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Memo

June 3, 2022

To: Patient Safety Standing Committee, Fall 2021

From: NQF staff

Re: Post-comment web meeting to discuss NQF member and public comments received and NQF member expressions of support

Background

Patient safety measurement efforts over the last two decades have focused on quality improvement in healthcare organizations to improve care delivery and outcomes for patients. Measures this cycle focused on unintended weight loss, coronavirus disease 2019 (COVID-19) vaccination coverage, and excessive radiation exposure from computed tomography (CT) scans. The Standing Committee evaluated four newly submitted measures and one maintenance measure against NQF's standard evaluation criteria. The Standing Committee recommended all five measures for endorsement.

The Standing Committee recommended the following measures:

- NQF #0689 Percent of Residents Who Lose Too Much Weight (Long Stay) (Acumen/Centers for Medicare & Medicaid Services [CMS])
- NQF #3636 Quarterly Reporting of COVID-19 Vaccination Coverage Among Healthcare Personnel (Centers for Disease Control and Prevention [CDC])
- NQF #3633e Excessive Radiation Dose or Inadequate Image Quality for Diagnostic Computed Tomography (CT) in Adults (Clinician Level) (Alara Imaging/University of California, San Francisco [UCSF])
- NQF #3662e Excessive Radiation Dose or Inadequate Image Quality for Diagnostic Computed Tomography (CT) in Adults (Clinician Group Level) (Alara Imaging/UCSF)
- NQF #3663e Excessive Radiation Dose or Inadequate Image Quality for Diagnostic Computed Tomography (CT) in Adults (Facility Level) (Alara Imaging/UCSF)

Standing Committee Actions in Advance of the Meeting

1. Review this briefing memo and draft report
2. Review and consider the full text of all comments received and the proposed responses to the post-evaluation comments (see Comment Brief).
3. Review the NQF members' expressions of support of the submitted measures.
4. Be prepared to provide feedback and input on proposed post-evaluation comment responses.

Comments Received

NQF accepts comments on endorsed measures on an ongoing basis through the Quality Positioning System (QPS). In addition, NQF solicits comments for a continuous 16-week period during each evaluation cycle via an online tool located on the project webpage. For this evaluation cycle, the

commenting period opened on December 6, 2021 and closed on January 16, 2022. Comments received by January 16, 2022 were shared with the Standing Committee prior to the measure evaluation meeting(s). Following the Standing Committee's evaluation of the measures under review, NQF received eight comments from three organizations (all NQF members) pertaining to the draft report and the measures under review. This memo focuses on comments received after the Standing Committee's evaluation.

NQF members also had the opportunity to express their support ("support" or "do not support") for each measure submitted for endorsement consideration. One NQF members submitted an expression of support. More information on the submitted expressions of support can be found in Appendix A. NQF staff have included all comments that were received (both pre- and post-evaluation) in the Comment Brief. The Comment Brief contains the commenter's name, comment, associated measure, and draft responses for post-evaluation comments (including measure steward/developer responses if appropriate) for the Standing Committee's consideration. Please review this table in advance of the meeting and consider the individual comments received and the proposed responses for each comment.

In order to facilitate the discussion, the post-evaluation comments have been categorized into action items and major topic areas or themes. Although all comments are subject to discussion, the intent is not to discuss each individual comment during the post-comment call. Instead, NQF staff will spend the majority of the time considering the themes discussed below and the set of comments as a whole. Please note that the organization of the comments into major topic areas is not an attempt to limit the Standing Committee's discussion, and the Standing Committee can pull any comment for discussion. Measure stewards/developers were asked to respond to comments where appropriate. All developer responses, along with the proposed draft Standing Committee responses, have been provided in this memo and the Comment Brief.

Comments and Their Disposition

Themed Comments

One major theme was identified in the post-evaluation comments.

Concerns Regarding Excessive Radiation Dose or Inadequate Image Quality for Diagnostic Computed Tomography (CT) in Adults Measures

One commenter expressed several concerns regarding the three measures of excessive radiation dose or inadequate image quality for diagnostic computed tomography (CT) in adults at the clinician, clinician group, and facility level. The commenter expressed concerns that the Standing Committee failed to adequately consider the opinions provided by the commenter's pre-evaluation public comment and reiterated several concerns provided in the pre-evaluation public comment, including concerns about the measure's specifications and usability.

Measure Steward/Developer Response:

The developer has responded to each of the items mentioned in the public comment. Due to the length of the response, the full text of this response can be found in Appendix B.

Proposed Standing Committee Response:

The Patient Safety Standing Committee thanks American Association of Physicists in Medicine for their comment. The Standing Committee does take public comments into account when discussing and recommending measures for endorsement. The Standing Committee made the decision to endorse the measures after reviewing and considering the original comment and the measure developer's response. The Standing Committee stands by their decision to recommend to endorse the measures. .

Action Item:
Review the comments received and determine whether to accept the proposed Standing Committee response.

Measure-Specific Comments

NQF #3636 Quarterly Reporting of COVID-19 Vaccination Coverage Among Healthcare Personnel (CDC)
One commenter did not support the endorsement of the measure and raised concerns that the reporting of this measure is duplicative because the same information is reported to the Department of Health and Human Services as part of COVID-19 reporting requirements. The commenter states that some of the employee categories required by this measure are challenging to capture such as construction personnel, particularly in the cases where contracting construction companies are unwilling to disclose vaccination status of its employees. The commenter notes that this type of vaccination documentation is unique to COVID-19, is not common practice for other transmissible diseases, and is not based on evidence-based interventions that result in improved patient outcomes. Another commenter expressed support for the measure and the Standing Committee's deliberation.

Measure Steward/Developer Response:
It is not entirely clear to which specific reporting the Commenter is referring. The Commenter may be referring to acute care facility reporting of healthcare personnel vaccination information as a component of the CMS public health emergency response (CMS-152-F) and as a component of CMS quality measurement programs (CMS-1762-F)(https://www.hhs.gov/sites/default/files/covid-19-faqs-hospitals-hospital-laboratory-acute-care-facility-data-reporting.pdf and https://www.federalregister.gov/documents/2021/08/13/2021-16519/medicare-program-hospital-inpatient-prospective-payment-systems-for-acute-care-hospitals-and-the). If so, this comment may reflect concern about duplicative reporting requirements of specific programs but does not appear to reflect opposition to NQF endorsement of measure #3636 itself. Healthcare worker COVID-19 vaccination is associated with reduced patient COVID-19 infections and deaths (N Engl J Med. 2022 Jan 27;386(4):397-398). Recording healthcare worker COVID-19 vaccination information may pose challenges and some associated burden, but healthcare worker COVID-19 vaccination is an important intermediate outcome directly relevant to patient safety. Reporting vaccination coverage for contractors (e.g., construction personnel) is not required for NQF #3636. There has been immunization record keeping and reporting of influenza vaccination coverage among healthcare personnel for many years across many healthcare facility types. CMS Quality reporting programs have required reporting influenza vaccination coverage among healthcare personnel by acute care hospitals beginning in 2013, by inpatient rehabilitation facilities and long-term acute care hospitals beginning in 2014, and by Prospective payment system (PPS)-exempt cancer hospitals beginning in 2016. Evidence that tracking COVID-19 vaccination rates has directly and independently improved outcomes may not currently be available. However as noted above, there is evidence that reduced patient COVID-19 infections and deaths are associated with high healthcare personnel COVID-19 vaccination coverage, which provide supporting evidence for tracking vaccination rates. Tracking COVID-19 vaccination rates is feasible and continued monitoring of COVID-19 vaccination coverage is important as new personnel are hired, and additional doses of vaccine are recommended (Public Health Rep. Mar-Apr 2022;137(2):239-243).

Proposed Standing Committee Response:
Thank you for your comment. The Standing Committee found the specifications clear and does not anticipate the measure will add undue burden to measured entities.

Action Item:
Review the comment received and determine whether to accept the proposed Standing Committee response.

Appendix A: NQF Member Expression of Support Results

One NQF member provided their expressions of support/nonsupport. Three of five measures under consideration received support from NQF members. Results for each measure are provided below.

NQF #3633e Excessive Radiation Dose or Inadequate Image Quality for Diagnostic Computed Tomography (CT) in Adults (Clinician Level) (Alara Imaging/University of California, San Francisco [UCSF])

Member Council	Commenter Names, Organizations	Support	Do Not Support	Total
Purchaser	0	1	0	0
Total	0	1	0	0

NQF #3662e Excessive Radiation Dose or Inadequate Image Quality for Diagnostic Computed Tomography (CT) in Adults (Clinician Group Level) (Alara Imaging/UCSF)

Member Council	Commenter Names, Organizations	Support	Do Not Support	Total
Purchaser	0	1	0	0
Total	0	1	0	0

NQF #3663e Excessive Radiation Dose or Inadequate Image Quality for Diagnostic Computed Tomography (CT) in Adults (Facility Level) (Alara Imaging/UCSF)

Member Council	Commenter Names, Organizations	Support	Do Not Support	Total
Purchaser	0	1	0	0
Total	0	1	0	0

Appendix B: Developer Response to Concerns Regarding Excessive Radiation Dose or Inadequate Image Quality for Diagnostic Computed Tomography (CT) in Adults Measures

UCSF thanks the American Association of Physicists in Medicine (AAPM) for their additional comments. UCSF would like to respond and address several inaccuracies and misunderstandings in how the measure is calculated and its intent. COMMENT 1: [Medical Physicists and the American Association of Physicists in Medicine have extensive content expertise that should be considered]…and "while the measure developers have published on the topic of radiation dose, they have limited expertise or history with clinical CT, CT image quality, or CT technology." RESPONSE 1: The measure developers agree that medical physicists have relevant and important expertise, and they have involved medical physicists in all aspects of our work including both the measure development itself and all of the work in the preceding decade that laid the foundation for UCSF's development of this measure. FIRST: J. Anthony Seibert, PhD was included as a member of our Technical Expert Panel (TEP) to ensure consideration of the perspectives of medical physicists at every step of measure development. Dr. Seibert recently retired as Professor of Diagnostic Imaging Physics and Associate Chair of Radiology Informatics at UC Davis Health and is a past president of the AAPM (2011). In addition to serving on our TEP, Dr. Seibert led UC Davis as a measure testing site and wrote a letter of support for the measure confirming it was "highly feasible" to calculate the measure and noting his belief "that this quality measure can significantly reduce the use of excessive high radiation dose as well as inadequate, sub-optimal low dose used for clinical CT studies." SECOND, the developers also worked closely with another medical physicist, Tim Szczkutowicz, PhD on measure development. Dr. Szczkutowicz guided the work of automating the calculation of image noise, expanding on his earlier published work in this area (Malkus 2017). Dr. Szczkutowicz is an Associate Professor in the Department of Radiology at the University of Wisconsin Madison School of Medicine and Public Health with affiliations in the Department of Medical Physicists and Biomedical Imaging. Lastly, this measure development effort has been led by Rebecca Smith-Bindman, MD, a radiologist and epidemiologist whose primary area of research for the last 15 years has been in quantifying the radiation doses used for CT scanning and identifying ways to safely reduce excessive doses. Over the last 10 years, her research team created a CT radiation dose registry of more than 8 million exams from over 160 facilities, which has allowed the team to quantify the variation in dose, to understand the cause of the variation, and to develop and study interventions to help facilities appropriately lower doses without loss of image quality. The development of this quality measure was a natural extension of this work, and the registry has allowed for the testing of the adult measures. As part of this past work, Dr. Smith-Bindman led a randomized controlled trial of two interventions to optimize CT radiation doses across 100 hospitals and imaging facilities and found that providing feedback (similar to that proposed for these quality measures) along with education and opportunities for sharing best practices resulted in meaningful dose reductions (up to 40%) without any loss in image quality (Smith-Bindman 2020). In total, 13 medical physicists served as site-Principal Investigators for this NIH funded-trial (R01CA181191). Thus, medical physicists have contributed substantially to the body of work that led to the measure as well as measure development. In large part based on Dr. Smith-Bindman's 15-year track record in this area, involving medical physicists, CMS awarded UCSF a cooperative agreement to develop these CT quality measures under the Medicare Access and CHIP Reauthorization Act of 2015 ("MACRA"). COMMENT 2: [There is] unscientific characterization of CT scan risk … the AAPM is concerned that the stated risk of patient radiation dose .. may contribute to fear of diagnostic exams that may in turn lead some patients to refuse safe and appropriate imaging. RESPONSE 2: The measure is not focused on radiation risk and does not calculate nor report radiation risk. A review of the published epidemiological evidence summarizing radiation risk is provided in the application as background and context for the measure (see sections 1a.01-1b.01).

This includes several systematic reviews, cohort studies, and an extensive and comprehensive review from the National Academies that conclude that exposure to CT (or radiation doses in the same range as CT) increases a person's risk of developing cancer. Most of these studies do not rely upon the linear no threshold model that the AAPM criticizes in its comment. Indeed, the systematic reviews are based on an observed elevated risk of cancer among patients exposed to medical imaging. The estimates used in the application are based on this extensive literature review. HOWEVER, radiation risk is not part of the measure at all: it is not calculated nor is it reported. INSTEAD, the measure evaluates dose length product (DLP), and specifically whether size-adjusted DLP exceeds thresholds specific to CT category. DLP is the radiation dose measure most directly under the control of providers, determined by specific parameters that were chosen for the scan. Further, DLP is universally reported by CT scanner manufacturers (unlike other metrics of radiation dose or risk). THE TEP, including the American College of Radiology (ACR), several radiologists, and the medical physicist serving on the committee, unanimously recommended and supported the radiation dose measure used (DLP) and unanimously agreed that it is a relevant metric of quality for CT imaging, as noted in Validity Results, 2b.03. There is also considerable precedent for using DLP to evaluate radiation dose in CT. The American College of Radiology has used DLP to set benchmarks [Kanal 2017] and to measure CT radiation dose in their own NQF-endorsed quality measure #3621. There is no reason to believe that endorsing this measure, which seeks to standardize practice and reduce extreme radiation dose outliers based on DLP, would result in patients refusing appropriate imaging. COMMENT 3: The usability of data resulting from these measures is not clear. The measures do not provide the clinician with an analysis of or methodology for determining what improvements should be made to address a poor showing. It may not be clear to practitioners what a poor score means or how to address it. RESPONSE 3: Entities that report the measure using the measure steward's software will be provided information to both identify causes of performance gaps and make targeted changes to improve quality. There are only two conditions that would push a CT out of compliance - high radiation dose, and poor image quality. The reason for failure (high dose or low quality) will be available to sites on a scan-by-scan basis for those that report the measure using the measure steward's software Those scans where the radiation dose is too high, the dose should be lowered through usual means (technologist education, protocol changes). For those where image quality is too low, more radiation dose should be used through similar means. COMMENTS IN SUPPORT of the measure from many of the testing sites describe how useful the information provided was to allow them to understand and improve their practice. (Available here, beginning page 113: https://www.qualityforum.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=96982) As described in our submission and noted above, UCSF found in a randomized controlled trial in 100 hospitals and outpatient radiology practices that providing detailed audit and feedback on radiation doses, similar to what will be provided as part of the feedback on this measure, resulted in significant reductions in radiation dose with no impact on satisfaction with image quality, described in Usability, 4b.01. (Smith-Bindman, 2020) The measure steward does not have control over how 3rd party vendors will report information back to reporting entities. COMMENT 4. The measures rely on categorization of CT data into cohesive groups… There is, however, significant variability in the CT protocol lexicon across institutions that results in making assignment of a given protocol to one of these categories challenging. [There is] substantial oversimplified representation of implementation in practice RESPONSE 4: For the reason the AAPM highlights and for another important reason describe below, the CT category assigned by the measure (reflecting the indication and appropriate radiation dose level for the scan) does not rely on the protocol name at all. As described in Specifications, sp-11, clinical indication for imaging is determined using an algorithm that combines procedure (CPT®) and diagnosis (ICD-10-CM) codes associated with the clinical visit when the test was ordered, information provided as part of the order, and information on the final bill. The codes are available in the radiology electronic systems and/or the EHR or billing systems. The goal in creating the CT categorization decision rules was to identify exams

that are exceptions to the routine dose category (i.e., either high or low dose), (Smith-Bindman, 2021.) Details of the approach for developing and validating the assignment of CT exams to categories in an automated fashion are provided in the measure submission (see Validity sections 2b.02 and 2b.03) and in detailed answers provided to initial comments made by the ACR and AAPM. This approach was first developed using records from over 4.5 million CT exams in the UCSF International CT Dose Registry (Smith-Bindman, 2021), and then turned into an algorithm that combines procedure (CPT®) and diagnosis codes (ICD-10-CM) associated with the clinical visit when the test was ordered, information provided as part of the order, and information on the final bill, provided in Specifications, sp-11. This algorithm was developed using detailed review of over 10,000 patient records from UCSF Health, and validated against "gold standard" chart review, as described in Validity sections 2b.02 and 2b.03. When the algorithm was deployed at our testing sites (including 16 hospitals and 13 outpatient imaging centers), the correct classification rate of the assignment of CT exams to CT category in field-testing was excellent (over 90% for all reporting levels: clinician, clinician group, and facility). Knowing that the algorithm was developed using data from a single health system, the developers performed detailed investigation of the categorization results at testing sites – comparing the assigned CT category against full radiology reports – for the purpose of improving the algorithm. One of the strengths of these measures is that they do not determine the CT category using the protocol name, as this would mask an important quality improvement opportunity (namely, the selection of which protocol to use to scan the patient). Two key process of care components determine radiation doses: (A) the choice of imaging protocol, for example, whether a patient with a suspected pulmonary embolism is imaged with a single- or double-phase CT exam (a decision usually made by the performing radiologist); and (B) the technical settings used for that type of CT exam, which are usually at the discretion of the technologist or medical physicist who oversee and operate the machines. As both of these components contribute to radiation dose, a comprehensive quality measure must encompass both of these decision-making processes. By determining the CT category independent of the protocol used, the measures is able to evaluate both components of quality. COMMENT 5 The noise measure is not an adequate or sufficient parameter of overall image quality. RESPONSE 5: Several comments focus on image quality and the concern that the measure does not offer a comprehensive assessment of image quality. The measure is not intended as a robust measurement of image quality. The primary focus of our measure is to assess radiation dose adjusted for body size. The image quality component was included to protect against the unlikely possibility of substantial degradation of image quality as an unintended consequence of dose reduction. Our measure of image quality uses thresholds developed based on radiologists' satisfaction with images, reflecting what in practice is regarded as adequate for diagnosis. Others might have an interest in more nuanced assessment of image quality for other purposes, but that was not our intent. If the measure is adopted and used, the Steward will closely monitor image noise and measure failure due to low image quality. The Steward will be sensitive to any signal that there is a problem and will revise the measure if changes are needed. COMMENT 6: With these measures, an optimum study is one that delivers the least radiation dose with an acceptable global noise level. but no evidence is provided that clinicians with high values for the measures perform better or even adequately, only that they perform with less radiation dose. AAPM recommends using an alternative approach that would optimize the acquisition for the task at hand to deliver the least radiation dose necessary while still providing the diagnostic image quality necessary for the task. RESPONSE 6: This measure provides a standardized method for monitoring the performance of diagnostic CT to discourage unnecessarily high radiation doses, a risk factor for cancer, while preserving image quality. It is expressed as a percentage of eligible CT exams that are out-of-range based on having either excessive radiation dose or inadequate image quality, relative to evidence-based thresholds based on the clinical indication for the exam. THE HIGHER THE SCORE, the higher the proportion of out-of-range exams and the worse the performance. The measure is NOT INTENDED to improve diagnostic accuracy. The purpose of the measure is to establish a radiation

dose ceiling to avoid excessive radiation exposure, and an image quality floor to safeguard against unintended deterioration of image quality. ADDITIONALLY, the entire framework for the measure is to ensure the radiation dose and image quality are acceptable for the specific clinical indication, aligned with what the AAPM recommends. The CT categories were created based on radiation dose and image quality requirements specific to the clinical indications for imaging (Smith-Bindman 2021). Using radiologists' satisfaction with image quality, an image quality floor for each category was established, below which an exam is considered to have inadequate quality, and a radiation dose ceiling, beyond which doses are considered unnecessarily high. The purpose is to allow detailed assessment of each CT exam to ensure the dose is optimal based on the clinical indication for imaging. In our testing data, far more CT exams exceeded the radiation dose ceiling (average = 30%) than failed to meet the image quality requirement (average << 1%) (see section 1b.02). The measure encourages entities to reduce the proportion of exams that may "be overdosed for their exact need and condition" while preserving the minimum image quality. COMMENT 7: [There is] Inadequate accuracy in patient size estimation… Assessing a patient size can be challenging because of significant variability in differences in the habitus of different patients, coupled with the existential challenge that there is no single metric capturing the size of a patient of varying diameter at different cross-sectional locations. RESPONSE 7: The developers agree that measuring patient size is important and provided a detailed response to the ACR and AAPM in their earlier comments. FIRST, our approach for using mid-scan diameter is highly correlated with patient weight. In separate, NIH-funded research on CT use in children up to age 21 (Kwan 2022), UCSF has shown that diameter in 4,239 children as measured on mid-scan axial images is highly predictive of patient weight, correlation = 0.904.SECOND, for this measure, patient size is measured using CT image pixel data, either on the mid-scan axial image or the coronal scout image when the mid-scan axial image was not available. This approach has been validated using data from UCSF Health, the UCSF Registry, as well as the data assembled for measure testing from 16 hospitals and 13 outpatient imaging centers. While there may be different ways to measure patient size, and different reasons for measuring patient size, the developers are adjusting for patient size primarily to ensure that entities that see larger patients are not penalized for doing so. using data from the UCSF Registry for abdomen CT we asse the relationship between radiation dose (in DLP) and patient diameter. Abdomen CT was selected as this is the category most influenced by patient size, meaning that patient mix could impact an entity's out-of-range rate. The raw correlation between patient diameter and unadjusted DLP is 0.50, and the marginal R-squared of the log-linear model used for adjustment is 0.15. After size-adjustment, the relationship is nearly removed: the raw correlation is far lower -(0.09), and the modeled marginal R-squared post-adjustment is 0. THIS DEMONSTRATES ADEQUACY OF THE APPROACH FOR PATIENT SIZE ADJUSTMENT TO REMOVE BIAS CAUSED BY CASE MIX. THIRD, the adequacy of size adjustment was shown empirically using data assembled from the testing sites. Out-of-range proportions for routine abdomen exams at 16 hospitals in our testing data based on unadjusted DLP, by decile in patient size are strongly associated by decile in size. Among patients in the highest size decile the out-of-range proportions across the 16 hospitals ranged from 93-100%. ON THE OTHER HAND The out-of-range rates based on adjusted DLP are not higher among the larger patients. Among patients in the highest size decile, out-of-range rates ranged from 11-53%. THIS ALSO DEMONSTRATES ADEQUACY OF THE APPROACH FOR ADJUSTMENT OF PATIENT SIZE. COMMENT 8 Limited expertise… Alara Imaging Alara is a new company without a significant track record of having previously performed a project of such wide scope, scientifically or technically … Alara has limited IT development experience with no demonstrated history of interfacing with complex EHR or Radiology Clinical Data systems. ..The software interface is problematic because it is a vector to a 3rd party product, which can expose healthcare organizations to ransomware attacks by malicious actors seeking valuable patient medical information. RESPONSE 8: These assertions are incorrect. Measure stewardship is in collaboration with the University of California San Francisco (UCSF). UCSF was responsible for all measure development, scientific research, and measure validation work.

UCSF also has a significant track record of successfully performing projects of this scope. About mid-way into the cooperative agreement, CMS asked UCSF to develop and report these measures as eCQMs. UCSF sought guidance from the measures' Technical Expert Panel and asked if members of the TEP would step forward to develop the software and steward the measure. When no group presented itself, it became clear that developing the eCQM and managing nationwide implementation and reporting of this measure was beyond the scope of the UCSF academic team and other TEP member organizations. Accordingly, Dr. Smith-Bindman worked with UCSF to create a company, Alara Imaging, that would help serve as measure steward. UCSF created Alara Imaging to develop the eCQM software and support measure stewardship. Alara is comprised of a team specifically assembled for the creation of this measure software, with deep radiology informatics and technical expertise. The Alara team has over 50 combined years of experience deploying software in hospital environments. The company is new, but the team is well versed in secure implementation. Alara's software is secure. The software is both HIPAA certified and SOC II certified with an independent third-party audit. The software protects against cyberattacks. Tools and information are provided to protect site data and support product security. Alara Imaging's software was used to perform the extensive testing described in the measure application, including correctly calculating measure results for 35,729 CT exams assembled from 7 hospital systems and 1 ambulatory imaging network. Software to calculate the measure will be made available to sites without charge. Measure specifications are in the public domain. If practices do not want to work with Alara, they may work with other vendors to report on the measure. Burden was found to be no more or less onerous than the effort required by participation in other eCQMs or national registries, such as the ACR Dose Index Registry (Feasibility, 3.06). References: KANAL KM et al. U.S. Diagnostic Reference Levels and Achievable Doses for 10 Adult CT Examinations. Radiology. 2017;284(1):120-133. MALKUS A, SZCZYKUTOWICZ TP. A method to extract image noise level from patient images in CT. Med Phys. 2017 Jun;44(6):2173-2184. SMITH-BINDMAN R, Yu S, Wang Y, et al. An Image Quality-informed Framework for CT Characterization. Radiology. 2021 Nov 9:210591. SMITH-BINDMAN R et al. Comparison of the Effectiveness of Single-Component and Multicomponent Interventions for Reducing Radiation Doses in Patients Undergoing Computed Tomography: A Randomized Clinical Trial. JAMA Intern Med. 2020 May 1;180(5):666-675. KWAN M et al. Smith-Bindman senour Author. Quantifying cancer risk from exposures to medical imaging in the Risk of Pediatric and Adolescent Cancer Associated with Medical Imaging (RIC) Study: Research Methods and Cohort Profile Marilyn Kwan et al. Cancer Causes Control 2022 May;33(5):711-726. doi: 10.1007/s10552-022-01556-z. Epub 2022 Feb 2.