

## From the Desk of the Editor

# Critical Care Ultrasonography: essential skill for a bedside physician.

Gentle S Shrestha

Critical care ultrasonography (CCUS) is a bedside technique performed by the clinician at point of care. Conceptually, CCUS functions as an extension of traditional physical examination by allowing the intensivist to visualize the anatomy and function of various organ systems in real time. It overcomes the limitations of ultrasonography performed by radiology or cardiology services on consultative basis. The inevitable delay in obtaining the study is avoided and the dissociation between the individual interpreting the study and the physician treating the patient at bedside is eliminated. The beauty of CCUS lies in that, the focused examinations can be repeated as required at bedside, without the need to transfer to radiology suite and without additional exposure to radiation. The repeat examination can track effects of therapy and evolution of disease with time.<sup>1</sup>

CCUS is evolving from an optional to an indispensable tool for managing critically ill patients. General CCUS incorporates competence in pleural, lung, abdominal and vascular ultrasonography. Basic critical care echocardiography incorporates qualitative and target oriented ultrasonographic cardiac evaluation at bedside.<sup>2</sup> It is suggested that general CCUS and basic critical care echocardiography should be mandatory in the curriculum of ICU physicians. Critical Care Societies should support the implementation of training in CCUS in its own country<sup>3</sup> and should work to achieve national consensus on standards of training, quality assurance and maintenance of competence in CCUS for intensivists and critical care trainees.<sup>4</sup>

CCUS can function as a valuable adjunct to physical examination for evaluation of critically ill patient with undifferentiated shock, which can be one of the most challenging issues in daily practice.<sup>5</sup> In ICU patients, bedside lung ultrasound has a considerably better diagnostic performance than chest X-ray for the diagnosis of common pathological conditions and may serve as an alternative to thoracic CT.<sup>7</sup> Ultrasonography of optic nerve sheath diameter has a good diagnostic accuracy for detecting intracranial hypertension.<sup>8</sup>

Beyond the convincing diagnostic yield of CCUS, it can be a useful bedside tool to guide treatment and to follow the response of therapy. Ultrasonographic measurement of respiratory variation of inferior vena cava diameter is useful in predicting fluid responsiveness in ICU patients.<sup>9</sup> Bedside lung ultrasound can be a tool to assess the response to antibiotic therapy in patients with ventilator-associated pneumonia.<sup>10</sup> Diaphragm dysfunction, assessed by bedside ultrasonography has been shown to predict patients with weaning difficulty and weaning failure.<sup>11</sup>

Application of CCUS can enhance safety of common bedside

procedures like central venous cannulation,<sup>12</sup> arterial catheterization<sup>13</sup> and thoracocentesis.<sup>14</sup> CCUS can have impact on clinical decision making and therapeutic management.<sup>15,16,17</sup>

CCUS is a teachable and readily learnable skill. Simulation and web-based technologies, when available, can be used for standardization of both ultrasound skills training and competency assessment.<sup>18</sup>

CCUS can be valuable in resource-limited settings where the diagnostic imaging modalities are often constrained and frequently limited to plain film radiography. As ultrasound machines become more portable and affordable, and with the advent of low-cost telemetry, CCUS may have a transformative effect on critical care in resource-limited settings.<sup>19</sup>



Dr. Gentle Sunder Shrestha  
MD, FACC, EDIC, FCCP  
Intensivist & Anaesthesiologist  
Department of Anaesthesiology  
Tribhuvan University Teaching Hospital  
Maharajgunj, Kathmandu, Nepal  
gentlesunder@hotmail.com

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