Stay
- Reconciliation Action
- Reconciliation Action by End of Day 2
- Transfer From an Acute Care Setting

Denominator Statement: Admissions to an inpatient facility from home or a non-acute setting

Included Populations: Admissions to an inpatient facility from home or a non-acute setting

Excluded Populations:

- Admissions with a length of stay less than two days
- Admissions that result from transfer from an acute care setting

Data Elements:

- Admission Date
- Discharge Date
- Length of Stay
- Transfer From an Acute Care Setting

Risk Adjustment: No

Data Collection Approach: Retrospective data sources for required data elements include medical record documents. Some hospitals may prefer to gather data concurrently. This approach provides opportunities for improvement at the point of care/service.

Data Accuracy: Data accuracy is enhanced if all definitions are used without modification. The data dictionary should be referenced for definitions and abstraction notes when questions arise during data collection.

Sampling: The sampling approach for this measure will align with Option 2 sampling methodology described in the Inpatient Psychiatric Facility Quality Reporting Program Manual (dated November 10, 2016) and is shown in Table 11.

Table 11. IPFQR Measures Global Population and Sampling

Total Number of Annual Discharges	Number of Records to be Sampled
≥6,117	1,224
3,057 – 6,116	20% of initial patient population
609 – 3,056	609
0 – 608	All cases

Data Reported As: The percentage of admissions with documentation of a completed medication reconciliation by end of Day 2 of the hospitalization.

Selected References:

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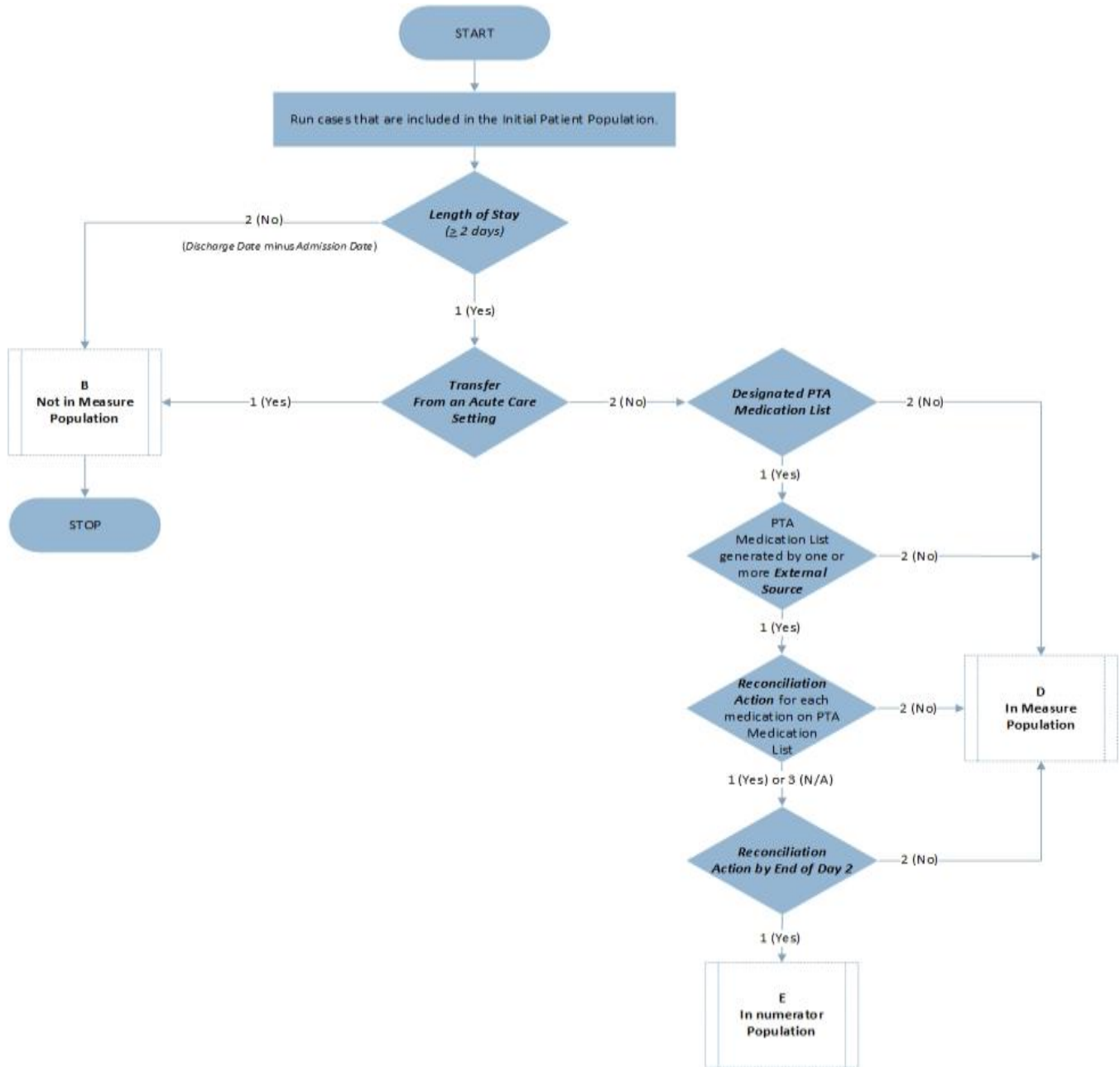
5.3 Measure Algorithm

Measure Name: Medication Reconciliation on Admission

Numerator Statement: Number of admissions with a designated PTA medication list generated by referencing one or more external sources of medications for which all PTA medications have a documented reconciliation action by the end of Day 2 of the hospitalization.

Denominator Statement: Admissions to an inpatient facility from home or a non-acute setting.

Figure 2. Measure Algorithm



Medication Reconciliation on Admission Narratives

Measure Name: Medication Reconciliation on Admission

Numerator Statement: Number of admissions with a designated PTA medication list generated by referencing one or more external sources of medications for which all PTA medications have a documented reconciliation action by the end of Day 2 of the hospitalization.

Denominator Statement: Admissions to an inpatient facility from home or a non-acute setting.

Measure Population:

1. Start processing. Run cases that are included in the Initial Patient Population as follows:
2. Check *Length of Stay* (automatically calculated in hours as equal to the *Discharge Date* and *Discharge Time* minus the *Admission Date* and *Admission Time*).
 - a. If the *Length of Stay* is equal to 1 (Yes), the case is greater than or equal to two days. Continue processing and proceed to *Transfer From an Acute Care Setting*.
 - b. If the *Length of Stay* is equal to 2 (No), the case is less than two days and the record will proceed to Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
3. Check *Transfer From an Acute Care Setting*.
 - a. If the *Transfer From an Acute Care Setting* is equal to 1 (Yes), the case was admitted from a transfer from an acute care setting and the record will proceed to Measure Category Assignment of B and will not be in the Measure Population. Stop processing.
 - b. If the *Transfer From an Acute Care Setting* is equal to 2 (No), the case was admitted from an admission source other than an acute care setting. Continue processing and proceed to *Designated PTA Medication List*.
4. Check *Designated PTA Medication List*.
 - a. If the *Designated PTA Medication List* is equal to 1 (Yes), continue processing and proceed to *External Source*.
 - a. If the *Designated PTA Medication List* is equal to 2 (No), the record will proceed to Measure Category Assignment of D and will be in the Measure Population. Stop processing.
5. Check *External Source*.
 - a. If *External Source* is equal to 1 (Yes), continue processing and proceed to *Reconciliation Action*.
 - b. If *External Source* is equal to 2 (No), the record will proceed to Measure Category Assignment of D and will be in the Measure Population. Stop processing.
6. Check *Reconciliation Action*.
 - a. If *Reconciliation Action* is equal to 1 (Yes) or 3 (N/A), continue processing and proceed to *Reconciliation Action by End of Day 2*.
 - b. If *Reconciliation Action* is equal to 2 (No), the record will proceed to Measure Category Assignment of D and will be in the Measure Population. Stop processing.
7. Check *Reconciliation Action Within Two Days of Admission*.
 - a. If *Reconciliation Action by End of Day 2* is equal to 1 (Yes), the record will proceed to Measure Category Assignment of E and will be in the Numerator Population. Stop processing.
 - b. If *Reconciliation Action by End of Day 2* is equal to 2 (No), the record will proceed to Measure Category Assignment of D and will be in the Measure Population. Stop processing.

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Appendix A. List of Acronyms and Abbreviations

Avg	Average
ADE	Adverse drug event
CI	Confidence interval
CMS	Centers for Medicare & Medicaid Services
H&P	History and physical
HSAG	Health Services Advisory Group, Inc.
IOM	Institute of Medicine
IPF	Inpatient psychiatric facility
IPFQR	Inpatient Psychiatric Facility Quality Reporting
IRR	Inter-rater reliability
MARQUIS	Multicenter Medication Reconciliation Quality Improvement Study
MATCH	Medications At Transitions and Clinical Handoff Study
NPSG	National Patient Safety Goal
NQF	National Quality Forum
PDMP	Prescription Drug Monitoring Program
PTA	Prior to admission
TEP	Technical expert panel

Appendix B. Data Dictionary

Data Dictionary

Data Element Name: Admission Date

Definition: The month, day, and year of admission to an inpatient facility.

Suggested Data Collection Question: What was the date the patient was admitted to the inpatient facility?

Format:

Length: 10 – MM-DD-YYYY (includes dashes)

Type: Date

Occurs: 1

Allowable Values:

Date:

MM = Month (01-12)

DD = Day (01-31)

YYYY = Year (20xx)

Notes for Abstraction:

- The intent of this data element is to determine the date that the patient was admitted to an inpatient facility, as evidenced by an admission order. Because this data element is critical in determining the population for the measure, the abstractor should NOT assume that the billing or claim information for the admission date is correct. If the abstractor determines through chart review that the date from billing is incorrect, for purposes of abstraction, she or he should enter the correct admission date and time documented in the admission order. Admission dates from billing information should only be considered if the admission order is not available or does not include a date.
- For patients who are admitted to Observation status and subsequently admitted to inpatient care, abstract the date that the order was made to admit to inpatient care. Do not abstract the date that the patient was admitted to Observation.
Example: Medical record documentation reflects that the patient was admitted to observation on 04-05-20xx. On 04-06-20xx, the physician writes an order to admit to inpatient care effective 04-05-20xx. The Admission Date would be abstracted as 04-06-20xx, the date the determination was made to admit to inpatient care and the order was written.
- If there are multiple inpatient admission orders, use the order that most accurately reflects the date that the patient was admitted, based on other documentation in the record.
- For interrupted stays, where the patient is readmitted to the facility, use the admission order that most accurately reflects the admission date that corresponds to the stay that is being reviewed.

Suggested Data Sources:

Note: The physician order is the priority data source for this data element.

Only Allowable Sources:

1. Physician order
2. Face sheet
3. UB-04

Excluded Data Sources:

UB-04 “From” and “Through” dates

Inclusion Guidelines for Abstraction:

None

Exclusion Guidelines for Abstraction:

- Admit to observation
- Arrival date
- Emergency department (ED) admission date
- ED admission date

Data Element Name: Designated PTA Medication List

Definition: Documentation in the medical record on a form or within an area exclusively designated to capture a comprehensive list of all medications that the patient was taking prior to admission (Prior to Admission [PTA] Medication List) and used for the purpose of reconciling each medication.

Suggested Data Collection Question: Does the medical record contain a dedicated PTA Medication List that documents medications that the patient is taking prior to admission (even if there are no medications on the PTA Medication List)?

Format:

Length: 1

Type: Alphanumeric

Occurs: 1

Allowable Values:

1 (Yes) There is a designated PTA Medication List that is located outside of a progress note or history and physical (H&P).

2 (No) There is a no designated PTA Medication List that is located outside of a progress note or H&P.

Notes for Abstraction:

- The abstractor should choose “1 (Yes)” if the record contains a designated form or area for the documentation of the PTA Medication List, even if there are no PTA medications listed on the form or medication reconciliation area or the form/area is blank.
- The abstractor should choose “2 (No)” if:
 - The record does not contain a form/area for the documentation of the PTA Medication List.
 - The PTA Medication List is documented on a practitioner’s note or in a form/area not exclusively designated for medication reconciliation (e.g., H&P, progress notes, nurse’s notes, admissions record).

Only Allowable Sources:

PTA Medication List

Inclusion Guidelines for Abstraction:

None

Exclusion Guidelines for Abstraction:

- A PTA Medication List that is documented on a practitioner’s note (such as, H&P, progress notes, nurse’s note, admissions record) but not in a designated document/area of the chart to perform the medication reconciliation.

Data Element Name: Discharge Date

Definition: The month, day, and year of discharge from an inpatient facility.

Suggested Data Collection Question: What was the date the patient was discharged from the inpatient facility?

Format:

Length: 10 – MM-DD-YYYY (includes dashes)

Type: Date

Occurs: 1

Allowable Values:

Date:

MM = Month (01-12)

DD = Day (01-31)

YYYY = Year (20xx)

Notes for Abstraction:

- Because this data element is critical in determining the population for the measure, the abstractor should NOT assume that the claim information for the discharge date is correct. If the abstractor determines through chart review that the date is incorrect, she or he should correct and override the value. If the abstractor is unable to determine the correct discharge date through chart review, she or he should default to the discharge date on the claim information.

Only Allowable Sources:

1. Physician orders
2. Death certificate
3. Discharge summary
4. Nursing discharge notes
5. Transfer note
6. Face sheet
7. UB-04

Inclusion Guidelines for Abstraction:

None

Exclusion Guidelines for Abstraction:

None

Data Element Name: External Source

Definition: Documentation that external sources were used to generate the PTA Medication List.

Suggested Data Collection Question: Were one or more external sources from the acceptable list referenced to generate the PTA Medication List?

Format:

Length: 1

Type: Alphanumeric

Occurs: 1

Allowable Values:

- | | |
|---------|------------------------------------------------------------------------------------------------------------------|
| 1 (Yes) | There is documentation that one or more external sources were referenced to generate the PTA Medication List. |
| 2 (No) | There is no documentation that one or more external sources were referenced to generate the PTA Medication List. |

Notes for Abstraction:

- The intent of this data element is to set a minimum standard for the collection of medications for the PTA Medication List by referencing one or more external sources to generate the PTA Medication List.
- The intent of this data element is not to capture an external source for each medication, but rather capture documentation in the medical record that demonstrates that one or more external sources were referenced to generate the PTA Medication List.
- To answer “1 (Yes)” to this data element, there must be explicit documentation in the medical record that one or more of the following acceptable external sources were used to generate the PTA medication list:
 - Interview of the patient or patient proxy
 - Medication container brought in by patient or patient proxy
 - Medication list brought by patient or patient proxy
 - Patient support network, such as a group home
 - Nursing home
 - Outpatient provider or emergency department
 - Retail pharmacy
 - Prescription Drug Monitoring Program (PDMP)
 - Electronic prescribing network system (e.g., Allscripts®, Surescripts®) or aggregate pharmacy billing data (e.g., claims data using state/federal healthcare plans)
- A patient proxy is a healthcare agent or surrogate appointed by the patient who is legally authorized to make health care decisions on behalf of the patient in the event the patient is no longer competent to make his or her own healthcare decisions. For example: a legal guardian, durable power of attorney, or healthcare power of attorney.
- If the patient does not have an appointed healthcare agent or surrogate, a family member such as the spouse or domestic partner, child over eighteen years old, parent, or sibling over eighteen years old may serve as a patient proxy.
 - Only consider information that has been explicitly stated. For example, the medical record includes a note that the “patient states no longer taking this medication,” or “patient took this medication this morning.” Since interviewing the patient would have been necessary to obtain this information, it is correct to interpret that “Interview of the patient or patient proxy” was an external source used to generate the PTA Medication List.
- External sources can include PTA medication information that is provided upon request by the inpatient facility from pharmacies, outpatient providers, or other institutional settings.
- If a patient moves from one level of care to another within an integrated system, the electronic health record from the lower level of care (outpatient) may be considered as an external source.

- Documentation that an attempt was made within two days of admission to contact a retail pharmacy to obtain a list of PTA medications, but the retail pharmacy was closed is NOT sufficient to meet this criterion.

Suggested Data Sources:

- The entire medical record can be referenced to ascertain if an external source was used to generate the PTA Medication List. Any documentation referencing any of the above-listed external sources in the medical record may be considered.

Inclusion Guidelines for Abstraction:

None

Exclusion Guidelines for Abstraction:

- PTA medications from a prior encounter through the facility's electronic health record.

Data Element Name: Length of Stay

Definition: Determination whether the length of stay in the inpatient psychiatric facility was two days or more.

Suggested Data Collection Question: Was length of stay during the inpatient facility admission two days or more?

Format:

Length: 1

Type: Alphanumeric

Occurs: 1

Allowable Values:

1 (Yes) The patient was admitted to the inpatient facility for two days or more.

2 (No) The patient was admitted to the inpatient facility for less than two days.

Notes for Abstraction:

- This data element is auto-populated, using the following formula: *Discharge Date* minus the *Admission Date*.

Only Allowable Sources:

- Date entered in the *Discharge Date* data element
- Date entered in the *Admission Date* data element

Inclusion Guidelines for Abstraction:

None

Exclusion Guidelines for Abstraction:

None

Data Element Name: Reconciliation Action

Definition: Documentation of a reconciliation action (continued, discontinued, or modified) for each of the medications listed on the PTA Medication List.

Suggested Data Collection Question: Do all the medications listed on the PTA Medication List have a documented reconciliation action of continue, discontinue or modify?

Format:

Length: 1

Type: Alphanumeric

Occurs: 1

Allowable Values:

- | | |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 1 (Yes) | All medications listed on the PTA Medication List have a documented reconciliation action of “Continued,” “Discontinued,” or “Modified.” |
| 2 (No) | Not all medications listed on the PTA Medication List have a documented reconciliation action of “Continued,” “Discontinued,” or “Modified.” |
| 3 (N/A) | Not applicable, the PTA Medication List does not contain any PTA medications for reconciliation. |

Notes for Abstraction:

- Any documentation that suggests the following three types of actions:
 - Continued
 - Discontinued
 - Modified
- A note of an initial decision including any of the above three types of actions is satisfactory even if the order is later changed.
 - Example, a prescriber documents: “continue as ordered,” but after review of the order, the medication dosage, route, and/or frequency was actually modified. This scenario would qualify as an acceptable action for the medication and the abstractor should select “1 (Yes).”
- If there are no medications listed on the PTA Medication List answer “3 (N/A).”

Only Allowable Sources:

Medication Reconciliation Form/Area

Inclusion Guidelines for Abstraction:

All medications listed on the PTA Medication List must have a reconciliation action and may include, but are not limited to prescriptions, over-the-counter medications, herbals, vitamin/mineral/dietary (nutritional) supplements, and/or medical marijuana.

Exclusion Guidelines for Abstraction:

None

Data Element Name: Reconciliation Action by End of Day 2

Definition: Each medication is reconciled by a licensed prescriber by the end of Day 2 of the hospitalization to the inpatient facility OR if there are no medications listed on the PTA Medication List, is the PTA Medication List signed by a licensed prescriber by the end of Day 2 of the hospitalization.

Suggested Data Collection Question: Are all of the reconciliation actions for each medication listed on the PTA Medication List documented as completed by the end of Day 2 of the hospitalization **OR** if there are no medications listed on the PTA Medication List, is the PTA Medication List signed by a licensed prescriber by the end of Day 2 of the hospitalization?

Format:

Length: 1

Type: Numerical

Occurs: 1

Allowable Values:

- | | |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 (Yes) | Each medication has a reconciliation action by a licensed prescriber by the end of Day 2 of the hospitalization to the inpatient facility OR the PTA Medication List is signed by a licensed prescriber by the end of Day 2 of the hospitalization if there are no medications on the PTA Medication List. |
| 2 (No) | Each medication does not have a reconciliation action by a licensed prescriber by the end of Day 2 of the hospitalization to the inpatient facility OR the PTA Medication List is not signed by a licensed prescriber by the end of Day 2 of the hospitalization if there are no medications on the PTA Medication List. |

Notes for Abstraction:

- To answer “1 (Yes)” to this data element, all the reconciliation actions for each medication must be documented as completed by the end of Day 2 of the hospitalization to the inpatient facility. If any reconciliation action is beyond the end of Day 2 of the hospitalization, the abstractor must select “2 (No).”
- If there are no medications listed on the PTA Medication List and the PTA Medication List was signed by a licensed prescriber by the end of Day 2 of the hospitalization answer “1 (Yes).”
- The signature by a licensed prescriber must be documented on the PTA Medication List or in the Medication Reconciliation Form/Area. Other documents that include such documentation are NOT acceptable.
- Electronic signature is acceptable.

Only Allowable Sources:

- PTA Medication List
- Medication Reconciliation Form/Area

Inclusion Guidelines for Abstraction:

All medications listed on the PTA Medication List must have a reconciliation action and may include, but are not limited to prescriptions, over-the-counter medications, herbals, vitamin/mineral/dietary (nutritional) supplements, and/or medical marijuana.

Exclusion Guidelines for Abstraction: None

Data Element Name: Transfer From an Acute Care Setting

Definition: Documentation that the patient was received as a transfer from an acute care setting.

Suggested Data Collection Question: Was the patient admitted to the inpatient facility from an acute care setting?

Format:

Length: 1

Type: Alphanumeric

Occurs: 1

Allowable Values:

1 (Yes) The patient was admitted to the inpatient facility from an acute care setting.

2 (No) The patient was not admitted to the inpatient facility from an acute care setting.

Notes for Abstraction:

- Admissions from another acute care setting (short-term acute care hospitals or inpatient psychiatric facilities) or an acute care setting within the same hospital are not included in the denominator because the medication reconciliation process is different for patients coming from these settings.
- Select “1 (Yes)” stop abstraction, and select another case if the patient was:
 - Transferred to your hospital from an outside acute care setting where he or she was an inpatient. This applies even if the two acute care settings are close in proximity, part of the same system, have the same provider number, and/or there is one medical record.
 - Transferred from another unit within the same hospital into the inpatient psychiatric unit.
- Select “2 (No)” if the patient was:
 - Transferred from an ED from another hospital or an ED that is part of your hospital’s system (e.g., your hospital’s free-standing or satellite emergency department), has a shared medical record or provider number, or is in close proximity.
 - Transferred from a long-term acute care (LTAC) hospital or unit outside or inside your facility.
 - Transferred from acute rehabilitation unit in outside hospital, free-standing rehab hospital/facility/pavilion, OR rehab hospital inside your facility.
 - Transferred from the following other types of facilities:
 - Urgent care center
 - Dialysis center (unless documented as an outpatient department of an outside hospital)
 - Same day surgery or other outpatient department inside your hospital
 - Clinic (outside or inside your hospital)
 - Assisted living facilities and nursing homes
 - Skilled nursing facility (SNF) care: Any facility or unit (outside or inside your hospital) providing SNF level of care to patient

For Conflicting Information or Unable to Determine Admission Source:

- Select “1 (Yes)” if there is conflicting documentation in the record, and you are unable to determine the admission source, UNLESS there is supporting documentation for one setting over the other.

Examples: One source reports patient was transferred from an outside inpatient acute care hospital; another source reports patient was transferred from an outside ED with no additional documentation. The information is conflicting; therefore, select “Yes.”

- One source states patient came from physician office; another source reports patient was transferred from an outside acute care hospital, and transfer records from the outside acute care hospital are

included in the record. Although there is conflicting documentation, there is more supporting documentation that the patient was transferred from an outside inpatient acute care hospital over the physician office. Select “1 (Yes).”

- Select “2 (No)” in cases other than conflicting documentation, you are unable to determine whether the patient was received as a transfer from an acute care setting (such as, “Transferred from Park Meadows” documented—documentation is not clear whether Park Meadows is a hospital or not.).

Suggested Data Sources:

- Ambulance record
- Emergency department record
- Face sheet
- History and physical
- Nursing admission assessment
- Physician order
- Progress notes
- UB04 – Filed 15 (Source of Admission)

Inclusion Guidelines for Abstraction:

- Transfers from long-term care facilities
- Transfers from emergency departments

Exclusion Guidelines for Abstraction:

Patients admitted from an acute care setting

Appendix C. Data Collection Tool

Question ID	Data Element Name	Data Collection Question	Format
1.	Transfer From an Acute Care Setting	<p>Was the patient admitted to the inpatient facility from an acute care setting?</p> <p><u>Allowable Values:</u></p> <ol style="list-style-type: none"> 1. Yes 2. No <p>If “1 (Yes)” stop abstraction, the case is not in the Measure Population. If “2 (No)” go to next question.</p>	Alphanumeric
2.	Admission Date	<p>What was the date the patient was admitted to the inpatient facility?</p>	Date (MM/DD/YYYY)
3.	Discharge Date	<p>What was the date the patient was discharged from the inpatient facility?</p>	Date (MM/DD/YYYY)
4.	Length of Stay	<p>Was length of stay during the inpatient facility admission two days or more?</p> <p><u>Allowable Values:</u></p> <ol style="list-style-type: none"> 1. Yes 2. No <p>If “1 (Yes)” go to next question. If “2 (No)” stop abstraction, the case is not in the Measure Population.</p>	Auto-calculated
5.	Designated PTA Medication List	<p>Does the medical record contain a dedicated PTA Medication List that documents medications that the patient is taking prior to admission (even if there are no medications on the PTA Medication List)?</p> <p><u>Allowable Values:</u></p> <ol style="list-style-type: none"> 1. Yes 2. No <p>If “Yes,” go to next question. If “No,” stop abstraction, the case is in the Measure Population.</p>	Alphanumeric
6.	External Source	<p>Were one or more external sources from the acceptable list referenced to generate the PTA Medication List?</p> <p><u>Allowable Values:</u></p> <ol style="list-style-type: none"> 1. Yes 2. No <p>If “Yes,” go to next question. If “No,” stop abstraction, the case is in the Measure Population.</p>	Alphanumeric
7.	Reconciliation Action	<p>Do all the medications listed on the PTA Medication List have a documented reconciliation action of continue, discontinue or modify?</p>	Alphanumeric

Question ID	Data Element Name	Data Collection Question	Format
		<p><u>Allowable Values:</u></p> <ol style="list-style-type: none"> 1. Yes 2. No 3. N/A <p>If “Yes” or “N/A,” go to next question. If “No,” stop abstraction, the case is in the Measure Population.</p>	
8.	Reconciliation Action by End of Day 2	<p>Are all of the reconciliation actions for each medication listed on the PTA Medication List documented as completed by the end of Day 2 of the hospitalization OR if there are no medications listed on the PTA Medication List, is the PTA Medication List signed by a licensed prescriber by the end of Day 2 of the hospitalization?</p> <p><u>Allowable Values:</u></p> <ol style="list-style-type: none"> 1. Yes 2. No <p>If “Yes,” stop abstraction, the case is in the Numerator Population. If “No,” stop abstraction, the case is in the Measure Population.</p>	Alphanumeric