

Bedside Ultrasonography for the Intensivist



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KEYWORDS

- Critical care ultrasonography • Critical care echocardiography
- Thoracic ultrasonography • Vascular ultrasonography • Abdominal ultrasonography

KEY POINTS

- Point-of-care ultrasonography is conceptually related to physical examination.
- The intensivist uses visual assessment, auscultation, and palpation on an ongoing basis to monitor their patient.
- Ultrasonography adds to traditional physical examination by allowing the intensivist to visualize the anatomy and function of the body in real time.

Videos of a normal parasternal long-axis view, a normal parasternal short-axis view, a normal apical 4-chamber view, a normal subcostal long-axis view, an inferior vena cava long longitudinal axis view, a severely reduced left ventricular systolic function, a moderately reduced left ventricular systolic function, a hyperdynamic left ventricular systolic function, a right ventricular pressure overload, acute cor pulmonale, a pericardial and pleural effusion, a pericardial tamponade, aortic stenosis, valvular vegetation, papillary muscle rupture, pleural effusion, lung sliding and A lines, lung pulse, lung point, B lines, a consolidation pattern, a noncompressible common femoral vein diagnostic of thrombus, a compressible common femoral vein and artery, a compressible common femoral vein at the level of the saphenous vein intake, a femoral vein at common femoral artery bifurcation, a fully compressible common femoral vein, a fully compressible superficial femoral vein, a fully compressible popliteal vein, FAST study of right side, FAST study of suprapubic area, FAST study of left side accompany this article at <http://www.criticalcare.theclinics.com/>



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Crit Care Clin 31 (2015) 43–66

<http://dx.doi.org/10.1016/j.ccc.2014.08.003>

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INTRODUCTION

Critical care ultrasonography (CCUS) has utility for the diagnosis and management of critical illness. By definition, it is a bedside technique performed by the frontline clinician at point of care. Image acquisition, image interpretation, and application of the results to the clinical problem are the personal responsibility of the intensivist who is in charge of the case. This approach departs from the standard method of using ultrasonography in the intensive care unit (ICU), where radiology or cardiology service performs ultrasonography on a consultative basis.

Ultrasonography performed by the intensivist has advantages in comparison with the standard model.

- There is no delay in obtaining the study, thus avoiding the inevitable delay inherent in scheduling, performing, and interpreting the study when performed on a consultative basis.
- There is no disassociation between the individual who is interpreting the study and the clinical reality at the bedside. The intensivist performing the scan at the bedside can integrate knowledge of the history, physical, laboratory values, and other imaging results with the ultrasonography examination, whereas the off-line reader has a limited understanding of the case.
- The intensivist can repeat the examination as required to track the effects of therapy and the evolution of disease, and can perform limited or goal-directed examinations. The radiology and cardiology services have difficulty in performing repeated or limited studies.

Point-of-care ultrasonography is conceptually related to physical examination. The intensivist uses visual assessment, auscultation, and palpation on an ongoing basis to monitor the patient. Ultrasonography adds to traditional physical examination by allowing the intensivist to visualize the anatomy and function of the body in real time. Initial, repeated, and goal-directed ultrasonography is an extension of the physical examination that allows the intensivist to establish a diagnosis and monitor the condition of the patient on a regular basis.

THE COMPONENTS OF CRITICAL CARE ULTRASONOGRAPHY

The American College of Chest Physicians/La Société de Réanimation de Langue Française Statement on Competence in Critical Care Ultrasonography (ACCP/SRLF Statement) is a guide for the intensivist in setting goals of training.¹ The statement defines 5 modules of CCUS:

- Cardiac: basic and advanced levels
- Thoracic: lung and pleura
- Vascular access
- Vascular diagnostic: examination for deep venous thrombosis (DVT)
- Abdominal: screening examination

Another consensus statement that was sponsored by the major critical societies, The Expert Round Table on Ultrasound in ICU International Expert Statement on Training Standards for Critical Care Ultrasonography, offers guidance for the intensivist regarding the design of training.² The cognitive base of CCUS is available through review articles, textbooks, and original literature in the major journals. Training in image acquisition and interpretation is available in courses sponsored by the professional societies. Part of the training is performed at the bedside under the supervision of expert faculty, as scanning patients is not practical in standard course design. Competence in

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