

The American College of Radiology, with more than 30,000 members, is the principal organization of radiologists, radiation oncologists, and clinical medical physicists in the United States. The College is a nonprofit professional society whose primary purposes are to advance the science of radiology, improve radiologic services to the patient, study the socioeconomic aspects of the practice of radiology, and encourage continuing education for radiologists, radiation oncologists, medical physicists, and persons practicing in allied professional fields.

The American College of Radiology will periodically define new practice parameters and technical standards for radiologic practice to help advance the science of radiology and to improve the quality of service to patients throughout the United States. Existing practice parameters and technical standards will be reviewed for revision or renewal, as appropriate, on their fifth anniversary or sooner, if indicated.

Each practice parameter and technical standard, representing a policy statement by the College, has undergone a thorough consensus process in which it has been subjected to extensive review and approval. The practice parameters and technical standards recognize that the safe and effective use of diagnostic and therapeutic radiology requires specific training, skills, and techniques, as described in each document. Reproduction or modification of the published practice parameter and technical standard by those entities not providing these services is not authorized.

Revised 2017 (Resolution 4)\*

## **ACR-SPR PRACTICE PARAMETER FOR THE PERFORMANCE OF THE MODIFIED BARIUM SWALLOW**

---

### **PREAMBLE**

This document is an educational tool designed to assist practitioners in providing appropriate radiologic care for patients. Practice Parameters and Technical Standards are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care<sup>1</sup>. For these reasons and those set forth below, the American College of Radiology and our collaborating medical specialty societies caution against the use of these documents in litigation in which the clinical decisions of a practitioner are called into question.

The ultimate judgment regarding the propriety of any specific procedure or course of action must be made by the practitioner in light of all the circumstances presented. Thus, an approach that differs from the guidance in this document, standing alone, does not necessarily imply that the approach was below the standard of care. To the contrary, a conscientious practitioner may responsibly adopt a course of action different from that set forth in this document when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations of available resources, or advances in knowledge or technology subsequent to publication of this document. However, a practitioner who employs an approach substantially different from the guidance in this document is advised to document in the patient record information sufficient to explain the approach taken.

The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation, and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict with certainty a particular response to treatment. Therefore, it should be recognized that adherence to the guidance in this document will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of this document is to assist practitioners in achieving this objective.

---

<sup>1</sup> *Iowa Medical Society and Iowa Society of Anesthesiologists v. Iowa Board of Nursing*, \_ N.W.2d \_ (Iowa 2013) Iowa Supreme Court refuses to find that the *ACR Technical Standard for Management of the Use of Radiation in Fluoroscopic Procedures* (Revised 2008) sets a national standard for who may perform fluoroscopic procedures in light of the standard's stated purpose that ACR standards are educational tools and not intended to establish a legal standard of care. See also, *Stanley v. McCarver*, 63 P.3d 1076 (Ariz. App. 2003) where in a concurring opinion the Court stated that "published standards or guidelines of specialty medical organizations are useful in determining the duty owed or the standard of care applicable in a given situation" even though ACR standards themselves do not establish the standard of care.

## I. INTRODUCTION

The modified barium swallow (MBS) is a proven and useful procedure for evaluating the oral and pharyngeal phases of swallowing [1-5]. Although it is used primarily for evaluation of function, structural abnormalities may also be revealed and may be a primary cause of swallowing dysfunction. A tailored MBS focusing primarily on function is often performed alone. A complete patient evaluation may also include spot images of the pharynx for structural assessment and an esophagram, as symptoms of dysphagia are often poorly localized. This practice parameter focuses on assessment of the pharynx. For evaluation of the esophagus, see the [ACR Practice Parameter for the Performance of Esophagrams and Upper Gastrointestinal Examinations in Adults](#) [6] and the [ACR-SPR Practice Parameter for the Performance of Contrast Esophagrams and Upper Gastrointestinal Examinations in Infants and Children](#) [7].

The MBS may be performed because of known or suspected swallowing dysfunction or because of the presence of conditions that are strongly associated with swallowing dysfunction. The MBS should be performed only for a valid medical reason and with the minimum radiation dose necessary to achieve a study of diagnostic quality. Additional or specialized examinations may be required to complete the patient's assessment.

Although it is not possible to detect all structural and functional swallowing abnormalities using the MBS, adherence to the following practice parameter will maximize the probability of their detection.

## II. INDICATIONS

Indications for the MBS include, but are not limited to:

1. Oropharyngeal dysphagia
2. Coughing, choking, or drooling with swallowing
3. Known or suspected aspiration pneumonia
4. Frequent respiratory tract infections
5. Neurologic disorders likely to affect swallowing
6. Myoneural junction disorders likely to affect swallowing
7. Myopathy involving the pharynx and cervical esophagus
8. Masses of the tongue, pharynx, larynx, or retropharyngeal region that may affect swallowing
9. Follow-up post-treatment (operative, radiation, and/or chemotherapy) evaluation of the mouth, pharynx, larynx, or retropharyngeal area [8-10]
10. Follow-up of known oropharyngeal swallowing dysfunction
11. Follow-up assessment of dietary restrictions and protective maneuvers to limit or prevent aspiration
12. Follow-up assessment of patients recovering from trauma and/or coma
13. Oral feeding assessment for ventilator dependent patients [11]
14. Poor feeding (neonate)
15. Patients with basilar pulmonary fibrosis

For the pregnant or potentially pregnant patient, see the [ACR-SPR Practice Parameter for Imaging Pregnant or Potentially Pregnant Adolescents and Women with Ionizing Radiation](#) [12,13].

## III. QUALIFICATIONS AND RESPONSIBILITIES OF PERSONNEL

### A. Physician

Examinations must be performed by or under the supervision of a licensed physician at the site and interpreted by a physician with the following qualifications:

1. Certification in Radiology, Diagnostic Radiology or Interventional Radiology/Diagnostic Radiology (IR/DR) by the American Board of Radiology, the American Osteopathic Board of Radiology, the Royal College of Physicians and Surgeons of Canada, or the Collège des Médecins du Québec.

or

Completion of a residency program approved by the Accreditation Council for Graduate Medical Education (ACGME), the Royal College of Physicians and Surgeons of Canada (RCPSC), the Collège des Médecins du Québec, or the American Osteopathic Association (AOA) and must have spent a minimum of 3 months of documented formal training in the performance and interpretation of gastrointestinal fluoroscopy, including MBS.

and

2. The physician shall have documented training in and understanding of the physics of diagnostic radiology and the equipment needed to produce the images. This should include radiography, fluoroscopy, and digital image processing. In addition, the physician must be familiar with the principles of radiation protection, the hazards of radiation, and radiation monitoring requirements as they apply to both patients and personnel.

and

3. The physician shall have documented training in and understanding of the value of MBS examinations relative to other medical imaging procedures (general radiography, fluoroscopy, computed tomography, ultrasound, magnetic resonance imaging, and nuclear medicine) in order to best evaluate a patient's clinical symptoms.

#### Continuing Medical Education

The physician's continuing medical education should be in accordance with the [ACR Practice Parameter for Continuing Medical Education \(CME\)](#) [14].

#### B. Registered Radiologist Assistant

A registered radiologist assistant is an advanced level radiographer who is certified and registered as a radiologist assistant by the American Registry of Radiologic Technologists (ARRT) after having successfully completed an advanced academic program encompassing an ACR/ASRT (American Society of Radiologic Technologists) radiologist assistant curriculum and a radiologist-directed clinical preceptorship. Under radiologist supervision, the radiologist assistant may perform patient assessment, patient management and selected examinations as delineated in the Joint Policy Statement of the ACR and the ASRT titled "Radiologist Assistant: Roles and Responsibilities" and as allowed by state law. The radiologist assistant transmits to the supervising radiologists those observations that have a bearing on diagnosis. Performance of diagnostic interpretations remains outside the scope of practice of the radiologist assistant. (ACR Resolution 34, adopted in 2006)

#### C. Radiologic Technologist

Qualifications of technologists performing GI radiography should be in accordance with the current ACR policy statement for fluoroscopy<sup>2</sup> and with the operating procedures or manuals at the imaging facility. Fluoroscopy technologists assisting in modified barium swallow examinations should be thoroughly trained in GI radiography.

Certification by the ARRT or unrestricted state licensure is required.

---

<sup>2</sup>The American College of Radiology approves of the practice of certified and/or licensed radiologic technologists performing fluoroscopy in a facility or department as a positioning or localizing procedure only, and then only if monitored by a supervising physician who is personally and immediately available.\* There must be a written policy or process for the positioning or localizing procedure that is approved by the medical director of the facility or department/service and that includes written authority or policies and processes for designating radiologic technologists who may perform such procedures. (ACR Resolution 26, 1987 – revised in 2007, Resolution 12-m)

\*For the purposes of this parameter, "personally and immediately available" is defined in manner of the "personal supervision" provision of CMS—a physician must be in attendance in the room during the performance of the procedure. Program Memorandum Carriers, DHHS, HCFA, Transmittal B-01-28, April 19, 2001.

#### D. Speech-Language Pathologist

The speech-language pathologist should have specific education and training related to the indications for and the performance of the MBS and it is recommended that he or she hold the Certificate of Clinical Competence in Speech-Language Pathology (CCC-SLP) from the American Speech-Language-Hearing Association. The speech-language pathologist should have knowledge of the patient's medical condition and current cognitive and mental status.

### **IV. SPECIFICATIONS OF THE EXAMINATION**

The written or electronic request for a modified barium swallow should provide sufficient information to demonstrate the medical necessity of the examination and allow for its proper performance and interpretation.

Documentation that satisfies medical necessity includes 1) signs and symptoms and/or 2) relevant history (including known diagnoses). Additional information regarding the specific reason for the examination or a provisional diagnosis would be helpful and may at times be needed to allow for the proper performance and interpretation of the examination.

The request for the examination must be originated by a physician or other appropriately licensed health care provider. The accompanying clinical information should be provided by a physician or other appropriately licensed health care provider familiar with the patient's clinical problem or question and consistent with the state's scope of practice requirements. (ACR Resolution 35, adopted in 2006)

#### A. Patient Selection, Preparation, and Positioning

The patient must have sufficient cognitive awareness to cooperate with the study. The patient should have nothing by mouth for several hours prior to the study and should not smoke or chew gum for the same period of time. The oral and pharyngeal regions are usually evaluated initially in the lateral plane with the patient upright. Special chairs are available to assist with patient positioning but are not necessary to perform an adequate study. Patients who cannot be placed upright may be examined with cross-table lateral fluoroscopy or in the lateral decubitus position. For infants, the MBS should be performed with the patient upright and sitting supported in a secured chair/seat preferentially designed for oropharyngeal motility studies.

#### B. Personnel

The examination may be performed by a physician alone for diagnostic evaluation or by a physician and a speech-language pathologist for both diagnosis and recommendation regarding therapy and technique to promote swallowing with the least risk of aspiration.

#### C. Method of Recording

For functional assessment, the fluoroscopic portion of the examination should be recorded on high-resolution videofluorographic (VF) and/or rapid digital fluorographic imaging [15]. For morphologic assessment, spot images and/or rapid digital fluorographic imaging with double-contrast or single-contrast technique should be used (single contrast usually suffices in children).

#### D. Modified Barium Swallow Technique

##### 1. Examination

The examination should include evaluation of oral and pharyngeal function and morphology in the lateral projection. Evaluation in the frontal projection may be useful to further evaluate an abnormality identified on the lateral projection. An esophagram may be required to complete the assessment of the patient. Evaluation in the frontal projection is not necessary in infants and young children.

a. Videofluorographic recording medium

Videofluorographic and/or rapid digital fluorographic recording is performed while the patient swallows a variety of consistencies of barium or barium-impregnated food with varying bolus volumes. Assessment includes all phases of swallowing from the preparatory oral phase through the oral transfer phase and pharyngeal phase. The esophageal phase may be assessed on other swallows. The viscosity and volume of each bolus may be varied by the clinical judgment of the speech-language pathologist or the radiologist based on the patient's presenting symptoms. If aspiration occurs, the patient's response to aspiration and ability to clear the aspirated materials and his or her response to protective and therapeutic maneuvers should be assessed wherever possible.

In some instances, continuous fluoroscopy may not be indicated. For example, in assessing the ability of the patient to protect the airway once fatigue occurs following progressive feedings, interval fluoroscopy should be used. Fluoroscopic screening should be restarted once the patient's swallow appears to slow [12].

b. Spot radiographs

Spot radiographs are not needed for all patients. When obtained, double-contrast spot radiographs and/or rapid digital fluorographic images of the pharynx may include lateral views during both suspended respiration and phonation and frontal views during both suspended respiration and modified Valsalva maneuver. Single-contrast radiographs and/or rapid digital fluorographic images may be substituted if warranted by the patient's clinical condition. For pediatric patients, spot radiographs and double contrast examinations are seldom necessary. The examination should be performed with a pulsed fluoroscopy unit using a frame rate sufficient for diagnostic quality and in keeping with the principles of ALARA. Images and/or cine clips may be stored with the image capture feature rather than using full exposures.

c. Esophagram

For evaluation of the esophagus, see the [ACR Practice Parameter for the Performance of Esophagrams and Upper Gastrointestinal Examinations in Adults](#) [6] and the [ACR-SPR Practice Parameter for the Performance of Contrast Esophagrams and Upper Gastrointestinal Examinations in Infants and Children](#) [7]. In cases of significant aspiration, the esophagram may be performed with injection of barium directly into the esophagus through a feeding tube, either pre-existing or placed by the radiologist. A dedicated evaluation of the esophagus in children is often part of an upper gastrointestinal study (UGI) and can be performed before the modified barium swallow or at a later time after the MBS, as ingestion of different consistencies of barium impregnated foods may impact the diagnostic quality of the UGI.

2. Tailored examination

The method of examination will often vary based on the patient's history, the clinical questions to be answered, and the findings during the study. Many institutions tailor the majority of examinations to VF in the lateral projection to assess for the presence or absence of aspiration and the effects of protective maneuvers to limit aspiration. The examination may need to be terminated prematurely if the patient demonstrates severe aspiration (such as aspiration below the sternal notch) and does not respond to protective or therapeutic maneuvers.

3. Protective and therapeutic maneuvers

When aspiration does occur, the effect of maneuvers to limit or prevent aspiration may be assessed. These may include changes in neck or body position or other special maneuvers. If swallowing dysfunction is present, additional compensatory strategies may be assessed to improve swallow physiology [14]. Additional consistencies of food may be assessed based on the patient's usual or expected diet.

4. Provocative maneuvers

When the patient's symptoms are not explained by the basic examination, provocative or helpful maneuvers based on the history may be needed. Changes in body position may be used to evoke subtle swallowing dysfunction, including the supine and prone oblique positions and head extension. Similarly, a change in the position of an infant's head (flexion) may also be useful, once aspiration has been shown, to determine if head position eliminates aspiration.

In the event of aspiration during the study, frontal chest radiography may be helpful at the end of the examination to document or determine the extent of aspiration.

#### E. Radiographic Quality Control

Proper functioning of the imaging equipment should be assured prior to beginning the examination. If spot images are obtained, image quality should be checked by a qualified technologist or physician before the patient is dismissed. Images not of diagnostic quality should be repeated as necessary. Provision should be made for recording all available radiation dose data in the patient's medical record. If cumulative air kerma or air kerma-area-product data are not available, the fluoroscopic exposure time and the number of acquired images (radiography or cine) should be recorded in the patient's medical record, according to the [ACR–AAPM Technical Standard for Management of the Use of Radiation in Fluoroscopic Procedures](#) [16].

### V. DOCUMENTATION

Comparison to prior MBS studies should be performed when relevant, particularly when the examination is performed to follow up previously demonstrated abnormalities. Patient identity (using name and/or a unique identifying number) and examination date should be recorded on the VF recording medium. Each institution should develop a policy on retention of video images consistent with applicable state or federal policies.

Reporting should be in accordance with the [ACR Practice Parameter for Communication of Diagnostic Imaging Findings](#) [17].

### VI. EQUIPMENT SPECIFICATIONS

Examinations should be performed with fluoroscopic and radiographic equipment meeting all applicable federal and state radiation standards. The equipment should provide diagnostic fluoroscopic image quality and recording capability. The equipment should be capable of producing kilovoltage greater than 100 kVp. In selected cases, patient monitoring (eg, pulse oximetry) may be desirable. However, most patients do not require any additional monitoring other than that which may already be in use.

### VII. RADIATION SAFETY IN IMAGING

Radiologists, medical physicists, registered radiologist assistants, radiologic technologists, and all supervising physicians have a responsibility for safety in the workplace by keeping radiation exposure to staff, and to society as a whole, "as low as reasonably achievable" (ALARA) and to assure that radiation doses to individual patients are appropriate, taking into account the possible risk from radiation exposure and the diagnostic image quality necessary to achieve the clinical objective. All personnel that work with ionizing radiation must understand the key principles of occupational and public radiation protection (justification, optimization of protection and application of dose limits) and the principles of proper management of radiation dose to patients (justification, optimization and the use of dose reference levels)

[http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1578\\_web-57265295.pdf](http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1578_web-57265295.pdf)

Nationally developed guidelines, such as the ACR's [Appropriateness Criteria](#)<sup>®</sup>, should be used to help choose the most appropriate imaging procedures to prevent unwarranted radiation exposure.

Facilities should have and adhere to policies and procedures that require varying ionizing radiation examination protocols (plain radiography, fluoroscopy, interventional radiology, CT) to take into account patient body habitus

(such as patient dimensions, weight, or body mass index) to optimize the relationship between minimal radiation dose and adequate image quality. Automated dose reduction technologies available on imaging equipment should be used whenever appropriate. If such technology is not available, appropriate manual techniques should be used.

Additional information regarding patient radiation safety in imaging is available at the Image Gently® for children ([www.imagegently.org](http://www.imagegently.org)) and Image Wisely® for adults ([www.imagewisely.org](http://www.imagewisely.org)) websites. These advocacy and awareness campaigns provide free educational materials for all stakeholders involved in imaging (patients, technologists, referring providers, medical physicists, and radiologists).

Radiation exposures or other dose indices should be measured and patient radiation dose estimated for representative examinations and types of patients by a Qualified Medical Physicist in accordance with the applicable ACR Technical Standards. Regular auditing of patient dose indices should be performed by comparing the facility's dose information with national benchmarks, such as the ACR Dose Index Registry, the NCRP Report No. 172, Reference Levels and Achievable Doses in Medical and Dental Imaging: Recommendations for the United States or the Conference of Radiation Control Program Director's National Evaluation of X-ray Trends. (ACR Resolution 17 adopted in 2006 – revised in 2009, 2013, Resolution 52).

## VIII. QUALITY CONTROL AND IMPROVEMENT, SAFETY, INFECTION CONTROL, AND PATIENT EDUCATION

Policies and procedures related to quality, patient education, infection control, and safety should be developed and implemented in accordance with the ACR Policy on Quality Control and Improvement, Safety, Infection Control, and Patient Education appearing under the heading *Position Statement on QC & Improvement, Safety, Infection Control, and Patient Education* on the ACR website (<http://www.acr.org/guidelines>).

Equipment performance monitoring should be in accordance with the [ACR–AAPM Technical Standard for Diagnostic Medical Physics Performance Monitoring of Radiographic Equipment](#) [18] and the [ACR–AAPM Technical Standard for Diagnostic Medical Physics Performance Monitoring of Fluoroscopic Equipment](#) [19].

### ACKNOWLEDGEMENTS

This practice parameter was revised according to the process described under the heading *The Process for Developing ACR Practice Parameters and Technical Standards* on the ACR website (<http://www.acr.org/guidelines>) by the Committee on Body Imaging (Abdominal) of the ACR Commission on Body Imaging and the Committee on Practice Parameters – General, Small, Emergency and/or Rural Practice of the ACR Commission on General, Small, Emergency and/or Rural Practice and the Committee on Practice Parameters – Pediatric Radiology of the ACR Commission of Pediatric Radiology, in collaboration with the SPR.

Collaborative Committee – members represent their societies in the initial and final revision of this practice parameter

#### ACR

Padmaja A. Jonnalagadda, MD, Co-Chair  
Serena M. Liebengood, MD, Co-Chair  
Terry L. Levin, MD

#### SPR

Sudha A. Anupindi, MD  
Mark E. Bittman, MD

#### Committee on Body Imaging (Abdominal)

(ACR Committee responsible for sponsoring the draft through the process)

Ruedi F. Thoeni, MD, Chair  
Mahmoud M. Al-Hawary, MD  
Mark E. Baker, MD, FACR  
Barry D. Daly, MD, MB, BCh

Dean D. Maglinte, MD, FACR  
Frank H. Miller, MD, FACR  
Donald G. Mitchell, MD, FACR  
Eric M. Rubin, MD

Committee on Body Imaging (Abdominal)

Isaac R. Francis, MD, FACR  
Patrick Gonzales, MD  
Richard M. Gore, MD, FACR

Scott D. Stevens, MD, FACR  
William E. Torres, MD, FACR

Committee on Practice Parameters – General, Small, Emergency and/or Rural Practice

(ACR Committee responsible for sponsoring the draft through the process)

Sayed Ali, MD, Chair  
Marco A. Amendola, MD, FACR  
Gory Ballester, MD  
Lonnie J. Bargo, MD  
Christopher M. Brennan, MD, PhD  
Resmi A. Charalel, MD  
Charles E. Johnson, MD  
Candice A. Johnstone, MD

Padmaja A. Jonnalagadda, MD  
Pil S. Kang, MD  
Jason B. Katzen, MD  
Serena McClam Liebengood, MD  
Steven E. Liston, MD, MBA, FACR  
Gagandeep S. Mangat, MD  
Tammam N. Nehme, MD  
Jennifer L. Tomich, MD

Committee on Practice Parameters – Pediatric Radiology

(ACR Committee responsible for sponsoring the draft through the process)

Beverley Newman, MB, BCh, BSc, FACR, Chair  
Lorna P. Browne, MB, BCh  
Timothy J. Carmody, MD, FACR  
Brian D. Coley, MD, FACR  
Lee K. Collins, MD  
Monica S. Epelman, MD  
Lynn Ansley Fordham, MD, FACR  
Kerri A. Highmore, MD

Sue C. Kaste, DO  
Tal Laor, MD  
Terry L. Levin, MD  
Marguerite T. Parisi, MD, MS  
Sumit Pruthi, MBBS  
Nancy K. Rollins, MD  
Pallavi Sagar, MD

Lincoln L. Berland, MD, FACR, Chair, Commission on Body Imaging  
Robert S. Pyatt, Jr., MD, FACR, Chair, Commission on General, Small, Emergency and/or Rural Practice  
Marta Hernanz-Schulman, MD, FACR, Chair, Commission on Pediatric Radiology  
Jacqueline A. Bello, MD, FACR, Chair, Commission on Quality and Safety  
Matthew S. Pollack, MD, FACR, Chair, Committee on Practice Parameters and Technical Standards

Comments Reconciliation Committee

Joseph G. Cernigliaro, MD, FACR, Co-Chair  
Debra S. Dyer, MD, FACR, Co-Chair  
Sayed Ali, MD  
Sudha A. Anupindi, MD  
Jacqueline A. Bello, MD, FACR  
Lincoln L. Berland, MD, FACR  
Mark E. Bittman, MD  
Kate A. Feinstein, MD, FACR  
Marta Hernanz-Schulman, MD, FACR  
William T. Herrington, MD, FACR

Padmaja A. Jonnalagadda, MD  
Terry L. Levin, MD  
Serena M. Liebengood, MD  
Beverley Newman, MD, BCh, BSc, FACR  
Matthew S. Pollack, MD, FACR  
Robert S. Pyatt, Jr., MD, FACR  
Timothy L. Swan, MD, FACR, FSIR  
Shawn D. Teague, MD, FACR  
Ruedi F. Thoeni, MD

**REFERENCES**

1. Dodds WJ, Logemann JA, Stewart ET. Radiologic assessment of abnormal oral and pharyngeal phases of swallowing. *AJR Am J Roentgenol.* 1990;154(5):965-974.
2. Dodds WJ, Stewart ET, Logemann JA. Physiology and radiology of the normal oral and pharyngeal phases of swallowing. *AJR Am J Roentgenol.* 1990;154(5):953-963.

3. Jones B. The pharynx. Disorders of function. *Radiol Clin North Am.* 1994;32(6):1103-1115.
4. Martin-Harris B, Logemann JA, McMahon S, Schleicher M, Sandidge J. Clinical utility of the modified barium swallow. *Dysphagia.* 2000;15(3):136-141.
5. Rubesin SE. The pharynx. Structural disorders. *Radiol Clin North Am.* 1994;32(6):1083-1101.
6. American College of Radiology. ACR practice parameter for the performance of esophagrams and upper gastrointestinal examination in adults. 2014; Available at: <http://www.acr.org/~media/5223A3FBC92E40378DF6E55FB8E6134B.pdf>. Accessed November 6, 2015.
7. American College of Radiology. ACR–SPR practice parameter for the performance of contrast esophagrams and upper gastrointestinal examinations in infants and children. 2015; Available at: <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/UpperGIAdults.pdf>. Accessed March 8, 2016.
8. Bleier BS, Levine MS, Mick R, et al. Dysphagia after chemoradiation: analysis by modified barium swallow. *Ann Otol Rhinol Laryngol.* 2007;116(11):837-841.
9. Nguyen NP, Frank C, Moltz CC, et al. Aspiration risk and postoperative radiation for head and neck cancer. *Cancer Invest.* 2009;27(1):47-51.
10. Nguyen NP, Frank C, Moltz CC, et al. Risk of aspiration following radiation for non-nasopharyngeal head and neck cancer. *J Otolaryngol Head Neck Surg.* 2008;37(2):225-229.
11. Davis LA, Thompson Stanton S. Characteristics of dysphagia in elderly patients requiring mechanical ventilation. *Dysphagia.* 2004;19(1):7-14.
12. Newman LA, Keckley C, Petersen MC, Hamner A. Swallowing function and medical diagnoses in infants suspected of Dysphagia. *Pediatrics.* 2001;108(6):E106.
13. American College of Radiology. ACR–SPR practice parameter for imaging pregnant or potentially pregnant adolescents and women with ionizing radiation. 2014; Available at: <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/Pregnant-Pts.pdf>. Accessed November 12, 2015.
14. Logemann JA. Role of the modified barium swallow in management of patients with dysphagia. *Otolaryngol Head Neck Surg.* 1997;116(3):335-338.
15. Jones B, Donner MW. Examination of the patient with dysphagia. *Radiology.* 1988;167(2):319-326.
16. American College of Radiology. ACR–AAPM technical standard for management of the use of radiation in fluoroscopic procedures. 2013; Available at: <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/MgmtFluoroProc.pdf>. Accessed February 29, 2016.
17. American College of Radiology. ACR practice parameter for communication of diagnostic imaging findings. 2014; Available at: <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/CommunicationDiag.pdf>. Accessed November 6, 2015.
18. American College of Radiology. ACR–AAPM technical standard for diagnostic medical physics performance monitoring of radiographic equipment. 2016; Available at: <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/RadEquip.pdf>. Accessed June 23, 2016.
19. American College of Radiology. ACR–AAPM technical standard for diagnostic medical physics performance monitoring of fluoroscopic equipment. 2016; Available at: <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/FluoroConEnema.pdf>. Accessed June 23, 2016.

---

\*Practice parameters and technical standards are published annually with an effective date of October 1 in the year in which amended, revised or approved by the ACR Council. For practice parameters and technical standards published before 1999, the effective date was January 1 following the year in which the practice parameter or technical standard was amended, revised, or approved by the ACR Council.

#### Development Chronology for this Practice Parameter

2001 (Resolution 30)  
 Revised 2006 (Resolution 50, 17, 34, 35, 36)  
 Amended 2007 (Resolution 12m)  
 Amended 2009 (Resolution 11)  
 Revised 2011 (Resolution 49)  
 Amended 2014 (Resolution 39)  
 Revised 2017 (Resolution 4)  
 Amended 2018 (Resolution 44)

