



# Utilization Management Policy

## Diagnostic Spinal Ultrasound

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### Policy Statement

Spinal and paraspinal ultrasonography are unproven for the following uses:

- to diagnose and manage spinal (neck and/or back) pain and radiculopathies
- to guide the rehabilitation of neuromusculoskeletal disorders and back pain

As a diagnostic tool, ultrasound appears to be inferior to more established and widely available imaging techniques eg, MRI for the assessment of anatomical pathology. The use of rehabilitative ultrasound imaging (RUSI) is supported by some positive published data regarding reliability and validity for muscle size and to a lesser extent, muscle activity; however, a beneficial impact on clinically important patient-centered health outcomes has not been proven (eg, improving decision making regarding treatment interventions and or demonstrating results that are superior to typical care rendered in ambulatory settings for spine-related musculoskeletal disorders).

### Purpose

This policy describes the position of Optum\* by OptumHealth Care Solutions, LLC regarding the application of diagnostic ultrasound in clinical practice for spine-related musculoskeletal conditions.

### Scope

In Scope:

All in and out of network programs, involving all provider types, where spinal diagnostic ultrasound is reported.

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**Out of Scope:**

- Therapeutic ultrasound (CPT Code 97035)
- Diagnostic ultrasound when used for newborns and infants for the evaluation of suspected spinal disorders (e.g., congenital cord anomalies, spinal cord tumors, vascular malformations and birth-related trauma)
- Diagnostic ultrasound for any condition in any population other than musculoskeletal spinal disorders
- Diagnostic ultrasound for surgical conditions involving the spine, including needle guidance procedures
- Doppler ultrasound techniques

**Key Questions**

1. *Is there sufficient research evidence that supports confident conclusions about the efficacy of diagnostic ultrasonography for the evaluation of spinal/paraspinal morphology and/or pathology in the management of spinal-related disorders, when compared to other established technologies e.g., MRI, CT, EMG?*
2. *Is there sufficient research evidence to support confident conclusions that the addition of rehabilitative ultrasound imaging achieves superior patient-centered outcomes e.g., pain and function, when compared to usual care typically rendered in ambulatory settings for spinal-related disorders?*

**Description**

Diagnostic ultrasound involves the use of high frequency sound waves (3-17 MHz) to image bony and soft tissue structures for the purposes of diagnosing pathology and or guiding real-time intervention procedures [1]. This procedure should not be confused with therapeutic ultrasound (97035), which has both thermal and non-thermal effects (e.g. cell repair effects of the inflammatory response). Therapeutic ultrasound frequency takes place in a lower range (0.7 to 3.3 MHz).

**Definitions**

*Criterion-related validity* – Evidence of criterion-related validity was demonstrated when quantitative ultrasound measurements were compared to established technologies e.g., MRI, CT scan, needle EMG. Studies were interpreted as supporting criterion-related validity if they reported a correlation and/or regression coefficient of  $\geq 0.70$ .

*Construct validity* – Studies were classified as providing evidence of construct validity when quantitative ultrasound measurements were: a) able to distinguish between conditions or states known to be different e.g., groups with vs. groups without pain (known groups validity); or b) compared either to an external measurement that is thought to reflect a similar construct and yielded similar results e.g., comparison of ultrasound measurements with measurements of muscle oxygenation and change in blood volume (convergent validity). Studies were interpreted as supporting construct validity, when they formulated specific hypotheses and  $\geq 75\%$  of results were within accordance with those hypotheses.

*Sensitivity to change* – Studies were classified as providing evidence of sensitivity to change when quantitative ultrasound measurements were compared across a period of time in which a change in muscle

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morphology or function was expected e.g., increased muscle size and/or activation following training. Studies were interpreted as supporting sensitivity to change, when they formulated specific hypotheses and  $\geq 75\%$  of results were within accordance with those hypotheses.

### Summary

- Diagnostic ultrasound involves the use of high frequency sound waves (3-17 MHz) to image bony and soft tissue structures for the purposes of diagnosing pathology and or guiding rehabilitation procedures.
- Diagnostic spinal ultrasound does not appear to be in widespread usage in clinical settings
- Diagnostic ultrasound appears to be inferior to more established and widely available imaging techniques eg, MRI for the assessment of anatomical pathology
- There is a growing body of evidence supporting the validity of rehabilitative ultrasound imaging (RUSI) to accurately measure trunk muscle size and activation during most sub-maximal isometric contractions of the trunk muscles
- There is a small body of evidence that has consistently demonstrated sensitivity to change involving trunk muscle size
- There is preliminary evidence supporting the potential prognostic value of RUSI for a specific treatment strategy
- Additional research evidence is needed to arrive at confident conclusions about the validity of RUSI for measuring muscle morphology and activation
- There was no literature identified that investigated RUSI in the context of impact upon patient-centered outcomes (pain and disability) and measures of importance (perceived effect), when compared to usual care typically rendered in ambulatory settings for spinal-related disorders.
- Other health care organizations have determined that the applications of diagnostic spinal ultrasound for musculoskeletal spinal conditions are unproven; experimental, and investigational.
- Professional societies have published positions statements concluding that diagnostic spinal ultrasound is investigational for non-operative spinal and paraspinal conditions in adults.
- Further research is needed to determine if diagnostic ultrasound imaging can add to evaluative and treatment benefits currently available for patients with spinal-related musculoskeletal disorders.

### Background

Ultrasonography is a noninvasive imaging technique that relies on detection of the reflections or echos generated as high-frequency sound waves are passed into the body. This technique is commonly used for a number of imaging purposes such as investigation of abdominal and pelvic masses, cardiac echocardiography, and prenatal fetal imaging. Less commonly, it has also been applied to detection of spinal and paraspinal disorders.

The American Institute of Ultrasound in Medicine (AIUM) Ultrasound Practice Accreditation Council has developed standards for the accreditation of ultrasound practices. These standards serve as a benchmark for ultrasound professionals seeking to meet nationally accepted protocols [2].

The literature describes a fairly wide spectrum of clinical usage for diagnostic musculoskeletal ultrasound, from peripheral conditions, such as carpal tunnel syndrome, rotator cuff pathology, and patella femoral alignment, to more proximal conditions, such as femoral torsion and pelvic floor impairments. The greatest amount of literature comes from studies that investigate the lower spinal segments of subjects with and without lower back pain (LBP). This asymmetry in the research agenda is consistent with the prevalence and financial costs associated with managing LBP in the United States [3].

One application of spinal ultrasound has been in the investigation of anatomical pathology e.g., degenerative disc disease, the assessment of injuries to paraspinous ligaments after spinal fractures, and as a means to assess the vertebral posterior ligament complex [4-6].

By far the most common subset of diagnostic ultrasound for musculoskeletal conditions is rehabilitative ultrasound. In May 2006, an international panel of experts adopted the term ‘rehabilitative ultrasound imaging’ (RUSI) to define the procedure of evaluating muscle and related soft tissue morphology and function during exercise and physical tasks, such as muscle size (thickness and cross sectional area) and level and timing of muscle activation [7].

The most frequently reported trunk-related structures reviewed in the literature are the lumbar multifidus and transversus abdominis muscles. The research identified used RUSI to determine if differences in muscle thickness and or cross sectional appearance were present among subjects with and without LBP [8,9], during basic maneuvers such as the abdominal drawing-in maneuver, and to assess muscle symmetry [8,10-13]. Additional research employed RUSI in association with specific exercise approaches e.g., stabilization [8,14], spinal manipulation [15-17], and as a real-time biofeedback tool [8,18].

Compared with computed tomography (CT) and magnetic resonance imaging (MRI), ultrasonography provides less detailed images of bone and the structures within and near bone. However, ultrasonography has the advantages of being simpler, more widely available, requiring no exposure to ionizing radiation, and having less susceptibility to patient movement [10,11,19]. [Table 1]

### Literature Review

#### Literature Search and Quality Appraisal

A structured literature search using a sensitive strategy was conducted by a clinical work group.[17] Biomedical databases and consumer-oriented search engines were used to identify and retrieve relevant evidence. Hand-searches of bibliographies and non-indexed documents were included in the search strategy.

#### Ultrasound for Anatomical Pathology

Three relevant studies investigating the validity of ultrasound imaging for anatomical pathology affecting the adult spine were identified in the search results [4-6]. Data extraction was hampered, as the full text of two of the studies was not available in English [4,5]. Additional limitations associated with the literature search included ‘outdated’ studies – the bulk of literature publication dates precede the common use of modern imaging criterion standards such as MRI. Other publications concerned populations and/or technologies that are excluded from the scope of the policy [20], or were best described as feasibility studies [21,22, Moon].

Berth investigated the criterion-related validity of transabdominal ultrasonography in comparison with MRI and intraoperative findings with 119 patients suffering from lower back pain [4]. When compared to MRI, investigation transabdominal ultrasonography of the lumbar herniated disc proved to be distinctly inferior because of methodical limitations and lower diagnostic accuracy.

In a prospective clinical study, 102 patients suffering from low back pain were examined by ultrasound [5]. A total of 306 lumbar disc segments were analyzed. The results of the ultrasound documentation were compared to MRI or if the patient was operated on with the intraoperative findings. The statistical analysis showed that ultrasound scores were significantly inferior to those of other imaging modalities like CT or MRI. The authors concluded: that ultrasound does not seem to be of diagnostic value for patients with herniated disk.

A preliminary investigation evaluated the effectiveness of ultrasonography for bed-side evaluation of patients with suspected spinal pathology [6]. The sonographic appearance of normal and pathological structures was compared to CT or MRI studies. In five patients ultrasonographic examination was not interpretable due to obesity or diminution of the intervertebral disc space. Overall ultrasonography afforded relatively poor definition as compared to Computed Tomography or Magnetic Resonance Imaging.

### **Rehabilitative Ultrasound Imaging**

Two systematic reviews concerning rehabilitative ultrasound imaging (RUSI) that addressed the key policy questions were identified [7,23]. A single cross-sectional study, which was not included in the literature reviews, examined the relationship between trunk muscle activation using RUSI and prognostic factors for clinical success using a specific exercise regime [14]. No experimental research evidence was identified that described the impact of spinal diagnostic ultrasound on patient-reported outcomes.

Both systematic reviews captured in this literature search were critically appraised for quality using the AMSTAR (A Measurement Tool to Assess Reviews) instrument [24,25]. [Table 2] The AMSTAR tool is comprised of 11 items that question the methodological quality of systematic reviews. It has good face and content validity. Literature reviews were rated as being methodological strong i.e. good quality if the (AMSTAR score was  $\geq 6$ ). This interpretation is consistent with the approaches of other recent ‘reviews of reviews’ [26-28].

The systematic review that assessed RUSI for measuring trunk muscle size and activation was methodologically strong (AMSTAR rating = 7) [7]. The narrative review that evaluated the application of RUSI for the measurement of cervical muscles received a lesser quality rating (AMSTAR rating = 5) [23]. Both reviews reported on methodologically sound search strategies. However, Javanshir, et al did not indicate that duplicate data extraction took place. Additionally, the selected studies were not qualitatively appraised. Neither review provided a list of excluded studies.

### ***Trunk Muscles***

Koppenhaver, et al conducted the first systematic evidence review of the validity of using RUSI to quantify the size and activation of trunk muscles [7]. The literature search took place recently (May 2009) and was comprehensive. A total of 37 studies were extracted for review. Of these, criterion-related validity was assessed in 10 studies, 23 studies reported on construct validity, and sensitivity to change was described in 6 studies.

The overall quality of the included studies regarding criterion-related validity was rated as “good”. The primary limitations across studies were small sample sizes (mean N=10); and a lack of directness (representiveness), as only a single study included symptomatic (low back pain) patients.

For construct validity and sensitivity to change, the overall quality was somewhat lower than those investigating criterion-related validity. The most consistent shortfall was indirectness. Only 11 of 28 studies included patients who were currently experiencing back pain. It was also unclear in the majority of these studies whether they had uninterpretable images and/or outcomes.

### **Criterion-related validity:**

Ten studies investigated the criterion-related validity of RUSI. Two studies reported substantial agreement between RUSI with MRI. Five studies evaluated the ability of RUSI to measure muscle activation in comparison with needle EMG. The results were somewhat inconsistent with 2 studies supporting criterion-related validity and 3 studies providing partial evidence of criterion-related validity. The likely reasons for inconsistencies likely include contextual-dependency (reliant upon the muscle involved), the level of muscle contraction (sub-maximal, maximal), the contraction strategy utilized (isometric, concentric, etc.), and variability among participants. The reviewers recommended that future studies comparing changes in trunk musculature size with activation are needed to investigate different contraction strategies across a wider range of muscle contractions.

**Construct validity:**

Twenty-three studies investigated the construct validity of RUSI. Eight studies provided consistent evidence of ‘known groups’ validity by demonstrating different ultrasound measurements between groups with and without pain. Four studies provided evidence of ‘known groups’ validity by demonstrating different muscle morphology between groups that have different demographic characteristics (race, age, gender). Another eight studies provided evidence of ‘known groups’ validity by showing differences in trunk muscle size and/or activation among different postures and activities. Five studies provided evidence of ‘convergent’ validity by demonstrating a similar direction of results with physiologic measurements e.g., body mass index, muscle oxygenation and change in blood volume.

**Sensitivity to change:**

Six studies provided evidence of rehabilitative ultrasound imaging’s sensitivity to change. Three of these studies supplied sufficient data to calculate an index of responsiveness. Four of the studies demonstrated positive correlations in muscle size and/or activation following training. Two of the studies showed decreased muscle size after inducing pain and/or injury.

No studies were identified for this systematic review that compared changes in ultrasound measurements with external measurements of clinically-relevant outcomes (e.g., pain or disability), or external measurements of importance (e.g., global perceived effect).

Gaps in assessing sensitivity to change were noted by the review authors. Studies are needed that investigate the rate of deterioration and extent of atrophy and activation following the occurrence of low back pain. Studies investigating responsiveness are needed to document changes in muscle size and activation in conjunction with patient-important clinical outcomes resulting from training in order to determine what constitutes clinically-important change.

***Cervical Muscles***

Javanshir, et al conducted a critical review of the literature for ultrasonography of the cervical muscles [23]. The literature search was comprehensive and current (1996 through Dec. 2009). A total of 16 studies were extracted for review. Of these, the posterior muscles were assessed in 12 studies. The anterior muscles were evaluated in the remaining 4 studies. There was significant variability in the test positions (prone, supine, sitting) across studies with the prone position employed most frequently.

The overall quality of the included studies was not formally assessed in this review. The primary limitations across studies were small sample sizes (12 studies =  $N < 30$ ); and a lack of directness (representiveness). Eleven of the studies (69%) included only healthy subjects.

**Reliability:**

Six of the studies were limited to the investigation of the reliability of ultrasound measurements. An additional two studies evaluated for both reliability and validity. These studies employed heterogeneous methodologies e.g., differences in populations, types of reliability, statistical methods, technical views, and the muscles investigated. Despite these variations, acceptable reliability (intra-rater, inter-rater) was consistently reported across studies.

Technical factors that can enhance the quality of ultrasound images include using constant landmarks, knowledge of anatomy and function of the target muscle, and proper definition of muscle borders. The reliability of results can be further increased by standardizing subject position, correct placement of the transducer, and using multiple RUSI for statistical analysis.

### Validity:

Three studies, comprising 55 healthy subjects, investigated the validity of RUSI for measuring neck musculature dimensions. Conflicting results supporting partial criterion-related validity were obtained, when compared to MRI. Construct validity and sensitivity to change were not assessed in any of the selected studies.

No studies were reported for this critical review that compared changes in ultrasound measurements with external measurements of clinically-relevant outcomes (e.g., pain or disability), or external measurements of importance (e.g., global perceived effect).

The authors concluded that additional studies are needed to address the topic of validity of RUSI for the assessment of the neck muscles.

### **Research Evidence Rating**

#### Ultrasound for Anatomical Pathology:

**No Proven Benefit (D):** The use ultrasound for the diagnosis of spinal and paraspinal anatomical pathology has not been shown to be equivalent to more widely available imaging techniques e.g., MRI

#### Rehabilitative Ultrasound Imaging:

**Potential but Unproven Benefit (C):** The use of spinal diagnostic ultrasound is supported by some positive published data regarding reliability and validity for muscle size and to a lesser extent, muscle activity; however, a beneficial impact on clinically important patient-centered health outcomes has not been proven (e.g., improving decision making regarding treatment interventions and or demonstrating results that are superior to typical care rendered in ambulatory settings for spinal-related musculoskeletal disorders).

### **Pragmatic Judgments**

1. Does diagnostic ultrasound address a significant patient or plan need?
  - There are typically other established or more broadly employed options (e.g. MRI, EMG) for musculoskeletal conditions involving the spine to facilitate provider decision making
  - No patient subgroups have been identified that would preferentially benefit from diagnostic spinal musculoskeletal ultrasound
2. Is insufficient evidence likely to continue?
  - Clinical trial registries report one study regarding RUSI is in development.
  - No trials were identified that seek to investigate ultrasonography for the assessment of spinal musculoskeletal pathology
3. Is diagnostic ultrasound already used or will it soon be in widespread use?
  - A national survey of chiropractors conducted in 2014 showed that diagnostic ultrasound is virtually never performed [29]
  - While the prevalence of use of diagnostic ultrasound imaging for spinal musculoskeletal conditions has not been established in physical and occupational therapy practices, a recently posted question to physical and occupational therapy owners and managers on a high volume list-serve regarding current use of diagnostic ultrasound, in particular RUSI revealed no positive responses
4. Do the potential benefits for the patient outweigh the risks?
  - The current evidence reports that more established imaging e.g., MRI is superior to diagnostic spinal ultrasound for the assessment of anatomical pathology
  - Clinically important (patient-centered outcomes) benefits from including RUSI in directing treatment have not been investigated
5. Are coverage risks less than non-coverage risks?

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- Health plan clients maintain policies that exclude diagnostic spinal musculoskeletal ultrasound from benefits coverage.

### **What are the Conclusions of Others?**

The positions and policies of other health care organizations [Table 3] were assessed. All groups consider diagnostic spinal ultrasound to be unproven, and/or experimental and investigational for its use in the management of musculoskeletal spinal-related conditions [30-36].

Professional societies have also produced position statements concerning diagnostic spinal ultrasound:

1. American Institute of Ultrasound in Medicine

There is insufficient evidence in the peer-reviewed medical literature establishing the value of nonoperative spinal/paraspinal ultrasound in adults. Therefore, the AIUM states that, at this time, the use of nonoperative spinal/paraspinal ultrasound in adults (for study of intervertebral discs, facet joints and capsules, central nerves and fascial edema, and other subtle paraspinal abnormalities) for diagnostic evaluation, screening, diagnostic evaluation, including pain or radiculopathy syndromes, and for monitoring of therapy has no proven clinical utility.

Nonoperative spinal/paraspinal ultrasound in adults should be considered investigational. The AIUM urges investigators to perform properly designed research projects to evaluate the efficacy of these diagnostic spinal ultrasound examinations [37].

2. American Chiropractic Association

Diagnostic ULTRASOUND has been shown to be a useful modality for evaluating certain musculoskeletal complaints. Fetal, pediatric and intra-operative applications have been published in the scientific literature.

The quality of ULTRASOUND images is extremely dependent on operator skill. The resolution abilities of the equipment may have an impact on diagnostic yield and accuracy. Consequently, the importance of training to establish technologic as well as interpretive competency cannot be understated. The application of diagnostic ULTRASOUND in the adult spine in areas such as disc herniation, spinal stenosis and nerve root pathology is inadequately studied and its routine application for these purposes cannot be supported by the evidence at this time.

Be it further resolved that the House of Delegates recommend the American Chiropractic College of Radiology re-evaluate annually diagnostic ULTRASOUND and report to the House of Delegates. (Ratified by the House of Delegates, May 1996) [38].

3. American Academy of Neurology

Currently, no published peer reviewed literature supports the use of diagnostic ultrasound in the evaluation of patients with back pain or radicular symptoms. The procedure cannot be recommended for use in the clinical evaluation of such patients [39].



### Coding Information

Note: The Current Procedural Terminology (CPT) codes listed in this policy may not be all inclusive and are for reference purposes only. The listing of a service code in this policy does not imply that the service described by the code is a covered or non-covered health service. Coverage is determined by the member's benefit document.

Code	Description
76800	Ultrasound, spinal canal and contents

### References

- Smith J, Finnoff JT. Diagnostic and interventional musculoskeletal ultrasound: Part 1. Fundamentals. *Physical Medicine & Rehabilitation*. 2009; 1(1):64-75.
- The Association for Medical Ultrasound Official Statement Page. Accessed 2/18/2019. <http://www.aium.org/resources/statements.aspx>
- Hebert JJ, Koppenhaver SL, Parent EC, Fritz JM. A Systematic review of the reliability of rehabilitative ultrasound imaging for the quantitative assessment of the abdominal and lumbar trunk muscles. *Spine*. 2009; 34(23):E848-E856.
- Berth A, Mahlfeld K, Merk HR. Transabdominal ultrasonography in the diagnosis of lumbar disc herniation [Abstract]. *Ultraschall in Medicine* 2003; 24:383-387.
- Jerosch J, Strauss JM, Castro WH, Schlicker U. Ultrasound diagnosis of lumbar intervertebral disk displacement--a clinically relevant method? [Abstract] *Ultraschall in Medicine* 1992; 13:187-92.
- Evliyaoglu C, Ayberk G, Sargin H, et al. Diagnostic value of bed-side ultrasonographic evaluation by anterior approach in spine disorders? A preliminary report. *Neurocirugia (Astur)*. 2003; 14:392-397
- Koppenhaver SL, Hebert JJ, Parent EC, Fritz JM. Rehabilitative ultrasound imaging is a valid measure of trunk muscle size and activation during most isometric sub-maximal contractions: A systematic review. *Australian Journal of Physiotherapy*. 2009; 55:153-169.
- Hides J, Stanton W, McMahon S, Sims K, Richardson C. Effect of stabilization training on multifidus muscle cross-sectional area among young elite cricketers with low back pain. *Journal of Orthopaedic & Sports Physical Therapy*. 2008; 38(3):101-108.
- Kiesel KB, Uhl T, Underwood FB, Nitz AJ. Rehabilitative ultrasound measurement of select trunk muscle activation during induced pain. *Manual Therapy*. 2008; 13:132-138.
- Koppenhaver SL, Hebert JJ, Fritz JM, Parent EC, Teyhen DS, Magel JS. Reliability of rehabilitative ultrasound imaging of the transversus abdominis and lumbar multifidus muscles. *Achieves of Physical Medicine & Rehabilitation*. 2009; 90(1):87-94.
- Koppen SL, Parent EC, Teyhen DS, Hebert JJ, Fritz JM. The effect of averaging multiple trials on measurement error during ultrasound imaging of transversus abdominis and lumbar multifidus muscles in individuals with low back pain. *Journal of Orthopaedic & Sports Physical Therapy*. 2009; 39(8):604-611.
- Stetts DM, Freund JE, Allison SC, Carpenter G. A rehabilitative ultrasound imaging investigation of lateral abdominal muscle thickness in healthy aging adults. *Journal of Geriatric Physical Therapy*. 2009; 32(2):16-22.
- Hides JA, Miokovic T, Belavý DL, Stanton WR, Richardson CA. Ultrasound imaging assessment of abdominal muscle function during drawing-in of the abdominal wall: An intrarater reliability study. *Journal of Orthopaedic & Sports Physical Therapy*. 2007; 37(8):480-486.
- Hebert JJ, Koppenhaver SL, Magel JS, Fritz JM. The relationship of transversus abdominis and lumbar multifidus activation and prognostic factors for clinical success with a stabilization exercise program: A cross-sectional study. *Achieves of Physical Medicine & Rehabilitation*. 2010; 91(1):78-85.
- Brenner AK, Gill NW, Buscema CJ, Kiesel K. Improved activation of lumbar multifidus following spinal manipulation: A case report applying rehabilitative ultrasound imaging. *Journal of Orthopaedic & Sports Physical Therapy*. 2007; 37(10):613-619.

16. Raney NH, Teyhen DS, Childs JD. Observed changes in lateral abdominal muscle thickness after spinal manipulation: A case series using rehabilitative ultrasound imaging. *Journal of Orthopaedic & Sports Physical Therapy*. 2007; 37(8):472-479.
17. Puentedura EJ, Landers MR, Hurt K, Meissner M, Mills J, Young D. Immediate effects of lumbar spine manipulation on the resting and contraction thickness of transversus abdominis in asymptomatic individuals. *Journal of Orthopaedic & Sports Physical Therapy*. 2011; 41(1):13-21.
18. Herbert WJ, Heiss DG, Basso DM. Influence of feedback schedule in motor performance and learning of a lumbar multifidus muscle task using rehabilitative ultrasound imaging: A randomized clinical trial. *Physical Therapy*. 2008; 88(2):261-269.
19. Koppen SL, Parent EC, Teyhen DS, Hebert JJ, Fritz JM. The effect of averaging multiple trials on measurement error during ultrasound imaging of transversus abdominis and lumbar multifidus muscles in individuals with low back pain. *Journal of Orthopaedic & Sports Physical Therapy*. 2009; 39(8):604-611.
20. Klauser A, Halpern EJ, Fruscher F, et al. Inflammatory low back pain: high negative predictive value of contrast-enhanced color Doppler ultrasound in the detection of inflamed sacroiliac joints. *Arthritis Rheum*. 2005; 53:440-4.
21. Leung YL, Roshier AL, Johnson S, et al. Demonstration of the appearance of the paraspinal musculoligamentous structures of the cervical spine using ultrasound. *Clin Anat*. 2005; 18:96-103.
22. Moon SH, Park MS, Suk KS, et al. Feasibility of ultrasound examination in posterior ligament complex injury of thoracolumbar spine fracture. *Spine* 2002; 27:2154-8.
23. Javanshir K, Amiri M, Mohseni-Bandpei MA, Rezasoltani A, Fernández-de-las-Peñas C. Ultrasonography of the cervical muscles: A critical review of the literature. *Journal of Manipulative & Physiological Therapeutics*. 2010; 33(8):630-637.
24. Shea BJ, Bouter LM, Peterson J, et al. External Validation of a Measurement Tool to Assess Systematic Reviews (AMSTAR). *PLoS ONE*. 2007; 2:e1350.
25. Shea BJ, Hamel C, Wells GA, et al. AMSTAR is a reliable and valid measurement tool to assess the methodological quality of systematic reviews. *Journal of Clinical Epidemiology* 2009; 62:1013-1020.
26. Mikton C, Butchart A. Child maltreatment prevention: a systematic review of reviews. *Bull World Health Organ* 2009; 87:353-361
27. Rookmoneea M, Dennis L, Brealey S, et al. The effectiveness of interventions in the management of patients with primary frozen shoulder. *J Bone Joint Surg [Br]* 2010; 92-B:1267-72
28. Sakzewski L, Ziviani J, Boyd R. Systematic review and meta-analysis of therapeutic management of upper-limb dysfunction in children with congenital hemiplegia. *Pediatrics* 2009; 123:e1111-e1122
29. Christensen MG, Kollasch MW, Hyland JK. Professional functions and treatment procedures. In: Practice Analysis of Chiropractic 2015. *National Board of Chiropractic Examiners* 2015; Chapter 9: 111-126. [www.nbce.org](http://www.nbce.org)
30. Aetna Clinical Policy Bulletin: Spinal Ultrasound – No. 0628. Accessed: 2.18.2019: [http://www.aetna.com/cpb/medical/data/600\\_699/0628.html](http://www.aetna.com/cpb/medical/data/600_699/0628.html)
31. Cigna Medical Coverage Policy: Spinal Ultrasound – No. 038. Accessed: 2.18.2019: [https://cignaforhcp.cigna.com/public/content/pdf/coveragePolicies/medical/CPG038\\_Spinal\\_Ultrasound.pdf](https://cignaforhcp.cigna.com/public/content/pdf/coveragePolicies/medical/CPG038_Spinal_Ultrasound.pdf)
32. BlueCross BlueShield of Tennessee Medical Policy Manual: Nonoperative Diagnostic Spinal Ultrasound (Echography/Sonogram). Accessed: 2.18.2019: [http://www.bcbst.com/mpmanual/Nonoperative\\_Diagnostic\\_Spinal\\_Ultrasound\\_Echography-Sonogram.htm](http://www.bcbst.com/mpmanual/Nonoperative_Diagnostic_Spinal_Ultrasound_Echography-Sonogram.htm)
33. UnitedHealthcare Medical Policy: Spinal Ultrasonography – No. 2019T0462Q. Accessed 2.19.2019: <https://www.unitedhealthcareonline.com/b2c/CmaAction.do?viewKey=PreLoginMain&forwardToken=PreLoginMain>
34. The American Institute for Ultrasound in Medicine. Official Statement: Nonoperative spinal/paraspinal ultrasound in adults. April 2, 2014; Accessed February 20, 2018: <http://www.aium.org/officialStatements/18>
35. American Chiropractic Association. Diagnostic ultrasound of the adult spine. Accessed 2.20.2018: <https://www.acatoday.org/About/Public-Policies>
36. American Academy of Neurology. Review of the literature on spinal ultrasound for the evaluation of back pain and radicular disorders. *Neurology* 1998; 51:343-344

## Tables

**Trade-offs Between Diagnostic spinal Ultrasound and Established Imaging Techniques Table 1**

Advantages	Disadvantages
High-resolution soft tissue imaging	Variable quality
Ability to image in real-time	Limited field of view
Facilitates dynamic examination of anatomic structures	Incomplete evaluation of bones and joints
Can interact with the patient while imaging	Limited penetration
Minimally affected by metal artifact (implants and hardware)	With deeper structures, resolution in obese and muscular patients maybe reduced
No known contraindication	Artifacts can mimic real pathology
Enables rapid contralateral structure to be examined for comparison	Lack of educational infrastructure
Portable	Examiner experience can impact imaging results
Relatively inexpensive	Clinicians are unfamiliar with the images produced by diagnostic ultrasound
Lacks ionizing radiation	Greater reliability of results requires averaging multiple measures

Smith J, Finnoff JT. Diagnostic and interventional musculoskeletal ultrasound: part 1 - fundamentals. *Physical Medicine and Rehabilitation* 2009; 1:64-75

## AMSTAR Quality Rating Summary

**Table 2**

Item	Description	Javanshir	Koppenhaver
'A priori' design provided?	The research question and inclusion criteria should be established before the conduct of the review.	Yes	Yes
Duplicate study selection and data extraction?	There should be at least two independent data extractors and a consensus procedure for disagreements should be in place.	No	Yes
Was a comprehensive literature search performed?	At least two electronic sources should be searched. The report must include years and databases used. Key words and/or MESH terms must be stated and where feasible the search strategy should be provided. All searches should be supplemented by consulting current contents, reviews, textbooks, specialized registers, or experts in the particular field of study, and by reviewing the references in the studies found.	Yes	Yes
Was the status of publication (i.e. grey literature) used as an inclusion criterion?	The authors should state that they searched for reports regardless of their publication type. The authors should state whether or not they excluded any reports (from the systematic review), based on their publication status, language etc.	Yes	Yes
Was a list of studies (included and excluded) provided?	A list of included and excluded studies should be provided.	No	No
Were the characteristics of the included studies provided?	In an aggregated form such as a table, data from the original studies should be provided on the participants, interventions and outcomes. The ranges of characteristics in all the studies analyzed e.g. age, race, sex, relevant socioeconomic data, disease status, duration, severity, or other diseases should be reported.	Yes	Yes
Was the scientific quality of the included studies assessed and documented?	'A priori' methods of assessment should be provided (e.g., for effectiveness studies if the author(s) chose to include only randomized, double-blind, placebo controlled studies, or allocation concealment as inclusion criteria); for other types of studies alternative items will be relevant.	No	Yes
Was the scientific quality of the included studies used appropriately in formulating conclusions?	The results of the methodological rigor and scientific quality should be considered in the analysis and the conclusions of the review, and explicitly stated in formulating recommendations	N/A	Yes
Were the methods used to combine the findings of studies appropriate?	For the pooled results, a test should be done to ensure the studies were combinable, to assess their homogeneity (i.e. Chi-squared test for homogeneity, $I^2$ ). If heterogeneity exists a random effects model should be used and/or the clinical appropriateness of combining should be taken into consideration (i.e. is it sensible to combine?).	N/A	N/A
Was the likelihood of publication bias assessed?	An assessment of publication bias should include a combination of graphical aids (e.g., funnel plot, other available tests) and/or statistical tests (e.g., Egger regression test).	No	No
Was the conflict of interest stated?	Potential sources of support should be clearly acknowledged in both the systematic review and the included studies.	Yes	No
<b>TOTAL</b>		<b>5</b>	<b>7</b>

**Policies of other health care organizations**
**Table 3**

Organization	Position
Aetna	Diagnostic ultrasound of the spine and paraspinal tissues is considered to be experimental and investigational for evaluation of neuromusculoskeletal conditions.
Cigna	Diagnostic ultrasound of the spine and/or paraspinal tissues is not covered for the evaluation of neuromusculoskeletal conditions (e.g., intervertebral discs, facet joints and capsules, central nerves and fascial edema, paraspinal abnormalities, pain or radiculopathy syndromes, monitoring of therapy), because it is considered experimental, investigational or unproven.
Blue Cross/Blue Shield – Tennessee	The use of nonoperative diagnostic spinal ultrasound to evaluate or treat back pain or radicular symptoms (e.g., disc herniation, spinal stenosis, nerve root pathology) is considered <i>investigational</i>
UnitedHealthcare	<p>Spinal and paraspinal ultrasonography (including extremities, pelvis, or soft tissues of the head and neck) are unproven for the following uses:</p> <ul style="list-style-type: none"> <li>to diagnose and manage back pain and radiculopathies</li> <li>to guide rehabilitation of neuromusculoskeletal disorders and back pain</li> </ul> <p>There is insufficient evidence in the peer-reviewed medical literature to establish the efficacy or clinical value of spinal and paraspinal ultrasonography as a diagnostic tool in the management of back pain, radiculopathies or for monitoring of therapies. The use of ultrasound imaging to guide rehabilitation is under investigation. More research is needed to define the role of rehabilitative ultrasound imaging.</p>

### Policy History/Revision Information

Date	Action/Description
1/31/2003	Original effective date
11/11/2003	Annual review and approval completed
10/18/2004	Annual review and approval completed
2/14/2006	Annual review and approval completed
4/10/2008	Annual review and approval completed
1/15/2009	Policy reformatted
4/30/2009	Annual review and approval completed
4/08/2010	Annual review and approval completed
10/26/2010	Policy rebranded to “OptumHealth Care Solutions, Inc. (OptumHealth)”
4/07/2011	Policy revised to include rehabilitative ultrasound imaging (RUSI)
4/19/2012	Annual review and approval completed
4/18/2013	Annual review and approval completed
4/17/2014	Annual review and approval completed; Policy rebranded “Optum* by OptumHealth Care Solutions, Inc.”
4/16/2015	Annual review and approval completed
4/21/2016	Updated references and Table 3; Annual review and approval completed
4/20/2017	Annual review and approval completed. Updated references and Table 3. Annual review and approval completed. Legal entity name changed from “OptumHealth Care Solutions, Inc.” to “OptumHealth Care Solutions, LLC.”
4/26/2018	Annual review and approval completed; Updated references and Table 3
4/25/2019	Annual review and approval completed; Updated references and Table 3
4/23/2020	Annual review and approval completed; No significant changes made to the document

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## Utilization Management Policy

### Contact Information

Please forward any commentary or feedback on Optum utilization management policies to: [policy.inquiry@optumhealth.com](mailto:policy.inquiry@optumhealth.com) with the word "Policy" in the subject line.

The services described in Optum\* by OptumHealth Care Solutions, LLC policies are subject to the terms, conditions and limitations of the Member's contract or certificate. Optum reserves the right, in its sole discretion, to modify policies as necessary without prior written notice unless otherwise required by Optum's administrative procedures.

Certain internal policies may not be applicable to self-funded members and certain insured products. Refer to the member's Summary Plan Description (SPD) or Certificate of Coverage (COC) to determine whether coverage is provided or if there are any exclusions or benefit limitations applicable to any of these policies. If there is a difference between any policy and the member's SPD or COC, the member's SPD or COC will govern.

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