

**American College of Radiology
ACR Appropriateness Criteria®
Assessment of Gravid Cervix**

Variant 1: Assessment of gravid cervix. Nulliparous or no history of prior preterm birth. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
US cervix transabdominal	Usually Appropriate	0
US cervix transperineal	May Be Appropriate	0
US cervix transvaginal	May Be Appropriate	0

Variant 2: Assessment of gravid cervix. History of prior preterm birth. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
US cervix transvaginal	Usually Appropriate	0
US cervix transperineal	May Be Appropriate	0
US cervix transabdominal	Usually Not Appropriate	0

Variant 3: Assessment of gravid cervix. Suspected preterm labor. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
US cervix transvaginal	Usually Appropriate	0
US cervix transperineal	May Be Appropriate	0
US cervix transabdominal	May Be Appropriate	0

Variant 4: Assessment of gravid cervix. Induction of labor or active term labor. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
US cervix transperineal	May Be Appropriate (Disagreement)	0
US cervix transabdominal	Usually Not Appropriate	0
US cervix transvaginal	Usually Not Appropriate	0

ASSESSMENT OF GRAVID CERVIX

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Summary of Literature Review

Introduction/Background

Preterm birth (PTB), defined as delivery before 37 weeks gestational age, remains the leading cause of perinatal mortality and morbidity worldwide [1]. In the United States alone, the rate of PTB for the year 2016 was 9.9%, with more than two-thirds occurring during the late preterm period (34–36 weeks) and nearly one-third occurring during the early preterm period (<34 weeks) [2]. Although advances in neonatal care have resulted in improved survival, the associated economic impact of PTB in the United States is high and has been estimated to be \$26.2 billion per year [3].

The most significant risk factor for PTB is a history of prior spontaneous PTB. A short transvaginal cervical length (CL), commonly accepted as a length of ≤ 25 mm before 24 weeks gestational age, is a clinical finding that is also associated with increased risk for preterm delivery [4]. Several options now exist for the management of short CL in patients without a history of prior spontaneous PTB (eg, vaginal progesterone, cerclage, and pessary) [5-8] and in patients with a history of prior spontaneous PTB (eg, intramuscular progesterone with or without cerclage) [9]. As such, development of effective screening strategies for identifying those at risk for PTB has become an important aim, and CL assessment has become an area of particular focus.

In addition to CL screening for those at risk for PTB, other clinical scenarios may arise in which imaging assessment of the gravid cervix may be of interest. These include suspected preterm labor, induction of labor, and active term labor. Additional clinical scenarios, which may require a focused assessment of the gravid cervix, include suspected abnormal placentation including placenta previa, vasa previa, and lower uterine segment and/or cervical fibroids that may impede progression of labor and potential umbilical cord prolapse.

The focus of this document is the assessment of the gravid cervix in singleton gestations. Evaluation of the gravid cervix is also pertinent to cases of multiple gestations but is covered in the ACR Appropriateness Criteria[®] topic on “[Multiple Gestations](#)” [10]. Similarly, evaluation of the gravid cervix in the setting of suspected abnormal placentation, (eg, placenta previa) will be covered in the upcoming ACR Appropriateness Criteria[®] topic on “[Suspected Placenta Accreta Spectrum Disorder](#)” [11].

Special Imaging Considerations

Although the ACR Appropriateness Criteria methods assume that all procedures are performed and interpreted by experts, image acquisition in the gravid cervix merits particular attention given that about one-fourth of images may be technically suboptimal [12,13]. Image quality resources include the Cervical Length Education and Review (CLEAR) program (<https://clear.perinatalquality.org>) and the Fetal Medicine Foundation’s Certificate of Competence in cervical assessment (<https://fetalmedicine.org/education/cervical-assessment>).

3-D Transvaginal US

Three-dimensional TVUS acquires a volumetric data set that can be reformatted and analyzed in any plane. Three-dimensional TVUS may eventually be of benefit for certain clinical scenarios; however, there is currently insufficient data to recommend its routine use.

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US Elastography Cervix

US elastography is an imaging technique that assesses tissue stiffness. Although the available data suggest that US elastography may be beneficial in evaluating the gravid cervix [14-17], technical standards and normal reference values are lacking, and the technique remains investigational. As such, there is currently insufficient data to recommend its use in routine screening for PTB in low-risk and high-risk women, suspected preterm labor, and predicting successful induction of labor [18-22].

Discussion of Procedures by Variant

Variant 1: Assessment of gravid cervix. Nulliparous or no history of prior preterm birth. Initial imaging.

US Cervix Transabdominal

Transabdominal assessment of the cervix is a component of the standard second and third trimester US evaluation according to the [ACR-ACOG-AIUM-SMFM-SRU Practice Parameter for the Performance of Standard Diagnostic Obstetrical Ultrasound](#) [23]. Although transabdominal assessment of the cervix is less reliable than transvaginal and transperineal approaches, recent studies suggest that prevoid transabdominal CL ≤ 36 mm had high sensitivity (96%–100%) for detection of short transvaginal CL ≤ 25 mm [24,25]. Therefore, although TVUS is not currently recommended for women at low risk for PTB, transvaginal or transperineal US are preferred in cases in which transabdominal evaluation results in inadequate visualization of the cervix or instances in which there are findings suspicious for a cervical abnormality.

US Cervix Transperineal

Transperineal US is an alternate approach to transvaginal evaluation of the gravid cervix and may be a complementary method to transabdominal US in certain clinical situations, such as large body habitus or when incomplete distention of the bladder limits transabdominal cervical assessment. The transperineal approach is superior to transabdominal US, although inadequate visualization of the cervix has been reported in up to 22% of patients [26]. An inability to adequately assess the cervix via the transperineal approach may result from shadowing from the symphysis pubis and rectal gas and stool. Adequate assessment by transperineal US is also dependent on sonographer experience.

Transperineal assessment of the gravid cervix has been shown to be comparable to TVUS by several studies. Good correlation between CL measurements obtained transperineally and transvaginally have been reported in normal gravid cervix patients at each trimester, and the accuracy improves as the pregnancy progresses [27]. In a study by Hertzberg et al [28], similar levels of diagnostic confidence were achieved via the transperineal and transvaginal approaches, although there was a clear preference expressed by the interpreting physician for the latter. CLs were found to be comparable after 20 weeks gestational age, and CL measured between 14 and 20 weeks gestational age were statistically shorter via the transperineal approach. In a study of women between 22 and 24 weeks gestational age, Cicero et al [26] reported transperineal CL comparable to those obtained transvaginally.

Standard second and third trimester transabdominal US evaluation may inadequately visualize the cervix or demonstrate findings suspicious for shortening. In such cases, transvaginal or transperineal US have been recommended for further evaluation [23]. If TVUS is declined by the patient or if the risk of TVUS is deemed too high (eg, placenta previa, suspected preterm premature rupture of membranes), transperineal US is a suitable alternative. If transperineal US is performed, the above caveats regarding CL in the early second trimester should be noted.

US Cervix Transvaginal

TVUS allows for the most complete assessment of the cervix, yet its use in universal screening of low-risk women remains controversial. Supportive evidence for universal screening comes from two studies evaluating the rates of PTB before and after implementation of a universal transvaginal cervical screening program [29,30]. Following implementation of their screening program, Son et al [29] demonstrated statistically significant decreases in the rates of spontaneous PTB <37 weeks (4.8% versus 4.0%), <34 weeks (1.3% versus 1.0%), and <32 weeks (0.7% versus 0.5%). Temming et al [30] demonstrated similar findings following implementation of their screening program; however, statistically significant decreases only were observed in the rates of spontaneous PTB <28 weeks (2.0% versus 0.7%) and <24 weeks (1.5% versus 0.35%).

Other studies demonstrate no clear benefit to transvaginal screening, thereby calling into question its appropriateness. In one study evaluating a CL screening program in nulliparous women, no statistical difference was observed in the rate of spontaneous PTB in patients who underwent screening compared with those who did not [31]. In a separate study of nulliparous women, the predictive accuracy of serial TVUS for spontaneous PTB

was shown to be low [32]. Among women with spontaneous PTB, short CL (≤ 25 mm) was observed in only 8% at 16 to 22 weeks and only 23.3% at 22 to 30 weeks [32].

The use of TVUS for screening of low-risk patients is controversial, although screening may be considered. In clinical settings in which routine screening is not implemented, TVUS would be preferred in the event that second trimester transabdominal images inadequately visualize the cervix or demonstrate findings suspicious for cervical shortening (CL ≤ 36 mm) [4].

Although TVUS is not contraindicated in the setting of placenta previa, it should be performed using real-time imaging as the probe is advanced. The safety in this setting is based on the presumption that the angle between the cervix and the vaginal probe is sufficient to prevent the probe from inadvertently slipping into the cervix and that real-time imaging is used throughout the procedure to assess the relationship between the probe tip and the cervix [33].

Variant 2: Assessment of gravid cervix. History of prior preterm birth. Initial imaging.

US Cervix Transabdominal

Transabdominal US of the cervix may be adversely affected by multiple factors, including poor sonographic windows and bladder distention, and, as a result, optimal visualization of the cervix is highly variable [25]. In addition, the sensitivity for detection of a transvaginally confirmed short cervix (≤ 25 mm) by transabdominal approach is also variable with reported sensitivities ranging between 33% for a transabdominal cutoff length of ≤ 25 mm and 96.7% for a transabdominal cutoff length of ≤ 33 mm [34,35]. In light of this, transabdominal US traditionally has been considered inadequate for CL assessment.

More recently, several studies have challenged the belief that transabdominal US is not reliable for assessing and screening for cervical shortening. In one such study of patients with and without history of prior PTB, a prevoid transabdominal CL ≤ 36 mm was reported as having a sensitivity of 96% for detection of a transvaginal CL ≤ 25 mm, whereas a prevoid transabdominal CL ≤ 35 mm was associated with a sensitivity of 100% for detection of a transvaginal CL ≤ 20 mm [24]. A prospective study designed to test these thresholds confirmed that a transabdominal CL of 35 to 36 mm could detect a short cervix by TVUS. However, the authors reported inadequate visualization of the cervix in 50.8% of examinations, as well as multiple technical problems, including shadowing or obscuration by the fetus, bladder edge-artifact obscuring portions of the cervix, and unexplained obscuration of the cervix [25]. In addition, the authors reported a significant association between suboptimal transabdominal imaging of the cervix and a short cervix by TVUS. Given the potential consequences of a missed short CL, transabdominal US for cervical screening is not recommended for the routine assessment of patients at high risk for PTB. Situations uncommonly may arise in which transabdominal US may be considered, such as when the patient declines TVUS and transperineal US assessment is inadequate.

US Cervix Transperineal

Transperineal US is an alternate approach to transvaginal evaluation of the gravid cervix and may be useful in certain clinical scenarios, such as large body habitus or when incomplete distention of the bladder limits the transabdominal cervical assessment. The transperineal approach is superior to transabdominal US, and transperineal assessment of the gravid cervix has been shown to be comparable to TVUS [27]. Good correlation between CL measurements obtained transperineally and transvaginally have been reported in normal gravid patients at each trimester [26-28]. In a study by Hertzberg et al [28], similar levels of diagnostic confidence were achieved with both transperineal and transvaginal approaches, noting a clear preference expressed for the latter. CL was found to be comparable after 20 weeks gestational age; however, CL measured between 14 and 20 weeks gestational age was statistically shorter via the transperineal approach. Given the apparent difference in accuracy of transperineal CL in the early second trimester, the authors suggested performing transvaginal imaging when short CL are obtained transperineally in the early second trimester. In a study of women between 22 and 24 weeks gestational age, Cicero et al [26] reported satisfactory transperineal visualization of the cervix in approximately 80% of cases. CLs obtained by the transperineal approach during this gestational age were also comparable to those obtained transvaginally.

TVUS is the preferred approach for assessment of the gravid cervix in high-risk patients, but there may be instances in which TVUS is not possible because of patient discomfort or preference. If TVUS is declined by the patient or if the risk of TVUS is deemed too high (eg, placenta previa, suspected preterm premature rupture of membranes), transperineal US is a suitable alternative. In such instances, transperineal US would be indicated, noting the above caveats regarding CL in the early second trimester.

US Cervix Transvaginal

TVUS is the reference standard of imaging modalities used for assessment of the gravid cervix. The transvaginal approach affords the shortest distance between transducer and cervix, and TVUS transducers typically offer higher frequency evaluation and greater detailed evaluation. The combination of these features allows for complete visualization of the cervix, including the internal os where changes increasing the risk of PTB first occur. Lastly, transvaginal imaging is a highly reproducible test.

Several studies have demonstrated that identification of a short CL by TVUS decreases the rate of PTB by directing patients to appropriate interventions. In a randomized placebo-controlled study by Fonseca et al [6], women with a sonographically short cervix who received progesterone demonstrated a 44% reduction in the rate of PTB <34 weeks, as well as a 41% decrease in neonatal morbidity. A separate randomized placebo-controlled study confirmed the benefit of progesterone administration and found a 45% decrease in PTB <33 weeks and a 50% decrease in PTB <28 weeks [8]. Reduction in PTB rates was also observed in patients undergoing cervical pessary placement [7]. When compared with patients undergoing expectant management, pessary placement was associated with a 78% reduction of PTB <34 weeks. Lastly, short CL treated by cerclage has been found to decrease PTB. In a meta-analysis of 5 trials of high-risk patients with short CL, cerclage placement resulted in a 30% decrease in PTB <35 weeks with significantly decreased rates of PTB seen before 37, 32, 28, and 24 weeks [5].

Given the availability of several effective interventions for the prevention of PTB, TVUS cervical screening for high-risk patients is recommended. Routine TVUS screening is also supported by the American College of Obstetricians and Gynecologists and Society for Maternal-Fetal Medicine [36,37].

Although TVUS is not contraindicated in the setting of placenta previa, it should be performed using real-time imaging as the probe is advanced. The safety in this setting is based on the presumption that the angle between the cervix and the vaginal probe is sufficient to prevent the probe from inadvertently slipping into the cervix and that real-time imaging is used throughout the procedure to assess the relationship between the probe tip and the cervix [33].

Cervical Cerclage

Patients who have undergone history-indicated cerclage for cervical insufficiency represent a subset of high-risk patients. In these patients with a history of one or more second trimester losses, cerclage placement may be offered during the early second trimester. In one recent study screening cerclage patients by TVUS until 26 weeks, a shorter CL below the cerclage and cervical funneling were shown to be associated with a higher rate of PTB [38]. In a separate study evaluating postcerclage patients between 18 and 24 weeks, cervical funneling was the only variable independently associated with increased risk of PTB before 34 weeks [39]. Although these and other studies suggest that short CL and cervical funneling are associated with higher rates of PTB in patients with cerclage, the Society for Maternal-Fetal Medicine does not recommend routine surveillance for this subset of high-risk patients because there is insufficient data supporting a clinical benefit to screening [37]. If assessment of the cerclage is performed, additional measurements irrespective of approach (eg, transabdominal, transvaginal, or transperineal) may include the total length of closed cervix regardless of cerclage sutures, and if funneling is present, the length of closed cervix from the level of cervical funneling to the level of the cerclage sutures.

Variant 3: Assessment of gravid cervix. Suspected preterm labor. Initial imaging.

US Cervix Transabdominal

To our knowledge, there is no relevant literature regarding the use of transabdominal US in the evaluation of the cervix for suspected preterm labor.

US Cervix Transperineal

Transperineal US is an alternate approach to transvaginal evaluation of the gravid cervix. In one study, adequate visualization of the cervix was achieved in 82% of patients in preterm labor with good agreement of transperineal and transvaginal measurements with an intraclass correlation coefficient of 0.83 [40]. The mean difference in cervical measurements between transperineal and transvaginal approaches was 1.5 mm, with transperineal US underestimating CL in most cases. No significant disagreement between both methods was observed above or below a length of 25 mm. A study by Dimassi et al [41] also reported a strong correlation in CL obtained by both methods as well as a low mean difference in cervical measurements (0.38 mm).

TVUS would be preferred for assessment of the cervix in cases of suspected preterm labor. Nevertheless, transperineal US would be an adequate alternative in the event that TVUS is declined by the patient or if the risk of TVUS is deemed too high (eg, placenta previa, suspected preterm premature rupture of membranes).

US Cervix Transvaginal

TVUS is the reference standard of imaging modalities used for assessment of the gravid cervix because it allows for complete visualization of the cervix, including the internal os where changes of PTB first occur. Transvaginal imaging is highly reproducible.

There is a significant association between short cervix and spontaneous PTB in patients presenting with suspected preterm labor. In one study of patients presenting with symptoms of preterm labor, patients with transvaginal CL ≤ 15 mm were more likely to deliver spontaneously ≤ 35 weeks than those patients with CL ≥ 15 mm (66.7% versus 13.5%) [42]. A CL ≤ 15 mm was also associated with a statistically higher spontaneous premature delivery ≤ 32 weeks as well as premature delivery within 7 days and 48 hours of admission when compared with those patients with CL ≥ 15 mm. In those patients who had CL ≥ 30 mm, the risk of spontaneous PTB was very low as was delivery within 7 days and 48 hours of admission [42]. In a more recent study, a CL ≤ 15 mm was reported to have sensitivity and specificity values of 77% and 77%, respectively, and an accuracy of 88% for predicting delivery within 7 days of presentation [43]. In addition, this study reported that the presence of cervical funneling was an independent predictor of delivery < 37 weeks [43]. Melamed et al [44] also demonstrated an inverse relationship between CL and the risk of spontaneous PTB at < 37 weeks, 35 weeks, and 32 weeks. A weak but statistically significant correlation between CL and the interval between presentation and delivery was also observed, yet the overall accuracy of using CL to predict occurrence and timing of spontaneous PTB was relatively poor. In a separate study evaluating the relationship between CL and cervical dilatation in patients with threatened preterm labor, CL was inversely associated with the risk of spontaneous PTB in patients with cervical dilation ≤ 3 cm and those with a closed cervix [45]. Although the accuracy of CL in predicting preterm delivery was relatively poor for patients with and without cervical dilatation, this study also demonstrated that CL measurement had a high negative predictive value for spontaneous PTB even in cases of cervical dilatation.

Taken together, the data demonstrate that although TVUS has limitations in its predictive ability in identifying those who will progress to PTB, its greatest value is its high negative predictive value. As such, transvaginal assessment of the gravid cervix would be the preferred approach in cases of suspected preterm labor.

Although TVUS is not contraindicated in the setting of placenta previa, it should be performed using real-time imaging as the probe is advanced. The safety in this setting is based on the presumption that the angle between the cervix and the vaginal probe is sufficient to prevent the probe from inadvertently slipping into the cervix and that real-time imaging is used throughout the procedure to assess the relationship between the probe tip and the cervix [33].

Variant 4: Assessment of gravid cervix. Induction of labor or active term labor. Initial imaging.

US Cervix Transabdominal

To our knowledge, there is no relevant literature regarding the use of transabdominal US in the evaluation of the cervix prior to induction of labor or during active term labor.

US Cervix Transperineal

Transperineal US is a noninvasive approach to assess the cervix and is potentially beneficial in evaluating active term labor. Hassan et al [46] first reported the ability to adequately visualize the cervix during labor by transperineal approach in a small pilot study. In this study, satisfactory visualization of the cervix was reported in 90% of primiparous women. There was also a strong positive correlation between digital and US measurements as well as a high intraclass correlation (0.81) between both methods. In subsequent studies, both methods demonstrated good agreement with similar intraclass correlations (0.82–0.83) and mean differences in cervical dilatation of 9 to 10 mm [47,48]. Successful transperineal US visualization of the cervix was 71% in one of these later studies [47] and somewhat lower than the 90% success rate originally reported [46]. Although transperineal US has potential utility, there is insufficient evidence to support routine use in predicting induction of labor outcomes. Moreover, clinical situations in which imaging is necessary are uncommon and, as such, imaging is rarely performed.

US Cervix Transvaginal

TVUS as a predictor of successful labor induction has been the subject of much interest given that the standard clinical method—the Bishop score—is rather limited in its ability to predict labor induction outcomes. Because TVUS is the most sensitive method for assessing length and changes at the internal cervical os, it has been suggested that it may help predict cervical ripeness.

However, a meta-analysis of 31 studies demonstrated limited value in predicting the outcome of induced labor [49]. Studies that are more recent also report conflicting data. In one study, a shorter CL prior to induction was associated

with a shorter interval from induction to delivery, and a CL ≥ 28 mm was associated with increased risk of failure of induction [50]. CL was also reported to be predictive of vaginal delivery and induction-to-delivery interval [20,51], although CL was a poor predictor of cesarean delivery [20]. Another study found no efficacy in predicting successful vaginal delivery using CL measurement [52]. Lastly, a meta-analysis by Ezebialu et al [53] found no difference in labor induction outcomes between patients assessed by TVUS and Bishop score. At present, there is insufficient evidence to support routine use in predicting induction of labor outcomes. Moreover, clinical situations in which imaging is necessary are uncommon and, as such, imaging is rarely performed. Another potential application for TVUS at the time of term labor lies in distinguishing true labor from false labor in patients presenting with labor symptoms. In one study of term nulliparous and multiparous patients, a CL cutoff of ≤ 1.5 cm provided the highest specificity (81%), positive predictive value (83%), and positive likelihood ratios (4.2) for distinguishing true from false labor [54]. Although promising, the results of the findings have yet to be confirmed by other studies, and there is insufficient evidence to support its use and clinical utility.

Although TVUS is not contraindicated in the setting of placenta previa, it should be performed using real-time imaging as the probe is advanced. The safety in this setting is based on the presumption that the angle between the cervix and the vaginal probe is sufficient to prevent the probe from inadvertently slipping into the cervix and that real-time imaging is used throughout the procedure to assess the relationship between the probe tip and the cervix [33].

Summary of Recommendations

- **Variant 1:** US cervix transabdominal is usually appropriate as the initial imaging for the assessment of a gravid cervix in patients who are nulliparous or have no history of prior PTB.
- **Variant 2:** US cervix transvaginal is usually appropriate as the initial imaging for the assessment of a gravid cervix in patients with a history of PTB.
- **Variant 3:** US cervix transvaginal is usually appropriate as the initial imaging for the assessment of a gravid cervix in patients with suspected preterm labor.
- **Variant 4:** For the initial imaging, assessment of a gravid cervix with induction of labor or active preterm labor, the panel did not agree on recommending US cervix transperineal. There is insufficient medical literature to conclude whether or not these patients would benefit from this procedure. This procedure in this patient population is controversial but may be appropriate.

Supporting Documents

The evidence table, literature search, and appendix for this topic are available at <https://acsearch.acr.org/list>. The appendix includes the strength of evidence assessment and the final rating round tabulations for each recommendation.

For additional information on the Appropriateness Criteria methodology and other supporting documents go to www.acr.org/ac.

Safety Considerations in Pregnant Patients

Imaging of the pregnant patient can be challenging, particularly with respect to minimizing radiation exposure and risk. For further information and guidance, see the following ACR documents:

- [ACR–SPR Practice Parameter for the Safe and Optimal Performance of Fetal Magnetic Resonance Imaging \(MRI\)](#) [55]
- [ACR-SPR Practice Parameter for Imaging Pregnant or Potentially Pregnant Adolescents and Women with Ionizing Radiation](#) [56]
- [ACR-ACOG-AIUM-SMFM-SRU Practice Parameter for the Performance of Standard Diagnostic Obstetrical Ultrasound](#) [23]
- [ACR Manual on Contrast Media](#) [57]
- [ACR guidance document on MR safe practices: 2013](#) [58]

Appropriateness Category Names and Definitions

Appropriateness Category Name	Appropriateness Rating	Appropriateness Category Definition
Usually Appropriate	7, 8, or 9	The imaging procedure or treatment is indicated in the specified clinical scenarios at a favorable risk-benefit ratio for patients.
May Be Appropriate	4, 5, or 6	The imaging procedure or treatment may be indicated in the specified clinical scenarios as an alternative to imaging procedures or treatments with a more favorable risk-benefit ratio, or the risk-benefit ratio for patients is equivocal.
May Be Appropriate (Disagreement)	5	The individual ratings are too dispersed from the panel median. The different label provides transparency regarding the panel's recommendation. "May be appropriate" is the rating category and a rating of 5 is assigned.
Usually Not Appropriate	1, 2, or 3	The imaging procedure or treatment is unlikely to be indicated in the specified clinical scenarios, or the risk-benefit ratio for patients is likely to be unfavorable.

Relative Radiation Level Information

Potential adverse health effects associated with radiation exposure are an important factor to consider when selecting the appropriate imaging procedure. Because there is a wide range of radiation exposures associated with different diagnostic procedures, a relative radiation level (RRL) indication has been included for each imaging examination. The RRLs are based on effective dose, which is a radiation dose quantity that is used to estimate population total radiation risk associated with an imaging procedure. Patients in the pediatric age group are at inherently higher risk from exposure, because of both organ sensitivity and longer life expectancy (relevant to the long latency that appears to accompany radiation exposure). For these reasons, the RRL dose estimate ranges for pediatric examinations are lower as compared with those specified for adults (see Table below). Additional information regarding radiation dose assessment for imaging examinations can be found in the ACR Appropriateness Criteria® [Radiation Dose Assessment Introduction](#) document [59].

Relative Radiation Level Designations		
Relative Radiation Level*	Adult Effective Dose Estimate Range	Pediatric Effective Dose Estimate Range
○	0 mSv	0 mSv
⊕	<0.1 mSv	<0.03 mSv
⊕⊕	0.1-1 mSv	0.03-0.3 mSv
⊕⊕⊕	1-10 mSv	0.3-3 mSv
⊕⊕⊕⊕	10-30 mSv	3-10 mSv
⊕⊕⊕⊕⊕	30-100 mSv	10-30 mSv

*RRL assignments for some of the examinations cannot be made, because the actual patient doses in these procedures vary as a function of a number of factors (eg, region of the body exposed to ionizing radiation, the imaging guidance that is used). The RRLs for these examinations are designated as "Varies."

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The ACR Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists and referring physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient’s clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those examinations generally used for evaluation of the patient’s condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the FDA have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.