Initial Baseline Screen of Nutritional Status for Every Patient Within 24 Hours of Pediatric Intensive Care Unit (PICU) Admission

Section 1. Basic Measure Information

1.A. Measure Name

Inpatient Baseline Screen of Nutritional Status for Every Patient Within 24 Hours of Pediatric Intensive Care Unit (PICU) Admission

1.B. Measure Number

0199

1.C. Measure Description

Please provide a non-technical description of the measure that conveys what it measures to a broad audience.

The measure is a chart review performed to determine the frequency of conducting an initial nutritional status screening. The screening is to be performed within the first 24 hours of admission to the pediatric intensive care unit (PICU) with the use of a standardized nutrition screening tool. The results of the screening must be documented in the patient's chart upon completion.

1.D. Measure Owner

Pediatric Measurement Center of Excellence (PMCoE).

1.E. National Quality Forum (NQF) ID (if applicable)

Not applicable.

1.F. Measure Hierarchy

Please note here if the measure is part of a measure hierarchy or is part of a measure group or composite measure. The following definitions are used by AHRQ:

1. **Please identify the name of the collection of measures to which the measure belongs (if applicable). A collection is the highest possible level of the measure hierarchy. A**

collection may contain one or more sets, subsets, composites, and/or individual measures.

Not applicable.

2. **Please identify the name of the measure set to which the measure belongs (if applicable). A set is the second level of the hierarchy. A set may include one or more subsets, composites, and/or individual measures.**

   Pediatric Intensive Care Unit (PICU) Measure Set.

3. **Please identify the name of the subset to which the measure belongs (if applicable). A subset is the third level of the hierarchy. A subset may include one or more composites, and/or individual measures.**

   Not applicable.

4. **Please identify the name of the composite measure to which the measure belongs (if applicable). A composite is a measure with a score that is an aggregate of scores from other measures. A composite may include one or more other composites and/or individual measures. Composites may comprise component measures that can or cannot be used on their own.**

   Not applicable.

1.G. Numerator Statement

Number of patients for whom a screening of nutritional status was documented with use of a standardized nutrition screening tool within 24 hours of admission to the PICU.

Definitions

Standardized nutrition screening tool: Screening tool should be applied in a standardized manner to each patient admitted to the PICU and should be based on a nutrition screening tool that has been validated for the majority of the institution's PICU patients.

Examples of this would include STAMP (Wong, Graham, Hirani, et al., 2013) and the Paediatric Yorkhill Malnutrition Score (Gerasimidis, Macleod, Maclean, et al., 2011) and potentially institution-derived nutrition screening tools.

1.H. Numerator Exclusions

None.

1.I. Denominator Statement

All patients admitted to the PICU for at least 24 hours during a monthly or quarterly reporting period.

1.J. Denominator Exclusions

Patients who have already had a documented nutrition screening or assessment in the previous 48 hours.

1.K. Data Sources

Check all the data sources for which the measure is specified and tested.

Paper medical record; electronic health record (EHR).

If other, please list all other data sources in the field below.

Not applicable.

Section 2: Detailed Measure Specifications

Provide sufficient detail to describe how a measure would be calculated from the recommended data sources, uploading a separate document (+ Upload attachment) or a link to a URL. Examples of detailed measure specifications can be found in the CHIPRA Initial Core Set Technical Specifications Manual 2011 published by the Centers for Medicare & Medicaid Services. Although submission of formal programming code or algorithms that demonstrate how a measure would be calculated from a query of an appropriate electronic data source are not requested at this time, the availability of these resources may be a factor in determining whether a measure can be recommended for use.

Construction Using Manual Chart Abstraction

To construct this measure using manual chart abstraction, a research nurse or other trained medical professional will perform chart reviews and manually abstract each of the elements of the measure. For example, in addition to basic demographic elements, for this measure, elements such as PICU admission date (mm/dd/yyyy), PICU admission time (hh:mm, military), PICU discharge or transfer date (mm/dd/yyyy), and PICU discharge or transfer time (hh:mm, military) will be abstracted and used to identify the denominator population. Similarly, evidence of a standardized nutrition screening tool (yes/no), the date the standardized nutrition screening tool was administered following admission (mm/dd/yyyy), and the time the standardized nutrition screening tool was administered following admission (hh:mm, military) will be abstracted from patient charts and used to identify which patients meet the numerator criteria. Additionally, the date the standardized nutrition screening tool was administered prior to admission (mm/dd/yyyy) and the time the standardized screening tool was administered prior to admission (hh:mm, military) will also be abstracted as exclusion criteria. Please see Supporting Documents (Section 2) for the Chart Abstraction Tool for this measure.

Construction as an e-Measure in the Electronic Health Record

To construct this measure as an eMeasure in the electronic health record (EHR), each of the measure elements must exist in structured, queriable fields; the eMeasure will be implemented in the EHR using the eMeasure specifications and an electronic algorithm that will compute the

measure automatically and generate a performance report that indicates whether patients met the measure. Please see Supporting Documents (Section 2) for eMeasure specifications.

Section 3. Importance of the Measure

In the following sections, provide brief descriptions of how the measure meets one or more of the following criteria for measure importance (general importance, importance to Medicaid and/or CHIP, complements or enhances an existing measure). Include references related to specific points made in your narrative (not a free-form listing of citations).

3.A. Evidence for General Importance of the Measure

Provide evidence for all applicable aspects of general importance:

- **Addresses a known or suspected quality gap and/or disparity in quality (e.g., addresses a socioeconomic disparity, a racial/ethnic disparity, a disparity for Children with Special Health Care Needs (CSHCN), a disparity for limited English proficient (LEP) populations).**
- **Potential for quality improvement (i.e., there are effective approaches to reducing the quality gap or disparity in quality).**
- **Prevalence of condition among children under age 21 and/or among pregnant women**
- **Severity of condition and burden of condition on children, family, and society (unrelated to cost)**
- **Fiscal burden of measure focus (e.g., clinical condition) on patients, families, public and private payers, or society more generally, currently and over the life span of the child.**
- **Association of measure topic with children's future health – for example, a measure addressing childhood obesity may have implications for the subsequent development of cardiovascular diseases.**
- **The extent to which the measure is applicable to changes across developmental stages (e.g., infancy, early childhood, middle childhood, adolescence, young adulthood).**

Potential for Quality Improvement

Identification of a subset of nutritionally at-risk patients allows providers the ability to modify treatment therapies as indicated specific to this population. The prevalence of malnutrition at admission to the PICU and the demonstration of worsening nutritional status over the course of stay in the PICU (*vide infra*) suggest that identification of nutritionally at-risk patients at the time of admission would provide an opportunity to improve nutrition therapy for these patients.

In a multicenter, retrospective study of 1,349 patients, 645 (47.8 percent) had a caloric goal entered in the medical record within 48 hours of admission to the PICU (Walkenham,

Christensen, Manzi, et al., 2013). These patients had higher total daily caloric intake and were more likely to be fed enterally during the first 4 days of PICU admission than those without an identified caloric goal ($p<0.001$ for both comparisons).

Prevalence

Children who develop critical illness or injury may be malnourished at the time of admission. In a prospective study from the Netherlands, 15 percent of children had evidence of acute malnutrition at the time of admission to the PICU, 20 percent of children had evidence of chronic malnutrition at the time of admission, and 24 percent of children had evidence of acute or chronic malnutrition at the time of admission (Hulst, Joosten, Zimmermann, et al., 2004). In a separate study, the same investigators found significant nutritional deficits in the first 14 days of admission to the PICU (Hulst, van Goudoever, Zimmermann, et al., 2004). These cumulative energy and protein deficits were associated with declines in weight over the same 14-day period (Hulst, van Goudoever, Zimmermann, et al., 2004). In a recent international multicenter prospective study, 30 percent of children were severely malnourished at the time of admission to the PICU (Mehta, Bechard, Cahill, et al., 2012). Of these children, 17.1 percent were severely underweight at admission, and 13.2 percent were severely overweight at admission. In addition, about 30 percent of children were moderately malnourished at the time of admission to the PICU. Of these children, 14.4 percent were moderately underweight, and 16.3 percent were moderately overweight at the time of admission (Mehta, et al., 2012). A retrospective study from a tertiary PICU in Brazil found that 53 percent of patients were moderately or severely malnourished at the time of admission to the PICU (Delgado, Okay, Leone, et al., 2008).

In 2000, a prospective study from France found that 26 percent of hospitalized children were undernourished at the time of admission to the hospital, and 65 percent of children lost weight during their hospital stay (Sermet-Gaudelus, Poisson-Salomon, Colomb, et al., 2000). In 2006, a prospective study from Brazil found that 18.7 percent of hospitalized children were severely malnourished at the time of admission to the hospital, and 51.6 percent of patients lost weight during their hospital stay (Rocha, Rocha, Martins, 2006). In this study, children who were malnourished on admission were still malnourished at hospital discharge, and 10 (9.17 percent) well-nourished children developed mild malnutrition while hospitalized.

A retrospective study from the Netherlands found that only 40 percent of children admitted to the PICU received some form of nutrition in the first day of admission, and that mean caloric goal was not reached until day 5 of admission, with protein intake of 75 percent of goal during the 10-day study period (de Neef, Geukers, Dral, et al., 2008). During critical illness or injury, the energy needs of children vary greatly, with some needing more than the predicted amount and others needing less than the predicted amount (Alexander, Susla, Burstein, et al., 2004). In summary, malnutrition is prevalent among patients in the PICU and has been shown to worsen over the course of the PICU stay (Hulst, van Goudoever, Zimmermann, et al., 2004; Mehta, et al., 2012).

Severity of Condition

In critically ill children, malnutrition is associated with an increased PICU length of stay and an increased risk-adjusted mortality (Goday, Kuhn, Sachdeva, et al., 2008). The benefits of nutrition support in the critically ill patient include improved wound healing, a decreased catabolic

response to injury, and improved gastrointestinal structure and function (Arnold, Barbul, 2006; Wray, Mammen, Hasselgren, 2002). While data from randomized controlled trials in adults have shown the benefits of enteral nutrition (EN) in contrast to parenteral nutrition (PN) (Kalfarentzos, Kehagias, Mead, et al., 1997; Kudsk, Croce, Fabian, et al., 1992), these effects are as yet unproven in critically ill children. Adult guidelines recommend the initiation of EN in the critically ill patient (Martindale, McClave, Vanek, et al., 2009). In critically ill children, EN is generally recommended, but there are no recommendations on when it should be started (Mehta, Compher, ASPEN Board of Directors, 2009).

Two recent studies have demonstrated significantly lower mortality rates associated with early EN in critically ill children (ages 1 month to 18 years). Early enteral nutrition (EEN), defined as EN that is begun within 24-48 hours of admission to the PICU (Martindale, et al., 2009) has been shown to be feasible in critically ill children (Chellis, Sanders, Webster, et al., 1996). The first study was an observational study of 500 prospectively enrolled, mechanically ventilated children from 31 academic centers in eight countries. This study showed a significant association between higher proportion of goal calories by the enteral route and lower 60-day mortality [OR=0.27 (95 percent CI 0.11-0.67) for proportion of calories by the enteral route 33.3-66.7 percent and OR=0.14 (95 percent CI 0.03-0.61), for proportion of calories by the enteral route >66.7 percent p=0.002] (Mehta, et al., 2012).

The second study was a retrospective, multicenter study of 5,105 patients (53.8 percent male; median age 2.4 years) designed to determine whether EEN is associated with lower mortality, shorter length of stay, and shorter duration of mechanical ventilation in critically ill children (Mikhailov, Kuhn, Manzi, et al., 2014). Data were obtained retrospectively from the Virtual PICU Systems (VPS) LLC database and from review of medical records at each participating institution. Unadjusted mortality was 5.3 percent. EEN was achieved by 27.1 percent of patients. Children receiving EEN were less likely to die than those who did not [OR=0.51 (0.34-0.76) p=0.001, adjusted for propensity score, PIM2, age, and center]. When adjusted for PIM2, age, and center, the length of stay (p=0.59) and the duration of mechanical ventilation (p=0.058) did not differ between those who received EEN and those who did not. The investigators concluded that EEN is strongly associated with lower mortality in patients with PICU length of stay >96 hours. A subgroup analysis of this study included patients who had received no EN (n=2,069) during the first 4 days of PICU admission. Those patients who received early PN (defined as parenteral nutrition begun within 24-48 hours of admission) were significantly more likely to die than those who did not [OR=2.10 (1.41-3.13) p=0.0003, adjusted for propensity score, PIM2, center] (goday, Kuhn, Mikhailov, 2013).

Applicable to Changes Across Developmental Stages

Children of all ages are at risk for malnutrition and for worsening nutritional status during their critical illness (Hulst, Joosten, Zimmermann, 2004; Hulst, van Goudoever, Zimmerman, et al., 2004; Mehta, et al., 2012; Delgado, et al., 2008). The necessity of screening for malnutrition and the need for providers to modify nutrition therapy to improve outcomes applies to all developmental stages and age groups (Chellis, et al., 1996; de Neef, et al., 2008; Goday, et al., 2008; Mehta, et al., 2009; Mehta, et al., 2012).

3.B. Evidence for Importance of the Measure to Medicaid and/or CHIP

Comment on any specific features of this measure important to Medicaid and/or CHIP that are in addition to the evidence of importance described above, including the following:

- **The extent to which the measure is understood to be sensitive to changes in Medicaid or CHIP (e.g., policy changes, quality improvement strategies).**
- **Relevance to the Early and Periodic Screening, Diagnostic and Treatment benefit in Medicaid (EPSDT).**
- **Any other specific relevance to Medicaid/CHIP (please specify).**

In addition to the evidence of general importance described above, this measure is relevant and important to Medicaid and/or CHIP because the medically complex patients who are treated in the PICU often fall disproportionately into the Medicaid population. Children from poorer families are more likely to become critically ill, either because their access to care is not optimal or they have chronic conditions and do not receive the ongoing care needed to keep them out of the PICU.

The PICU is the "canary in the coal mine" for pediatric inpatient care; it is the intended placement location for the sickest children in the institution, where risk is high, teamwork is required, and resource utilization is elevated. The PICU is where lapses or gaps in safety or quality potentially are the most devastating, but it can also be the location where early improvement might be most noticeable if the correct measurements are completed, analyzed, and acted upon.

Existing pediatric critical care quality measures are limited and simply do not capture the clinical relevance needed for measuring, reporting, and improving quality. Continued progress in measurement science has been shown to be effective in engaging clinicians and promoting the dissemination of best practices across many stakeholders to close quality gaps and produce true improvement in PICU care. Among the benefits to Medicaid/CHIP are: cost savings through improved patient outcomes, more efficient staffing, more effective use of resources, and more efficient procedures.

The aim of this measure is to identify nutritionally at-risk patients – including those on Medicaid/CHIP – as early as possible in their illness so that providers can prescribe nutrition therapy that is appropriate for the individual patient's current nutritional state and clinical condition and that will facilitate the healing process. An initial baseline screen of nutritional status for every patient increases awareness of a patient's nutritional state, specifically identifies the subset of PICU patients who are at risk of malnutrition, and allows providers to adjust the timing, content, and quantity of nutrition therapy to meet the individual patient's needs. While there is no single, validated screening tool that is considered appropriate for critically ill and injured children, those available for hospitalized children (including institution-derived nutrition screening tools) typically take about 5 minutes to administer, can be done at the bedside, and generally do not require a dietitian.

3.C. Relationship to Other Measures (if any)

Describe, if known, how this measure complements or improves on an existing measure in this topic area for the child or adult population, or if it is intended to fill a specific gap in an existing measure category or topic. For example, the proposed measure may enhance an existing measure in the initial core set, it may lower the age range for an existing adult-focused measure, or it may fill a gap in measurement (e.g., for asthma care quality, inpatient care measures).

No PICU-related measures are currently included in the Core Set of Children's Health Care Quality Measures for Medicaid and CHIP (Child Core Set), yet the PICU is where a hospital's sickest and most vulnerable children are treated. In addition to closing gaps in safety and/or quality, implementation of appropriate measures in the PICU could mitigate much of the elevated risk and costs associated with pediatric critical care.

Early in its process, the PMCoE PICU Expert Workgroup conducted an extensive review of existing measures related to pediatric critical care. Clinical experts and family representatives weighed in on a wide range of possible new measures to be proposed for the PICU. Once identification of nutritional status at PICU admission emerged as a concern among the Expert Workgroup members, it was soon determined that no such measure existed, and Measure Champions were assigned to lead the development of a proposed new measure on this topic.

The Measure Champions noted that critically ill patients have complex nutritional needs. The PICU must accommodate a wide age range where there is tremendous variability in basic nutritional needs, challenging the provider to assure that adequate nutrition is met for every patients of every age while they are being cared for in the PICU. Another area of variation is the difficulty faced in attempting to unify a standard practice within a single PICU group and translate this into a standard practice to be followed by all pediatric institutions where intensive care is a part of the practice group. National as well as regional and even intra-hospital variability in practice has existed among PICUs in the treatment of common pediatric illnesses such as asthma and sepsis and the diagnosing of brain death. Evidence-based guidelines have standardized the practice and allowed better data collection in comparing outcomes.

We are further aware of an existing gap that still needs to be addressed. As we propose this process measure to implement a change in the nutritional culture for our PICU, we have no follow-up tool to measure our successes and failures in meeting the nutritional requirements of our patients. To address this gap, the following measures might be considered in the future:

Nutritional Assessment for Patients at Risk for Malnutrition Completed Within 48 Hours of PICU Admission: A chart review to determine the frequency of conducting a nutritional status assessment for patients admitted to the PICU within 48 hours of identification of risk of malnutrition using a standardized nutrition screening tool. The assessment must be documented in the patient's chart on completion.

Initial Caloric Goal Documented for Every Patient Within 48 Hours of PICU Admission: A chart review to determine the frequency of documentation of initial caloric goal for all PICU patients within 48 hours of admission to PICU.

Section 4. Measure Categories

CHIPRA legislation requires that measures in the initial and improved core set, taken together, cover all settings, services, and topics of health care relevant to children. Moreover, the legislation requires the core set to address the needs of children across all ages, including services to promote healthy birth. Regardless of the eventual use of the measure, we are interested in knowing all settings, services, measure topics, and populations that this measure addresses. These categories are not exclusive of one another, so please indicate "Yes" to all that apply.

Does the measure address this category?

a. **Care Setting – ambulatory:** No.
b. **Care Setting – inpatient:** Yes.
c. **Care Setting – other – please specify:** No.
d. **Service – preventive health, including services to promote healthy birth:** Yes.
e. **Service – care for acute conditions:** Yes.
f. **Service – care for children with acute conditions:** Yes.
g. **Service – other (please specify):** No.
h. **Measure Topic – duration of enrollment:** No.
i. **Measure Topic – clinical quality:** Yes.
j. **Measure Topic – patient safety:** Yes.
k. **Measure Topic – family experience with care:** No.
l. **Measure Topic – care in the most integrated setting:** No.
m. **Measure Topic other (please specify):** No.
n. **Population – pregnant women:** No.
o. **Population – neonates (28 days after birth) (specify age range):** No.
p. **Population – infants (29 days to 1 year) (specify age range):** Yes; infants 29-364 days.
q. **Population – pre-school age children (1 year through 5 years) (specify age range):** Yes; 1-5 years.
r. **Population – school-aged children (6 years through 10 years) (specify age range):** Yes; 6-10 years.
s. **Population – adolescents (11 years through 20 years) (specify age range):** Yes; 11-20 years.
t. **Population – other (specify age range):** No.
u. **Other category (please specify):** Not applicable.

Section 5. Evidence or Other Justification for the Focus of the Measure

The evidence base for the focus of the measures will be made explicit and transparent as part of the public release of CHIPRA deliberations; thus, it is critical for submitters to specify the scientific evidence or other basis for the focus of the measure in the following sections.

5.A. Research Evidence

Research evidence should include a brief description of the evidence base for valid relationship(s) among the structure, process, and/or outcome of health care that is the focus of the measure. For example, evidence exists for the relationship between immunizing a child or adolescent (process of care) and improved outcomes for the child and the public. If sufficient evidence existed for the use of immunization registries in practice or at the State level and the provision of immunizations to children and adolescents, such evidence would support the focus of a measure on immunization registries (a structural measure).

Describe the nature of the evidence, including study design, and provide relevant citations for statements made. Evidence may include rigorous systematic reviews of research literature and high-quality research studies.

Delivery of nutrition therapy that is appropriate for the individual patient's current nutritional state and clinical condition will facilitate the healing process. If a patient is malnourished at admission to the PICU, the healing process may be compromised regardless of other interventions. Assessing nutritional status at PICU admission is vital to ensuring patients receive nutrition therapy that is suited to their individual needs and that will promote healing and improved outcomes.

Several prospective studies and one retrospective study reported the prevalence of malnutrition at admission to the PICU with rates of malnutrition ranging from 24 percent to 53 percent (Delgado, et al., 2008; Hulst, Joosten Zimmermann, 2004; Hulst, van Goudoever, Zimmermann, 2004). Two other prospective studies of hospitalized children (but not specifically PICU patients) reported the prevalence of weight loss during hospitalization, with one study reporting weight loss in 51.6 percent of hospitalized patients and the other reporting weight loss in 65 percent of hospitalized patients (Rocha, et al., 2006; Sermet-Gaudelus, et al., 2000). Furthermore, a retrospective study of critically ill children found that only 40 percent received any nutrition in the first 24 hours of PICU admission, and caloric goals were not achieved until day 5 of their PICU admission (de Neef, et al., 2008).

A retrospective study from a large PICU database, with data from over 40 PICUs in North America, found that children who were undernourished had increased PICU length of stay and risk-adjusted mortality (Goday, et al., 2008). A prospective, multicenter study of PICU patients found that those who received early EN had a lower mortality (Chellis, et al., 1996), and a large, multicenter retrospective study of PICU patients found that those who received early EN were less likely to die (Mikhailov, et al., 2014).

Furthermore, a variety of challenges and barriers occur within the PICU setting that impede both the timely initiation and the effective delivery of protein and energy. In a multicenter international study, Mehta and colleagues (2012) were able to show a significant reduction in mortality in 500 mechanically ventilated patients when adequate nutritional support was provided to these individuals.

Based on these reports, it is paramount to identify nutritionally at-risk children in the PICU so that nutrition therapy can be modified to meet their needs, and outcomes can be improved.

5.B. Clinical or Other Rationale Supporting the Focus of the Measure (optional)

Provide documentation of the clinical or other rationale for the focus of this measure, including citations as appropriate and available.

The Joint Commission requires that hospitals complete nutrition screening within 24 hours after inpatient admission. [(See also PC.01.02.01, Eps 2 and 3; RC.02.01.01, EP 2) Reference: http://www.jointcommission.org/]

Several well-designed nutrition screening tools have been developed for the pediatric population (Gerasimidis, et al., 2011; Hulst, Zwart, Hop, et al., 2009; Sermet-Gaudeus, et al., 2000; Tool, Graham, Hirani, et al., 2013). None of these have been validated in the critically ill and injured pediatric population. However, these tools are all quick and easy to administer. Thus, any of these tools, or an institution's own validated nutrition screening tool, could be administered within 24 hours of admission of a critically ill or injured child to the PICU. This would allow identification of malnourished patients and those at risk of becoming malnourished so that further assessment could be obtained. Such an assessment might require a registered dietitian or other trained provider. An example of an assessment tool would be the Subjective Global Nutritional Assessment for children (Secker, Jeejeebhoy, 2007), which has been validated in the PICU population (Vermilyea, Slicker, El-Chammas, et al., 2012). Based on this assessment, nutrition therapy could be prescribed and administered in a timely manner based on the energy and protein needs of the critically ill or injured child.

Clinical evidence suggests that improvements in meeting patients' nutritional needs through the use of evidence-based nutritional guidelines will improve patient outcomes, reduce duration of recovery time, and decrease length of stay which will result in a reduction of health care costs.

Section 6. Scientific Soundness of the Measure

Explain the methods used to determine the scientific soundness of the measure itself. Include results of all tests of validity and reliability, including description(s) of the study sample(s) and methods used to arrive at the results. Note how characteristics of other data systems, data sources, or eligible populations may affect reliability and validity.

6.A. Reliability

Reliability of the measure is the extent to which the measure results are reproducible when conditions remain the same. The method for establishing the reliability of a measure will depend on the type of measure, data source, and other factors.

Explain your rationale for selecting the methods you have chosen, show how you used the methods chosen, and provide information on the results (e.g., the Kappa statistic). Provide appropriate citations to justify methods.

Construction of the eMeasure and Manual Chart Abstraction of the Measures

Testing Sites

The testing sites for the testing of this measure included three hospitals of the Chicago Pediatric Quality and Safety Consortium (CPQSC): Lutheran General Children's Hospital, Christ Hope Children's Hospital, and Anne and Robert H. Lurie Children's Hospital. See description of the CPQSC participating hospitals in the Supporting Documents (Section 6-A, CPQSC Participating Hospitals).

Methods

Feasibility testing indicated that this measure was feasible in the three CPQSC sites. Lurie Children's Hospital performed parallel forms reliability testing where the eMeasure construction was compared against manual chart reviews. The patient sample was identified using a reporting period of 01 January – 31 March 2015. This measure was implemented in the site's EHR using an electronic algorithm, which computed the measure automatically and generated a performance report on the selected sample of patients. At the same time, a trained chart abstracter performed manual chart reviews on the same patients. Manual chart abstraction was then compared to the automated measure report to determine how reliably the overall measure and individual measure elements were calculated.

Lutheran General Children's Hospital and Christ Hope Children's Hospital conducted reliability assessment across two time periods of measurement as a chart review measure, for the time periods 01 January – 30 June 2015 and 01 July – 31 December 2015. Using an electronic algorithm, charts were identified that met the denominator criteria, they were stratified by age group (0-< 6 years, 6–< 12 years, 12–< 18 years), and then were randomly selected for abstraction within each age strata.

To complete the manual chart abstraction, whether conducting parallel forms testing to assess the reliability of the eMeasure or reliability across time for the chart review measure, the following algorithm was followed:

1. Evaluate the charts in the patient sample to see whether the patients meet the denominator criteria: admitted to the PICU for at least 24 hours during the reporting period.
2. Collect demographics and elements for equity assessment: age, gender, race/ethnicity, language preference, insurance status/type.
3. Consider the exclusion criteria, patients who had a documented nutrition screening in the prior 48 hours. If so, stop chart abstraction at this time. This patient does not meet the measure.
4. Review patient chart and document measure elements in the chart abstraction tool including both denominator and numerator measure elements.
5. Note relevant comments.

Analysis

At Lurie Children's, data analysis included construction of the eMeasure performance report for the entire sample to assess clinical performance, construction of the eMeasure for a sub-sample of patients, and assessment of agreement across chart abstractions and electronic eMeasure output for the same patients. The intent of the analysis was to test the ability to construct this measure as an eMeasure, test the reliability and validity of the measure as constructed, determine the level of agreement between the chart abstraction and the electronic eMeasure output, and assess for overall clinical performance. The results of reliability and validity testing provide a basis for this measure as a measure of performance for public reporting and quality improvement.

At the two other sites, data analysis included assessment of clinical performance of the measure as a chart review measure and assessment of reliability of the reported clinical performance of the measure across time. The intent of the analysis was to test the ability to construct this measure as a manual chart review measure, test the reliability and validity of the measure construction, and assess the overall clinical performance. The results of reliability and validity testing provide a basis for this measure as a measure of performance for public reporting and quality improvement.

Results

Lurie Children's was able to assess this eMeasure electronically, providing electronic output for 110 unique patients representing 121 events. Lutheran General Children's Hospital and Christ Hope Children's Hospital assessed this measure as a chart review measure, providing complete chart reviews (i.e., the patient met the denominator criteria) for 315 patients. Please see Section 7 of this report for information regarding the race/ethnicity, socioeconomic status, and language preference of these patient samples.

eMeasure Performance Results

Overall (N=110) for this eMeasure, clinical performance was reasonably high with 90 percent of patients meeting the measure and 92 percent of all screens meeting the measure. These eMeasure performance results represent the performance at one testing site. This measure also showed reasonably high clinical performance across age groups: 92 percent of screens performed for children aged 0-<6, 96 percent performed for children aged 6-<13, and 88 percent performed for children aged 13-<19 met the measure. Only 67 percent of screens performed on patients 19 years and older met the measure due to the small sample (N=3) in this age group. Reasons for not meeting the measure included not meeting the denominator criteria of having a nutrition screen more than 48 hours prior to PICU admission (N=8), not having the screen performed in the PICU (N=2), and having a nutrition screen performed within 48 hours of PICU admission (N=5).

Chart Review Performance Results

Across all three sites (N=320), for this measure chart reviews revealed poor clinical performance, with 18 percent of patients meeting the measure. The largest number of chart reviews (N=315) were conducted at two sites where nutrition assessment is not routinely performed. Reasons for not meeting the measure included not having a nutrition screen

documented in the chart (N=241) or a nutrition screen more than 24 hours after PICU admission or > 48 hours before PICU admission (N=23). Patients were excluded because they met the denominator exclusion criteria of not staying in the PICU at least 24 hours (N=11) or having a nutrition screen within 48 hours of PICU admission meeting (N=10). These chart reviews revealed a substantial performance gap at two of the testing sites, with 12 percent of patients at one site and 23 percent of patients at the other site meeting the measure compared to 100 percent of patients at the third site. Clinical performance was comparable across age groups: 16 percent of children aged 0-<6 (N=122), 20 percent of children aged 6-<13 (N=103), and 11 percent of children aged 13-<18 (N=90) met the measure.

Reliability Testing

At Lurie Children's Hospital, chart abstractions were performed for five patient charts and compared against the same patients in the electronic output. Agreement for parallel forms reliability testing was 100 percent for measure elements: admission date, race, ethnicity, payer, and whether a nutrition screening tool was used to assess nutritional status within 24 hours of admission to the PICU. Agreement was 100 percent for overall measure performance. As agreement was 100 percent with no variability, a kappa statistic could not be computed.

At the two other testing sites where we assessed reliability of the measure as a chart review measure across two different time periods (N1=179, N2=85), we found no significant difference in the reported performance across the two time periods of performance measurement, with 15 percent of patients who had a nutrition screen between 01 January – 30 June 2015 and 19 percent of patients who had a nutrition screen between 01 July – 31 December meeting the measure (p=0.33).

6.B. Validity

Validity of the measure is the extent to which the measure meaningfully represents the concept being evaluated. The method for establishing the validity of a measure will depend on the type of measure, data source, and other factors.

Explain your rationale for selecting the methods you have chosen, show how you used the methods chosen, and provide information on the results (e.g., R2 for concurrent validity).

The PMCoE used the American Medical Association's Physician Consortium for Performance Improvement (AMA-PCPI) Wheel Methodology, which is extensively used in the adult setting, to develop clinically relevant quality measures for pediatric critical care, including this measure aimed at performing an initial baseline screen of nutritional status for every patient within 24 hours of PICU admission. The goal is to provide nutrition therapy that is appropriate for the individual patient's current nutritional state and clinical condition and will facilitate the healing process.

This measure was assessed for content validity by looking for agreement among subject matter experts, specifically by the panel of stakeholder representatives serving as members of the Pediatric Intensive Care Unit (PICU) Expert Workgroup during the development process (see Supporting Documents, PMCoE PICU Expert Workgroup and Meeting Materials). This

multidisciplinary, national panel consisted of physicians, nurses, parent/family representatives, and measure methodologists.

Additionally, input on the content validity of draft measures was obtained through a 21-day public comment period. The Expert Workgroup reviewed all comments received and modified the measures as needed.

Finally, the Expert Work Group considered the following questions during a final content validity assessment of this measure:

1. How strong is the scientific evidence supporting the validity of this measure as a quality measure?

100 percent of respondents indicated "Very Strong (60 percent)" or "Somewhat Strong (40 percent)."

2. Are all individuals in the denominator equally eligible for inclusion in the numerator?

100 percent of respondents answered "Yes."

3. Is the measure a result under control of those whom the measure evaluates?

100 percent of respondents answered "Yes."

4. How well do the measure specifications capture the event that is the subject of the measure?

100 percent of respondents indicated "Very well (80 percent)" or "Somewhat well" (20 percent).

5. Does the measure provide for fair comparisons of the performance of providers, facilities, health plans, or geographic areas?

100 percent of respondents answered "Yes." Comment: "I think a validated nutrition screening tool is needed or a better description of what the nutrition screening should include for better measurement."

Section 7. Identification of Disparities

CHIPRA requires that quality measures be able to identify disparities by race, ethnicity, socioeconomic status, and special health care needs. Thus, we strongly encourage nominators to have tested measures in diverse populations. Such testing provides evidence for assessing measure's performance for disparities identification. In the sections below, describe the results of efforts to demonstrate the capacity of this measure to produce results that can be stratified by the characteristics noted and retain the scientific soundness (reliability and validity) within and across the relevant subgroups.

7.A. Race/Ethnicity

The PMCoE PICU Expert Workgroup and Measure Champions were focused from the outset on the incorporation of specified elements to assess equity/disparities, particularly race/ethnicity,

payer status (socioeconomic status inferred), and language preference. Additionally, performance of this measure was assessed by gender. Attention to equity/disparities assessment was incorporated into each stage of the measure development and testing process.

Many critically ill children require various nutritional support levels at different stages of their illness. The delivery of nutrition can either occur through parenteral nutrition (PN) or enteral nutrition (EN). Despite the controversy that surrounds which nutritional resource is the best for critically ill patients, access to both sources is not always possible for all centers. Racial and geographical disparities in the use of PN have been cited and studied by Nguyen and his colleagues and reveal that African Americans and individuals not living in the Northeast are less likely to receive PN (Nguyen, Munsell, Brant, et al., 2009).

We recognize the value of testing in a diverse population so that the measure might be capable of producing stratified results to identify any disparities in the measure's performance. In specifying this measure, the Supplemental Data Elements included:

- Patient Characteristic Race using the "Race CDCREC Value Set."
- Patient Characteristic Ethnicity using the "Ethnicity CDCREC Value Set."

Testing

At Lurie Children's, 40 percent (N=42) of the patient sample (N=105) was Hispanic, 30 percent (N=31) was white, 23 percent (N=24) was black, and 7 percent (N=8) was other. The eMeasure performed reasonably well across all race/ethnicity groups, with 97 percent of white patients, 88 percent of black patients, 88 percent of Hispanic patients, and 88 percent of other patients meeting the measure. These differences were not statistically significant. White patients (N=3) and Hispanic patients (N=3) were more likely than black patients (N=0) or patients of other race/ethnicity groups (N=0) to meet the denominator exclusion criteria by already having a documented nutrition screening or assessment in the previous 48 hours.

Across the two other sites (N=315), 43 percent (N=135) of the patient sample was white, 24 percent (N=77) was black, 21 percent (N=66) was Hispanic, 7 percent (N=21) was other, and 5 percent (N=16) was unknown.

Using this chart review measure, we found the poorest clinical performance for patients in the black sub-sample with 6 percent meeting the measure as compared to 38 percent of patients who list their race/ethnicity as other, 20 percent of Hispanic patients, 19 percent in patients with unknown race/ethnicity, and 16 percent of white patients. These differences were statistically significant (p=.009). Regarding the denominator exclusions, black patients (N=4), white patients (N=3), and Hispanic patients (N=3) were fairly equally likely to meet the denominator exclusion criteria by already having a documented nutrition screening or assessment in the previous 48 hours.

7.B. Special Health Care Needs

The performance of this measure was not assessed for children with special health care needs.

7.C. Socioeconomic Status

Uninsured children and children from economically disadvantaged homes usually present to the hospital with much poorer nutritional status and may require more extensive support that will extend beyond the walls of the ICU and may be beyond the scope of the medical center where they are hospitalized.

We recognize the value of testing in a diverse population so that the measure might be capable of producing stratified results to identify any disparities in the measure's performance. In specifying this measure, the Supplemental Data Elements included:

- Patient Characteristic Payer using the "Payer SOP Value Set."

Testing

At Lurie Children's, 54 percent (N=57) of our patient sample used private insurance, and 46 percent (N=48) used Medicaid. This eMeasure performed similarly in both groups, with 92 percent of Medicaid patients and 89 percent of patients using private insurance meeting the measure. This difference was not statistically significant. Patients using private insurance were more likely to meet the denominator exclusion criteria (N=4) than Medicaid patients (N=2).

At Lutheran General Children's Hospital and Christ Hope Children's Hospital, 61 percent (N=193) of the patient sample used private insurance, and 39 percent (N=122) used Medicaid. This chart review measure assessment showed similar clinical performance in both subgroups with 16 percent of patients with private insurance and 17 percent of patients with Medicaid meeting the measure. This difference was not statistically significant. Patients with Medicaid were more likely to meet the denominator exclusion criteria (N=8) than patients with private insurance (N=2).

7.D. Rurality/Urbanicity

All testing sites are located in the Chicagoland area; therefore, the performance of this measure by rurality/urbanicity was not assessed.

7.E. Limited English Proficiency (LEP) Populations

We recognize the value of testing in a diverse population so that the measure might be capable of producing stratified results to identify any disparities in the measure's performance. In specifying this measure, we assessed for language preference.

Testing

At Lurie Children's, the preferred language for 77 percent (N=81) of the patient sample was English as compared to 19 percent (N=20) who preferred Spanish and 4 percent (N=4) who preferred a different language. Clinical performance of this eMeasure was very good across all groups, with 90 percent of patients who preferred English, 90 percent of patients who preferred Spanish, and 100 percent of patients who preferred a different language meeting the measure.

These differences were not statistically significant. Spanish speakers were more likely to meet the denominator exclusion criteria (N=5) than English speakers (N=1) and patients who preferred a different language (N=0) and, therefore, were less likely to be included in the denominator.

At Lutheran General Children's Hospital and Christ Hope Children's Hospital, 93 percent (N=293) of the patients preferred English, 5 percent (N=17) preferred Spanish, 1 percent (N=3) preferred a different language, and l percent (N=2) did not report a preferred language. Chart reviews of this measure demonstrated clinical performance was best in the Spanish-speaking subgroup, with 29 percent of patients meeting the measure as compared to 16 percent of English-speaking patients and 0 percent of patients who spoke a different language or failed to report a language. These differences were not statistically significant. All patients who met the exclusion criteria (N=10) preferred speaking English.

Section 8. Feasibility

Feasibility is the extent to which the data required for the measure are readily available, retrievable without undue burden, and can be implemented for performance measurement. Using the following sections, explain the methods used to determine the feasibility of implementing the measure.

8.A. Data Availability

1. What is the availability of data in existing data systems? How readily are the data available?

The feasibility of the construction of this measure was assessed in the Chicago Pediatric Quality and Safety Consortium (CPQSC), which includes Advocate Children's Hospital – Park Ridge, Advocate Children's Hospital – Oak Lawn, John H. Stroger Hospital, and Lurie Children's Hospital. The EHR vendor systems used across these institutions included Epic and Cerner. Please see the Supporting Documents, Section 8-A, for the Data Element Table (DET) tool used in feasibility testing.

Based on the informaticists' assessments at each site and further validation of responses by the PhD level bioinformaticist at Northwestern University, this measure was determined to be "technically feasible, can do today" and "feasible, can do today" for implementation feasibility at three testing sites, Advocate Children's Hospital – Park Ridge, Advocate Children's Hospital – Oak Lawn, and Lurie Children's Hospital. For both technical feasibility and implementation feasibility, this measure was designated "feasible with workflow modifications or changes to the EHR" at John H. Stroger Jr Hospital of Cook County. Please see results in the Supporting Documents, Section 8-A.

2. If data are not available in existing data systems or would be better collected from future data systems, what is the potential for modifying current data systems or creating new data systems to enhance the feasibility of the measure and facilitate implementation?

There were two reasons that this measure was determined to be "technically feasible with workflow modifications or changes to the EHR," at John H. Stroger Jr Hospital of Cook County. First, the numerator element identifying whether a patient has received a nutritional screen cannot be identified in this hospital's EHR system. Second, the denominator elements, "occurrence of an administration of a nutritional status screening tool that is standardized within the institution" and the associated date, as well as the exception element, "patients who have already had a documented nutrition screening or assessment in the previous 48 hours," are captured only as free text. In order to increase feasibility of this measure, all elements of the measure including numerator, denominator, and exception elements should be entered in structured queriable fields as opposed to free text or associated paper forms that are scanned into the medical record.

This measure was designated as, "technically feasible with workflow modifications or changes to the EHR" for implementation feasibility because John H. Stroger Jr Hospital of Cook County does not currently administer a nutritional status screening tool. In order for this measure to be implemented at this site, the tool would need to be designed/chosen, implemented, and the staff would need to be trained to administer the tool. Additionally, discrete fields would need to exist in the EHR for required data.

8.B. Lessons from Use of the Measure

1. Describe the extent to which the measure has been used or is in use, including the types of settings in which it has been used, and purposes for which it has been used.

Not applicable.

2. If the measure has been used or is in use, what methods, if any, have already been used to collect data for this measure?

Not applicable.

3. What lessons are available from the current or prior use of the measure?

Not applicable.

Section 9. Levels of Aggregation

CHIPRA states that data used in quality measures must be collected and reported in a standard format that permits comparison (at minimum) at State, health plan, and provider levels. Use the following table to provide information about this measure's use for reporting at the levels of aggregation in the table.

For the purpose of this section, please refer to the definitions for provider, practice site, medical group, and network in the Glossary of Terms.

If there is no information about whether the measure could be meaningfully reported at a specific level of aggregation, please write "Not available" in the text field before progressing to the next section.

Level of aggregation (Unit) for reporting on the quality of care for children covered by Medicaid/ CHIP†:

State level* Can compare States

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
Yes.

Data Sources: **Are data sources available to support reporting at this level?**
Yes.

Sample Size: **What is the typical sample size available for each unit at this level? What proportion of units at this level of aggregation can achieve an acceptable minimum sample size?**
Not available.

In Use: **Have measure results been reported at this level previously?**
No.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
No.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**
There are no unintended consequences for reporting this measure if the data are accurate.

Other geographic level: Can compare other geographic regions (e.g., MSA, HRR)

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
Yes.

Data Sources: **Are data sources available to support reporting at this level?**
Yes.

Sample Size: **What is the typical sample size available for each unit at this level? What proportion of units at this level of aggregation can achieve an acceptable minimum sample size?**
Not available.

In Use: **Have measure results been reported at this level previously?**
No.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
No.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**
There are no unintended consequences for reporting this measure if the data are accurate.

Medicaid or CHIP Payment model: Can compare payment models (e.g., managed care, primary care case management, FFS, and other models)

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
Yes.

Data Sources: **Are data sources available to support reporting at this level?**
Yes.

Sample Size: **What is the typical sample size available for each unit at this level? What proportion of units at this level of aggregation can achieve an acceptable minimum sample size?**
Not available.

In Use: **Have measure results been reported at this level previously?**
No.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
No.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**
There are no unintended consequences for reporting this measure if the data are accurate.

Health plan*: Can compare quality of care among health plans.

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
Yes.

Data Sources: **Are data sources available to support reporting at this level?**
Yes.

Sample Size: **What is the typical sample size available for each unit at this level? What proportion of units at this level of aggregation can achieve an acceptable minimum sample size?**
Not available.

In Use: **Have measure results been reported at this level previously?**
No.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
No.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**
There are no unintended consequences for reporting this measure if the data are accurate.

Provider Level
Individual practitioner: Can compare individual health care professionals

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
No.

Data Sources: **Are data sources available to support reporting at this level?**
No.

Sample Size: **What is the typical sample size available for each unit at this level? What proportion of units at this level of aggregation can achieve an acceptable minimum sample size?**
Not available.

In Use: **Have measure results been reported at this level previously?**
No.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
No.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**
Not applicable.

Provider Level
Hospital: Can compare hospitals

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
Yes.

Data Sources: **Are data sources available to support reporting at this level?**
Yes.

Sample Size: **What is the typical sample size available for each unit at this level? What proportion of units at this level of aggregation can achieve an acceptable minimum sample size?**
Not available.

In Use: **Have measure results been reported at this level previously?**
No.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
No.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**
There are no unintended consequences for reporting this measure if the data are accurate.

Provider Level
Practice, group, or facility:** Can compare: (i) practice sites; (ii) medical or other professional groups; or (iii) integrated or other delivery networks

Intended use: **Is measure intended to support meaningful comparisons at this level? (Yes/No)**
Yes.

Data Sources: **Are data sources available to support reporting at this level?**
Yes.

Sample Size: **What is the typical sample size available for each unit at this level? What proportion of units at this level of aggregation can achieve an acceptable minimum sample size?**
Not available.

In Use: **Have measure results been reported at this level previously?**
No.

Reliability & Validity: **Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**
No.

Unintended consequences: **What are the potential unintended consequences of reporting at this level of aggregation?**
There are no unintended consequences for reporting this measure if the data are accurate.

Section 10. Understandability

CHIPRA states that the core set should allow purchasers, families, and health care providers to understand the quality of care for children. Please describe the usefulness of this measure toward achieving this goal. Describe efforts to assess the understandability of this measure (e.g., focus group testing with stakeholders).

During late summer 2014, together with four other draft PICU measures, this measure was widely disseminated during a 21-day period of Public Comment. The objective was two-fold: one, to provide stakeholders with an opportunity to review the draft measures and advise PMCoE on appropriate changes in content, based on their respective areas of expertise; and two, to assess the public's perception of the draft measures' usefulness and understandability.

In the case of this measure, Initial Baseline Screen of Nutritional Status for Every Patient Within 24 Hours of PICU Admission, we were able to enhance the usefulness and understandability by making the following changes directly indicated from Public Comment:

- Commenters raised questions about standard scoring and absence of validated screening tools.

  Language in the numerator definition was clarified to include "potentially institution-derived nutrition screening tools."

- In response to feasibility concerns raised through Public Comment, language was added regarding "relationship to desired outcome."

  (most available screening tools) "…take about 5 minutes to administer, can be done at the bedside, and do not generally require a dietitian."

Additionally, the Measure Champions considered comments suggesting that conducting the baseline screen within 24 hours of admission to the PICU might not be necessary; within 48 or 72 hours was a timeframe suggested as "more reasonable." However, after thoughtful debate, the Measure Champions decided to retain the 24-hour requirement, as this is the timeframe that is consistent with the Joint Commission's recommendation.

Then in the spring of 2015, an abstract submitted by PMCoE, "Identification of National Nutrition Measures for the Pediatric Intensive Care Unit," was selected for a poster presentation at the 2015 Pediatric Academic Societies Annual Meeting in San Diego, CA. This was still another opportunity to receive feedback on this measure, and it was generally well received.

Section 11. Health Information Technology

Please respond to the following questions in terms of any health information technology (health IT) that has been or could be incorporated into the measure calculation.

11.A. Health IT Enhancement

Please describe how health IT may enhance the use of this measure.

Health IT could enhance the use of this measure by creating structured, queriable fields for "occurrence of an administration of a nutritional status screening tool that is standardized within the institution" and the associated date, as well as "patients who have already had a documented nutrition screening or assessment in the previous 48 hours." These elements may be captured as free text or as scanned documents in certain sites' EHR systems and would therefore not be included in an eMeasure calculation.

11.B. Health IT Testing

Has the measure been tested as part of an electronic health record (EHR) or other health IT system?

Yes.

If so, in what health IT system was it tested and what were the results of testing?

Feasibility testing for construction of this eMeasure was conducted in four sites in the CPQSC, and in three sites it was determined to be technically feasible to construct the measure. The feasibility of the measure was assessed using Cerner and Epic EHR systems. Feasibility testing for construction of this eMeasure was conducted using Cerner and EPIC. Of the three sites using Cerner, two could feasibly construct the measure. One site required EHR and workflow modifications to implement the measure in their EHR. This measure was feasible in the site using EPIC. Further details are provided in Section 8.

11.C. Health IT Workflow

Please describe how the information needed to calculate the measure may be captured as part of routine clinical or administrative workflow.

In order to improve workflow, an integrated tool could be developed so that a standardized nutritional status screening tool would be incorporated in the EHR system such that the administration of the screening tool (date, time) as well as the score could be stored in structured, queriable fields. This would greatly increase implementation feasibility of this measure and allow for clinician prompting in the event of an abnormal screen.

11.D. Health IT Standards

Are the data elements in this measure supported explicitly by the Office of the National Coordinator for Health IT Standards and Certification criteria (see healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__standards_ifr/1195)?

No.

If yes, please describe.

Not applicable.

11.E. Health IT Calculation

Please assess the likelihood that missing or ambiguous information will lead to calculation errors.

The majority of data elements were identifiable and encoded as structured data in the EHR systems at each of our test sites; we are confident that these elements will exist as structured data in the majority of EHR systems. The biggest concern regarding the calculation of this measure is that "occurrence of an administration of a nutritional status screening tool that is standardized within the institution" and the associated date, as well as the exception element "patients who have already had a documented nutrition screening or assessment in the previous 48 hours," may be captured as free text. If this is the case, patients who meet the denominator criteria might not be included in the measure due to the fact that these elements are in free text and not captured in structured, queriable fields. We recommend that sites utilize the structured fields present in their current EHR system to prevent these issues.

11.F. Health IT Other Functions

If the measure is implemented in an EHR or other health IT system, how might implementation of other health IT functions (e.g., computerized decision support systems in an EHR) enhance performance characteristics on the measure?

Not applicable.

Section 12. Limitations of the Measure

Describe any limitations of the measure related to the attributes included in this CPCF (i.e., availability of measure specifications, importance of the measure, evidence for the focus of the measure, scientific soundness of the measure, identification of disparities, feasibility, levels of aggregation, understandability, health information technology).

The Joint Commission requires that hospitals complete nutrition screening within 24 hours after inpatient admission (Joint Commission). The absence of a validated screening tool for providers to meet this requirement has led to a significant performance gap, at least in terms of documentation, which our measure testing revealed. While our experts know that nutrition screening is taking place in some centers, they suspect that it also could be taking place informally in other centers, just not in any way that is documented. The need for a validated tool to aid in the performance and documentation of this requirement presents both a limitation and an opportunity for this proposed measure.

Additional Measures Needed

While we recognize that this proposed measure is a step in the right direction for pediatric critical care medicine, another limitation exists because no current measures are in place to guide the follow-up process; that is, for patients with positive screens at PICU admission for being at risk for malnutrition, there are no measures to follow up later in the PICU stay and document an initial caloric goal for these patients. Earlier in our grant period, the Expert Workgroup had

developed two additional complementary measures to potentially address this gap; due to resource limits, these additional measures were never specified or tested. It is likely that patients would benefit greatly from pursuing the following complementary measures in the future.

Nutritional Assessment for Patients at Risk for Malnutrition Completed Within 48 Hours of PICU Admission

A chart review to determine the frequency of conducting a nutritional status assessment for patients admitted to the PICU within 48 hours of identification of risk of malnutrition with use of a standardized nutrition-screening tool. The assessment must be documented in the patient's chart on completion.

Initial Caloric Goal Documented for Every Patient Within 48 Hours of PICU Admission

A chart review to determine the frequency of documentation of initial caloric goal for all PICU patients within 48 hours of admission to PICU.

eMeasure Limitations

The primary limitation of this measure as an eMeasure is that the nutrition status screen might be performed as a paper-based assessment, and the scores may not be integrated into the EHR system. Similarly, the screening results might be scanned into the patient record or entered as free text. However, of the four testing sites, this was only an issue in one site; the other three sites were able to implement the measure.

Chart Review Limitations

The main limitation of this measure as a chart review measure is that the nutrition screening results or the screen itself might be stored in free text and thus be difficult to find in the medical record. Additionally, chart review measures can be time consuming, and institutions may not have the resources to complete them.

Additionally, most State Medicaid and CHIP programs find chart review as a method for quality assessment too challenging and burdensome, and therefore, they do not use measures specified for manual chart abstraction.

Section 13. Summary Statement

Provide a summary rationale for why the measure should be selected for use, taking into account a balance among desirable attributes and limitations of the measure. Highlight specific advantages that this measure has over alternative measures on the same topic that were considered by the measure developer or specific advantages that this measure has over existing measures. If there is any information about this measure that is important for the review process but has not been addressed above, include it here.

Rationale for Selection

Importance

Children who develop critical illness or injury may be malnourished at the time of admission to the PICU. Malnutrition is associated with an increased PICU length of stay and an increased risk-adjusted mortality (Goday, et al., 2008). The benefits of nutrition support in critically ill patients include improved wound healing, a decreased catabolic response to injury, and improved gastrointestinal structure and function (Arnold, Barbul, 2006; Wray, et al., 2002). Critically ill patients have complex nutritional needs, and providers are additionally challenged to assure that adequate nutrition is met for the wide range of ages of patients cared for in the PICU. Identification of nutritionally at-risk patients allows providers to modify treatment therapies as needed.

Desirable Attributes and Limitations

An initial baseline screen of nutritional status for every PICU patient increases awareness of his/her nutritional state, identifies patients at risk for malnutrition, and allows providers to adjust the timing, content, and quantity of nutrition therapy to meet the individual's needs and facilitate the healing process. While there is no single, validated screening tool that is considered appropriate for critically ill and injured children, those available for hospitalized children (including institution-derived nutrition screening tools) typically take about 5 minutes to administer, can be done at the bedside, and generally do not require a dietitian.

The Joint Commission requires that hospitals complete nutrition screening within 24 hours after inpatient admission (Joint Commission). The absence of a validated screening tool for providers to meet this requirement has led to a significant performance gap, at least in terms of documentation, which our measure testing revealed. While our experts know that nutrition screening is taking place in some centers, they suspect that it also could be taking place informally in other centers, just not in any way that is documented. The need for a validated tool to aid in the performance and documentation of this requirement presents both a limitation and an opportunity for this proposed measure.

Another limitation exists because no measures are currently in place to guide the follow-up on positive screens for patients determined on PICU admission to be at risk for malnutrition and to document an initial caloric goal for these patients. Earlier in our grant period, the Expert Workgroup had developed and proposed two additional complementary measures to address this gap, but due to resource limits, they were never specified or tested. It could be that the field would benefit greatly from pursuing the following complementary measures in the future (refer to Section 3.C for descriptions): Nutritional Assessment for Patients at Risk for Malnutrition Completed Within 48 Hours of PICU Admission; and Initial Caloric Goal Documented for Every Patient Within 48 Hours of PICU Admission.

Advantages

No PICU-related measures are currently included in the Core Set of Children's Health Care Quality Measures for Medicaid and CHIP (Child Core Set), yet the PICU is where a hospital's sickest and most vulnerable children are treated. Implementation of this measure could mitigate much of the elevated risk and costs associated with pediatric critical care. It could also raise

awareness across the field of the connection between optimal nutrition therapy and healing, as well as the need for a single, validated screening tool to be developed for use with critically ill and injured children to assess and document their nutritional status.

References

Alexander E, Susla GM, Burstein AH, et al. Retrospective evaluation of commonly used equations to predict energy expenditure in mechanically ventilated, critically ill patients. Pharmacotherapy 2004; 24(12):1659-67.

Arnold M, Barbul A. Nutrition and wound healing. Plast Reconstr Surg 2006; 117:42S-58S.

Chellis MJ, Sanders SV, Webster H, et al. Early enteral feeding in the pediatric intensive care unit. JPEN J Parenter Enteral Nutr 1996; 20:71-3.

de Neef M, Geukers VG, Dral A, et al. Nutritional goals, prescription and delivery in a pediatric intensive care unit. Clin Nutr 2008; 27(1):65-71.

Delgado AF, Okay TS, Leone C, et al. Hospital malnutrition and inflammatory response in critically ill children and adolescents admitted to a tertiary intensive care unit. Clinics (Sao Paulo) 2008; 63(3):357-62.

Gerasimidis K, Macleod I, Maclean A, et al. Performance of the novel Paediatric Yorkhill Malnutrition Score (PYMS) in hospital practice. Clin Nutr 2011; 30:430-5.

Goday PS, Kuhn EM, Mikhailov TA. Early parenteral nutrition is associated with significantly higher mortality in critically ill children. Presented as an oral abstract at Clinical Nutrition Week 2013. JPEN J Parenter Enteral Nutr 37:A5-6, 2013.

Goday PS, Kuhn EM, Sachdeva RC, et al. Does admission weight influence mortality and morbidity in the pediatric intensive care unit (PICU)? JPEN J Parenter Enteral Nutr 2008; 32:316-7.

Hulst J, Joosten K, Zimmermann L, et al. Malnutrition in critically ill children: From admission to 6 months after discharge. Clin Nutr 2004; 23(2):223-32.

Hulst JM, van Goudoever JB, Zimmermann LJ, et al. The effect of cumulative energy and protein deficiency on anthropometric parameters in a pediatric ICU population. Clin Nutr 2004; 23:1381-9.

Hulst JM, Zwart H, Hop WC, et al. Dutch national survey to test the STRONG (kids) nutritional risk screening tool in hospitalized children. Clin Nutr 2009; 29:106e11.

The Joint Commission. Standards and elements of performance. PC.01.02.01, Eps 2 and 3; RC.02.01.01, EP 2. http://www.jointcommission.org/ ; also see

https://www.jointcommission.org/standards_information/jcfaqdetails.aspx?StandardsFaqId=872&ProgramId=46

Kalfarentzos F, Kehagias J, Mead N, et al. Enteral nutrition is superior to parenteral nutrition in severe acute pancreatitis: results of a randomized prospective trial. Br J Surg 1997; 84:1665-9.

Kudsk KA, Croce MA, Fabian TC, et al. Enteral versus parenteral feeding. Effects on septic morbidity after blunt and penetrating abdominal trauma. Ann Surg 1992; 215:503-11.

Martindale RG, McClave SA, Vanek VW, et al. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: Society of Critical Care Medicine and American Society for Parenteral and Enteral Nutrition: Executive Summary. JPEN J Parenter Enteral Nutr 2009; 33:277-316.

Mehta NM, Bechard LJ, Cahill N, et al. Nutritional practices and their relationship to clinical outcomes in critically ill children—an international multicenter cohort study. Crit Care Med 2012; 40:2204-11.

Mehta NM, Compher C, and A.S.P.E.N. Board of Directors. A.S.P.E.N. Clinical Guidelines: Nutrition Support of the Critically Ill Child. JPEN J Parenter Enteral Nutr 2009; 33:260-76.

Mikhailov TA**,** Kuhn EM, Manzi J, et al. Early enteral nutrition is associated with lower mortality in critically ill children. JPEN J Parenter Enteral Nutr 2014; 38(4):459-66.

Nguyen GC, Munsell M, Brant SR, et al. Racial and geographic disparities in the utilization of parenteral nutrition among inflammatory bowel disease inpatients diagnosed with malnutrition in the United States. J Parenter Enteral Nutr 2009; 33(5):563-8.

Rocha GA, Rocha EJ, Martins CV. The effects of hospitalization on the nutritional status of children. J Pediatr (Rio J) 2006; 82(1):70-4.

Secker DJ, Jeejeebhoy KN. Subjective global nutritional assessment for children. Am J Clin Nutr 2007; 85:1083e9.

Sermet-Gaudelus I, Poisson-Salomon AS, Colomb V, et al. Simple pediatric nutritional risk score to identify children at risk of malnutrition. Am J Clin Nutr 2000; 72:64-70.

Tool, Wong S, Graham A, et al. Validation of the Screening Tool for the Assessment of Malnutrition in Paediatrics (STAMP) in patients with spinal cord injuries (SCIs). Spinal Cord 2013; 51:424-9.

Vermilyea S, Slicker J, El-Chammas K, et al. Subjective global nutritional assessment in critically ill children. JPEN J Parenter Enteral Nutr 2012; 37(5):659-66.

Wakeham MK, Christensen MA, Manzi J, et al. Impact of registered dietitians: Early medical record documentation of a caloric requirement in critically ill children is associated with higher daily caloric intake and the use of the enteral route. J Acad Nutr Diet 2013**;** 113(10):1311-6.

Wong S, Graham A, Hirani SP, et al. Validation of the Screening Tool for the Assessment of Malnutrition in Paediatrics (STAMP) in patients with spinal cord injuries (SCIs). Spinal Cord 2013; 51:424-9.

Wray CJ, Mammen JMV, Hasselgren P. Response to stress and potential benefits of nutrition support. Nutrition 2002; 18:971–7.

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The CHIPRA Pediatric Quality Measures Program (PQMP) Candidate Measure Submission Form (CPCF) was approved by the Office of Management and Budget (OMB) in accordance with the Paperwork Reduction Act.

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Public Disclosure Requirements

Each submission must include a written statement agreeing that, should U.S. Department of Health and Human Services accept the measure for the 2014 and/or 2015 Improved Core Measure Sets, full measure specifications for the accepted measure will be subject to public disclosure (e.g., on the Agency for Healthcare Research and Quality [AHRQ] and/or Centers for Medicare & Medicaid Services [CMS] websites), except that potential measure users will not be permitted to use the measure for commercial use. In addition, AHRQ expects that measures and full measure specifications will be made reasonably available to all interested parties. "Full measure specifications" is defined as all information that any potential measure implementer will need to use and analyze the measure, including use and

analysis within an electronic health record or other health information technology. As used herein, "commercial use" refers to any sale, license or distribution of a measure for commercial gain, or incorporation of a measure into any product or service that is sold, licensed or distributed for commercial gain, even if there is no actual charge for inclusion of the measure. This statement must be signed by an individual authorized to act for any holder of copyright on each submitted measure or instrument. The authority of the signatory to provide such authorization should be described in the letter.

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