Point of care ultrasound is an increasingly utilized imaging modality both within hospital and out-of-hospital settings.

Its applicability extends to rural and austere settings because it is uniquely durable, portable and battery powered.1-3

Existing literature delineates uses for ultrasound in austere settings, rural clinics, combat and natural disasters. As handheld ultrasound becomes widely available, there is potential for use in wilderness settings such as extended backcountry expeditions.

Medical personnel carrying handheld ultrasound in these wilderness settings may lack information about this equipment, such as proper indications, limitations, and device considerations including durability and options for alternative coupling gels.

Investigate uses of portable ultrasound in wilderness and austere settings

Distill uses and considerations of portable ultrasound into an introductory and accessible chapter in Advanced Wilderness Life Support text

Identify an area within wilderness medicine ultrasound for further study

A literature review was conducted to review ultrasound uses in wilderness, military, high altitude, austere and rural settings.

Search Terms: “austere OR wilderness” AND “ultrasound OR ultrasoundography”

Dates: 1998 - 2020

116 articles returned, 31 reviewed

Handheld ultrasound product websites were reviewed, including Butterfly IQ, Philips Lumify, GE Vscan, Sonosite iViz, and Clarius

Ultrasound learning modalities were consulted for fundamentals.4-5

The text is a 15 page chapter organized in the following subheadings with guiding pictures (as shown) on proper probe placement and pathology:

Principles of Portable Ultrasound: Brief discussion of echogenicity, transducer types, and ultrasound terminology including gain, depth, and doppler

Device Considerations: Review of considerations in austere settings, including: portability, durability, power, data storage, telemedicine capability, and gel substitutions

Indications in Wilderness Settings:

- Extended Focused Assessment with Sonography for Trauma (eFAST): In traumatic injury, evaluate for pericardial tamponade, pneumothorax, hemothorax, and peritoneal free fluid that typically represents internal bleeding

- Cardiac Exam: Assess left ventricular function and check for an obstructive process like pulmonary embolism

- Inferior Vena Cava (IVC) Exam: Assess IVC diameter to differentiate underlying cause of shock

- Musculoskeletal Exam: Assess for long bone fractures, joint dislocations, and joint effusions

- Dyspnea: Identify etiology including pneumothorax, pneumonia, pulmonary contusion, pulmonary embolus, or heart failure

- Soft Tissue: Improve accuracy of assessing for abscess and cellulitis and to identify and remove foreign bodies

- Undifferentiated Abdominal Pain: Identify potential etiologies including ectopic pregnancy, gallstones, small bowel obstruction, appendicitis, and kidney stones

An accompanying podcast was recorded to review the key points of the text

The following themes emerge from the literature review and are emphasized in the text:

- Handheld ultrasound units should be considered for long expeditions where specialty resources may not be available, or where evacuation would be difficult or dangerous

- Ultrasound has better specificity than sensitivity, so in the backcountry, its greatest utility is in ruling in emergent pathology such as with eFAST and getting the victim to care sooner.1,6

- Ultrasound is operator dependent and should be used as an adjunct to support but not replace clinical findings and to increase suspicion for a diagnosis.7 This is important in the backcountry where other diagnostic testing is not available, and where ultrasound may be a new skill

Ongoing: Identify and compare ultrasound coupling alternatives (i.e., sunscreen, energy gels, liquid body soap) to commercial gel for use in austere wilderness settings

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REFERENCES


