

#3621 Composite weighted average for 3 CT Exam Types: Overall Percent of CT exams for which Dose Length Product is at or below the size-specific diagnostic reference level (for CT Abdomen-pelvis with contrast/single phase scan, CT Chest without contrast/single, Last Updated: Apr 08, 2021



## Measure Information

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

### Brief Measure Information

**NQF #:** 3621

**Corresponding Measures:**

**De.2. Measure Title:** Composite weighted average for 3 CT Exam Types: Overall Percent of CT exams for which Dose Length Product is at or below the size-specific diagnostic reference level (for CT Abdomen-pelvis with contrast/single phase scan, CT Chest without contrast/single

**Co.1.1. Measure Steward:** American College of Radiology

**De.3. Brief Description of Measure:** Measure title continued: Composite weighted average for 3 CT Exam Types: Overall Percent of CT exams for which Dose Length Product is at or below the size-specific diagnostic reference level (for CT Abdomen-pelvis with contrast/single phase scan, CT Chest without contrast/single phase scan and CT Head/Brain without contrast/single phase scan)

**Description:** Weighted average of 3 CT Exam Types: Overall Percent of CT exams for which Dose Length Product is at or below the size-specific diagnostic reference level (for CT Abdomen-pelvis with contrast/single phase scan, CT Chest without contrast/single phase scan and CT Head/Brain without contrast/single phase scan)

**1b.1. Developer Rationale:**

**S.4. Numerator Statement:** Number of CT Abdomen-Pelvis exams with contrast (single phase scan), CT Chest exams without contrast (single phase scan), and CT Head/Brain exams without contrast (single phase scan) for which Dose Length Product is at or below the size-specific exam-specific diagnostic reference level

**S.6. Denominator Statement:** Number of CT Abdomen-pelvis exams with contrast (single phase scans), CT Chest exams without contrast (single phase scans), and CT Head/Brain (single phase scans)

**Target population:** all patients regardless of age.

**S.8. Denominator Exclusions:** No denominator exclusions

**De.1. Measure Type:** Composite

**S.17. Data Source:** Registry Data

**S.20. Level of Analysis:** Clinician : Group/Practice, Facility

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

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

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

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

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

Extent to which the specific measure focus is evidence-based, important to making significant gains in healthcare quality, and improving health outcomes for a specific high-priority (high-impact) aspect of healthcare where there is variation in or overall less-

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than-optimal performance. **Measures must be judged to meet all sub criteria to pass this criterion and be evaluated against the remaining criteria.**

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

[NQF\\_3621\\_Evidence\\_Attachment-637535000870391200.docx](#)

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

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

**1b. Performance Gap**

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

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

**1b.1. Briefly explain the rationale for this measure** (e.g., how the measure will improve the quality of care, the benefits or improvements in quality envisioned by use of this measure)

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

**1b.2. Provide performance scores on the measure as specified (current and over time) at the specified level of analysis.** (*This is required for maintenance of endorsement. Include mean, std dev, min, max, interquartile range, scores by decile. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities include.*) This information also will be used to address the sub-criterion on improvement (4b1) under Usability and Use.

2017: Performance Rate: 79.93, Mean: 80.17, # of patients: 1698254, # of groups: 173, Min: 11.01, Max: 100, Std Deviation: 16.82, Interquartile Range: 20.69

2018: Performance Rate: 78.37, Mean: 78.61, # of patients: 1317898, # of groups: 189, Min: 11.01, Max: 100, Std. Deviation: 18.04, Interquartile Range: 22.87

2019: Performance Rate: 79.86, Mean: 78.41, # of patients: 2832268, # of groups: 208, Min: 13.59, Max: 100, Std. Deviation: 18.74, Interquartile Range: 24.34

2020: Performance Rate: 78.32, Mean: 78.47, # of patients: 2832268, # of groups: 205, Min: 13.60, Max: 100, Std. Deviation: 18.85, Interquartile Range: 21.73

CMS recently provided preliminary historical benchmark data for this measure based on reporting for 2019. The measure average performance rate was 80.3% with a range of performance by decile.

Decile 3: 28.83 - 60.42

Decile 4: 60.43 - 73.28

Decile 5: 73.29 - 82.24

Decile 6: 82.25 - 87.25

Decile 7: 87.26 - 89.15

Decile 8: 89.16 - 94.27

Decile 9: 94.28 - 95.13

Decile 10: >= 95.14

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

**1b.4. Provide disparities data from the measure as specified (current and over time) by population group, e.g., by race/ethnicity, gender, age, insurance status, socioeconomic status, and/or disability.** *(This is required for maintenance of endorsement. Describe the data source including number of measured entities; number of patients; dates of data; if a sample, characteristics of the entities included.) For measures that show high levels of performance, i.e., "topped out", disparities data may demonstrate an opportunity for improvement/gap in care for certain sub-populations. This information also will be used to address the sub-criterion on improvement (4b1) under Usability and Use.*

We are unable to provide disparities by population group, but we can provide facility characteristics for this measure. In particular, the gap between the metropolitan facilities and the rural facilities show how many more patients are being seen in metropolitan communities. We hope this gap continues to improve with continued use of the measure.

Facility category	# of facilities	# of patients
Academic	173	4,014,721
Community hospital	1,277	17,776,843
Multi-specialty clinic	119	412,793
Freestanding center	623	1,450,846
Children's hospital	33	92,927
Other	108	320,303

Facility location	# of facilities	# of patients
Metropolitan	1,011	13,351,998
Suburban	837	7,751,000
Rural	438	2,965,435

Census region	# of facilities	# of patients
Northeast	473	5,588,555
Midwest	537	4,708,684
South	890	10,224,294

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

## 1c. Composite Quality Construct and Rationale

**1c.1. A composite performance measure is a combination of two or more component measures, each of which individually reflects quality of care, into a single performance measure with a single score.**

For purposes of NQF measure submission, evaluation, and endorsement, the following will be considered composites:

- Measures with two or more individual performance measure scores combined into one score for an accountable entity.
- Measures with two or more individual component measures assessed separately for each patient and then aggregated into one score for an accountable entity:
  - all-or-none measures (e.g., all essential care processes received, or outcomes experienced, by each patient);

**1c.1.** Please identify the composite measure construction: **two or more individual performance measure scores combined into one score**

**1c.2. Describe the quality construct, including:**

- the overall area of quality
- included component measures and
- the relationship of the component measures to the overall composite and to each other.

The measure goal is to decrease preventable harm through effective optimization of computed tomography (CT) protocols and resulting reduction in radiation dose to patients.

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This is a composite weighted average for 3 computed tomography (CT) exam types. The overall score is the percent of CT exams for which Dose Length Product (DLP) is at or below the size-specific diagnostic reference level benchmarks (for CT Abdomen-pelvis with contrast/single phase scan, CT Chest without contrast/single phase scan and CT Head/Brain without contrast/single phase scan).

This measure will be calculated using the weighted average of three performance rates:

Rate 1: Percent of CT Abdomen-pelvis exams with contrast (single phase scan) for which Dose Length Product is at or below the size-specific diagnostic reference level

Rate 2: Percent of CT Chest exams without contrast (single phase scan) for which Dose Length Product is at or below the size-specific diagnostic reference level

Rate 3: Percent of CT Head/brain exams without contrast (single phase scan) for which Dose Length Product is at or below the size-specific diagnostic reference level

Dose Length Product (DLP) is a standardized parameter to measure computed tomography (CT) scanner radiation output to a patient and is a useful index to compare protocol-based outputs across different practices and scanners. Providing comparative performance data across CT exam types (e.g. head, chest, and abdomen) to a physician or site will help identify where imaging protocols may need adjustment in order to obtain diagnostic images using the lowest reasonable dose. While DLP itself is not a measure or estimate of actual patient radiation dose, it is closely related to doses received by patients. DLPs cover scan length, which is important in terms of capturing radiation exposure to patients. Physicians can see DLP on their PACS for each exam, which allows for feedback and care coordination between the physician, technologist, and medical physicist in improving scan lengths.

Diagnostic reference levels (DRLs) are used as benchmarks for radiation protection and optimization of patient imaging. The intended use of DRLs is as a simple test for identifying situations where the levels of patient dose are unusually high and provide a means for facilities and clinicians to optimize dose to a lower level than a DRL. In 2017, the American College of Radiology (ACR) published a study, U.S. Diagnostic Reference Levels and Achievable Doses for 10 Adult CT Examinations, identifying DRLs and Achievable Doses (ADs) for the 10 most common CT adult examinations performed in the United States. The study used 2014 data submitted to the National Radiology Data Registry – Dose Index Registry (DIR) for 1,310,727 CT head, neck and body exams. It represents the first time that national adult DRLs and ADs have been developed as a function of patient size. This data enables facilities to effectively compare their patient doses with national benchmarks and to optimize their CT protocols, resulting in lower doses at the appropriate image quality. DRLs should be used to determine if a facility's dose indexes are unusually high; they should not be used as target doses. Both ADs and DRLs are provided to encourage facilities to optimize dose to a lower level than that indicated by the DRL.

This measure and its components measures the DLP of CT exam for a particular aspect of the body (abdomen/pelvis, chest, and head/brain). It is imperative to measure each body area separately since they all have a different DLP requirement and using a weighted average for the three different exam types ensures that physician performance is accurately captured.

There are several potentially justified reasons for variations in dose exposure, such as indication for exam and patient size. We define the exams fairly narrowly for each component measure which narrows variability driven by indication. We stratify records by patient size and compare each record to a size specific DRL to ensure unbiased comparison across patient populations.

Reference:

Kanal KM, Butler PF, Sengupta D, Bhargavan-Chatfield M, Coombs LP, Morin RL. U.S. Diagnostic Reference Levels and Achievable Doses for 10 Adult CT Examinations. Radiology. 2017 Jul;284(1):120-133. doi: 10.1148/radiol.2017161911. Epub 2017 Feb 21. PMID: 28221093.

**1c.3. Describe the rationale for constructing a composite measure, including how the composite provides a distinctive or additive value over the component measures individually.**

This performance measure was initially developed as three individual quality measures. The ACR combined the three into a composite performance measure in 2019 to consolidate the concept of radiation safety for CT exams to a single measure for optimal radiation dose. Each measure captures how well radiation exposure from the scanner is adjusted for patient size, using size-specific exam-level diagnostic reference levels and how well total radiation exposure from an exam is optimized based on the CT dose index dose-length product (DLP). A single composite performance measure consisting of these three indicators allows physicians and

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facilities to accurately view which body area exam may require further improvement on dose protocols.

**1c.4. Describe how the aggregation and weighting of the component measures are consistent with the stated quality construct and rationale.**

This measure is calculated using the weighted average of three performance rates:

- Rate 1: Percent of CT Abdomen-pelvis exams with contrast (single phase scan) for which Dose Length Product is at or below the size-specific diagnostic reference level
- Rate 2: Percent of CT Chest exams without contrast (single phase scan) for which Dose Length Product is at or below the size-specific diagnostic reference level
- Rate 3: Percent of CT Head/brain exams without contrast (single phase scan) for which Dose Length Product is at or below the size-specific diagnostic reference level

Composite score:

Each component measure percentile score is weighted by the denominator count. The weighted scores are summed then divided by the sum of weights of all 3. Alternatively, the numerator and denominator counts for each measure can be totaled then averaged by 3.

Example:

	Numerator	Denominator	Rate
Head	3000	8000	38%
Abdomen/Pelvis	5000	10000	50%
Chest	2000	5000	40%
All	10000	23000	43%
Weighted average			43%

Weighted average = (Weight Head x Rate Head) + (Weight Abdomen/Pelvis x Rate Abdomen/Pelvis) + (Weight Chest x Rate Chest))/Sum of weights of all 3

## 2. Reliability and Validity—Scientific Acceptability of Measure Properties

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

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

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

**De.6. Non-Condition Specific**(check all the areas that apply):

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

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

<https://www.acr.org/-/media/ACR/Files/Registries/QCDR/2021-QCDR-Measure-Specification-Details.pdf>

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

[This is not an eMeasure](#) Attachment:

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

Attachment Attachment: [ACRad\\_34\\_-\\_Multistrata\\_weighted\\_average\\_of\\_three\\_CT\\_exam\\_types.pdf](#)

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

[No, this is not an instrument-based measure](#) Attachment:

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

[Not an instrument-based measure](#)

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

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

**S.4. Numerator Statement** (Brief, narrative description of the measure focus or what is being measured about the target population, i.e., cases from the target population with the target process, condition, event, or outcome) DO NOT include the rationale for the measure.

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

[Number of CT Abdomen-Pelvis exams with contrast \(single phase scan\), CT Chest exams without contrast \(single phase scan\), and CT Head/Brain exams without contrast \(single phase scan\) for which Dose Length Product is at or below the size-specific exam-specific diagnostic reference level](#)

**S.5. Numerator Details** (All information required to identify and calculate the cases from the target population with the target process, condition, event, or outcome such as definitions, time period for data collection, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b)

*IF an OUTCOME MEASURE, describe how the observed outcome is identified/counted. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14).*

[Dose length product; CTDIw Phantom Type; Effective Diameter \(calculated from localizer image\); size specific exam-specific diagnostic reference level.](#)

[These components capture how well radiation exposure from the scanner is adjusted for patient size, using size-specific exam-level diagnostic reference levels and how well total radiation exposure to a patient from an exam is optimized based on the CT dose index dose-length product \(DLP\).](#)

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

[Number of CT Abdomen-pelvis exams with contrast \(single phase scans\), CT Chest exams without contrast \(single phase scans\), and CT Head/Brain \(single phase scans\)](#)

[Target population: all patients regardless of age.](#)

**S.7. Denominator Details** (All information required to identify and calculate the target population/denominator such as definitions, time period for data collection, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b.)

*IF an OUTCOME MEASURE, describe how the target population is identified. Calculation of the risk-adjusted outcome should be described in the calculation algorithm (S.14).*

Study description; Exam date; Acquisition protocol

Target population: all patients who require either a CT Abdomen-pelvis exam with contrast (single phase scans), a CT Chest exam without contrast (single phase scans), and/or a CT Head/Brain (single phase scans) exam regardless of age.

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

No denominator exclusions

**S.9. Denominator Exclusion Details** (All information required to identify and calculate exclusions from the denominator such as definitions, time period for data collection, specific data collection items/responses, code/value sets – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format at S.2b.)

No denominator exclusions

**S.10. Stratification Information** (Provide all information required to stratify the measure results, if necessary, including the stratification variables, definitions, specific data collection items/responses, code/value sets, and the risk-model covariates and coefficients for the clinically-adjusted version of the measure when appropriate – Note: lists of individual codes with descriptors that exceed 1 page should be provided in an Excel or csv file in required format with at S.2b.)

The measure calculation is stratified by patient size. The results are not reported separately by the stratification variable.

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

Stratification by risk category/subgroup

If other:

**S.12. Type of score:**

Rate/proportion

If other:

**S.13. Interpretation of Score** (Classifies interpretation of score according to whether better quality is associated with a higher score, a lower score, a score falling within a defined interval, or a passing score)

Better quality = Higher score

**S.14. Calculation Algorithm/Measure Logic** (Diagram or describe the calculation of the measure score as an ordered sequence of steps including identifying the target population; exclusions; cases meeting the target process, condition, event, or outcome; time period for data, aggregating data; risk adjustment; etc.)

Target population is all patients regardless of age.

To calculate the denominator for each of the measures we include all exams that are mapped to a standardized exam name/study description that corresponds to one of the three exam types used for measures, has a localizer image to permit size assessment, and has non-zero values for dose indices.

To calculate the numerator:

Head exams are categorized using lateral thickness (size) from scout images submitted by facilities. Body exams (chest and abdomen/pelvis ) are categorized using the effective diameter (size) that ACR calculates from scout images. The numerator consists of the total number of exams among the denominator that are at or below the size specific DRL.

To calculate the performance rate, the numerator (Total number of exams among the denominator that are at or below the size specific DRL) is divided by the denominator (submitted eligible records) and multiplied by 100 to indicate the percentage. Physician groups/facilities may compare their performance to other facilities using aggregate registry level benchmarks.



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Step 1: Denominator: Total number of exams that were mapped to one of the 3 exam names, had a non-zero DLP and a non-zero CTDIvol, CTDIvol<DLP, age was not missing, and patient size is available

Step 2: Numerator: Total number of exams among the denominator that are at or below the size specific DRL

Step 3: Percentage at or below size-specific DRL for each body part: (Numerator/Denominator)\*100

Step 4: Percentage of all exams at or below size-specific DRL. Alternately, calculate weighted average of component measures, where weight is number of records for each body part.

Composite score:

Each component measure percentile score is weighted by the denominator count. The weighted scores are summed then divided by the sum of weights of all 3. Alternatively, the numerator and denominator counts for each measure can be totaled then averaged by 3.

Example:

	Numerator	Denominator	Rate
Head	3000	8000	38%
Abdomen/Pelvis	5000	10000	50%
Chest	2000	5000	40%
All	10000	23000	43%
Weighted average			43%

Weighted average = (Weight Head x Rate Head) + (Weight Abdomen/Pelvis x Rate Abdomen/Pelvis) + (Weight Chest x Rate Chest))/Sum of weights of all 3

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

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

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

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

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

If other, please describe in S.18.

Registry Data

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

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

Clinical data registry (ACR National Radiology Data Registry - Dose Index Registry)

**S.19. Data Source or Collection Instrument** (available at measure-specific Web page URL identified in S.1 OR in attached appendix at A.1)

Available at measure-specific web page URL identified in S.1

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

Clinician : Group/Practice, Facility

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



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Emergency Department and Services, Inpatient/Hospital, Other, Outpatient Services

If other: Dialysis Facility

**S.22. COMPOSITE Performance Measure** - Additional Specifications (*Use this section as needed for aggregation and weighting rules, or calculation of individual performance measures if not individually endorsed.*)

This measure will be calculated using the weighted average of three performance rates:

- Rate 1: Percent of CT Abdomen-pelvis exams with contrast (single phase scan) for which Dose Length Product is at or below the size-specific diagnostic reference level
- Rate 2: Percent of CT Chest exams without contrast (single phase scan) for which Dose Length Product is at or below the size-specific diagnostic reference level
- Rate 3: Percent of CT Head/brain exams without contrast (single phase scan) for which Dose Length Product is at or below the size-specific diagnostic reference level

## 2. Validity – See attached Measure Testing Submission Form

[NQF\\_3621\\_Composite\\_Testing\\_Form.docx](#)

### 2.1 For maintenance of endorsement

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

### 2.2 For maintenance of endorsement

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

### 2.3 For maintenance of endorsement

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

## 3. Feasibility

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

### 3a. Byproduct of Care Processes

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

#### 3a.1. Data Elements Generated as Byproduct of Care Processes.

Generated or collected by and used by healthcare personnel during the provision of care (e.g., blood pressure, lab value, diagnosis, depression score)

If other:

### 3b. Electronic Sources

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

**3b.1. To what extent are the specified data elements available electronically in defined fields** (*i.e., data elements that are needed to compute the performance measure score are in defined, computer-readable fields*) Update this field for **maintenance of endorsement**.

ALL data elements are in defined fields in a combination of electronic sources

**3b.2. If ALL the data elements needed to compute the performance measure score are not from electronic sources, specify a credible, near-term path to electronic capture, OR provide a rationale for using other than electronic sources.** For **maintenance of endorsement**, if this measure is not an eMeasure (eCQM), please describe any efforts to develop an eMeasure (eCQM).

**3b.3. If this is an eMeasure, provide a summary of the feasibility assessment in an attached file or make available at a measure-specific URL. Please also complete and attach the NQF Feasibility Score Card.**

Attachment: [DIR\\_NQF\\_Feasibility\\_Scorecard.xlsx](#)

### **3c. Data Collection Strategy**

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

**3c.1. Required for maintenance of endorsement.** Describe difficulties (as a result of testing and/or operational use of the measure) regarding data collection, availability of data, missing data, timing and frequency of data collection, sampling, patient confidentiality, time and cost of data collection, other feasibility/implementation issues.

**IF instrument-based,** consider implications for both individuals providing data (patients, service recipients, respondents) and those whose performance is being measured.

The initial setup for submitting data requires the site to have staff resources for installing data collection software. It is a small amount of time to set up the CT equipment to transmit the dose information and to map the site exam names to standardized DIR names for comparison. Occasionally, if done incorrectly, this can require a site to review the set-up and standardized formatting.

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

Minimal participation fee to participate in the DIR, which is based on facility size, number of facilities and number of radiologists in each practice. The fee is typically about \$500-\$1000 per year. The primary purpose of participating sites in DIR is quality improvement, but an additional benefit of this specific measure is the accountability purpose.

NRDR and Participation Fees: <https://nrdrsupport.acr.org/support/solutions/articles/11000029012-registration-and-participation-fees>

## **4. Usability and Use**

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

### **4a. Accountability and Transparency**

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

#### **4.1. Current and Planned Use**

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

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Specific Plan for Use	Current Use (for current use provide URL)
	<p>Payment Program Merit-based Incentive Payment System <a href="http://qpp.cms.gov">qpp.cms.gov</a></p> <p>Quality Improvement (Internal to the specific organization) ACR Dose Index Registry <a href="https://www.acr.org/Practice-Management-Quality-Informatics/Registries/Dose-Index-Registry">https://www.acr.org/Practice-Management-Quality-Informatics/Registries/Dose-Index-Registry</a></p>

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

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

The CMS Merit-based Incentive Payment System (MIPS) is a quality improvement accountability program. They reward high-value, high-quality Medicare clinicians with payment increases and reduce payments to those clinicians who aren't meeting performance standards. Over 10,000 physicians and approximately 2.4 million patients are included in the program for this measure. A variety of geographic areas in the United States are measured. Measurement is performed at the individual and group level.

The ACR Dose Index Registry (DIR) allows facilities to compare their CT dose indices to regional and national values. Facilities receive quarterly feedback reports comparing their results to aggregate results by body part and exam type. Participation offers participants additional ways to fulfill reporting requirements for the Merit-based Incentive Payment System (MIPS) and also allows credit for Maintenance of Certification (MOC) Part IV requirements of the American Board of Radiology (ABR). Over 2000 facilities and over 200 groups submit data to the DIR, with over 2 million patients included. Measurement is performed at the facility and group level.

**4a1.2. If not currently publicly reported OR used in at least one other accountability application (e.g., payment program, certification, licensing) what are the reasons? (e.g., Do policies or actions of the developer/steward or accountable entities restrict access to performance results or impede implementation?)**

This measure is currently used in an accountability program.

**4a1.3. If not currently publicly reported OR used in at least one other accountability application, provide a credible plan for implementation within the expected timeframes -- any accountability application within 3 years and publicly reported within 6 years of initial endorsement. (Credible plan includes the specific program, purpose, intended audience, and timeline for implementing the measure within the specified timeframes. A plan for accountability applications addresses mechanisms for data aggregation and reporting.)**

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

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

The measure specifications are updated annually and included in the CMS Quality Payment Program for MIPS. This measure is reported via the ACR National Data Radiology Database (NRDR) Qualified Clinical Data Registry (QCDR) with measure ID ACRad34. Detailed specifications are publicly available on the ACR website.

Assistance with interpretation for this measure is provided through the ACR help desk and through the CMS help desk. Users can submit their questions and receive a response from ACR staff within 72 hours.

Performance results are provided in two ways. The first is through the ACR NRDR DIR, where users upload their data to the registry and can compare their performance against registry benchmarks in real time. Users must have an account with the registry to view

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results and are able to view their performance online. The second is through CMS' MIPS Feedback Reports, which are issued annually. These feedback reports are based on performance benchmarks, which are calculated in deciles. These reports are not specific nor necessarily indicative of a group's performance. These reports are available online through the user's CMS account.

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

Feedback is provided to all DIR participants reporting this quality measure daily. Feedback is based on registry benchmarks. ACR educational webinars are conducted bimonthly to explain measure requirements and interpretation of performance results.

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

**Describe how feedback was obtained.**

Feedback is obtained through email, the ACR help desk, the CMS quality help desk, and CMS contractor QMMS.

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

Feedback on this measure is positive. Facilities are able to evaluate when their CT exam protocols should be reviewed and/or updated to optimize radiation dose exposure to patients.

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

No other feedback has been provided from entities other than individuals that could report the measure.

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

This feedback is considered during the annual measure specification update process with CMS. The ACR Metrics Committee reviews feedback for measure changes.

#### **Improvement**

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

**4b1. Refer to data provided in 1b but do not repeat here. Discuss any progress on improvement (trends in performance results, number and percentage of people receiving high-quality healthcare; Geographic area and number and percentage of accountable entities and patients included.)**

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

Performance has remained steady in the 79-80% for this measure. There hasn't been a significant performance improvement, which demonstrates that there is still a gap in care for optimizing radiation dose to patients. Improving performance in this measure would demonstrate that a facility is adjusting radiation dose protocols.

#### **4b2. Unintended Consequences**

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

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

We are not aware of any unintended consequences related to this measurement.

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

All benefits from this measure are intended.

## 5. Comparison to Related or Competing Measures

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

### 5. Relation to Other NQF-endorsed Measures

Are there related measures (conceptually, either same measure focus or target population) or competing measures (conceptually both the same measure focus and same target population)? If yes, list the NQF # and title of all related and/or competing measures.  
Yes

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

2820 : Pediatric Computed Tomography (CT) Radiation Dose

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

### 5a. Harmonization of Related Measures

The measure specifications are harmonized with related measures;

OR

The differences in specifications are justified

#### 5a.1. If this measure conceptually addresses EITHER the same measure focus OR the same target population as NQF-endorsed measure(s):

Are the measure specifications harmonized to the extent possible?

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

### 5b. Competing Measures

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

OR

Multiple measures are justified.

#### 5b.1. If this measure conceptually addresses both the same measure focus and the same target population as NQF-endorsed measure(s):

Describe why this measure is superior to competing measures (e.g., a more valid or efficient way to measure quality); OR provide a rationale for the additive value of endorsing an additional measure. (Provide analyses when possible.)

NQF #3621 is a competing measure to NQF #2820 because our measure addresses the same measure focus and target population. The target population in NQF #2820 is a subset population of NQF #3621. Additionally, while NQF #2820 primarily targets pediatric patients, the measure description states that the measure can also be used for CT in adults.

In NQF #3621 performance for facilities and groups is calculated comparing dose indices to published benchmarks.

NQF #2820, “provides a simple framework for how facilities can assess their dose, compare their doses to published benchmarks (Smith-Bindman, Radiology, 2015) and identify opportunities to improve if their doses are higher than the benchmarks”. Measure users thus are self-calculating results against one of three published benchmarks themselves using one of three benchmarks published benchmarks for both levels of measurement (group and facility).

NQF #3621 uses data published in the ACR 2017 study, U.S. Diagnostic Reference Levels and Achievable Doses for 10 Adult CT Examinations, identifying DRLs and Achievable Doses (ADs) for the 10 most common CT adult examinations performed in the United States. It represents the first time that national adult DRLs and ADs have been developed as a function of patient size, a milestone in

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optimizing radiation dose to patients. NQF #3621 has eight years of performance data for each measure component, as well as four years of data for the composite. Using electronic data sources, NQF #3621 has high feasibility and low collection burden, which minimizes missing data bias. NQF #3621 provides greater consistency and level of comparison across facilities and groups, providing more validity and reliability for use in quality improvement and specifically for accountability programs.

Reference: Kanal KM, Butler PF, Sengupta D, Bhargavan-Chatfield M, Coombs LP, Morin RL. U.S. Diagnostic Reference Levels and Achievable Doses for 10 Adult CT Examinations. Radiology. 2017 Jul;284(1):120-133. doi: 10.1148/radiol.2017161911. Epub 2017 Feb 21. PMID: 28221093.

## Appendix

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

Available at measure-specific web page URL identified in S.1 Attachment:

## Contact Information

**Co.1 Measure Steward (Intellectual Property Owner):** American College of Radiology  
**Co.2 Point of Contact:** Karen, Campos, kcampos@acr.org, 800-227-5463-5848  
**Co.3 Measure Developer if different from Measure Steward:** American College of Radiology  
**Co.4 Point of Contact:** Karen, Campos, kcampos@acr.org, 800---

## Additional Information

### Ad.1 Workgroup/Expert Panel involved in measure development

Provide a list of sponsoring organizations and workgroup/panel members' names and organizations. Describe the members' role in measure development.

- William Sensakovic, PhD
- Steven Don, MD
- Loretta Johnson, PhD
- Clinton Jokerst, MD
- Aaron Jones, PhD
- Phillip Koo, MD
- Tony Seibert, MD, FACR
- Keith Strauss, MS, FACR
- Kalpana Kanal, PhD, FACR
- Mythreyi Chatfield, PhD
- Dustin Gress
- Penny Butler
- Judy Burleson, MHSA
- 

### Measure Developer/Steward Updates and Ongoing Maintenance

**Ad.2 Year the measure was first released:** 2019

**Ad.3 Month and Year of most recent revision:** 09, 2020

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

**Ad.5 When is the next scheduled review/update for this measure?** 09, 2021

**Ad.6 Copyright statement:** n/a

**Ad.7 Disclaimers:**

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

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