Bedside Ultrasonography Applications for Hospitalists

James Croffoot, MD[a,*], Adam Kittai, MD[a], Grant Berry, MD[b]

KEYWORDS

• Bedside ultrasonography • Point-of-care ultrasonography
• Hand-carried ultrasonography • Bedside procedures

HOSPITAL MEDICINE CLINICS CHECKLIST

1. Bedside ultrasonography is used to guide invasive procedures as well as to answer specific diagnostic and management questions.
2. Focused cardiac ultrasonography can prevent diagnostic delays and inform management decisions, especially in patients who are in shock, have heart failure, or have indeterminate volume status.
3. After limited training, providers can accurately detect left atrial enlargement, right and left ventricular enlargement, decreased systolic function, pericardial effusion, and inferior vena cava collapsibility.
4. Thoracic ultrasonography is better than the traditional physical examination and chest radiograph in evaluating acute respiratory failure and has similar accuracy to computed tomography scans.
5. Bedside ultrasonography can be reliably used to detect hydronephrosis.
6. Providers can accurately detect lower extremity deep venous thrombosis with bedside ultrasonography after limited training.
7. Point-of-care ultrasonography can help to diagnose cellulitis, soft tissue abscesses, and necrotizing fasciitis.

Video content accompanies this article at http://www.medical.theclinics.com.

Disclosures: The authors have no conflicts of interest or funding sources to disclose.
[a] Medical Service, Veterans Affairs Medical Center, 50 Irving Street, Northwest, Washington, DC 20002, USA; [b] Department of Emergency Medicine, George Washington University Hospital, 900 23rd Street, Northwest, Washington, DC 20037, USA
* Corresponding author.
E-mail address: james.croffoot@va.gov

Hosp Med Clin 6 (2017) 112–130
http://dx.doi.org/10.1016/j.ehmc.2016.08.003
2211-5943/17/Published by Elsevier Inc.

DEFINITIONS

What is point-of-care ultrasonography?

The use of ultrasonography in medicine has expanded exponentially since its first medical applications in the 1950s.[1] Point-of-care ultrasonography is both an emerging field and an established concept. For the purposes of this article the terms point-of-care ultrasonography, bedside ultrasonography, and hand-carried ultrasonography are interchangeable. All suggest that ultrasonography is being used by providers to inform real-time diagnostic and management decisions. This definition is in contrast with referral ultrasonography, which traditionally involves a requesting provider, a technologist, and an expert interpreter.[2]

PATIENT ASSESSMENT

What impact does bedside ultrasonography have on the traditional history and physical examination?

The bedside interaction between a hospitalist and patient has evolved in many ways, some of which may compromise traditional physical examination skills. Factors like ambient noise, monitors, patient obesity, and immobility can make traditional physical examination maneuvers ineffective.[3] Furthermore, many bedside ultrasonography findings, such as left atrial enlargement, small pleural effusions, and asymptomatic left ventricular dysfunction, are not detectable by history and physical examination. These factors suggest that bedside ultrasonography can have a positive impact on patient assessment, in addition to the traditional history and physical examination.

Does the use of bedside ultrasonography affect admitting diagnoses?

One study involving medical residents evaluated adding bedside ultrasonography of the heart and abdomen to their usual assessments on patient admission to the medical wards. Adding ultrasonography affected the admitting diagnoses in more than one-third of hospital admissions. Furthermore, the ultrasonography assessment took on average less than 11 minutes to perform.[4] For hospitalists, the use of beside ultrasonography has the potential to increase diagnostic accuracy without involving significant time expenditure.

What specific systems can bedside ultrasonography evaluate?

There are multiple systems that bedside ultrasonography can evaluate. The use of bedside ultrasonography for cardiopulmonary assessment has great potential for hospitalists. In experienced hands, lung ultrasonography outperforms auscultation and chest radiography for diagnosing pleural effusions, alveolar consolidations, pneumothoraxes, and alveolar interstitial syndromes.[5–9] In addition, adding bedside ultrasonography to the physical examination has also been shown to improve hospitalists' assessment of left ventricular function, cardiomegaly, and pericardial effusion.[10,11]

Similarly, bedside ultrasonography can improve hospitalists' ability to make volume assessments. In one study of outpatients with heart failure, providers trained in bedside ultrasonography outperformed their counterparts who relied on history and