Equipment and Quality Standards for Ultrasound

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### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ACR</td>
<td>American College of Rheumatology</td>
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<tr>
<td>AIUM</td>
<td>American Institute of Ultrasound in Medicine</td>
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<tr>
<td>ALARA</td>
<td>As low as reasonably achievable</td>
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<tr>
<td>ARDMS</td>
<td>American Registry for Diagnostic Medical Sonography</td>
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<tr>
<td>CME</td>
<td>Continuing medical education</td>
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<tr>
<td>EULAR</td>
<td>European League Against Rheumatism</td>
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<tr>
<td>MHz</td>
<td>Megahertz</td>
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<tr>
<td>MRI</td>
<td>Magnetic resonance imaging</td>
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<tr>
<td>MSK</td>
<td>Musculoskeletal</td>
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<tr>
<td>QC</td>
<td>Quality control</td>
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<tr>
<td>RhMSUS</td>
<td>Musculoskeletal Ultrasound Certification in Rheumatology</td>
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<tr>
<td>RMSK</td>
<td>Registered in Musculoskeletal Sonography (certification)</td>
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<tr>
<td>RMSKS</td>
<td>Registered Musculoskeletal Sonography for Sonographers</td>
</tr>
<tr>
<td>US</td>
<td>Ultrasound/ultrasonography</td>
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Introduction

Diagnostic imaging has become indispensable for the management of musculoskeletal (MSK) disorders. Over the past 3 decades, ultrasound (US, sonography) has been demonstrated to be a safe, cost-effective, and accurate method of imaging many MSK problems. The technique was enthusiastically adopted in Europe but was slow to take hold in the United States, most likely due to the widespread availability of and familiarity with magnetic resonance imaging (MRI).

In order to optimize the application of MSK US to the clinical rheumatology setting, several issues of standardization, quality control and training must be addressed. These include:

- The development of a standardized lexicon for the description of rheumatologic US anatomy and pathology
- The development of guidelines for the appropriate use of US in rheumatology
- The establishment of consensus protocols for performing specific US examinations
- The delineation of standards for reporting diagnostic studies and interventional procedures.

In 2001, the first EULAR guidelines for MSK US in rheumatology were published. The paper reviewed some of the technical advances in US which permitted excellent visualization, not only of soft tissue and fluid collections, but also of cartilage and bone surfaces. The authors describe some of the more common pathologic conditions that can be seen with MSK US in the shoulder, elbow, hand, wrist, hip, knee, ankle, heel, and foot as well as the proper positioning of the patient and the views that should be documented. In September of 2017, EULAR (the European League Against Rheumatism) published the EULAR ultrasound scanning app which can be accessed at [https://www.eular.org/eular_ultrasound_scanning_app.cfm](https://www.eular.org/eular_ultrasound_scanning_app.cfm). This document contains pictures of normal MSK US images as well as cine clips of the entire scan and pictures of probe positions. In addition, EULAR has published an imaging library which includes a large selection of abnormal US examinations for MSK disorders.

The United Rheumatology *Equipment and Quality Standards for Ultrasound in Rheumatology* are designed to assist the practicing rheumatologist in providing patients with the highest level of US imaging. United Rheumatology supports the published standards for MSK US from the American Institute of Ultrasound in Medicine (AIUM) and the American College of Radiology.

Physician credentialing as evidence of competency in MSK US is required. Every practice offering US services, whether performed by the provider or his/her staff or completely or partially by a contracted service, must meet the United Rheumatology equipment and quality standards outlined below. In addition, the indications for US examinations must be consistent with the United Rheumatology *Clinical Practice Guideline for Musculoskeletal Ultrasound in Rheumatology* and be clearly documented in the medical record of the patient.
**Equipment Standards**

Any practice or outside imaging provider must comply with all applicable state rules and regulations for the use and maintenance of US equipment applicable in the state in which the examination is performed.

**Transducers**

Transducers of different frequencies are required to perform a wide range of examinations in rheumatology.

High-resolution linear array transducers with a broad bandwidth and frequencies between 7.5 megahertz (MHz) and 20 MHz, and low-frequency transducers with frequencies between 3.5 MHz and 5 MHz are required.¹ The high-frequency transducers (7.5 MHz to 20 MHz) are used for more superficial structures such as tendons, ligaments, and small joints; the low-frequency transducers (3.5 MHz to 5 MHz) may be required for the evaluation of larger joints such as the shoulder and hip. Each examination should be performed with the highest frequency transducer which permits the best imaging of the anatomy included in the study. A small-footprint transducer may be helpful for the evaluation of small structures such as the interphalangeal joints, the wrist, and the metacarpal and metatarsal phalangeal joints.

**Additional Equipment Requirements**

All scanners required to have the ability to perform color and power and spectral Doppler imaging.

Depending on the type of US performed, harmonic imaging and/or extended-field-of-view imaging may be helpful.² When performing an US examination, the scanner should be set on the lowest acoustic output possible for good quality images. The transducer should be in place for the minimum time required for an examination. This is consistent with the “as low as reasonably achievable” (ALARA) principle.⁵

**Quality Control for Equipment**

United Rheumatology requires that every practice performing MSK US has written policies for quality control (QC) of the equipment, cleaning of transducers, and infection control. Each practice or outside provider of US services should appoint a qualified individual to monitor the QC program. All practices should be compliant with the manufacturer’s recommendations for equipment testing when initially acquired and/or when there is a significant upgrade of the equipment to include new or replacement scanners and transducers.⁶

With the introduction of small portable equipment and solid-state technology, some scanners do not require routine scheduled maintenance. Each practice should refer to their equipment manufacturer’s recommendations for the type and frequency of QC testing recommended for their equipment. Written documents of the QC program should be maintained by the practice.
Personnel Requirements

Only appropriately credentialed and trained individuals should perform US or interpret US examinations (including physicians interpreting examinations for outside vendors).

Physicians

Physicians interpreting US studies must be licensed in the state in which the study is performed and comply with all the rules and regulations of that state regarding the practice of medicine; including but not limited to regulations concerning telemedicine (if applicable), insurance (including but not limited to malpractice insurance), and continuing medical education (CME) requirements.

The physician performing and/or interpreting diagnostic US may work for an individual practice or can be an employee of a contracted outside provider of US services. Any physician interpreting and/or performing diagnostic US must have documented evidence of competency in US. Physician competency can be demonstrated in several different ways as follows:

- Completion of the American College of Rheumatology (ACR) Musculoskeletal Ultrasound Certification in Rheumatology (RhMSUS). If a rheumatologist has passed the certification examination more than 36 months ago then the physician must have at least 10 hours of Category 1 CME in MSK US within the last 3 years

  OR

- For physicians who completed their residency or fellowship more than 3 years ago completion of the following:
  - 10 hours of Category 1 CME in MSK US within the last 3 years
  - Interpretation and reporting of at least 50 MSK US studies within the last 3 years
    - If an individual did not interpret 50 MSK US studies: 30 hours of Category 1 CME in MSK US with at least one course that contained hands-on training

  OR

- Completion of residency or fellowship program that includes MSK US and the performance and interpretation of at least 100 MSK US studies supervised by a physician who was AIUM or ACR qualified to perform them

  OR

- For residency or fellowship trained physicians who did not have access to training in MSK US
  - Documentation of involvement in the supervision and/or performance and interpretation and reporting of at least 100 diagnostic MSK US studies in the prior 3 years and completion of at least 30 hours of Category 1 CME in MSK US which includes at least one course that contained hands-on training

Documentation of training and experience must be available upon request.
Interpreting physicians must demonstrate evidence of CME in US as follows:

- All physicians who interpret diagnostic MSK US must have 10 hours of Category 1 CME credits every 3 years and must interpret at least 50 diagnostic MSK US per year.

Documentation of case volume and CME credits must be available upon request.

A physician should be available to review all US studies before the patient is discharged from the facility. If this cannot be done, the practice should have a written call-back policy. Payment for the additional images because of an incomplete or inadequate study is included in the payment for the initial examination.

**Sonographers**

Sonographers must be Registered Musculoskeletal Sonographers™ (RMSKS™) or obtain this credential within 3 years of employment. This credential can be obtained from the American Registry for Diagnostic Medical Sonography (ARDMS).

- All sonographers must remain RMSKS certified and meet all the requirements of the ARDMS, including recertification every 6 years.\(^9\)
- All sonographers\(^{10}\) holding only certification as a RMSKS must have 30 hours of ARDMS-accepted continuing education in MSK US every 3 years

**OR**

- All sonographers who hold certification as a RMSK and another US specialty must have 10 ARDMS - CME in MSK US and 20 ARDMS CME hours in any other US specialty every 3 years.

**Image Documentation**

All images must be labelled with the following information:\(^{11}\)

- Patient name and additional personal identifier such as the social security number or medical record number
- Facility name and, if applicable, name of outside service providing the examination and/or interpretation
- Examination date
- Anatomic site imaged
- Anatomic side (right or left)
- Views—transverse or longitudinal or other
- Sonographer’s initials.

Any worksheets used during the examination should be retained and should include at least:\(^{11}\)

- Patient name and additional personal identifier such as the social security number or medical record number
• Examination date
• Indication for the examination and if available ICD-10 code
• Examination requested
• Name of referring provider and contact information when applicable.

Additional images should be obtained when appropriate. Images should include both normal and abnormal findings, and measurements should be permanently recorded on images, when applicable.

Images should be obtained according to written protocols which must be reviewed annually.

**Reporting Results**

All reports must be consistent with state and federal requirements and be separate from chart notes. A final report and all images must be available within 3 business days of completion of the examination.\(^{11}\)

The following suggestions are offered as parameters for report generation:\(^{11}\)

**Demographics**

• Facility or location where the study was performed; if performed by an outside service, the name of the service should also be included in the report
• Name of the patient and at least one other unique identifier (e.g., social security number, medical record number)
• Patient’s age and/or date of birth
• Patient’s gender
• Name of requesting provider
• Name of the examination
• Date of examination
• Date and time of dictation, date and time of transcription
• Brief description of relevant clinical information or indication for the examination and if possible ICD-10 number.

**Report**

• Name, volume, and type of contrast used (if any)
• Description of findings
• Limitations of the examination (if any)
• Answer to clinical questions, if possible; if not possible, explanation of why the clinical question could not be answered
• Comparison with other studies, including but not limited to prior sonograms, X-rays, MRIs, or computed tomography studies, if available
• Measurements when appropriate
• Name and number of joints studied when appropriate.
Impression or Conclusion or Diagnosis

- Specific diagnosis, if possible
- Differential diagnosis, if possible
- Suggestion for follow-up or additional diagnostic studies needed to clarify or confirm the impression
- Impression or conclusion should be included in every report.

Computer-generated reports are acceptable, if they meet all of the above requirements. The use of abbreviations and acronyms in reports is discouraged, because these can lead to the misinterpretation of results.\textsuperscript{11}

Direct Communication

The direct communication of results is required if:

- The final report is different from a preliminary report (if one was provided) or, on review, from the original report and an amended report should be issued
- There are findings that require immediate medical attention or are unexpected
- There are findings that, if not addressed in a timely manner, may have a negative impact on the patient.

Any telephone communication of results should be documented in the report. Fax or text communication are acceptable, provided they are secure and there is documentation that the information has been received by the appropriate provider. Documentation of fax and/or text communication must be maintained as part of the medical record.\textsuperscript{11}

The final report must be kept by the imaging facility or outside service as part of the patient’s medical record and be available upon request. Retention of reports and images must be consistent with state and federal regulations and facility policy.\textsuperscript{11}
References


### Document Updates

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<th>Description of Changes</th>
<th>Approval Date</th>
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<tr>
<td>1.1.2016</td>
<td>Creation of first version</td>
<td>08 Oct 2016</td>
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<tr>
<td>1.1.2017</td>
<td>2017 Update</td>
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