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Introduction: Point-of-Care Ultrasound in the Emergency Department: Past, Present, and Future **xvii**

Alexis Salerno and Michael Gottlieb

Ultrasound Physics **711**

Hamid Shokoohi, David Chu, and Nour Al Jalbout

With the growing use of point-of-care ultrasound (POCUS) in various clinical settings, it is essential for users of ultrasound to have a thorough understanding of the basics of ultrasound physics, including sound wave properties, its interaction with various tissues, common artifacts, and knology. The authors introduce and discuss these concepts in this article, with a focus on clinical implications.

Cardiac Point-Of-Care Ultrasound: An Emergency Medicine Review **731**

Stephen Alerhand, Robert James Adrian, and Lindsay Anne Taylor



Video content accompanies this article at <http://www.emed.theclinics.com>.

Cardiac point-of-care ultrasound (POCUS) can make critical diagnoses and monitor the response to interventions. In contrast with consultative echocardiography, cardiac POCUS serves to answer a specific clinical question. This imaging modality can be used to evaluate for left ventricular systolic and diastolic dysfunction, pericardial effusion and tamponade, acute and chronic right ventricular dysfunction, valvular dysfunction, and cardiac activity in cardiac arrest.

Airway and Thoracic Ultrasound **755**

Martin Demant, Paul Koscumb, and Elaine Situ-LaCasse


Airway and thoracic ultrasound applications can provide critical information to improve patient safety for procedures and management of pulmonary conditions. Emergency physicians should utilize airway ultrasound in the preparation for an anatomically and/or physiologically difficult airway, which may include site demarcation for surgical airway planning. Thoracic ultrasound is useful in the prompt evaluation of a dyspneic patient. This article underscores the crucial role of airway and thoracic ultrasound in

emergency medicine, emphasizing its utility for assessing difficult airways, planning surgical airways, and promptly evaluating dyspneic patients.

Gastrointestinal and Biliary Point-of-Care Ultrasound

773

Sara Damewood, Maytal Finberg, and Margaret Lin-Martore


 Video content accompanies this article at <http://www.emed.theclinics.com>.

Point-of-care ultrasound has been shown to have excellent diagnostic accuracy for a variety of gastrointestinal and biliary pathologies. This review explores the evidence and scanning techniques for hypertrophic pyloric stenosis, intussusception, appendicitis, small bowel obstruction, diverticulitis, hernias, pneumoperitoneum, and biliary pathology.

Ultrasound of the Aorta

791

Kristine Jeffers, Seshidar Tekmal, and Melissa Myers


 Video content accompanies this article at <http://www.emed.theclinics.com>.

This article reviews the use of point-of-care ultrasound (POCUS) for evaluating the aorta from anatomy and image acquisition to the diagnosis of aortic pathology, including aneurysms and dissection. Ruptured aortic aneurysm and aortic dissection are associated with high mortality and often experience a delay in time to diagnosis. Traditionally diagnosis was made through computed tomography which takes time and removes the patient from the emergency department. Incorporating POCUS into the evaluation of patients with suspected aortic pathology allows for rapid, accurate diagnosis and earlier definitive treatment.

Vascular Ultrasound

805

Meaghan K. Frederick, Lori A. Stolz, and Petra E. Duran-Gehring

 Video content accompanies this article at <http://www.emed.theclinics.com>.

Vascular point-of-care ultrasound is a useful tool for emergency department (ED) clinicians to evaluate lower extremity pain and swelling. It can quickly and safely detect deep vein thrombosis, a serious condition that can lead to pulmonary embolism and post-thrombotic syndrome as well as diagnose pseudoaneurysm, hematoma, and acute arterial occlusion, a vascular emergency that requires urgent surgical intervention. Point-of-Care Ultrasound can be a useful tool for the evaluation of ED patients with vascular emergencies.

Genitourinary Ultrasound

819

Daniel J. Kim, Colin R. Bell, and Gillian Sheppard

Renal and genitourinary (GU) complaints are common reasons for presentation to the emergency department (ED). This article reviews the approach to renal, bladder, and testicular point-of-care ultrasound (POCUS) with specific discussions of commonly encountered ED

pathology. It presents algorithms highlighting the clinical integration of renal and GU POCUS into the evaluation and management of these patients.

Clinical Ultrasound in Obstetrics and Gynecology 839

Jackie Shibata and Yiju Teresa Liu

Point-of-care ultrasound is a useful tool in the evaluation of women with pelvic complaints in the emergency department. Transabdominal and transvaginal approaches may be employed to assess a variety of obstetric or gynecologic pathologies.


Skin, Soft Tissue, and Musculoskeletal Ultrasound 863

Amy Marks, Evelyn Schraft, and Michael Gottlieb

Point-of-care ultrasound may be used to assist in the diagnosis of skin, soft tissue, and musculoskeletal concerns in the emergency department. Frequently, linear or curvilinear probes are used to perform these studies and ultrasound may be used to assist in common emergency department procedures related to these conditions.

Ocular Ultrasound 891


Valerie A. Pierre, Tierra Smith, and Alexis Salerno

 Video content accompanies this article at <http://www.emed.theclinics.com>.

Point-of-care ultrasound may be used to assist in the diagnosis of ocular complaints in the emergency department. With the use of a linear probe, the emergency physician can view anterior and posterior chamber structures of the patient's eye and evaluate for signs of pathology.

Ultrasound-Guided Nerve Blocks 905


David A. Martin, Henry Ashworth, and Arun Nagdev

 Video content accompanies this article at <http://www.emed.theclinics.com>.

Ultrasound-guided nerve blocks serve as a valuable component of multimodal pain management for acutely injured patients in the emergency department and offer a potentially more efficient alternative to time-consuming procedural sedation.

Common Ultrasound-Guided Procedures 927

Tiffany Fong, Harry Heverling, and Randall Rhyne

 Video content accompanies this article at <http://www.emed.theclinics.com>.

Ultrasound guidance is fundamental to procedural safety and success. For many emergency department (ED) procedures, the use of ultrasound improves first-pass success rate, time-to-completion, and complication rate when compared with traditional landmark-based techniques. Once

learned, the general principles of ultrasound guidance may be adapted across a broad range of bedside procedures.

Resuscitative Ultrasound and Protocols

947

Judy Lin, Javier Rosario, and Nicholas Saltarelli



Video content accompanies this article at <http://www.emed.theclinics.com>.

The management of patients in shock or arrest is a critical aspect of emergency medicine and critical care. Rapid and accurate assessment is paramount in determining the underlying causes and initiating timely interventions. This article provides a summary of essential ultrasound protocols for the critically ill patient including the extended focused assessment with sonography for trauma (EFAST), rapid ultrasound for shock and hypotension (RUSH), and sonography in hypotension and cardiac arrest in the emergency department (SHoC-ED).

Ultrasound Administration and Reimbursement

967

Christopher Thom and Jason Nomura

One cannot successfully employ point-of-care ultrasound (POCUS) without a process to provide support and guidance. POCUS administration is a multifaceted topic that demands the utmost attention from those responsible for program implementation and long-term execution. This article delves into POCUS administration and is meant to serve as a guide for the practitioner seeking to start, maintain, or augment their POCUS program.