SECTION I.
BASIC MEASURE INFORMATION

I.A. Measure Name

Overuse of Imaging: Policy for ALARA Specific to Imaging Children

I.B. Measure Number (auto-generated)

Macy ML, Freed GL, Madden B, Faasse T, McCormick J, Dombkowski KJ for the Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium. Overuse of Imaging: Policy for ALARA Specific to Imaging Children. National Quality Measures Clearinghouse (NQMC). Rockville (MD): Agency for Healthcare Research and Quality (AHRQ). Published June 29, 2015.

I.C. Measure Description

This measure assesses the percentage of facilities with a policy for "as low as reasonably achievable" (ALARA) dosing of radiation, specific to the imaging of children. This measure was tested using information obtained from 1) self-reported use of a written policy to implement ALARA principals or specific protocols to reduce radiation exposure for computed tomography (CT) imaging of children and 2) published pediatric CT imaging accreditation information from the American College of Radiology (ACR).

In the previous 10 to 15 years, significant advancements in multi-detector computed tomography (MDCT) technology have contributed to a substantial increase in the diagnostic applications and accuracy of CT imaging studies. Correspondingly, CT imaging can figure prominently in characterizing and facilitating treatment of a myriad of neurologic and oncologic-based childhood diseases. However, a major disadvantage of MDCT is the use of ionizing radiation and the prospect of increased risk for latent malignancies. Children who have multiple CTs in early childhood tend to be at greater risk for developing leukemia and related malignancies (Pearce et al., 2012). Although the available evidence on the risks of low-dose radiation still remains a matter of discussion, it is generally believed that there is a "linear-no threshold" risk relationship (Nievelstein, et al., 2010). In other words, no dose of radiation is safe. Consequently, there is an overwhelming need to consider that *any* radiation used in the course of imaging has the capacity to cause secondary cancer.

Within this context, reducing the medical radiation dose and exposure to children as much as possible by performing imaging studies with radiation doses "as low as reasonably achievable" (that is, ALARA) continues to gain attention and prominence for pediatric imaging best practice (ACR statement, 2009). In particular, professional practice and patient advocacy groups, as well as international scientific organizations, have focused on MDCT radiation dose reduction and optimization strategies. These groups include the ACR, the American Academy of Neurology (AAN), and the American Academy of Pediatrics (AAP). The ACR accredits facilities for different imaging

modalities, CT being one of them. As part of achieving ACR accreditation, facilities should have a policy and imaging protocols in place stating that radiation exposure to patients will be as low as reasonably achievable and therefor is consistent with ALARA principles (ACR overview, 2014).

An even higher level of care is specified by the Image Gently campaign, in which facilities are accredited by the ACR in pediatric CT imaging and commit to imaging pediatric patients with appropriate radiation dose. Having ALARA policies with age and/or size-specific radiation doses programmed into CT scanners is the essential first step for following this best practice. Although imaging guidelines have been developed, published, and advocated by numerous professional organizations, many hospitals and imaging entities still do not apply ALARA-based dose reduction techniques for all varieties of pediatric imaging. With that in mind, the feasibility and validity of the following measure was tested:

The percentage of eligible facilities with a policy for "as low as reasonably achievable" (ALARA), specific to the imaging of children (numerator divided by denominator).

A higher percentage indicates better performance, as reflected by use of minimal radiation when imaging. This measure is intended to be used for assessing ALARA policies among CT imaging sites in a specific geographic jurisdiction; we tested this measure in a statewide setting (Michigan).

This measure was tested using an in-person telephone survey of lead CT technologists or medical directors at facilities indicating that they provide CT services to children. The provision of CT services to children was determined from state Certificate of Need (CoN) reports (Michigan CoN, 2012); ALARA protocol responses were validated through accreditation information published by the ACR (ACR CT Accreditation, 2014).

I.D. Measure Owner

The Quality Measurement, Evaluation, Testing, Review, and Implementation Consortium (Q-METRIC)

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

Not applicable

I.F. Measure Hierarchy

Please use this section to note 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's National Quality Measures Clearinghouse and are available at http://www.qualitymeasures.ahrq.gov/about/hierarchy.aspx:

I.F.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.

This measure is part of the Q-METRIC Overuse of Imaging Measures collection.

I.F.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.

Not applicable

I.F.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

I.F.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

I.G. Numerator Statement

The numerator is the number of facilities that perform imaging of children with a policy for ALARA specific to the imaging of children in Michigan. Others may wish to test this measure at many different levels including geographic units, hospital groups, hospital associations, and health plans that contract with specific hospitals.

ALARA refers to the "as low as reasonably achievable" amount of radiation exposure for a given imaging study for a patient based on age and size. Facilities include all those that perform imaging of children, defined as a CT scan of any part of the body.

I.H. Numerator Exclusions (as appropriate)

Facilities that do not image children younger than 18 years old are excluded.

I.I. Denominator Statement

The denominator is the number of facilities that perform imaging of children younger than 18 years old in Michigan. Others may wish to test this measure at many different levels including geographic units, hospital groups, hospital associations, and health plans that contract with specific hospitals.

I.J. Denominator Exclusions (as appropriate)

Facilities that do not image children younger than 18 years old are excluded.

I.K. Data Sources

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

Data Source	
1. Administrative Data (e.g., claims data)	
2. Paper Medical Record	
3. Survey – Health care professional report	In-person telephone survey
4. Survey – Parent/caregiver report	
5. Survey – Child report	
6. Electronic Medical Record	
7. Other (If other, please list all other data sources in the field below.)	Denominator: Michigan Certificate of Need Annual Survey Report - Computed Tomography (CT) Services Provided by Hospitals, Freestanding Facilities, and Host Sites (2012) (Michigan CoN, 2012) Numerator: American College of Radiology (ACR) Accreditation for Computed Tomography and Image Gently Supporters (ACR CT Accreditation, 2014

References for Section I

American College of Radiology (ACR) Statement on recent studies regarding CT scans and increased cancer risk, December 15, 2009. ACR website. http://www.acr.org/About-Us/Media-Center/Position-Statements/Position-Statements-Folder/ACR-Statement-on-Recent-Studies-Regarding-CT-Scans-and-Increased-Cancer-Risk. Accessed December 18, 2014.

American College of Radiology (ACR) Overview for the Diagnostic Modality Accreditation Program. ACR website. http://www.acr.org/~/media/ACR/Documents/Accreditation/Apply/DiagnosticReqs.pdf. Accessed December 18, 2014. Accessed December 18, 2014.

American College of Radiology (ACR) Computed Tomography Accreditation. ACR website. (http://www.acr.org/Quality-Safety/Accreditation/CT. Accessed December 18, 2014.

Michigan Certificate of Need Annual Survey Report – Computed Tomography (CT) Services Provided by Hospitals, Freestanding Facilities, and Host Sites (2012) Report 101. State of Michigan website. http://www.michigan.gov/documents/mdch/Report_101_433946_7.pdf. Accessed December 18, 2014.

Nievelstein RA, van Dam IM, van der Molen AJ. Multidetector CT in children: Current concepts and dose reduction strategies. *Pediatr Radiol* 2010; 40(8): 1324–1344.

Pearce MS, Salotti JA, Little MP et al., Radiation exposure from CT scans in childhood and subsequent risk of leukemia and brain tumors: a retrospective cohort study. *Lancet* 2012; 380(9840): 499–505.

SECTION II.
DETAILED MEASURE SPECIFICATIONS

Provide sufficient detail to describe how a measure would be calculated from the recommended data sources, either by uploading a separate document or by providing a link to a URL in the field below. 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.[1] 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.

Please see the specifications document, Q-METRIC Imaging Measure 5, *Overuse of Imaging: Policy for ALARA Specific to Imaging Children,* at the end of this document.

[1] Initial Core Set of Children's Health Care Quality Measures: Technical Specifications and Resource Manual for Federal Fiscal Year 2011 Reporting. Available at http://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Quality-of-Care/Downloads/InitialCoreSetResourceManual.pdf and http://www.medicaid.gov/Medicaid-CHIP-Program-Information/By-Topics/Quality-of-Care/CHIPRA-Initial-Core-Set-of-Childrens-Health-Care-Quality-Measures.html.

SECTION III.
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).

III.A. Evidence for General Importance of the Measure

Provide evidence for all applicable aspects of general importance, including but not limited to the following:

- Addresses a known or suspected quality gap or disparity in quality (e.g., addresses a socioeconomic disparity, a racial/ethnic disparity, a disparity for Children with Special Health Care Needs (CSHCN) and/or a disparity for limited English proficiency (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).

Importance

ALARA applications to pediatric imaging policies have gained importance as ionizing radiation has become increasingly relied upon for the diagnosis and characterization of a variety of diseases (Dorfman et al., 2011, Broder et al., 2007). For both adult and pediatric patients, imaging has gained primacy and is in the vanguard of tools that clinicians use to understand a variety of pathologies. With regard to ionizing radiation, there continues to be the prevailing notion of a "linear-no threshold" risk relationship in terms of radiation dose (Nievelstein, et al., 2010). This theory holds that any radiation dose is deemed incrementally harmful; excess cancer risks related to low-dose radiation are directly proportional to the dose (Lin, 2010). This model is used to extrapolate excess cancer risk at low doses from the known risk at higher doses (Lin, 2010). In general, this has meant that any radiation used in the course of imaging has the capacity to cause secondary cancer. This is especially concerning for children, who have more rapidly dividing cells and have a baseline increased risk compared with their adult counterparts. Within this context, there is a recurring need to be judicious with radiation dose and to consider the benefits of information obtained from imaging vis-à-vis risks of malignancy.

Baseline Considerations for ALARA: Prevalence and Incidence of Malignancy in Children

ALARA and its related application to pediatric imaging policies require an assessment of the prevalence and incidence of malignancy in the pediatric population. A review of the literature reveals that childhood malignancies have been increasing slightly for the past few decades and comprise less than 1% of all malignancies diagnosed each year (American Cancer Society [ACS], 2014). For 2014, this correlates to nearly 10,450 children in the United States under the age of 15 years receiving a diagnosis of malignancy (ACS, 2014). Despite a malignancy rate of less than 1%, such cancers are the second leading cause of death in children in the United States (after injuries) (ACS, 2014). The ACS has estimated that approximately 1,350 children younger than 15 years old are expected to die from malignancy in 2014 (ACS, 2014).

To date, there is no definitive study or literature that reveals, in an absolute sense, the additional malignancy burden created by ionizing radiation used in the course of imaging children. However, it is widely understood that any reduction in radiation dose is beneficial and reduces harm to children (Lin, 2010). In a recent study from 2009, it was estimated that compared with a patient aged 40 years, the risk of cancer from a radiation imaging test is doubled for a patient aged 20 years and 50% lower for a patient aged 60 years (Smith-Bindman et al., 2009).

Considering that malignancy is the second leading cause of death in children in the United States, ALARA policies should be incorporated as standard-of-care for all pediatric imaging that makes use of ionizing radiation. This measure will reveal the percentage of facilities that have implemented ALARA policies for pediatric imaging, as well as the percentage that have gone the extra step to support the Image Gently campaign.

Overuse of Radiation Exposure in Imaging Related to Lack of ALARA Policies: Radiation Dose Pathology and Severity

Use of ionizing radiation-based imaging has increased substantially in recent years. The use of CT on older children nearly tripled from 1996 to 2005 to a peak of 27 CT scans per 1,000 children (Miglioretti et al., 2013). Radiation dose associated with CT-imaging introduces the possibility of chronic health

risks related to malignancies sustained from radiation effects (ACR statement, 2009). CT-based radiation dose for pediatric patients is problematic because the developing cellular structures and tissues of children are significantly more radiosensitive than those of adults; children, therefore, will be at substantially elevated risk for malignancy (ACR Expert Panel on Pediatric Imaging, 2012). Radiosensitive organs including the brain, bone marrow, lens of the eye, and thyroid gland can be exposed to radiation during CT of the head (Papadakis et al., 2011). In children under 5 years of age, about 20% of the active bone marrow is in the cranium, compared with 8% in adults (Cristy, 1981). Children who have multiple CT scans in early childhood tend to be at greater risk for developing leukemia (Pearce et al., 2012).

While radiation reduction strategies are important, the emphasis should continue to be on avoiding unnecessary imaging altogether for maximal mitigation of harm. Some studies suggest that as many as a third of pediatric CT scans are unnecessary and that eliminating them could potentially reduce the number of CT-attributable cancers by a third (Miglioretti et al., 2013). Combining the two strategies — reducing the highest 25% of doses and reducing unnecessary scans — could potentially prevent 62% of the projected radiation-related cancers (Miglioretti et al., 2013).

Performance Gap

Despite the availability of evidence-based guidelines for using ALARA policies while imaging children to reduce radiation dose, there is room for improvement in minimizing the radiation dose received (Bharat et al., 2008). A universal means of tracking a patient's cumulative radiation dose would be ideal, especially if the patient has undergone exams that use ionizing radiation at more than one facility. Minimizing excess radiation dose via instituting ALARA policies consistently is the crucial gap to fill. To promote safer imaging, the ACR and related organizations have undertaken concerted and specific efforts targeted at reducing the dose of radiation that children receive during CT imaging. These efforts have culminated in the Image Gently Campaign launched in 2008. The goals of this campaign continue to include increasing understanding of the harms of excessive radiation dose, as well as promoting an ongoing initiative to reduce radiation dose and maintain image quality. These efforts continue via specific imaging policy and protocol-based maneuvers in radiology departments throughout the United States, as well as globally.

Facilities that complete the ACR pediatric CT imaging accreditation process incorporate the Image Gently criteria successfully and routinely into pediatric imaging practice. Incorporating and implementing ACR-specific dose reduction policies to receive accreditation certainly involves additional preparation and effort on the part of facilities seeking accreditation. However, these efforts accrue value in the form of quantifiable dose reduction to children. Facilities may meet the standards put forth by the ACR for CT accreditation and Image Gently without going through the additional time/cost of seeking formal accreditation.

III.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).[2]

- Any other specific relevance to Medicaid/CHIP (please specify).

Computed Tomography Imaging and Medicaid/CHIP
This measure is relevant to Medicaid/CHIP because children with Medicaid/CHIP undergo CT imaging for a variety of indications. Likewise, facilities that image children are likely to encounter patients with Medicaid/CHIP coverage.

III.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).

We are unaware of any existing quality measures specific to minimizing radiation exposure for children undergoing imaging using CT. Facilities have been able to seek accreditation for CT through the ACR since 1987. Facilities are also able to obtain pediatric CT imaging accreditation demonstrating their support for the ACR's Image Gently campaign.

References for Section III

American Cancer Society. Cancer Facts & Figures 2014. Atlanta, Ga: American Cancer Society; 2014.

American College of Radiology (ACR) Statement on recent studies regarding CT scans and increased cancer risk, December 15, 2009. ACR website. http://www.acr.org/About-Us/Media-Center/Position-Statements/Position-Statements-Folder/ACR-Statement-on-Recent-Studies-Regarding-CT-Scans-and-Increased-Cancer-Risk. Accessed December 18, 2014.

American College of Radiology Expert Panel on Pediatric Imaging: Hayes LL, Coley BD, Karmazyn B, et al. ACR Appropriateness Criteria: Headache — child. American College of Radiology, revised 2012. Available at: https://acsearch.acr.org/docs/69439/Narrative/; accessed April 21, 2015.

Bahrat NS, Platt SL. ALARA: is there a cause for alarm? Reducing radiation risks from computed tomography scanning in children. *Curr Opin Pediatr* 2008; 20:243–247.

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[2] The EPSDT is a comprehensive set of benefits available to children and youth under age 21 who are enrolled in Medicaid. For more information, see http://www.healthlaw.org/images/stories/epsdt/3-ESDPT08.pdf.

Broder J, Fordham LA, Warshauer DM. Increasing utilization of computed tomography in the pediatric emergency department. *Emerg Radiol* 2007; 14(4): 227-232.

Cristy M. Active bone marrow distribution as a function of age in humans. *Phys Med Biol* 1981; 26(3):389-400Dorfman AL, Fazel R, Einstein AJ. Use of medical imaging procedures with ionizing radiation in children: a population-based study. *Arch Pediatr Adolesc Med* 2011; 165(5): 458-464.

Lin EC. Radiation Risks from Medical Imaging. *Mayo Clin Proc* 2010; 85(12): 1142–1146.

Miglioretti DL, Johnson E, Williams A. et al., The use of computed tomography in pediatrics and the associated radiation exposure and estimated cancer risk. *JAMA Pediatrics* 2013; 167(8):700-707.

Nievelstein RA, van Dam IM, van der Molen AJ. Multidetector CT in children: Current concepts and dose reduction strategies. *Pediatr Radiol* 2010; 40(8): 1324–1344.

Papadakis AE, Perisinakis K, Oikonomou I, Damilakis J. Automatic exposure control in pediatric and adult computed tomography examinations: Can we estimate organ and effective dose from mean MAS reduction? *Invest Radiol* 2011; 46(10):654-662.

Pearce MS, Salotti JA, Little MP et al., Radiation exposure from CT scans in childhood and subsequent risk of leukemia and brain tumors: a retrospective cohort study. *Lancet* 2012; 380(9840): 499–505.

Smith-Bindman R, Lipson J, Marcus R, et al., Radiation dose associated with common computed tomography exams and the associated lifetime attributed risk of cancer. *Arch Intern Med* 2009; 169(22):2078-2086.

SECTION IV.
MEASURE CATEGORIES

CHIPRA legislation[3] 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,[4] 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.

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8 Children's Health Insurance Program Reauthorization Act of 2009. Public Law No. 111-3, 123 Stat. 8 (2009). Available at: http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_public_laws&docid=f:publ003.111.

9 Under Section 214 of CHIPRA, States may elect to cover the following groups under Medicaid only or under both Medicaid and CHIP: pregnant women and children up to age 19 for CHIP or up to age 21 for Medicaid.

	Does the measure address this category [Yes/No drop-down]	
a. Care Setting – ambulatory	**Yes**	
b. Care Setting – inpatient	**Yes**	
c. Care Setting – other—please specify	**No**	**[Add the following choices: home, school, other community and public health settings, long-term care, other---drop-down or radio buttons]**
d. Service – preventive health	**No**	
e. Service – care for acute conditions	**Yes**	
f. Service - care for children with special health care needs/chronic conditions	**Yes**	
g. Service – health promotion and services to promote healthy birth	**No**	
h. Service-other (please specify)	**No**	
i. Measure Topic -duration of enrollment	**No**	
j. Measure Topic – clinical quality	**Yes**	
k. Measure Topic – patient safety	**Yes**	
l. Measure Topic – family experience with care	**No**	
m. Measure Topic – care in the most integrated setting	**No**	
n. Measure Topic – other (please specify)	**No**	
o. Population – pregnant women	**No**	
p. Population – neonates (28 days after birth) (specify age range)	**Yes**	All ages in this range
q. Population – infants (29 days to 1 year) (specify age range)	**Yes**	All ages in this range
r. Population – pre-school age children (1 year through 5 years) (specify age range)	**Yes**	All ages in this range
s. Population – school-age children (6 years through 10 years) (specify age range)	**Yes**	All ages in this range
t. Population – adolescents (11 years through 20 years) (specify age range)	**Yes**	Adolescents 11 through 17 years

SECTION V.
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.

V.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.

This measure assesses the percentage of facilities with a policy for "as low as reasonably achievable" (ALARA) dosing of radiation, specific to the imaging of children. A higher percentage indicates better performance, as reflected by use of minimal radiation for CT imaging. Table 1 summarizes several key sources of evidence for this measure, using the US Preventive Services Task Force (USPSTF) rankings (criteria denoted as a note to Table 1).

Table 1: Evidence for Having an ALARA Policy Specific to Imaging Children

Type of Evidence	Key Findings	Level of Evidence (USPSTF Ranking*)	Citations
Practice parameter	Society of Pediatric Radiology: Third Conference of ALARA: The concept of ALARA is strongly endorsed by the Society for Pediatric Radiology, particularly in the use of procedures and modalities of higher radiation doses such as CT and fluoroscopic examinations of pediatric patients.	III	Strauss KJ, Kaste SC. The ALARA concept in pediatric interventional and fluoroscopic imaging: Striving to keep radiation doses as low as possible during fluoroscopy of pediatric patients: A white paper executive summary. *Pediatr Radiol* 2006; 36 [supplement 2]:110–112
Appropriateness criteria	The American College of Radiology has espoused the following based upon a review of the literature related to pediatric imaging and epidemiologic evidence: There is significant debate and uncertainly regarding the cancer risks associated with the X-rays used for diagnostic imaging. However, some studies of large populations exposed to radiation have demonstrated slight increases in cancer risk even at low levels of radiation exposure, particularly in children. To be safe, we should act as if low doses of radiation may potentially cause harm. This has governed the ACR's efforts in dose reduction.	III	American College of Radiology (ACR) Statement on recent studies regarding CT scans and increased cancer risk, December 15, 2009. ACR website. http://www.acr.org/About-Us/Media-Center/Position-Statements/Position-Statements-Folder/ACR-Statement-on-Recent-Studies-Regarding-CT-Scans-and-Increased-Cancer-Risk. Accessed December 18, 2014
Recommendation	The National Cancer Institute has proposed that "although CT remains a crucial tool for pediatric diagnosis, it is important for the health care community to work together to minimize the radiation dose to children. Radiologists should continually think about reducing exposure as low as reasonably achievable by using exposure settings customized for children. All physicians who prescribe pediatric CT should continually assess its use on a case-by-case basis."	III	National Cancer Institute 2012, Radiation risks and pediatric computed tomography (CT): A guide for health care providers. NCR website. http://www.cancer.gov/cancertopics/causes/radiation/radiation-risks-pediatric-CT. Accessed December 18, 2014
Original investigation	Berrington de González et al., conducted detailed estimates of the future cancer risks from current CT scan use in the United States according to age, sex, and scan type and estimated that approximately 29,000 (95% UL [upper limit], 15,000-45,000) future cancers could be related to CT scans performed in the United States in 2007. The conclusion was that there are several areas of CT scan use that make large contributions to the total cancer risk in the context of	III	Berrington de González A, Mahesh M, Kim DP et al., Projected cancer risks from computed tomographic scans performed in the United States in 2007. *Arch Intern Med* 2009;169(22):2071-2077

	pediatric imaging.		

Note: *USPSTF criteria for assessing evidence at the individual study level are as follows: I) properly powered and conducted randomized controlled trial (RCT); well-conducted systematic review or meta-analysis of homogeneous RCTs. II) Well-designed cohort or case-control analytic study. III) Opinions of respected authorities, based on clinical experience; descriptive studies or case reports; reports of expert committees.*

V.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.

SECTION VI.
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.

VI.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.

The reliability of this measure was not separately tested; NQF guidance indicates that separate reliability testing of data elements in not necessary if data element validity testing is conducted (see below) (NQF, 2011).

VI.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., R^2 for concurrent validity). Provide appropriate citations to justify methods.

The validity of this measure was determined from two perspectives: face validity and validity of the facility survey data in relation to accreditation information published online.

Face Validity

The face validity of this measure was established by a national panel of experts and parent representatives for families of children with headaches and seizures convened by Q-METRIC. The Q-METRIC panel included nationally recognized experts in the area of imaging children, representing general pediatrics, pediatric radiology, pediatric neurology, pediatric neurosurgery, pediatric emergency medicine, general emergency medicine, and family medicine. In addition, face validity of this measure was considered by experts in state Medicaid program operations, health plan quality measurement, health informatics, and health care quality measurement. In total, the Q-METRIC imaging panel included 15 experts, providing a comprehensive perspective on imaging children and the measurement of quality metrics for states and health plans.

The Q-METRIC expert panel concluded that this measure has a high degree of face validity through a detailed review of concepts and metrics considered to be essential to the appropriate imaging of

children. Concepts and draft measures were rated by this group for their relative importance. This measure was very highly rated, receiving an average score of 9.0 (with 9 as the highest possible score).

Data and Methods

This measure was tested using an in-person telephone survey of staff members at facilities in Michigan indicating that they provide CT services to children. Indication of pediatric CT service capabilities was confirmed with state Certificate of Need (CoN) reports; ALARA protocol responses were validated through accreditation information published by the ACR.

We obtained the statewide universe of CT imaging facilities from the Michigan Department of Community Health (MDCH) Certificate of Need Annual Survey Report for CT Services Provided by Hospitals, Freestanding Facilities, and Host Sites (Michigan CoN, 2012). Facilities eligible to be surveyed were restricted to those that reported at least one pediatric head or body scan for children less than 18 years old (Appendix A) (Note, at the time of measure testing, the 2012 annual survey was the most current report available). CoN programs are designed to ensure that health facilities, services, and equipment match the needs of the population. In Michigan, facilities with CT scanners submit survey data in order to document sufficient utilization of the service to justify the location.

The telephone survey was conducted among a convenience sample of facilities to determine if information could feasibly and accurately be obtained from facility staff. Respondents consisted of lead CT technologists or medical directors at each facility; the brief telephone survey asked whether their facility performed CT scans on pediatric patients younger than 18 years old. Those responding 'yes' to this question were then asked: "Does your facility have a written policy to implement ALARA principals or specific protocols to reduce radiation exposure for CT imaging of children?" This question was followed by a brief set of questions to determine the number of different protocols to reduce radiation exposure during CT imaging in use at the facility for three body regions (head, chest, abdomen/pelvis).

We employed a convenience sample of 65 facilities providing CT imaging, of which 40 facilities were affiliated with other sites within a larger health care organization. From this sample, we obtained completed surveys from 21 individual sites representing a total of 58 (30%) of the 194 facilities reported to conduct CT scans of children in Michigan. Among the surveyed staff at these facilities, 100% reported the presence of policies to implement ALARA specific to children who undergo a CT scan. Seven staff members provided answers to questions regarding the number of protocols, two of whom responded they were unsure. The range of the number of protocols by body region was 2 to 12 among respondents who provided a number.

Validity of Survey Data

Telephone survey responses were validated using data acquired from the ACR Accreditation website (ACR CT Accreditation, 2014).

Of the 194 Michigan facilities that performed CT scans of children in 2012, 49% were ACR accredited in 2014 for CT imaging, indicating that they had policies for ALARA. Additionally, 39% of the facilities were noted to support Image Gently, indicating a commitment to imaging pediatric patients with an appropriate radiation dose (Table 2). It should be noted that all facilities (100%) supporting Image

Gently were also ACR accredited. Among the 58 facilities that reported ALARA policy compliance via the telephone survey, 33 (57%) were verified as having ACR accreditation (which includes having an ALARA policy).

Table 2: Rate of ACR Accredited Facilities (with ALARA policies) and Facilities Supporting Image Gently

	Numerator	Denominator	Rate
Surveyed Facilities Reporting Adherence to ALARA Protocols Specific to Imaging Children	58	58	100%
ACR Accredited Facilities	96	194	49%
Facilities Committed to Image Gently Campaign	76	194	39%

References for Section VI

American College of Radiology (ACR) Computed Tomography Accreditation. ACR website. (http://www.acr.org/Quality-Safety/Accreditation/CT. Accessed December 18, 2014

Michigan Certificate of Need Annual Survey Report - Computed Tomography (CT) Services Provided by Hospitals, Freestanding Facilities, and Host Sites (2012) Report 101. State of Michigan website. http://www.michigan.gov/documents/mdch/Report_101_433946_7.pdf. Accessed December 18, 2014.

National Quality Forum. Guidance for measure testing and evaluating scientific acceptability of measure properties, January 2011.

SECTION VII.
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.

VII.A. Race/Ethnicity

The data obtained did not contain information related to the race/ethnicity of individuals undergoing imaging at the facilities evaluated.

VII.B. Special Health Care Needs

The data obtained did not contain information related to the special health care needs of individuals undergoing imaging at the facilities evaluated.

VII.C. Socioeconomic Status

The data obtained did not contain information related to the socioeconomic status of individuals undergoing imaging at the facilities evaluated.

VII.D. Rurality/Urbanicity

Based on research conducted by Borders et al. (2012), there is evidence that ALARA policies for pediatric CT imaging vary corresponding to the setting for the CT examination. In particular, there has been a documented statistically significant decrease in the estimated effective dose for CT studies performed in pediatric radiology departments compared with combined pediatric and adult radiology departments (Borders et al., 2012). Facilities that have specialized pediatric radiology departments tend to be located almost exclusively in urban areas. This suggests that a child receiving care in an urban setting may have a higher likelihood of having access to pediatric-based ALARA CT practices compared with a child receiving care in a rural setting.

We did not have access to information regarding home addresses for pediatric patients undergoing imaging. However, we were able to consider the location of imaging facilities in terms of health service areas (HSA) in Michigan. We found that facilities in predominantly rural HSAs had lower proportions of ACR accredited facilities and facilities that support the Image Gently campaign (Table 3). Similarly, the proportions of pediatric CT scans performed at ACR accredited facilities and facilities that support the Image Gently campaign were lower in predominantly rural HSAs.

Table 3. 2014 ACR Accreditation/Pediatric-Specific Accreditation by Health Service Area*

Health Service Area	Pediatric Imaging Facilities in Area (N)	ACR Accredited Facilities (N)	ACR Accredited Facilities (%)	Pediatric CT Accredited (Image Gently) Facilities (N)	Pediatric CT Accredited (Image Gently) Facilities (%)	Total Pediatric CT Scans Performed (N)	Pediatric CT Scans Performed in an ACR Accredited Facility (N)	Pediatric CT Scans Performed in an ACR Accredited Facility (%)	Pediatric CT Scans Performed in a Pediatric CT Accredited (Image Gently) Facility (N)	Pediatric CT Scans Performed in a Pediatric CT Accredited (Image Gently) Facility (%)
Predominantly Rural										
Upper Peninsula	12	3	25%	3	25%	1,842	639	35%	639	35%
Northern Lower	12	2	17%	2	17%	4,059	871	21%	871	21%
East Central	18	4	22%	4	22%	7,520	3,870	51%	3,870	51%
Total-Predominantly Rural	42	9	21%	9	21%	13,421	5,380	40%	5,380	40%
Mixed										
Genesee/Lapeer/ Shiawassee	17	16	94%	14	82%	6,179	6,140	99%	6,130	99%
West Michigan	27	12	44%	12	44%	9,921	4,123	42%	4,123	42%
Southwest	17	11	65%	10	59%	6,564	3,569	54%	3,513	54%
Mid-Southern	14	5	36%	2	14%	8,519	5,261	62%	4,506	53%
Total-Mixed	75	44	59%	38	51%	31,183	19,093	61%	18,272	59%
Metropolitan Only										
Southeast	77	43	56%	29	38%	26,564	13,353	50%	11,774	44%
Total-Metropolitan only	77	43	56%	29	38%	26,564	13,353	50%	11,774	44%
Total-All HSAs	**194**	**96**	**49%**	**76**	**39%**	**71,168**	**37,826**	**53%**	**35,426**	**50%**

* Michigan Certificate of Need Annual Survey Report - Computed Tomography (CT) Services Provided by Hospitals, Freestanding Facilities, and Host Sites (2012) Report 101. State of Michigan website. http://www.michigan.gov/documents/mdch/Report_101_433946_7.pdf. Accessed December 18, 2014

VII.E. Limited English Proficiency (LEP) Populations

The data obtained did not contain information related to the primary language of individuals undergoing imaging at the facilities evaluated.

References for Section VII

Borders HL, Barnes CL, Parks DC, et al., Use of a dedicated pediatric CT imaging service associated with decreased patient radiation dose. *J Am Coll Radiol* 2012; 9:340-343.

SECTION VIII.
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.[5] Using the following sections, explain the methods used to determine the feasibility of implementing the measure.

VIII.A. Data Availability

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

This measure was tested at the statewide level using an in-person telephone survey of lead CT technologists or medical directors at facilities indicating that they provide CT services to children. Facilities to target for the survey were determined from Certificate of Need reports for the state of Michigan (2012), which indicated that 194 imaging facilities reported CT imaging of children (Michigan CoN, 2012). It should be noted that other states may not include CT imaging in their CoN reports or may not specifically indicate whether facilities conduct CT imaging for children.

The survey-based ALARA protocol responses were validated through accreditation information routinely published by the ACR (ACR CT Accreditation, 2014). Facilities were identified as having ALARA policies/protocols based on accreditation status as indicated on the ACR accreditation website.

VIII.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?

The proposed measure was determined to be feasible by Q-METRIC using publically-available data for facilities with CT scanners used to image children in the state of Michigan. Based on testing of the telephone survey, it is recommended that future data collection efforts may wish to use the web-based data sources employed in the Q-METRIC validation process as the primary data collection source. To minimize the potential for bias, future implementations may augment ACR accreditation data with telephone-based surveys targeting sites not represented in accreditation data.

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[5] The definition is adapted from: Centers for Medicare & Medicaid Services Quality Measurement and Health Assessment Group glossary, as part of the Measures Management System Measure Development Overview. Available at: http://www.cms.gov/MMS/19_MeasuresManagementSystemBlueprint.asp#TopOfPage. Accessed February 6, 2012.

VIII.B. Lessons from Use of the Measure

VIII.B.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.

To our knowledge, this measure is not currently in use anywhere in the United States.

VIII.B.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

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

Not applicable

References for Section VIII

American College of Radiology (ACR) Computed Tomography Accreditation. ACR website. (http://www.acr.org/Quality-Safety/Accreditation/CT. Accessed December 18, 2014.

Michigan Certificate of Need Annual Survey Report - Computed Tomography (CT) Services Provided by Hospitals, Freestanding Facilities, and Host Sites (2012) Report 101. State of Michigan website. http://www.michigan.gov/documents/mdch/Report_101_433946_7.pdf. Accessed December 18, 2014.

SECTION IX.
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 Section XVI. 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. Table IX-1 shows the questions (in columns) about the measure's use at different levels of aggregation for quality reporting (in rows) included in the CPCF.

Table IX-1 Questions about the measure's use at different levels of aggregation for quality reporting

Level of aggregation (Unit) for reporting on the quality of care for children covered by Medicaid/CHIP†	**Intended use: Is measure intended to support meaningful comparisons at this level? (Yes/No)**	**Data Sources: Are data sources available to support reporting at this level?**	**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?**	**In Use: Have measure results been reported at this level previously?**	**Reliability & Validity: Is there published evidence about the reliability and validity of the measure when reported at this level of aggregation?**	**Unintended consequences: What are the potential unintended consequences of reporting at this level of aggregation?**
State level*: Can compare States	☒Yes ☐No	Survey data at the State Health Department level	Not determined	No	No	None apparent
Other geographic level: Can compare other geographic regions (e.g., MSA, HRR)	☒Yes ☐No	Survey data at the hospital service level	Not determined.	No	No	None apparent
Medicaid or CHIP Payment model: Can compare payment models (e.g., managed care, primary care case management, FFS, and other models)	☐Yes ☒No	Enter Response Here.	Enter Response Here.	Enter Response Here.	Enter Response Here.	Enter Response Here.
Health plan*: Can compare quality of care among health plans.	☒Yes ☐No	Survey data at the health plan level	Not determined.	No	No	None apparent.
Provider-level*						
Individual practitioner: Can compare individual health care professionals	☐Yes ☒No	Enter Response Here.	Enter Response Here.	Enter Response Here.	Enter Response Here.	Enter Response Here.
Hospital: Can compare hospitals	☒Yes ☐No	Survey data at the hospital level	Not determined.	No	No	Hospital might be identifiable.
Practice, group, or facility:** Can compare: (i) practice sites; (ii) medical or other professional groups; or (iii) integrated or other delivery networks	☒Yes ☐No	Survey data at the health system or facility level.	Not determined	No	No	Facility or health system might be identifiable

† There could be other levels of reporting that could be of interest to Medicaid agencies such as markets and referral regions.
* Required in CHIPRA legislation.
** There is no implication that measures that are applicable at one level are automatically applicable at all three of the levels listed in this row.

SECTION X.
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).

This measure provides families with a straightforward means to assess if imaging facilities consider radiation reduction strategies for children who require computed tomography imaging. Lack of attention to ALARA is easily understood to be unsatisfactory. The simplicity of the measure likewise makes it a straightforward guide for providers and purchasers to assess at which facilities children will be more likely to receive radiation doses during CT imaging that are as low as reasonably achievable. This measure has not been assessed for comprehension, although respondents did not indicate that the survey questions were unclear.

SECTION XI.
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 calculation of the measure.

XI.A. Health IT Enhancement

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

Health information technology (IT) provides a platform that can support three new uses of the measure. First, health IT can begin by showing radiation dose levels. Health IT also can provide education about alternatives to higher dose imaging. Alerts and reminders, given to patients as well as providers, might also enhance use.

XI.B. Health IT Testing

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

[Yes/No drop-down]

No

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

XI.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.

This information will be captured through order entry systems, as well as noted as structured fields in radiology notes. Structured information of this sort could then be totaled for each patient over a period of time.

XI.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: http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__standards_ifr/1195)?

[Yes/No drop-down] Yes

If yes, please describe.

The ONC's Health IT Standards explicitly address the receipt of CT imaging results and other diagnostic tests into electronic health records (EHRs), which may be relevant to determining ALARA policies in hospitals providing imaging services to children. The ONC standards include the following

specific requirements in the Certification criteria (Federal Register 2010) pertaining to Stage 2 Meaningful Use requirements:

Stage 2 (beginning in 2013): CMS has proposed that its goals for the Stage 2 meaningful use criteria expand upon the Stage 1 criteria to encourage the use of health IT for continuous quality improvement at the point of care. In addition, the exchange of information in the most structured format possible is encouraged. This can be accomplished through mechanisms such as the electronic transmission of orders entered using computerized provider order entry (CPOE) and the electronic transmission of diagnostic test results. Electronic transmission of diagnostic test results includes a broad array of data important to quality measurement, and for this measure, specifically includes radiology studies such as CT imaging and the radiation dose delivered.

XI.E. Health IT Calculation

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

Missing or ambiguous information in the following areas could lead to missing cases or calculation errors:

(1) Lack of a consistent radiation dose moderation strategy.

(2) Possibly a scanned or electronic clinical document in the medical record.

XI.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 on the measure?

Health IT may enhance the use of this measure by providing real-time alerts for patients whose clinician has ordered a radiologic imaging test that may subject the patient to more or unnecessary radiation dose when a similarly effective alternative might exist. Health IT could display a warning about age and/or size-appropriate radiation dose policy, at the point of care, and use alerts and reminders to alert the clinicians that a child has had prior radiation exposure through CT imaging and at what dose. Health IT may also enhance the use of this measure by providing real-time alerts for patients with one or more chief complaints likely to trigger use of CT imaging. For example, a physician, nurse, or CT technologist seeing a patient with a chief complaint likely to prompt CT imaging can be alerted that the patient should receive imaging that makes use of ALARA policy.

References for Section XI Health Information Technology

Health information technology: Initial set of standards, implementation specifications, and certification criteria for electronic health record technology." *Federal Registry* 2010; 75(8): 2013-2047.

SECTION XII.
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).

This measure assesses the percentage of facilities with a policy for "as low as reasonably achievable" (ALARA), specific to the imaging of children. The measure was tested by conducting a telephone survey of staff at facilities in Michigan that image children. The survey responses were validated by searching the ACR accreditation website, which represents a source of verified information. State-level data regarding pediatric CT procedures provided the denominator pool of facilities that image children.

Q-METRIC testing determined that this measure is feasible. However, several limitations were identified during our testing process:

Telephone survey

- Validity testing was limited by not knowing the content of the ALARA policies based on survey responses. We were unable to determine if radiation exposure was actually reduced through the use of ALARA policies in facilities that did not seek ACR accreditation.
- Because many facilities enter their ALARA policies directly into their CT scanners and hold this information as proprietary, we were not able to directly assess the content of these policies.
- Some facility contacts did not know if they were ACR accredited.
- Few staff provided a number of protocols for three common body regions imaged by CT -- the head, chest, and abdomen/pelvis.
- While there were a small number of individuals completing the survey, many indicated they were able to provide responses for multiple facilities within the same health system. The accuracy of the information provided for these other facilities within the same health system was not assessed.
- Participation in the telephone survey was sometimes difficult for imaging facility staff members, as the phone calls often interrupted their day and conflicted with their workload.
- The telephone survey was subject to response bias.

Online Accreditation information

- Some facilities that were not ACR accredited reported following ALARA policies in the telephone survey. Thus, relying solely on the ACR website may underestimate the extent to which facilities follow ALARA policies, as this approach excludes sites that use ALARA policies without completing the ACR accreditation process.
- Occasionally, facilities would be ACR accredited and/or have pediatric-specific accreditation/ Image Gently certification and/or identify themselves in the phone survey as seeing children,

yet be shown in state data as conducting only adult imaging studies. Reasons for this discrepancy may include 1) a time lag between the data published by the ACR and state website and 2) the possibility that facilities were more comprehensively accredited than their patient roster indicated for insurance or public relations purposes.

- The degree of detail provided by state Certificate of Need data may vary; in some cases, only aggregate data characterizing multiple facilities may be reported for some health systems. Consequently, distinguishing all distinct physical locations within a health system that furnish CT imaging services for children may not be possible.
- All data sources were as current as possible. However, information on the ACR website was presumed to be more current (2014) than the Michigan state CT Certificate of Need survey (2012).

SECTION XIII.
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.

This measure, *Overuse of Imaging: Policy for ALARA Specific to Imaging Children,* assesses the percentage of facilities with a policy for "as low as reasonably achievable" (ALARA) dosing of radiation, specific to the imaging of children. This measure assesses the number of facilities that adhere to the computed tomography accreditation standards of the American College of Radiology and the number of facilities that support the pediatric Image Gently campaign.

Significant advancements in multi-detector computed tomography technology have increased the diagnostic applications and accuracy of CT imaging studies for neurologic and oncologic-based childhood diseases. However, ionizing radiation is associated with an increased risk for latent malignancies. There is an overwhelming need to consider that *any* radiation used in the course of imaging has the capacity to cause secondary cancer. Within this context, reducing the medical radiation exposure to children to the extent possible by performing imaging studies with radiation doses "as low as reasonably achievable" (ALARA) is considered a pediatric imaging best practice. Facilities with ALARA policies with age and/or size-specific radiation doses programmed into CT scanners are taking an essential step to reduce the risk of latent malignancies in children. An even higher level of care is specified by the Image Gently campaign, in which facilities are accredited by the ACR in pediatric CT imaging and commit to imaging pediatric patients with appropriate radiation dose. Although imaging guidelines have been promoted widely, many hospitals and imaging entities still do not apply ALARA-based dose reduction techniques for all varieties of pediatric imaging.

Q-METRIC tested this measure among a total of 194 facilities that image children using primary data collected through in-person telephone surveys and published accreditation data. All of the sites (100%) responding to the telephone survey indicated presence of an ALARA policy; 57% of these were confirmed with ACR accreditation data. Overall, 49% of the 194 facilities were accredited by the ACR, indicating that they have a policy and protocols in place stating that radiation dose to patients will be as low as reasonably achievable. Additionally, 39% of the ACR-accredited facilities also had pediatric-specific CT imaging accreditation indicating a commitment to the Image Gently campaign by imaging pediatric patients with an appropriate radiation dose.

This measure provides families, providers, and health plans with a straightforward means of assessing if imaging facilities consider radiation reduction strategies for children who require CT imaging. The primary information needed for this measure comes from accredited facility search data from the American College of Radiology and from state-level survey data on CT use in hospitals and freestanding facilities, both of which may be accessed through publicly available websites.

Continuing advances in the development and implementation of health IT may further support the aims of this measure by flagging imaging tests likely to subject patients to excessive or unnecessary radiation doses or by tracking cumulative radiation levels across procedures and facilities.

SECTION XIV.
IDENTIFYING INFORMATION FOR THE MEASURE SUBMITTER

Complete information about the person submitting the material, including the following:

a. Gary L. Freed, MD, MPH

b. Percy and Mary Murphy Professor of Pediatrics, School of Medicine; Professor of Health Management and Policy, School of Public Health

c. University of Michigan

d. 300 North Ingalls, Room 6E08, Ann Arbor, MI 48109

e. 734-615-0616

f. gfreed@med.umich.edu

g. Signed written statement guaranteeing that all aspects of the measure will be publicly available, as defined in the Public Disclosure Requirements.

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 (Section XIV: Identifying Information for the Measure Submitter).

This work was funded by the Agency for Healthcare Research and Quality (AHRQ) and the Centers for Medicare & Medicaid Services (CMS) under the CHIPRA Pediatric Quality Measures Program Centers of Excellence grant number U18 HS020516. AHRQ, in accordance to CHIPRA 42 U.S.C. Section 1139A(b), and consistent with AHRQ's mandate to disseminate research results, 42 U.S.C. Section 299c-3, has a worldwide irrevocable license to use and permit others to use products and materials from the grant for government purposes, which may include making the materials available for verification or replication by other researchers and making them available to the health care community and the public, if such distribution would significantly increase access to a product and thereby produce substantial or valuable public health benefits. The Measures, while copyrighted, can be reproduced and distributed, without modification, for noncommercial purposes, e.g., use by health care providers in connection with their practices. Commercial use is defined as the sale, license, or distribution of the Measures for commercial gain, or incorporation of the Measures into a product or service that is sold, licensed or distributed for commercial gain. Commercial uses of the measures require a license agreement between the user and the Quality Measurement, Evaluation, Testing, Review and Implementation Consortium (Q-METRIC) at the University of Michigan (U-M). Neither Q-METRIC/U-M nor their members shall be responsible for any use of the Measures. Q-METRIC/U-M makes no representations, warranties or endorsement about the quality of any organization or physician that uses or reports performance measures, and Q-METRIC/U-M has no liability to anyone who relies on such measures. The Q-METRIC performance measures and specifications are not clinical guidelines and do not establish a standard of medical care.

This statement is signed by Gary L. Freed, MD, MPH, who, as the principal investigator of Q-METRIC, is authorized to act for any holder of copyright on the submitted measure.

Gary L. Freed, MD, MPH
Percy and Mary Murphy Professor of Pediatrics, School of Medicine
Professor of Health Management and Policy, School of Public Health
Principal Investigator, Q-METRIC
Child Health and Evaluation Research (CHEAR) Unit
Division of General Pediatrics
University of Michigan Hospital and Health Systems
Ann Arbor, MI 48109-5456

Overuse of Imaging

Measure 5: Policy for ALARA Specific to Imaging Children

Description

The percentage of facilities with a policy for "as low as reasonably achievable" (ALARA), specific to the imaging of children. A higher proportion indicates better performance as reflected by use of minimal radiation when imaging.

Calculation

This measure requires survey data and is calculated as follows:

> The percentage of eligible facilities with a policy for "as low as reasonably achievable" (ALARA), specific to the imaging of children (numerator divided by denominator).

Definitions

Facility	Any facility that performs imaging on children (hospitals, free standing facilities, etc.).
ALARA	**"**As low as reasonably achievable" amount of radiation exposure for a given imaging study for a patient based on age and size.
Children	Newborn to 18 years old.
Imaging	CT scan of any part of the body.

Eligible Population

Facilities with CT scanners that image children

Specification

Denominator	The number of facilities that perform imaging of children.
Numerator	The number of facilities that perform imaging of children with a policy for ALARA specific to the imaging of children.

Exclusions

- Facilities that do not image children who are younger than 18 years old.