Standard Reporting Guidelines: Ultrasound for Procedure Guidance

Reviewed by the ACEP Board of Directors

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Introduction and Statement of Purpose

Developed by members of the ACEP Emergency Ultrasound Section

These guidelines represent the product of a working group that was formed based on discussions at the Industry Roundtable subcommittee of the American College of Emergency Physicians (ACEP) Emergency Ultrasound Section. The impetus for these guidelines emerged from discussions with emergency ultrasound leaders and industry, both ultrasound manufacturers and electronic medical record (EMR) companies that indicated a need for a more structured method to report and communicate the findings of point-of-care (POC) emergency ultrasound (EUS).

This document serves as a resource to clinicians with a wide range of experience, and as such may contain fields or terms that may not be appropriate in all situations or by all clinicians. It is important to note that these guidelines in no way represent required elements of reporting. In fact, in general these guidelines err on the side of including more fields than may be used by most emergency physicians, and it is expected that many fields may remain unused depending on the situations.

The purpose of these guidelines is to define fields that may be helpful for POC EUS in a consistent order, with consistent definitions, and in a method that may be easily coded into electronic communications and computer databases. The goal of this document is to accurately report the findings that commonly result from an ultrasound performed by a clinician in the emergency department and to avoid confusion with reports generated by other specialties.

We hope to eventually use these guidelines to work with existing reporting structures such as DICOM and initiatives through the Integrated Health Enterprise (IHE) to develop consistent non-proprietary methods of reporting and communicating POC EUS examination findings.

FORMAT

All diagnostic examinations should include:

- Patient/exam demographics
- Indications for examination
- Views
- Findings
- Interpretation
- Quality assurance

The first and last portions should be consistent across exam types and are presented here.

Patient/exam demographics:
Patient name: ________________________
Patient gender: ☐ M ☐ F
DOB: ___ / ___ / ___
MR#: ___________________
Bar Code/Patient Identifier: _____________
Hospital Name: ___________________
Date and time of exam: ___ / ___ / ___
Exam type:
☐ Diagnostic
☐ Educational
☐ Procedural

Clinical category:
☐ Resuscitative
☐ Symptom based
☐ Therapeutic
☐ Unknown/other

☐ Initial exam
☐ Repeat exam

Primary person obtaining/interpreting images: __________________
Secondary person obtaining/interpreting images: __________________
Additional person(s) obtaining/interpreting images: ________________

Quality assurance:

Suggested Quality Assurance Grading Scale

<table>
<thead>
<tr>
<th>Grading Scale Definitions</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No recognizable structures, no objective data can be gathered</td>
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<tr>
<td>Minimally recognizable structures but insufficient for diagnosis</td>
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<tr>
<td>Minimal criteria met for diagnosis, recognizable structures but with some technical or other flaws</td>
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<tr>
<td>Minimal criteria met for diagnosis, all structures imaged well and diagnosis easily supported</td>
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</tr>
<tr>
<td>Minimal criteria met for diagnosis, all structures imaged with excellent image quality and diagnosis completely supported</td>
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</tr>
</tbody>
</table>

Image quality 1 2 3 4 5
Accuracy of interpretation of images as presented TP TN FP FN
Accuracy of interpretation of images as compared to gold standard (ie, CT, operative report) TP TN FP FN

Comments: ____________________________________________________________
Ultrasound for Procedural Guidance: Pericardiocentesis

Patient/ exam demographics:

Patient name: ________________________________
Patient gender: ☐ M ☐ F
DOB: ___ / ___ / ___
MR#: ___________________
Date and time of exam: ___ / ___ / ___
Exam type:
☐ Diagnostic
☐ Educational (N/A)

Primary person obtaining/ interpreting images: __________________
Secondary person obtaining/ interpreting images: __________________
Additional person(s) obtaining/ interpreting images: __________________

Indication(s) for exam:
☐ Cardiac arrest ☐ Cardiac tamponade
☐ Pericardial effusion ☐ Pulsus paradoxus
☐ Other indication: ___________________________

Preparation:
Anesthesia:
☐ Local ☐ Procedural sedation ☐ Other: ___________________________

Equipment:
Needle Type:
☐ 18 gauge spinal needle
☐ Other: ___________________________

Catheter Type:
☐ Single Lumen
☐ Multi Lumen: ___________________________
☐ Other (*Cordis): ___________________________
☐ None

Technique: ☐ Sterile ☐ Emergent (minimal sterility)

Needle Insertion Approach:
☐ In-Plane Approach ☐ Out-of-Plane Approach
☐ Subxiphoid Approach
☐ Parasternal Approach
☐ Apical Approach
☐ Other ___________________________

Number of Attempts:
☐ One ☐ Two ☐ Three ☐ > Three
**Fluid Aspiration:**
Fluid Appearance (check all that apply)
- ☐ Colorless
- ☐ Bloody
- ☐ Straw-like
- ☐ Not bloody
- ☐ Purulent
- ☐ Cloudy
- ☐ Amber
- ☐ Not cloudy
- ☐ Comments/ other findings: __________________________

Fluid Volume
- ☐ <5 mL
- ☐ 5-50 mL
- ☐ 50-500 mL
- ☐ 500-1000 mL
- ☐ >1000 mL

**Catheter Insertion:**
- ☐ Permanent Catheter
- ☐ Temporary Catheter
- ☐ None

**Outcome(s):**
- ☐ Successful pericardial fluid aspiration
- ☐ Unsuccessful pericardial fluid aspiration
- ☐ Successful catheter insertion
- ☐ Unsuccessful catheter insertion

**Complication(s):**
- ☐ None
- ☐ Pneumothorax
- ☐ Myocardial injury
- ☐ Hemopericardium
- ☐ Other: _______________________

**Quality assurance:**
Adequacy of individual views
Accuracy of interpretation of individual views
Gold standard interpretation based on images
Overall adequacy of examination
Ultrasound for Procedural Guidance: Thoracentesis

Patient/ exam demographics:

Patient name: ________________________
Patient gender: ☐ M ☐ F
DOB: ___ / ___ / ___
MR#: ___________________
Date and time of exam: ___ / ___ / ___
Exam type:
☐ Diagnostic
☐ Educational (N/A)

Primary person obtaining/ interpreting images: _________________
Secondary person obtaining/ interpreting images: _________________
Additional person(s) obtaining/ interpreting images: _________________

Indication(s) for exam:
☐ Therapeutic ☐ Diagnostic

☐ Chest pain ☐ Dyspnea/Tachypnea/Hypoxia
☐ Hemothorax ☐ Pneumothorax
☐ Empyema ☐ Chylothorax
☐ Malignant effusion ☐ Pleural effusion
☐ Other indication: _____________________________

Preparation:
Anesthesia:
☐ Local ☐ Procedural sedation ☐ Other: _____________________________

Equipment:
Needle Type:
☐ 16 gauge needle ☐ 18 gauge needle
☐ Other: _____________________________

Catheter Type:
☐ Single Lumen
☐ Multi Lumen: _____________________________
☐ None

Technique:
☐ Sterile ☐ Emergent (minimal sterility)

Needle Insertion Approach:
☐ Right thorax ☐ Left thorax

Position
☐ Sitting/Posterior Approach
☐ Lateral Decubitus/Posterior Approach
☐ Supine/Lateral Approach
☐ Other: ____________________________

Guidance
☐ Real Time Guidance
  ☐ In-Plane Approach       ☐ Out-of-Plane Approach
☐ Pre-Procedure Marking

Number of Attempts:
☐ One       ☐ Two       ☐ Three       ☐ > Three

Fluid Aspiration:
Fluid Appearance (check all that apply)
☐ Colorless       ☐ Bloody
☐ Straw-like       ☐ Not bloody
☐ Purulent         ☐ Cloudy
☐ Amber           ☐ Not cloudy
☐ Comments/ other findings: ____________________________

Fluid Volume
☐ <5 mL       ☐ 5-50 mL
☐ 50-500 mL    ☐ 500-1000 mL
☐ >1000 mL

Catheter Insertion:
☐ Permanent Catheter       ☐ Temporary Catheter       ☐ None

Outcome(s):
☐ Successful pleural fluid aspiration
☐ Unsuccessful pleural fluid aspiration
☐ Successful catheter insertion
☐ Unsuccessful catheter insertion

Complication(s):
☐ None       ☐ Active Bleeding       ☐ Hemothorax
☐ Pneumothorax       ☐ Other: ____________________________

Quality assurance:
Adequacy of individual views
Accuracy of interpretation of individual views
Gold standard interpretation based on images
Overall adequacy of examination
Ultrasound for Procedural Guidance: Paracentesis

Patient/ exam demographics:

Patient name: ________________________
Patient gender: ☐ M ☐ F
DOB: ___ / ___ / ___
MR#: ___________________
Date and time of exam: ___ / ___ / ___
Exam type:
☐ Diagnostic
☐ Educational (N/A)

Primary person obtaining/ interpreting images: ________________
Secondary person obtaining/ interpreting images: ________________
Additional person(s) obtaining/ interpreting images: ________________

Indication(s) for exam:
☐ Therapeutic ☐ Diagnostic
______________________________________________________________
☐ Cirrhosis ☐ Fever
☐ Abdominal Pain/Tenderness ☐ Malignancy
☐ Alcoholism ☐ Dyspnea
☐ Other indication: _____________________________

Preparation:

Anesthesia:
☐ Local ☐ Procedural sedation ☐ Other: ____________________________

Equipment:

Needle Type:
☐ 16 gauge needle ☐ 18 gauge needle
☐ Other: ____________________________

Catheter Type:
☐ Single Lumen
☐ Multi Lumen: ____________________________
☐ None

Technique: ☐ Sterile

Needle Insertion Approach:
☐ In-Plane Approach ☐ Out-of-Plane Approach

Needle Insertion Location:
☐ Midline infraumbilical ☐ Right paracolic gutter
☐ Left paracolic gutter ☐ Other: ____________________________
Guidance
☐ Real Time Guidance
☐ In-Plane Approach
☐ Out-of-Plane Approach
☐ Pre-Procedure Marking

**Number of Attempts:**
☐ One  ☐ Two  ☐ Three  ☐ > Three

**Fluid Aspiration:**
Fluid Appearance (check all that apply)
☐ Colorless  ☐ Bloody
☐ Straw-like  ☐ Purulent
☐ Cloudy  ☐ Amber
☐ Comments/ other findings: __________________________

Fluid Volume
☐ <5 mL  ☐ 5-50 mL
☐ 50-500 mL  ☐ 500-1000 mL
☐ >1000 mL

**Catheter Insertion:**
☐ Permanent Catheter  ☐ Temporary Catheter  ☐ None

**Outcome(s):**
☐ Successful peritoneal fluid aspiration
☐ Unsuccessful Peritoneal fluid aspiration
☐ Successful catheter insertion
☐ Unsuccessful catheter insertion

**Complication(s):**
☐ None  ☐ Active bleeding  ☐ Bladder perforation
☐ Bowel perforation  ☐ Other: ____________________

**Quality assurance:**
Adequacy of individual views
Accuracy of interpretation of individual views
Gold standard interpretation based on images
Overall adequacy of examination
Ultrasound for Procedural Guidance: Arthrocentesis

Patient/ exam demographics:

Patient name: __________________________
Patient gender: ☐ M  ☐ F
DOB: ___ / ___ / ___
MR#: ___________________
Date and time of exam: ___ / ___ / ___
Exam type:
☐ Diagnostic
☐ Educational (N/A)

Primary person obtaining/ interpreting images: __________________
Secondary person obtaining/ interpreting images: __________________
Additional person(s) obtaining/ interpreting images: __________________

Indication(s) for exam:
☐ Therapeutic  ☐ Diagnostic

☐ Joint swelling  ☐ Restricted range of motion
☐ Joint pain  ☐ Fever
☐ Other indication: _____________________________

Preparation:
Anesthesia:
☐ Local  ☐ Procedural sedation  ☐ Other: _____________________________

Equipment:
Needle Type:
☐ 16 gauge needle  ☐ 18 gauge needle
☐ Other: _____________________________

Technique:  ☐ Sterile

Needle Insertion Approach:
☐ Right  ☐ Left

Joint Aspirated
☐ Shoulder  ☐ Elbow
☐ Wrist  ☐ Hip
☐ Knee  ☐ Ankle
☐ Digit(s): _____________  ☐ Other: _____________

Guidance
☐ Real Time Guidance
☐ In-Plane Approach  ☐ Out-of-Plane Approach
☐ Pre-Procedure Marking
**Number of Attempts:**

☐ One  ☐ Two  ☐ Three  ☐ > Three

**Fluid Aspiration:**

Fluid Appearance (check all that apply)

☐ Colorless  ☐ Bloody
☐ Straw-like  ☐ Purulent
☐ Cloudy  ☐ Amber

☐ Comments/ other findings: __________________________

Fluid Volume

☐ <5 mL  ☐ 5-10 mL
☐ 10-20 mL  ☐ 20-30 mL
☐ > 40 mL

**Outcome(s):**

☐ Successful joint fluid aspiration  ☐ Unsuccessful joint fluid aspiration

**Complication(s):**

☐ None  ☐ Active bleeding  ☐ Hematoma
☐ Nerve injury  ☐ Other: _______________________

**Quality Assurance:**

Adequacy of individual views
Accuracy of interpretation of individual views
Gold standard interpretation based on images
Overall adequacy of examination
Ultrasound for Procedural Guidance: Lumbar Puncture

**Patient/ exam demographics:**

Patient name: __________________________
Patient gender: ☐ M ☐ F
DOB: ___ / ___ / ___
MR#: ___________________
Date and time of exam: ___ / ___ / ___
Exam type:
☐ Diagnostic
☐ Educational (N/A)

Primary person obtaining/ interpreting images: ___________________
Secondary person obtaining/ interpreting images: ___________________
Additional person(s) obtaining/ interpreting images: ___________________

**Indication(s) for exam:**

☐ Therapeutic ☐ Diagnostic

...........................................................................................................

☐ Headache ☐ Fever
☐ Unexplained weakness ☐ Acute neurologic change
☐ Other: ________________________________

**Preparation:**

Anesthesia:
☐ Local ☐ Procedural sedation ☐ Other: ________________________________

Equipment:

Needle Type:

☐ 20 gauge needle: ☐ blunt ☐ cutting
☐ 22 gauge needle: ☐ blunt ☐ cutting
☐ Other: ________________________________

Technique: ☐ Sterile

**Needle Insertion Approach:**

Position:
☐ Sitting ☐ Lateral Decubitus

Level:
☐ L3-L4 ☐ L4-L5

Guidance

☐ Real Time Guidance

☐ In-Plane Approach ☐ Out-of-Plane Approach

☐ Pre-Procedure Marking
Number of Attempts:
☐ One   ☐ Two   ☐ Three   ☐ > Three

Fluid Aspiration:
Fluid Appearance (check all that apply)
☐ Colorless   ☐ Bloody
☐ Straw-like   ☐ Purulent
☐ Cloudy   ☐ Amber
☐ Comments/ other findings: __________________________

Outcome(s):
☐ Successful CSF fluid aspiration
☐ Unsuccessful CSF fluid aspiration

Complication(s):
☐ None   ☐ Active bleeding   ☐ Hematoma
☐ Post spinal headache   ☐ Nerve injury   ☐ Other: __________________________

Quality assurance:
Adequacy of individual views
Accuracy of interpretation of individual views
Gold standard interpretation based on images
Overall adequacy of examination
Ultrasound for Procedural Guidance: Vascular Access

**Patient/ Exam demographics:**

Patient name: ________________________

Patient gender: ☐ M  ☐ F

DOB: ___ / ___ / ___

MR#: __________________

Date and time of exam: ___ / ___ / ___

Exam type:

☐ Diagnostic

☐ Educational (N/A)

Primary person obtaining/ interpreting images: __________________

Secondary person obtaining/ interpreting images: __________________

Additional person(s) obtaining/ interpreting images: __________________

**Indication(s) for exam:**

☐ Hypotension

☐ Blood pressure monitoring

☐ Frequent lab draws

☐ Difficult IV access

☐ Vasopressor use

☐ Other: ______________________________

**Preparation:**

Anesthesia:

☐ Local  ☐ Procedural sedation  ☐ Other: ______________________________

Equipment:

Needle Type:

☐ 18 gauge needle

☐ 20 gauge needle

☐ 22 gauge needle

☐ Other: ______________________________

Technique:

☐ Sterile  ☐ Emergent (minimal sterility)

☐ Non-sterile

**Needle Insertion Approach:**

☐ Right  ☐ Left

**Vein:**

☐ Central

☐ Internal Jugular  ☐ Femoral

☐ Subclavian

☐ Peripheral

☐ Antecubital  ☐ Basilic

☐ Brachial  ☐ Cephalic

☐ Other: ______________________________

Artery:
☐ Femoral       ☐ Radial

Guidance
☐ Real Time Guidance
☐ In-Plane Approach       ☐ Out-of-Plane Approach
☐ Pre-Procedure Marking

Number of Attempts:
☐ One       ☐ Two       ☐ Three       ☐ > Three

Compressibility and Visualized Patency:
☐ Compressible       ☐ Partially compressible
☐ Non-compressible   ☐ Patent thrombus seen

Outcome(s):
☐ Successful blood aspiration
☐ Unsuccessful blood aspiration
☐ Successful catheter insertion
☐ Unsuccessful catheter insertion
☐ Saline flush confirmation
☐ Saline FLUSH with right atrium bubbles confirmation

Complication(s):
☐ None       ☐ Active bleeding       ☐ Vascular injury       ☐ Hematoma
☐ Nerve injury       ☐ Pneumothorax       ☐ Bladder aspiration
☐ Other: ____________________________

Quality assurance:
Adequacy of individual views
Accuracy of interpretation of individual views
Gold standard interpretation based on images
Overall adequacy of examination
Ultrasound for Procedural Guidance: Regional Nerve Block

**Patient/ exam demographics:**

- Patient name: ________________________
- Patient gender: ☐ M ☐ F
- DOB: ___ / ___ / ___
- MR#: ____________
- Date and time of exam: ___ / ___ / ___
- Exam type:
  - ☐ Diagnostic
  - ☐ Educational (N/A)

Primary person obtaining/ interpreting images: __________________
Secondary person obtaining/ interpreting images: __________________
Additional person(s) obtaining/ interpreting images: __________________

**Indication(s) for exam:**

- ☐ Major laceration
- ☐ Joint dislocation
- ☐ Joint fracture
- ☐ Other: ________________________

**Preparation:**

**Anesthesia:**

- ☐ Local
- ☐ Procedural Anesthetic
  - ☐ Lidocaine
  - ☐ Bupivacaine
  - ☐ Lidocaine with epinephrine
  - ☐ Other: ________________________

**Equipment:**

- Needle Type:
  - ☐ 18 gauge needle
  - ☐ 20 gauge needle
  - ☐ Other: ________________________

**Technique:**

- ☐ Sterile

**Needle Insertion Approach:** nerve(s) identified and anesthetic solution was infiltrated in the usual fashion with ultrasound assistance.

- ☐ Right
- ☐ Left

**Location**

- ☐ Interscalene
- ☐ Supraclavicular
- ☐ Infraclavicular
- ☐ Axillary
- ☐ Median
- ☐ Ulnar
- ☐ Radial
- ☐ Femoral
- ☐ Sciatric
- ☐ Tibial
- ☐ Peroneal
- ☐ Other: ________________________

**Guidance**

- ☐ Real Time Guidance
☐ In-Plane Approach  ☐ Out-of-Plane Approach
☐ Pre-Procedure Marking

**Number of Attempts:**
☐ One  ☐ Two  ☐ Three  ☐ > Three

**Outcome(s):**
☐ Successful anesthetic placement  ☐ Unsuccessful anesthetic placement

**Complication(s):**
☐ None  ☐ Active bleeding  ☐ Vascular injury  ☐ Hematoma
☐ Nerve injury  ☐ Pneumothorax
☐ Other: ____________________________

**Quality assurance:**
Adequacy of individual views
Accuracy of interpretation of individual views
Gold standard interpretation based on images
Overall adequacy of examination
Ultrasound for Procedural Guidance: Abscess

**Patient/ exam demographics:**

Patient name: _________________________
Patient gender: □ M  □ F
DOB: ___ / ___ / ___
MR#: ___________________
Date and time of exam: ___ / ___ / ___
Exam type:
□ Diagnostic
□ Educational (N/A)

Primary person obtaining/ interpreting images: ________________
Secondary person obtaining/ interpreting images: ________________
Additional person(s) obtaining/ interpreting images: ________________

**Indication(s) for exam:**
□ Redness
□ Swelling
□ Pain
□ Difficult IV access
□ Vasopressor use
□ Other: ________________________________

**Preparation:**
Anesthesia:
□ Local  □ Procedural sedation  □ Other: ________________________________

Equipment:
Needle Type:
□ 18 gauge needle □ 20 gauge needle
□ 22 gauge needle □ Other: ________________________________

Technique: □ Sterile

**Needle Insertion Approach:**
□ Right  □ Left

Location
□ Abdominal wall
□ Axilla
□ Breast
□ Chest wall
□ Extremities
□ Upper: __________________________________________
□ Lower: __________________________________________
□ Lower Back
□ Neck
□ Pelvic wall
□ Upper Back
☐ Other: ________________________________

Guidance
☐ Real Time Guidance
   ☐ In-Plane Approach    ☐ Out-of-Plane Approach
   ☐ Pre-Procedure Marking

**Number of Attempts:**
☐ One    ☐ Two    ☐ Three    ☐ > Three

Fluid Appearance (check all that apply)
☐ Colorless    ☐ Bloody
☐ Straw-like    ☐ Purulent
☐ Cloudy    ☐ Amber
☐ Comments/ other findings: ____________________________

Fluid Volume
☐ <5 mL    ☐ 5-50 mL
☐ > 50 mL

**Outcome(s):**
☐ Successful aspiration
☐ Unsuccessful aspiration
☐ Successful incision and drainage
☐ Unsuccessful incision and drainage

**Complication(s):**
☐ None    ☐ Active bleeding    ☐ Vascular injury    ☐ Hematoma
   ☐ Nerve injury    ☐ Other: ____________________________

**Quality assurance:**
Adequacy of individual views
Accuracy of interpretation of individual views
Gold standard interpretation based on images
Overall adequacy of examination
Ultrasound for Procedural Guidance: Other (Miscellaneous)

**Patient/ exam demographics:**

Patient name: ________________________
Patient gender: ☐ M    ☐ F
DOB: ___ / ___ / ___
MR#: ___________________
Date and time of exam: ___ / ___ / ___
Exam type:
☐ Diagnostic
☐ Educational (N/A)

☐ Initial exam

Primary person obtaining/ interpreting images: __________________
Secondary person obtaining/ interpreting images: __________________
Additional person(s) obtaining/ interpreting images: __________________

**Indication(s) for exam:**
☐ Other: ________________________________

**Preparation:**

Anesthesia:
☐ Local    ☐ Procedural sedation    ☐ Other: ________________________________

Equipment:

Needle Type:
☐ 18 gauge needle    ☐ 20 gauge needle
☐ Other: ________________________________

Technique:
☐ Sterile    ☐ Emergent (minimal sterility)
☐ Non-sterile

**Needle Insertion Approach:**

☐ Right    ☐ Left

Location
☐ Other: ________________________________

Guidance
☐ Real Time Guidance
   ☐ In-Plane Approach    ☐ Out-of-Plane Approach
☐ Pre-Procedure Marking

**Number of Attempts:**
☐ One    ☐ Two    ☐ Three    ☐ > Three
**Outcome(s):**
- ☐ Successful ____________________________
- ☐ Unsuccessful ____________________________

**Complication(s):**
- ☐ None
- ☐ Active bleeding
- ☐ Vascular injury
- ☐ Hematoma
- ☐ Nerve injury
- ☐ Other: ____________________________

**Quality assurance:**
Adequacy of individual views
Accuracy of interpretation of individual views
Gold standard interpretation based on images
Overall adequacy of examination