



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 sub criterion 1b).

Brief Measure Information

NQF #: 3136

Corresponding Measures:

De.2. Measure Title: GAPPs: Rate of preventable adverse events per 1,000 patient-days among pediatric inpatients

Co.1.1. Measure Steward: Center of Excellence for Pediatric Quality Measurement

De.3. Brief Description of Measure: GAPPs is a measure of the number of preventable adverse events per 1,000 patient-days among pediatric inpatients. It is designed to compare rates across institutions and over time. The GAPPs measure utilizes the GAPPs trigger tool to identify adverse events.

1b.1. Developer Rationale: Patient safety is a core domain of healthcare quality and a major focus for quality improvement efforts.(1,2) GAPPs is the first and only available global patient safety measure tailored for pediatric populations. By measuring preventable adverse event rates (i.e., harm) in inpatient pediatric populations, it provides important information to providers, hospital quality teams, and state health departments about outcomes of their patient care. Use of the measure will benefit patients, families, and providers because it enables stakeholders to identify and target areas of patient care that may benefit from quality improvement initiatives. Since GAPPs focuses on preventable adverse events, hospitals are able to assess and prioritize clinical areas with potential for immediate improvement.

The GAPPs Measure represents an opportunity to fill a notable void in safety measurement, specifically in pediatric preventable adverse events. National progress on quantifying and tracking AEs has stagnated because of the absence of an accepted national standard in all but a few defined areas. The GAPPs Measure can represent that national standard for pediatrics, and can be an important measure to evaluate and improve adverse event rates across different sites and time periods.

IMPORTANCE OF MEASURING ADVERSE EVENTS

Studies show that there is a high prevalence of medical errors and/or adverse events among the patient population. For example, in 1999, the Institute of Medicine (IOM) estimated that medical errors contribute up to 98,000 deaths and one million injuries each year.(2) In 2010, the Department of Health and Human Services' Office of the Inspector General estimated that 180,000 deaths due partly to adverse events occur among Medicare patients annually, making adverse events the third leading cause of death in the United States after heart disease and cancer.(3,4) Hospitalized pediatric patients, who tend to have unique diseases and care distinct from adult patients, are also vulnerable to high adverse event rates: published studies report 11.1 adverse drug events per 100 inpatient pediatric patients, 74 adverse events per 100 neonatal intensive care unit (NICU) patients, and 203 adverse events per 100 pediatric intensive care unit (PICU) patients.(5–9) Consequently, tracking adverse events in hospital settings is an important step towards understanding the current state of clinical care and creating initiatives aimed towards improving clinical quality.

Measuring preventable adverse event rates may also help hospitals better understand different aspects of their clinical quality. Some studies have found correlations between patient harm and other quality aspects such as performance on clinical processes of care and other health outcomes.(10–14) For instance, studies suggest that patients who experience healthcare-related harms have greater odds of in-hospital and 30-day mortality, as well as 30-day readmission.(11–14) As such, measuring preventable adverse event rates is an essential first step for hospitals to understand and improve their patient care.

IDENTIFICATION OF INPATIENT ADVERSE EVENTS

Various approaches exist for identifying adverse events. Voluntary passive reporting systems are commonly employed but recognized to have low sensitivity.(15) A more reliable, sensitive methodology for capturing data on the safety of hospital care is thus essential.(16,17)

In 2003, AHRQ released its Patient Safety Indicators (PSI), developed in response to a congressional mandate to reduce medical errors.(18) PSIs are intended to identify events that most likely resulted from preventable medical errors.(18–20) PSIs have been used with some success but have a number of limitations, in part due to their reliance on administrative data. They have also been found to have low sensitivity.(17,18)

Use of trigger tools has been shown to be a faster, more sensitive, and more reliable method of adverse event detection than other approaches.(5,9,17,21–23) “Triggers” are red flags in a medical record that may indicate the presence of an underlying adverse event and prompt further inspection to determine whether an adverse event occurred.(21,22) An example trigger is the documented administration of an antidote-type medication (e.g., naloxone). Once a trigger is found, an in-depth review is undertaken to determine whether an adverse event occurred. In the case of naloxone, administration may indicate an adverse event occurred if the drug was given to counteract an overdose of opioids given in the hospital but may not if the overdose occurred due to voluntary recreational opioid use. Trigger tools detect adverse events in a high percentage of hospitalizations, ranging in published reports from 19% to 63%, and have evolved significantly over time.(10–12)

The Global Trigger Tool for Measuring Adverse Events (GTT), developed by the Institute for Healthcare Improvement (IHI), has become widely accepted as an effective approach for identifying adverse events in hospitalized adult patients.(2,9,15,23–26) The GTT approach identifies 10 times more adverse events than AHRQ’s PSIs and almost 100 times more events than voluntary reporting.(1,17) However, the GTT has an exclusion of patients under age 18 so does not work for a pediatric population.

PEDIATRIC INPATIENT PATIENT SAFETY: LACK OF STANDARDIZED QUALITY MEASUREMENT

Although one study determined that a version of the GTT applied to the pediatric population could identify pediatric adverse events, the authors and other experts called for development of a standardized pediatric tool that focuses specifically on the problems of hospitalized children and that encompasses the breadth of inpatient pediatric care.(12, 18, 25, 29) The absence of a comprehensive pediatric trigger tool is a recognized limitation in quantifying the full scope of pediatric adverse events. An early effort to develop a pediatric-focused trigger tool led to the development of the Canadian Pediatric Trigger Tool.(30, 31)

We developed GAPPs to meet the need for a comprehensive, sensitive measure of pediatric patient safety. Our focus was on developing a global trigger tool for pediatric patients that could be more reliably applied across different hospital sites, both academic and community, than previous efforts. In addition, we sought to further refine the list of triggers to make a more robust global trigger list. We used methods similar to those used for GTT, including review of published tools and manual medical record review by experts in patient safety, which has been demonstrated to be a crucial component of developing patient safety measures.(30) We also utilized the RAND/UCLA Appropriateness Method, a 16-center field study, and post-analysis refinement of the trigger list to ensure GAPPs includes a more comprehensive trigger list than previous trigger tools.

GAPPs offers an enhancement in trigger tool methodology in that, unlike GTT, it requires that reviewers assess preventability. In the five years since IHI released the second edition of GTT, patient safety experts and national fiscal and quality improvement policies have increasingly focused on addressing preventable adverse events. The GAPPs measure uses the same approach to rate preventability as the North Carolina Patient Safety study, which was found to ascertain preventability with a high degree of reliability.(31)

DISPARITIES IN RISK OF HARM

Children with special healthcare needs experience elevated rates of medical errors.(32) Among hospitalized pediatric patients, those with chronic conditions are at significantly higher risk for medical errors than those without chronic conditions.(32)

What is known about racial/ethnic disparities in patient safety, particularly among children, is limited.(33) Black and Hispanic newborns are at higher risk of birth trauma.(18) In addition, extrapolations from associations between race/ethnicity and known risk factors for harm suggest that Black and Hispanic children are likely at greater risk of harm than White children. Because severity and complexity of illness increase the risk of errors, and Black and Hispanic children are at higher risk for more complex conditions, these children are at greater risk for adverse events.(33) Emergency room visits are also associated with increased risk of adverse events, and Black and Hispanic children are known to visit the emergency department more frequently.(28,33)

COSTS OF GAPPs UPTAKE

As is the case with all new quality measures, we recognize that there may be concerns about the uptake of GAPPs due to hospital resource constraints. AE monitoring, like patient experience surveying, is not possible using administrative data and therefore

requires additional resources. As previously discussed, intensive measurement of preventable AEs is one of the most important areas of quality measurement, one that has to this point been inadequately addressed in pediatric patient populations. The capacity of the GAPPs Measure to spur nationwide improvement in pediatric patient safety represents a significant potential return on investment, one that outweighs implementation resource concerns.

It is important to note that some of the resources and infrastructure to successfully implement the GAPPs measure are already in place, as states commit to systems of mandatory reporting of certain adverse events. About half of states currently have mandatory reporting systems in place, with many others reporting AEs on a voluntary basis.⁽³⁴⁾ GAPPs will require an augmentation of processes hospitals are already initiating to report AEs, but will yield far greater returns. Far from representing a duplicative burden, the GAPPs Measure can take advantage of recent prioritization of patient safety and the resources hospitals are putting in place to evaluate quality in this domain. The marginal resources used for GAPPs implementation provide a drastically more robust assessment of hospital safety than currently in place, as global trigger tools have been shown to capture up to ten times more AEs than alternative AE measurement methods.^(17,35)

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S.4. Numerator Statement: The number of preventable adverse events found in a patient sample.

S.6. Denominator Statement: The denominator is 1,000 patient-days for all sampled pediatric patients who meet inclusion, but not exclusion, criteria.

S.8. Denominator Exclusions: N/A

De.1. Measure Type: Outcome

S.17. Data Source: Electronic Health Records, Paper Medical Records

S.20. Level of Analysis: Facility

IF Endorsement Maintenance – Original Endorsement Date: Jul 12, 2017 **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? Not Applicable

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 sub criteria to pass this criterion and be evaluated against the remaining criteria.**

1a. Evidence to Support the Measure Focus – See attached Evidence Submission Form

[NQF_evidence_attachment_revision__2017_0201.docx](#)

1a.1 For Maintenance of Endorsement: Is there new evidence about the measure since the last update/submission?

Do not remove any existing information. If there have been any changes to evidence, the Committee will consider the new evidence. Please use the most current version of the evidence attachment (v7.1). Please use red font to indicate updated evidence.

No

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., how the measure will improve the quality of care, the benefits or improvements in quality envisioned by use of this measure)

If a COMPOSITE (e.g., combination of component measure scores, all-or-none, any-or-none), SKIP this question and answer the composite questions.

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1b.2. Provide performance scores on the measure as specified (current and over time) at the specified level of analysis. *(This is required for maintenance of endorsement. 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 include.) This information also will be used to address the sub-criterion on improvement (4b1) under Usability and Use.*

We conducted a National Field Test at 16 hospitals from across the United States that represented diverse geographic regions (four hospitals in each of the four US census regions: Northeast, South, West, and Midwest) and included eight teaching and eight non-teaching hospitals (teaching status was based on categorization set by the American Hospital Association). 3,790 hospitalizations occurring between 2007 and 2012 were included in this analysis.

Current rate of preventable AEs. Of the 414 AEs identified, 210 (50.7%) AEs were preventable, representing 9.5 preventable AEs [CI 8.2-10.8]/1,000 patient days. Compared to community hospitals, academic hospitals had higher preventable harm rates (13.1 [CI 11.4-15.2] vs. 2.4 [CI 1.5-3.8] AEs/1,000 patient days, $p < 0.001$). GAPPs is a measure of preventable adverse events. Because the identified adverse events are preventable, the ideal would be to have no preventable AEs. The GAPPs Measure specifically focuses on preventable adverse events because it outlines areas for immediate improvement. As we will discuss in more detail later in the application, the GAPPs Measure indicates there is significant room for improvement across most institutions and patient demographics. In addition to widespread incidence of preventable AEs, there is dramatic variation across institutions (preventable AEs/1000 patient days ranged from 0-20.4) and significant subpopulation disparities for race, medical complexity, and insurance type. In sum, GAPPs demonstrates areas to target to reduce disparities for subpopulations that may be at higher risk of encountering a preventable AE.

Changes in the rate of preventable AEs over time. Multivariate analyses controlling for demographic characteristics and chronic conditions showed no significant changes in preventable AE rates over time. Poisson regression accounting for hospital-level clustering and changes over time found no significant changes over time in preventable AEs (risk factor=1.00/1,000 patient days [CI 0.98-1.02]. When stratified by hospital type, neither academic nor community hospitals experienced significant temporal trends in preventable AEs/1,000 patient days.

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.

Not Applicable

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 maintenance of endorsement. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included.) For measures that show high levels of performance, i.e., “topped out”, disparities data may demonstrate an opportunity for improvement/gap in care for certain sub-populations. This information also will be used to address the sub-criterion on improvement (4b1) under Usability and Use.*

RACE/ETHNICITY

We assessed differences in pediatric patient safety associated with race/ethnicity by evaluating whether the rate of preventable adverse events (AEs) identified by reviewers varied among racial/ethnic groups. Race/ethnicity was recorded in our National Field Test using the categories Alaska Native, American Indian, Asian, Black, Hispanic, Native Hawaiian or other Pacific Islander, Other, and White. For our analysis, we combined Alaska Native, American Indian, Asian, Native Hawaiian or other Pacific Islander, and non-White, non-Hispanic Other patients into a single “Other” category because each of the categories was represented by a very small number of hospitalizations.

Table 1 –Preventable AEs per 1,000 patient days by race/ethnicity (n = 3,231)

Race/Ethnicity	n (%)	prev AE rate	P-Value
White	2,152 (56.8%)	8.9	Reference
Black	476 (12.6%)	5.9	0.13
Hispanic	419 (11.1%)	15.9	0.002
Other	184 (4.9%)	11.1	0.47

Across all sites evaluated, we found that Hispanic patients had a higher unadjusted preventable AE rate at 15.9, compared to White patients at 8.9 (p=0.002).

PATIENTS WITH CHRONIC CONDITIONS

We assessed differences in pediatric patient safety associated with presence of chronic conditions by evaluating whether the rate of preventable AEs identified by reviewers varied based on the chronic conditions present among patients (as classified in AHRQ’s CCI system), controlling for length of hospitalization.(38)

Table 2 – Preventable AEs per 1,000 patient days by numbers of Chronic Condition Indicators per patient (n= 3,524)

Chronic Condition Indicators	n (%)	prev AE rate	P-Value
0 body system	1,990 (52.5%)	6.5	Reference
1 body system	1,085 (28.6%)	9.5	0.04
2 body systems	321 (8.5%)	17.9	<0.001
3 or more body systems	128 (3.4%)	19.8	<0.001

Overall, we found that patients with a body system affected by a chronic condition had higher unadjusted preventable AE rates than those without any body system affected by a chronic condition. Particularly, patients with 3 or more body systems affected by a chronic condition had the highest unadjusted preventable AE rate at 19.8 (p<0.001) as shown in Table 2.

INSURANCE STATUS

We assessed differences in pediatric patient safety associated with socioeconomic status (SES) by using insurance status as a proxy for SES and examining whether the rate of preventable AEs identified by reviewers varied with insurance status. Insurance status was captured in our National Field Test using six non-mutually exclusive categories: Medicaid, Medicare, Private Insurance, Self-Pay, No Insurance, and Not Recorded. These sorted the cohort into eight unique categories (some of which indicate that a patient had multiple insurance types listed during the hospitalization included in our field test): no insurance; private insurance; public insurance; private insurance and self-pay; public and private insurance; public and no insurance; public, self-pay and private insurance; and insurance not recorded.

We chose to exclude hospitalizations for patients covered by Medicare from the analysis because pediatric eligibility for Medicare is based on having specific medical conditions rather than being based solely on family income.(39) Therefore, we evaluated patients with public insurance (Medicaid), private insurance, and no insurance. Patients who were recorded to have both private insurance and public insurance were categorized as patients with private insurance.

Table 3 shows the distribution of the insurance types included in our analysis. 37.5% of the patients had public insurance, 59.5% had private insurance, and 3.0% did not have insurance. 8.5% were missing insurance information and not included in this analysis. Patients with private insurance (preventable AE rate 8.5) and no insurance (preventable AE rate 3.9) had lower crude preventable AE rates across sites than patients with public insurance (AE rate 12.1).

Table 3 – Preventable AEs per 1,000 patient days by insurance type (n = 3,468)

Insurance	n (%)	prev AE rate	P-Value
Public	1,300 (37.5%)	12.1	Reference
Private	2,064 (59.5%)	8.5	0.02
No Insurance	104 (3.0%)	3.9	0.11

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1b.5. If no or limited data on disparities from the measure as specified is reported in 1b.4, then provide a summary of data from the literature that addresses disparities in care on the specific focus of measurement. Include citations. Not necessary if performance data provided in 1b.4

Not Applicable

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 sub criteria 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. Non-Condition Specific(check all the areas that apply):

De.7. Target Population Category (Check all the populations for which the measure is specified and tested if any):

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.)

<http://www.childrenshospital.org/research-and-innovation/research/centers/center-of-excellence-for-pediatric-quality-measurement-cepqm/cepqm-measures/global-tool-of-patient-safety/content>

S.2a. If this is an eMeasure, HQMF specifications must be attached. Attach the zipped 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)

[This is not an eMeasure](#) **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 **Attachment:** [S.2b_Data_Dictionary_Code_Table_Manual_-_Automated_Trigger_Lists.xlsx](#)

S.2c. Is this an instrument-based measure (i.e., data collected via instruments, surveys, tools, questionnaires, scales, etc.)? Attach copy of instrument if available.

Attachment:

S.2d. Is this an instrument-based measure (i.e., data collected via instruments, surveys, tools, questionnaires, scales, etc.)? Attach copy of instrument if available.

S.3.1. For maintenance of endorsement: Are there changes to the specifications since the last updates/submission. If yes, update the specifications for S1-2 and S4-22 and explain reasons for the changes in S3.2.

[No](#)

S.3.2. For maintenance of endorsement, please briefly describe any important changes to the measure specifications since last measure update and explain the reasons.

[Not Applicable](#)

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) **DO NOT** include the rationale for the measure.

IF an OUTCOME MEASURE, state the outcome being measured. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14).

[The number of preventable adverse events found in a patient sample.](#)

S.5. 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, time period for data collection, 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 (S.14).

Adverse events are defined as “unintended physical injuries resulting from or contributed to by medical care that require additional monitoring, treatments, or hospitalizations, or that result in death.”(1,2) This matches the Institute for Healthcare Improvement’s adult Global Trigger Tool’s (IHI GTT’s) definition of harm since “harm” and “adverse event” are used synonymously in the context of patient safety.(1) GAPPs includes assessments of preventability to facilitate the identification of clinical areas with potential for immediate improvement.

The GAPPs measure requires two physicians to review and independently rate the preventability of each adverse event case they review. When physicians disagree on an event’s preventability, they discuss the rationale for their ratings with one another until both agree on whether an adverse event is preventable or not. A third physician is consulted in the rare occasion that the two physicians continue to disagree on an event’s preventability after discussing with one another.

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2. Classen DC, Resar R, Griffin F, Federico F, Frankel T, Kimmel N, et al. “Global Trigger Tool” Shows That Adverse Events In Hospitals May Be Ten Times Greater Than Previously Measured. *Health Aff (Millwood)*. 2011 Apr 1;30(4):581–9.

Below is a list of example triggers from the GAPPS Measure that are often found by reviewers in various sections of the medical record. For a full list of GAPPS triggers and a description of each, see appendix A.1.

Discharge summary

- All inpatient deaths
- Mechanical ventilation >48 hours
- Hospital readmission within 30 days
- Return to surgery

Laboratory reports

- Valproic acid >170 mcg/ml
- Carbamazepine >20 mcg/ml
- Serum creatinine doubling
- Nephrotoxin use (e.g., aminoglycosides, cyclosporine, tacrolimus, vancomycin) and rising creatinine (Cr)
- Hepatotoxic medications and elevated liver enzymes (AST, ALT)
- Drop of hemoglobin (Hgb) or hematocrit (Hct) of >25% in less than 24 hours

Radiology results

- Patient fall

Physician orders

- Abrupt medication stop
- Transfer to higher level of care

Medication administration records (MARs)

- Vitamin K administration after warfarin
- Naloxone administration
- Hypoglycemia (<2 mmol/L or 40 mg/dL)

Nursing flow sheets

- Surgical site infection
- Infiltration/phlebitis documentation
- Embolus/thrombus documentation
- Pressure ulcer documentation (= stage 2)

Procedure notes (diagnostic, surgical)

- Any code or arrest, or rapid response team activation
- Mechanical ventilation greater than 48 hours post-operative

Nursing/Physician/Multi-disciplinary progress notes

- Opiate-related constipation with intermittent laxative use
- Healthcare-associated infections: positive C. difficile test
- Healthcare-associated infections: positive blood culture (only after 48 hours from admission)
- Healthcare-associated infections: positive urine culture (only after 48 hours from admission)
- Healthcare-associated infections: positive respiratory or GI viral test (only after 48 hours from admission)
- Racemic epinephrine administration (patients mechanically ventilated within the last 24 hours)

S.6. Denominator Statement (Brief, narrative description of the target population being measured)

The denominator is 1,000 patient-days for all sampled pediatric patients who meet inclusion, but not exclusion, criteria.

S.7. Denominator Details (All information required to identify and calculate the target population/denominator such as definitions, time period for data collection, 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 target population is identified. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14).

The denominator includes all patients who meet the following criteria:

1. Patients <18 years of age at admission;
2. Patients with length of stay (LOS) greater than or equal to 24 hours;
- 3 Patients admitted for acute care. Acute care does not include patients discharged from the Emergency Department without admission to the hospital; or patients in rehabilitation and residential units, non-acute inpatient psychiatric units, newborn nurseries, and day treatment areas. If a patient is initially admitted acutely but subsequently transferred to inpatient psychiatric care, the acute portion of the hospitalization should be included; and
4. Patients who were discharged from, who were transferred out of, or who died during the inpatient or observation hospital stay.

S.8. Denominator Exclusions (Brief narrative description of exclusions from the target population)

N/A

S.9. Denominator Exclusion Details (All information required to identify and calculate exclusions from the denominator such as definitions, time period for data collection, 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.)

N/A

S.10. Stratification Information (Provide all information required to stratify the measure results, if necessary, including the stratification variables, definitions, specific data collection items/responses, code/value sets, and the risk-model covariates and coefficients for the clinically-adjusted version of the measure when appropriate – 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 is not required within institutions. However, if desired, quality improvement teams may choose to stratify preventable adverse event rates. Variables commonly used to stratify outcome measures include service (e.g., medical versus surgical), department (e.g., cardiology, neurology, etc.), and patient safety focus area (e.g., healthcare-associated infections).

For comparisons between institutions, preventable adverse event rates should be stratified by teaching versus community hospitals due to differences in types (e.g., complexity) of patient populations

S.11. Risk Adjustment Type (Select type. Provide specifications for risk stratification in measure testing attachment)

Statistical risk model

If other:

S.12. Type of score:

Rate/proportion

If other:

S.13. 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.14. Calculation Algorithm/Measure Logic (Diagram or 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; time period for data, aggregating data; risk adjustment; etc.)

GAPPs allows quality improvement teams to measure preventable adverse event rates over time among pediatric inpatients. GAPPs can be applied within entire hospitals, individual divisions or services, or specific programs. The original candidate trigger list (n=54 triggers) was developed through literature searches and expert panel determination. After the national field test, we selected the final manual triggers (n=27 triggers) based on incidence and positivity rates (i.e., the frequency with which a trigger identifies an AE). To form our automated trigger list, we compiled all of the manual triggers that could be automated in an academic tertiary care hospital's EHR system and all candidate triggers that had a low frequency in the national field test that could feasibly be automated and had a positivity rate ≥10% when further tested at the academic tertiary care hospital (n=30 triggers), and recommended inclusion of all manual triggers in a final automated trigger list. As compared with our final manual list (n=27 triggers), the final automated list added triggers that are relatively rare, but when present have a high positivity rate for identifying AEs (there is a lower bar for including triggers in the automated tool because it does not involve manual effort).

The main advantages of using the automated, rather than manual, GAPPS approach are speed (it eliminates the need to find triggers manually in medical records and allows primary reviewers to avoid looking at non-flagged records) and consistency of trigger detection (it reduces human error during review). Whether an institution uses the manual or automated trigger list, the implementation of the measure to identify adverse events is the same. For more detailed instructions on how to find preventable adverse events using either GAPPS' manual or automated approach, refer to Appendix A.

Step 1 – Assemble a review team

The GAPPS review team should consist of:

- Two primary reviewers who are responsible for reviewing and identifying adverse events in medical records. The second primary reviewer will only review a subset of the first primary reviewer's charts for a reliability check. It is recommended that each primary reviewer have extensive clinical experience, have familiarity with multiple clinical settings and interventions (including diagnostic tests, medications, and procedures), and be well-acquainted with the hospital's medical record system and typical delivery of care. The primary reviewer in trigger tool applications has historically been a nurse, but physicians, physician assistants, and pharmacists – among others – may also be good candidates.
- Two secondary reviewers who are responsible for reviewing any suspected adverse event identified by a primary reviewer. The secondary reviewers verify the occurrence of adverse events, as well as the ratings of severity and preventability for the events. They do not review medical records directly; instead, they listen to the primary reviewer's description of the adverse events he or she identified and ask questions as needed for clarification. Some secondary reviewers may choose to read the primary reviewer's written assessment in addition to listening to the reviewer's description of the hospitalization. Secondary reviewers should be physicians.

Step 2 – Select relevant hospitalizations

We recommend that the main primary reviewer selects a random sample of at least 20 inpatient hospitalizations each month from a list of all inpatient hospitalizations with discharge dates that fall within the month being reviewed; the hospitalizations may be drawn from an entire hospital or from a specific division, service, or program. The hospitalizations should meet eligibility criteria (noted below) for a minimum of 60 hospitalizations per quarter. For institutions with high pediatric patient volume, records for 60 unique patients typically will be reviewed. However, patients who have multiple discharges that fall within a given quarter may have their records reviewed multiple times.

A two-stage process is used to determine which pediatric medical records should be included in the GAPPS sample frame. The first stage determines whether patients meet the inclusion criteria listed below. For patients who meet inclusion criteria, certain exclusion criteria – also described below, are then applied.

Inclusion Criteria:

GAPPS is intended for broadly reviewing the medical records of pediatric patients who meet the following criteria:

- Patients <18 years of age at admission;
- Patients with length of stay (LOS) ≥24 hours;
- Patients admitted for acute care. Acute care does not include patients discharged from the Emergency Department without admission to the hospital; or patients in rehabilitation and residential units, non-acute inpatient psychiatric units, newborn nurseries, and day treatment areas. If a patient is initially admitted acutely but subsequently transferred to inpatient psychiatric care, the acute portion of the hospitalization should be included; and
- Patients who were discharged from, who were transferred out of, or who died during the inpatient or observation hospital stay.

Exclusion Criteria:

Patients with inpatient LOS <24 hours are excluded because patients with brief hospital stays are less likely to have received the amount of medical intervention necessary to evaluate the quality of care.

Patients ≥18 years of age at admission are excluded because the Center of Excellence for Pediatric Quality Measurement's (CEPQM) task was to create a tool for measuring patient safety in the pediatric age group (i.e., <18 years of age). With this in mind, GAPPS is designed to perform exclusively in pediatric patients.

Step 3 – Review of patient records by primary reviewers and secondary reviewers

Primary reviewers should spend up to 30 minutes reviewing each hospitalization in a medical record. They should focus on identifying and recording triggers and adverse events (for lists of the GAPPs manual and automated triggers, see Appendix A).

- Identifying triggers: When a trigger is discovered in the record (either manually or automatically via an electronic health record (EHR) system that flags hospitalizations), primary reviewers should look for information relevant to that trigger to investigate whether an adverse event occurred. Reviewers typically identify many more triggers than adverse events. If no adverse event is found, continue reviewing the remainder of the record for additional triggers. The manner in which the trigger is identified (manually or automatically) has no impact on the rest of the GAPPs measure process. The automated trigger list removes the arduous human identification factor from the process, but the measure remains exactly the same following trigger identification.
 - o Some adverse events will be found without the identification of a related trigger. These events should still be recorded in the Primary Review Forms and Suspected Adverse Event Forms.

- Identifying adverse events: Whether discovered due to a positive trigger or encountered while searching for triggers, adverse events and their corresponding information should be recorded by the primary reviewer. We recommend that reviewers consider the following items when determining whether an adverse event has occurred:

- o Harm likely occurred through event(s) in which people experiencing the event would be unhappy the event occurred (e.g., IV infiltrate, even if minor).

- o Adverse events are, by definition, the result of medical treatment. If an incident was part of the natural progression of a patient's disease process, it is unlikely to be an adverse event (e.g., patient admitted for respiratory failure due to pneumonia worsens despite appropriate management and consequently needs to be intubated), unless medical care somehow contributed to the incident.

- o Incidents that are the intended results of medical care are not considered adverse events (e.g., neutropenia with chemotherapy).

- o Psychological harm alone is not generally considered an adverse event (e.g., stress).

All identified adverse events should be recorded, regardless of location. The Primary Review Forms and Suspected Adverse Event Forms allow reviewers to specify where harms occurred, so harms occurring outside the hospital can be analyzed separately or removed from assessments of unit/hospital care quality as needed.

- Determining severity

- o Severity: Reviewers should assign severity to an adverse event using the five-point severity scale below, which is a modified version of the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) Index for Categorizing Errors. Since the categories are not mutually exclusive, reviewers should assign the highest severity category that applies to the adverse event. It is important to note that adverse events in high-severity categories do not have to meet all of the requirements of lower-harm-level categories. For example, an adverse event can be categorized in harm level H (i.e., insulin bolus) but not qualify as a G-level harm (i.e., permanent injury).

Category E: Temporary harm to the patient and required intervention

Category F: Temporary harm to the patient and required initial or prolonged hospitalization

Category G: Permanent patient harm

Category H: Intervention required to sustain life

Category I: Patient death

Step 4- Determine preventability of adverse event

Primary reviewers (nurses) record preventability for data collection and internal validity assessment purposes. However, the final determination of preventability is made by the secondary reviewers (physicians). All reviewers should rely on the category definitions provided below and their own clinical experience when determining preventability. Training sessions, discussions with the review team, and experience with reviews will be crucial in developing consistent preventability ratings.

Categories of Preventability [1]

- Definitely not preventable: Events in which no obvious error occurred; necessary precautions were taken; no alteration in method or care exists to prevent the event.

- o Drug-associated rash (no prior exposure or history): A 9-year-old male with no known allergies presented to the emergency department for a sore throat, cough, and fever. When the patient was given ibuprofen for his fever, he developed hives and itching. The patient was then given diphenhydramine and responded well to the drug with no respiratory distress. Ibuprofen was discontinued and listed as an allergy on the patient's medical record.

- Probably not preventable: Events that do not appear preventable but would require further investigation to assess certainty.

- o Procedural complications (with skilled proceduralist and no errors): Despite nursing standards being followed, a 7-year-old female developed an IV infiltrate.
 - Probably preventable: Events that appear preventable but would require further investigation to assess certainty.
- o Hospital-acquired infections: A male infant born at 35 weeks estimated gestation age had an umbilical catheter placed. An inflamed wound developed at the catheter site, and he was started on antibiotics. An abscess formed at the site over the next few days, so the wound was drained, and cultures were obtained that were positive for MRSA and Enterobacter spp.
 - Definitely preventable: Events where error was identified; necessary precautions were not taken; event was preventable by modification of behavior, technique, or care.
- o Medication overdose: A 13-year-old female was given an overdose of insulin during treatment for diabetic ketoacidosis. Her blood glucose dropped precipitously, and she required a D50 bolus.

[1] While secondary reviewers can select one of four preventability rankings for each adverse event, preventability rankings are categorized into two groups when assessing secondary reviewer agreement and during data analysis. Specifically, adverse events ranked as “definitely not preventable” and “probably not preventable” are considered “nonpreventable,” and adverse events ranked as “definitely preventable” and “probably preventable” are considered “preventable.”

Step 5 – Record data in appropriate forms

Primary reviewers

Primary reviewers should complete the Primary Review Form for each hospitalization. For each adverse event, they should also complete the Suspected Adverse Event Form.

Secondary reviewers

Secondary Reviewer A should complete the Secondary Review Form A for each suspected adverse event identified by a primary reviewer, either confirming or denying that an adverse event occurred. Secondary Reviewer B should complete the Secondary Review Form B for each suspected adverse event identified by the primary reviewers, either confirming or denying that an adverse event occurred.

In cases in which Secondary Reviewers A and B disagree about whether an adverse event occurred or do not independently rate an adverse event with the same severity and preventability (note: preventability agreement is determined dichotomously, i.e., definitely/probably preventable vs. definitely/probably not preventable), the secondary reviewers must discuss the issues and reach consensus on all rankings. If the two secondary reviewers are unable to reach a consensus after discussing the case, a third physician should be consulted. Once reviewers agree on all rankings, one of the reviewers should complete the Consensus Form.

Step 6 – Check reliability

To assess the reliability with which institutions use GAPPS to identify triggers and adverse events, a second primary reviewer should perform a completely independent review of a random 10% sample of the medical records reviewed by the main primary reviewer from each sampling time frame (i.e., 6 records per quarter). This second review should occur at the end of each year on a total of 24 records annually. During this check, the second primary reviewer completes the same forms as the first primary reviewer: the Primary Review Form and, for each adverse event identified in a medical record, the Suspected Adverse Event Form. Knowing the rates at which primary reviewers identify and agree about adverse events will allow institutions to assess the reliability of their adverse event detection and to improve training efforts for reviewers as needed.

Step 7 – Analyze data

After the primary and secondary reviewers complete their reviews in each collection period, the data should be analyzed by computing preventable adverse events per 1,000 patient-days using the following equation:
$$\left[\frac{\text{Total number of preventable adverse events identified in all the medical records in the sampling frame}}{\text{Sum of the total number of inpatient days for all of the medical records reviewed in the sampling period}} \right] * 1,000$$
. When comparing across institutions, the unit of time should be annual.

Case-mix adjustment for inter-hospital comparisons:

We recommend groups use mixed effects negative binomial regression to adjust preventable adverse event rates based on patient characteristics and type of service. Specifically, the outcome is the number of preventable adverse events for an admission (exposure time equal to length of stay), case-mix variables are fixed effects, and a hospital-level random intercept represents the variation between hospitals. Case-mix models should be stratified by hospital type (teaching vs. community). The case-mix data are obtained from the Primary Review Forms.

S.15. Sampling *(If measure is based on a sample, provide instructions for obtaining the sample and guidance on minimum sample size.)*

IF an instrument-based performance measure (e.g., PRO-PM), identify whether (and how) proxy responses are allowed.

Hospitals and departments using GAPPs to measure preventable adverse event rates are responsible for generating complete, accurate, and valid lists of all pediatric inpatient hospitalizations (<18 years old) discharged between the first and last days of each month (e.g., for January, any qualifying discharges between and including the 1st and 31st days). The hospitalizations may be drawn from an entire hospital or from a specific division, service, or program.

We recommend that primary reviewers select a random sample of at least 20 inpatient hospitalizations each month from a list of all inpatient hospitalizations with discharge dates that fall within the month being reviewed. The hospitalizations should meet eligibility criteria (see Appendix A) for a minimum of 60 hospitalizations per quarter. We recommend a minimum sample size of 60 records per quarter in order for institutions to achieve adequate reliability for estimates of hospital-level preventable adverse event incidence. This sample size is based on the assumption that the trigger tool will be used in an improvement setting, for which the aim is to detect trends in the data showing meaningful change over time. According to Perla and colleagues, to plot the data quarterly, the appropriate sample size of medical records is given by $9/R$, where R is the average number of adverse events per person.⁽³⁾ Assuming an adverse event rate of at least 0.15, the recommended sample size computes to $9/0.15=60$.

For institutions with high pediatric patient volume, records for 60 unique patients will typically be reviewed. However, patients who have multiple discharges that fall within a given quarter may have their records reviewed multiple times.

Records should be selected through a random process to eliminate any potential bias. A variety of selection methods can be used to ensure a random sample, such as:

- For a given month, number all discharge records (including those ending with deaths) sequentially starting with one. Using random-number generating software, generate 25 numbers between one and the total number of records. Select the hospitalizations labeled with the random number. Keep the first 20 hospitalizations that meet eligibility criteria. If 25 records are insufficient to yield 20 eligible hospitalizations, select more hospitalizations using the random-number generating software until you obtain the 20 that are needed.

For medical facilities, departments, or programs that have fewer than 20 pediatric inpatients per month, review records for all hospitalizations during the month.

S.16. Survey/Patient-reported data *(If measure is based on a survey or instrument, provide instructions for data collection and guidance on minimum response rate.)*

Specify calculation of response rates to be reported with performance measure results.

Not Applicable

S.17. Data Source *(Check ONLY the sources for which the measure is SPECIFIED AND TESTED).*

If other, please describe in S.18.

Electronic Health Records, Paper Medical Records

S.18. Data Source or Collection Instrument *(Identify the specific data source/data collection instrument (e.g. name of database, clinical registry, collection instrument, etc., and describe how data are collected.)*

IF instrument-based, identify the specific instrument(s) and standard methods, modes, and languages of administration.

Primary Review Form, Suspected Adverse Event Form, Secondary Review Form A Secondary Review Form B, Consensus Form

S.19. 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.20. Level of Analysis *(Check ONLY the levels of analysis for which the measure is SPECIFIED AND TESTED)*

Facility

S.21. Care Setting *(Check ONLY the settings for which the measure is SPECIFIED AND TESTED)*

Inpatient/Hospital

If other:

S.22. 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.)

Not Applicable

2. Validity – See attached Measure Testing Submission Form

[NQF_testing_attachment_revision_02012017-636219708128376076.docx](#)

2.1 For maintenance of endorsement

Reliability testing: If testing of reliability of the measure score was not presented in prior submission(s), has reliability testing of the measure score been conducted? If yes, please provide results in the Testing attachment. Please use the most current version of the testing attachment (v7.1). Include information on all testing conducted (prior testing as well as any new testing); use red font to indicate updated testing.

2.2 For maintenance of endorsement

Has additional empirical validity testing of the measure score been conducted? If yes, please provide results in the Testing attachment. Please use the most current version of the testing attachment (v7.1). Include information on all testing conducted (prior testing as well as any new testing); use red font to indicate updated testing.

2.3 For maintenance of endorsement

Risk adjustment: For outcome, resource use, cost, and some process measures, risk-adjustment that includes social risk factors is not prohibited at present. Please update sections 1.8, 2a2, 2b1,2b4.3 and 2b5 in the Testing attachment and S.140 and S.11 in the online submission form. NOTE: These sections must be updated even if social risk factors are not included in the risk-adjustment strategy. You MUST use the most current version of the Testing Attachment (v7.1) -- older versions of the form will not have all required questions.

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.

[Abstracted from a record by someone other than person obtaining original information \(e.g., chart abstraction for quality measure or registry\)](#)

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) Update this field for **maintenance of endorsement**.

[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. For maintenance of

endorsement, if this measure is not an eMeasure (eCQM), please describe any efforts to develop an eMeasure (eCQM).

The measure currently requires a clinician to review each adverse event in order to determine whether that event may have been preventable. It may be possible in the future for this step to transition to an automated process. While capturing triggers can be automated, a completely automated approach is currently not feasible and also not likely feasible for the near future. An automated trigger identification system has no impact on the measure beyond the means by which triggers are identified. The remaining pieces of the measure process following trigger identification are exactly the same for the automated and manual trigger approaches.

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. Please also complete and attach the NQF Feasibility Score Card.

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. Required for maintenance of endorsement. Describe difficulties (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 instrument-based, consider implications for both individuals providing data (patients, service recipients, respondents) and those whose performance is being measured.

Not Applicable

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).

The codes for the GAPPS automated triggers, the GAPPS Manual of Operations, and all associated forms that reviewers complete are available to users free of charge.

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.

Specific Plan for Use	Current Use (for current use provide URL)
Public Reporting	
Quality Improvement (external benchmarking to organizations)	
Quality Improvement (Internal to the specific organization)	

4a1.1 For each CURRENT use, checked above (update for maintenance of endorsement), provide:

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

Not applicable.

4a1.2. 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?)

GAPPS was newly commissioned and developed as part of the AHRQ/CMS Pediatric Quality Measures Program and is therefore not yet in use or publicly reported.

4a1.3. 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.)

AHRQ and CMS intend that the GAPPS measure be available for public use with the current expectation that the full measure specifications be provided on the AHRQ website, CMS website, or both. For ease of implementation, we have prepared the GAPPS Manual of Operations and automated trigger codes for detection and analysis of preventable AE rates (see Appendix A). Our testing has shown that the measure is straightforward to implement across a variety of hospital types and on both paper and electronic medical records. In addition, we have made a series of comprehensive training videos that are easily accessible online for sites that want to learn how to utilize GAPPS.

Although GAPPS is not currently used for public reporting, endorsement will facilitate the measure's use by public and private payers, provider organizations, and consumer groups that require NQF endorsement of quality measures and will help support the integration of GAPPS into other patient safety measures. We anticipate that GAPPS results will be useful to everyone with a need for information on the quality of pediatric inpatient care, including patients, parents, hospitals, health plans, insurers, and policy makers. In addition, hospitals could provide GAPPS performance scores to quality organizations and purchasers. GAPPS reliably identifies preventable AEs and can be used to guide and monitor quality improvement efforts and facilitate inter-hospital comparisons.

4a2.1.1. Describe how performance results, data, and assistance with interpretation have been provided to those being measured or other users during development or implementation.

How many and which types of measured entities and/or others were included? If only a sample of measured entities were included, describe the full population and how the sample was selected.

During development of the original trigger list, we conducted a nine-member expert panel from top national stakeholder organizations using the RAND/UCLA Appropriateness Method. Their feedback was critical for determining which triggers to include in our final trigger list and for moving the project from development to field testing. Some of the site leads participating in the National Field Test (NFT) provided feedback on the development of the NFT materials and procedures. Following the NFT, results, data, and interpretation assistance were provided to the participating institutions.

4a2.1.2. Describe the process(es) involved, including when/how often results were provided, what data were provided, what educational/explanatory efforts were made, etc.

Results reports were created after development and field testing of the measure. The reports included field test summary results, brief explanations of these results, and the raw institution-specific data. These reports were sent to the NFT institutions that requested their results following completion of the field test and analysis of the data.

4a2.2.1. Summarize the feedback on measure performance and implementation from the measured entities and others described in 4d.1.

Describe how feedback was obtained.

Feedback was obtained through personal correspondence with the GAPPS team. Trained reviewers from the participating NFT sites reported understanding GAPPS and were able to identify triggers in medical records, use them to detect AEs, and assess severity and preventability. Feedback from the site leads indicated that the measure is straightforward to use and easily understandable. Our

results indicated that GAPPS works for both EHRs and paper medical records.

4a2.2.2. Summarize the feedback obtained from those being measured.

Please see above.

4a2.2.3. Summarize the feedback obtained from other users

Throughout development and testing, the GAPPS team presented our candidate measure to our Scientific Advisory Board, consisting of representatives from Boston Children's Hospital, the larger Harvard community, and organizations such as the National Initiative for Children's Healthcare Quality, as well as to our National Stakeholder Panel, which includes representatives from diverse national organizations that represent patients and families, providers, payers, and health services researchers. Comments and feedback from these various users and stakeholders indicate that they believe such a tool is useful to pediatric medical settings. Since finalizing the GAPPS measure, the team has presented their findings at national conferences and other public forums. We have received positive feedback and many stated that the measure would be useful to them.

4a2.3. Describe how the feedback described in 4a2.2.1 has been considered when developing or revising the measure specifications or implementation, including whether the measure was modified and why or why not.

Based on helpful suggestions from the NFT sites and reviewers, we improved the clarity of the Manual of Operations. The GAPPS NFT also demonstrated that it is crucial to provide rigorous training and feedback to reviewers on practice cases prior to reviewers' use of the measure in order to achieve optimal standardization in AE detection.

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.

4b1. Refer to data provided in 1b but do not repeat here. Discuss any progress on improvement (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.)

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.

POTENTIAL FOR QUALITY IMPROVEMENT

Key strategies for reducing preventable harms in children include early detection and treatment of potential harm(1) and identification of potentially preventable adverse events.(2) Use and further development of measures such as GAPPS to detect adverse events is thus a critical part of efforts to improve patient safety.(3–5) By using more sensitive and reliable measures, hospitals can increase their capacity to quantify inpatient adverse events, identify priorities, and target available resources.(6) Multiple studies have shown that hospitals with reliable means to track adverse events have experienced improvements in patient safety and associated clinical outcomes.(7–12)

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 12. Miles A, Spaeder M, Stockwell D. Unplanned ICU Transfers from Inpatient Units: Examining the Prevalence and Preventability of Adverse Events Associated with ICU Transfer in Pediatrics. *J Pediatr Intensive Care*. 2015 Nov 21;5(1):021–7.

4b2. 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).

4b2.1. Please explain any unexpected findings (positive or negative) during implementation of this measure including unintended impacts on patients.

No unexpected findings were identified during testing.

4b2.2. Please explain any unexpected benefits from implementation of this measure.

No unexpected benefits were identified during testing.

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 of Related Measures

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 harmonized to the extent possible?

5a.2. If the measure specifications are not completely harmonized, identify the differences, rationale, and impact on interpretability and data collection burden.

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.)

[Not Applicable](#)

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: AAA_MOO_-_Appendices_FINAL_20170201.pdf](#)

Contact Information

Co.1 Measure Steward (Intellectual Property Owner): [Center of Excellence for Pediatric Quality Measurement](#)

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Co.3 Measure Developer if different from Measure Steward: [Center of Excellence for Pediatric Quality Measurement](#)

Co.4 Point of Contact: [Mark, Schuster, cepqm@childrens.harvard.edu, 617-355-5859-](#)

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.

[The following people participated in measure development:](#)

CORE TEAM:

[Mark A. Schuster, MD, PhD \(Principal Investigator, Director\)](#)

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[David C. Stockwell, MD, MBA \(Measure Co-Leader\)](#)

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External expert primary reviewers: Kathleen M. Haig, RN, Diedre A. Rahn, RN, and Katherine R. Zigmont, RN

Expert secondary reviewers and training video instructors: Lee M. Adler, DO and Roger K. Resar, MD

Members of the GAPPS Expert Stakeholder Panel: David Bundy, MD, MPH, S. Todd Callahan, MD, MPH, Emi Datuin-Pal, RN, BSN, MSHSA, MBA, Carol Haraden, PhD, Laura Knobel, MD, FAAFP, Rita Pickler, PhD, RN, PNP-BC, FAAN, Xavier Sevilla, MD, MBA, FAAP, Jennifer Slayton, MSN, RN, and Glenn Takata, MD, MS

Reviewers and leads at all of our participating study sites: Boston Children's Hospital, Children's Hospital Colorado, Children's National Medical Center, Cincinnati Children's Hospital Medical Center, Grand View Hospital, Mary Washington Hospital, Lucile Packard Children's Hospital Stanford, Providence St. Peter Hospital, Progress West Hospital, University of Florida Health Shands Children's Hospital, Silver Cross Hospital, New York Presbyterian/Weill Cornell Medical Center, Utah Valley Regional Medical Center, Western Virginia University Hospitals, Hillcrest Hospital, and South Shore Hospital

Staff of the Center of Excellence for Pediatric Quality Measurement (CEPQM) at Boston Children's Hospital, members of CEPQM's Scientific Advisory Board, members of the National Stakeholder Panel Members of the Massachusetts Child Health Quality Coalition, and the GAPPS Expert Stakeholder Panel provided guidance and feedback on the measure.

Measure Developer/Steward Updates and Ongoing Maintenance

Ad.2 Year the measure was first released:

Ad.3 Month and Year of most recent revision:

Ad.4 What is your frequency for review/update of this measure?

Ad.5 When is the next scheduled review/update for this measure?

Ad.6 Copyright statement:

Ad.7 Disclaimers:

Ad.8 Additional Information/Comments: