

Metodología *Hands on* en el aprendizaje de ecografía focal en el paciente grave.

*Point of Care Ultrasound “POCUS”*

Julio Pontet MD, PhD.

Marzo 2023



# and in medicine



specific acoustic impedance between two adjacent materials the higher will be the percentage of energy reflected. This fact makes a liquid-gas interface almost impenetrable to ultrasound and is important in relation to gas-filled intestine within the abdominal cavity.

(2) Much of the energy which is not reflected is transmitted



Donald, el padre de la ecografía, era un clínico, un obstetra.  
El nacimiento del ultrasonido es "focalizado" . 1958

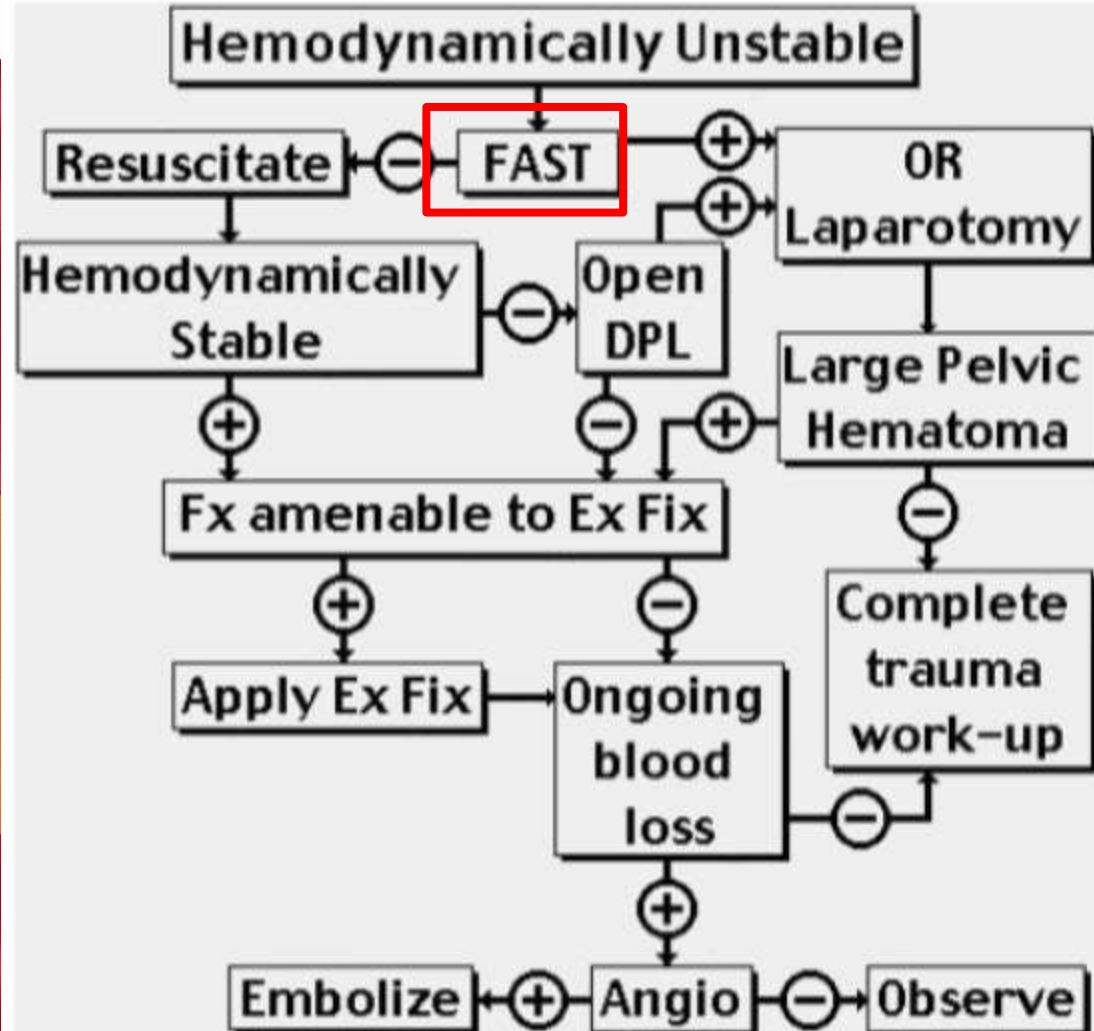
(3) Cavitation may be produced in a material which is present at the lower ultrasonic frequencies. This phenomenon, whose mechanism is not yet fully understood, can develop when the negative sound pressure exceeds the ambient hydrostatic pressure, giving rise to small temporary voids in the material. Cavitation becomes increasingly difficult to produce



Advanced Trauma Life Support®  
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American College of Surgeons Committee on Trauma



**Hemodynamically Unstable  
Pelvic Injury**

Simplified Algorithm derived from :

Scalea T, Burgess A; Pelvic Fracture;  
pp.824-825; TRAUMA (eds Mattox,  
Feliciano, Moore); McGraw Hill, NY  
1999

REVIEW ARTICLE

CURRENT CONCEPTS

## Point-of-Care Ultrasonography

Christopher L. Moore, M.D., and Joshua A. Copel, M.D.

ULTRASONOGRAPHY IS A SAFE AND EFFECTIVE FORM OF IMAGING THAT has been used by physicians for more than half a century to aid in diagnosis and guide procedures. Over the past two decades, ultrasound equipment has become more compact, higher quality, and less expensive, which has facilitated the growth of point-of-care ultrasonography — that is, ultrasonography performed and interpreted by the clinician at the bedside. In 2004, a conference on compact ultrasonography hosted by the American Institute of Ultrasound in Medicine (AIUM) concluded that “the concept of an ‘ultrasound stethoscope’ is rapidly moving from the theoretical to reality.” This conference included representatives from 19 medical organizations; in November 2010, the AIUM hosted a similar forum attended by 45 organizations.<sup>1-3</sup> Some medical schools are now beginning to provide their students with hand-carried ultrasound equipment for use during clinical rotations.<sup>4</sup>

Although ionizing radiation from computed tomographic (CT) scanning is increasingly recognized as a potentially major cause of cancer, ultrasonography has been used in obstetrics for decades, with no epidemiologic evidence of harmful effects at normal diagnostic levels.<sup>5,6</sup> However, ultrasonography is a user-dependent technology, and as usage spreads, there is a need to ensure competence, define the benefits of appropriate use, and limit unnecessary imaging and its consequences.<sup>7-10</sup> This article provides an overview of the history and current status of compact, point-of-care ultrasonography, with examples and discussion of its use.

From the Departments of Emergency Medicine (C.L.M.) and Obstetrics, Gynecology, and Reproductive Sciences (J.A.C.) Yale University School of Medicine, New Haven, CT. Address reprint requests to Dr. Moore at the Department of Emergency Medicine, Yale University School of Medicine, 464 Congress Ave., Suite 260 New Haven, CT 06519, or at [chris.moore@yale.edu](mailto:chris.moore@yale.edu).

N Engl J Med 2011;364:749-57.

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ORIGIN


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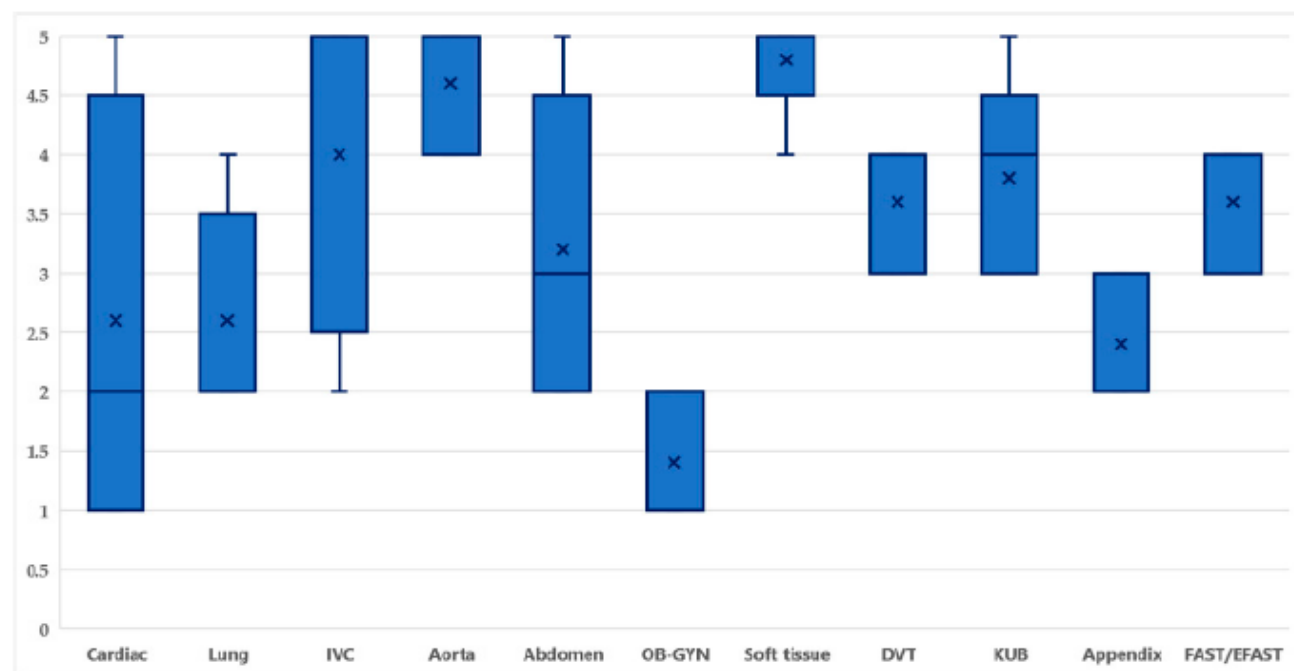
Daniel J.

Intensive Ca

Article

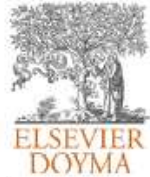
# Integrating Point of Care Ultrasound Education into Clinical Practice at the Emergency Department

Kamonwon Ienghong <sup>1</sup>, Lap Woon Cheung <sup>2,3</sup>, Somsak Tiamkao <sup>4</sup>, Vajarabhongsa Bhudhisawasdi <sup>1</sup>  
an



10002, Thailand;

**Figure 1.** Image quality score divided by area of POCUS examination. Abbreviation: inferior vena cava (IVC), obstetrics and gynecology (OB-GYN), deep venous thrombosis (DVT), kidney and urinary bladder (KUB), and focused assessment with sonography for trauma (FAST) scan/extended FAST (EFAST).



ARTÍCULO ESPECIAL

Documento de consenso para la formación en ecografía en Medicina Intensiva. Proceso asistencial, uso de la técnica y adquisición de competencias profesionales

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**PALABRAS CLAVE**

Ultrasonidos;  
Ecografía;  
Ecocardiografía;  
Medicina Intensiva;  
Cuidados Críticos

**Resumen** La ecografía se ha convertido en un instrumento imprescindible en la asistencia a los pacientes críticos. Su conocimiento, uso e instrucción requiere un posicionamiento por parte de las sociedades científicas implicadas en su desarrollo y aplicación.

Nuestros objetivos son determinar el uso de la técnica dentro de Medicina Intensiva, las situaciones clínicas donde su aplicación es recomendable, los niveles de conocimiento, la responsabilidad asociada y el proceso de aprendizaje, así como convertir la técnica ecográfica en un herramienta de uso habitual en todas las unidades de cuidados intensivos, en concordancia

- 
- Cada vez mas especialidades utilizan los ultrasonidos en su practica diaria:

- Cardiología
  - Ginecología/Obstetricia
  - Cirugía
  - Emergencias intrahospitalarias y prehospitalarias
  - Anestesia
  - Intensivistas
  - Traumatologos
  - Internistas
  - Neurologos
  - etc
- 

# CAMBIO DE PARADIGMA

1. EN LA PRACTICA CLINICA
2. EN EL DIAGNOSTICO
3. EN LAS DECISIONES TERAPEUTICAS
  
4. EN LA FORMACION / EDUCACION con aprendizaje 3.0 (eliminar learning 1.0 clásico)

*Tecnologia-globalizacion-comunicacion on time-knowmads-  
"aprendizaje invisible"*



~~QUIEN HACE EL US ???~~

**EL PROBLEMA CENTRO DEBE SER EL PACIENTE**



## Cardiac Examination: Stethoscope or Pocket Echo—Why Not Both?



The American Journal of Medicine, Vol 129, No 7, July 2016

- If I were a young physician beginning a career as a cardiologist, I would obtain a pocket echo and become an expert in its use!
  - James E. Dalen, MD, MPH
  - University of Arizona College of Medicine, Tucson, USA, Julio 2016



JAMA Cardiology | Special Communication

# Time to Add a Fifth Pillar to Bedside Physical Examination

Inspection, Palpation, Percussion, Auscultation,  
and Insonation

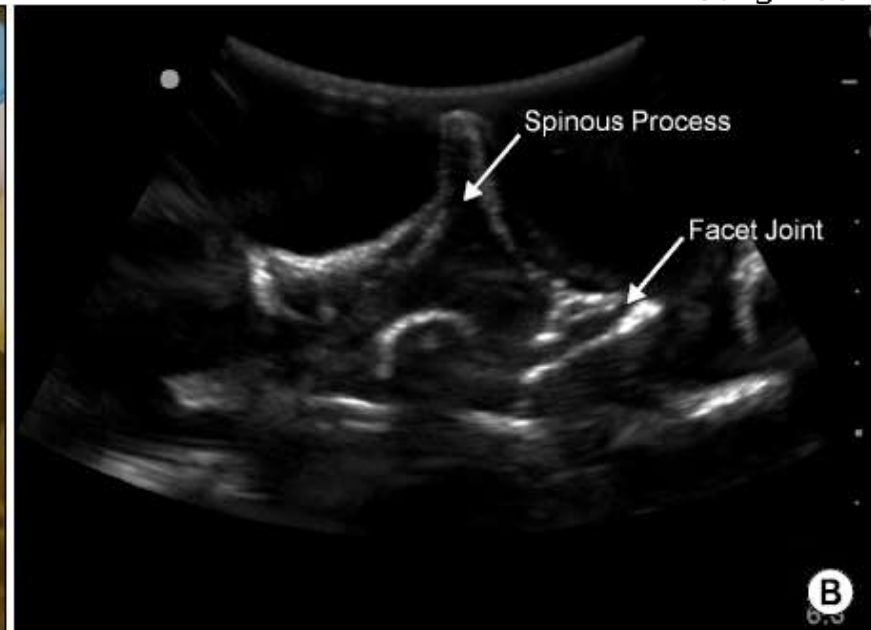
*JAMA Cardiol.* doi:10.1001/jamacardio.2018.0001  
Published online February 28, 2018.

# PROCESOS DE ENSEÑANZA APRENDIZAJE

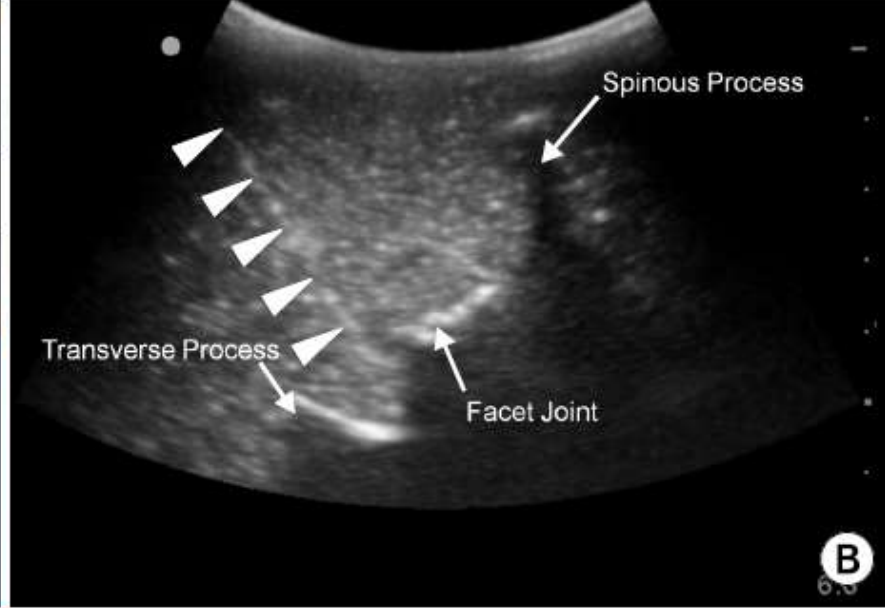
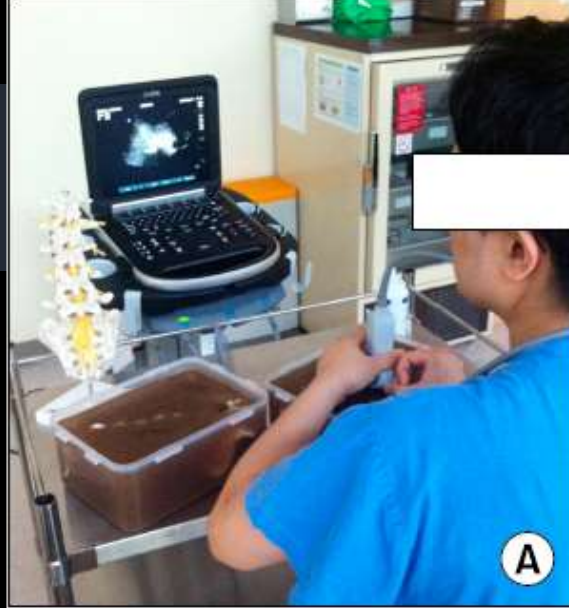
## Ultrasound Phantoms to Protect Patients from Novices

Department of Anesthesiology and Pain Medicine, Seoul St. Mary's Hospital, College of Medicine,  
The Catholic University of Korea, Seoul, Korea

Young Hoon Kim



Practicing first-time needle placement on a patient is usually **not** recommended.




RESEARCH ARTICLE

Open Access

# Skills acquisition for novice learners after a point-of-care ultrasound course: does clinical rank matter?

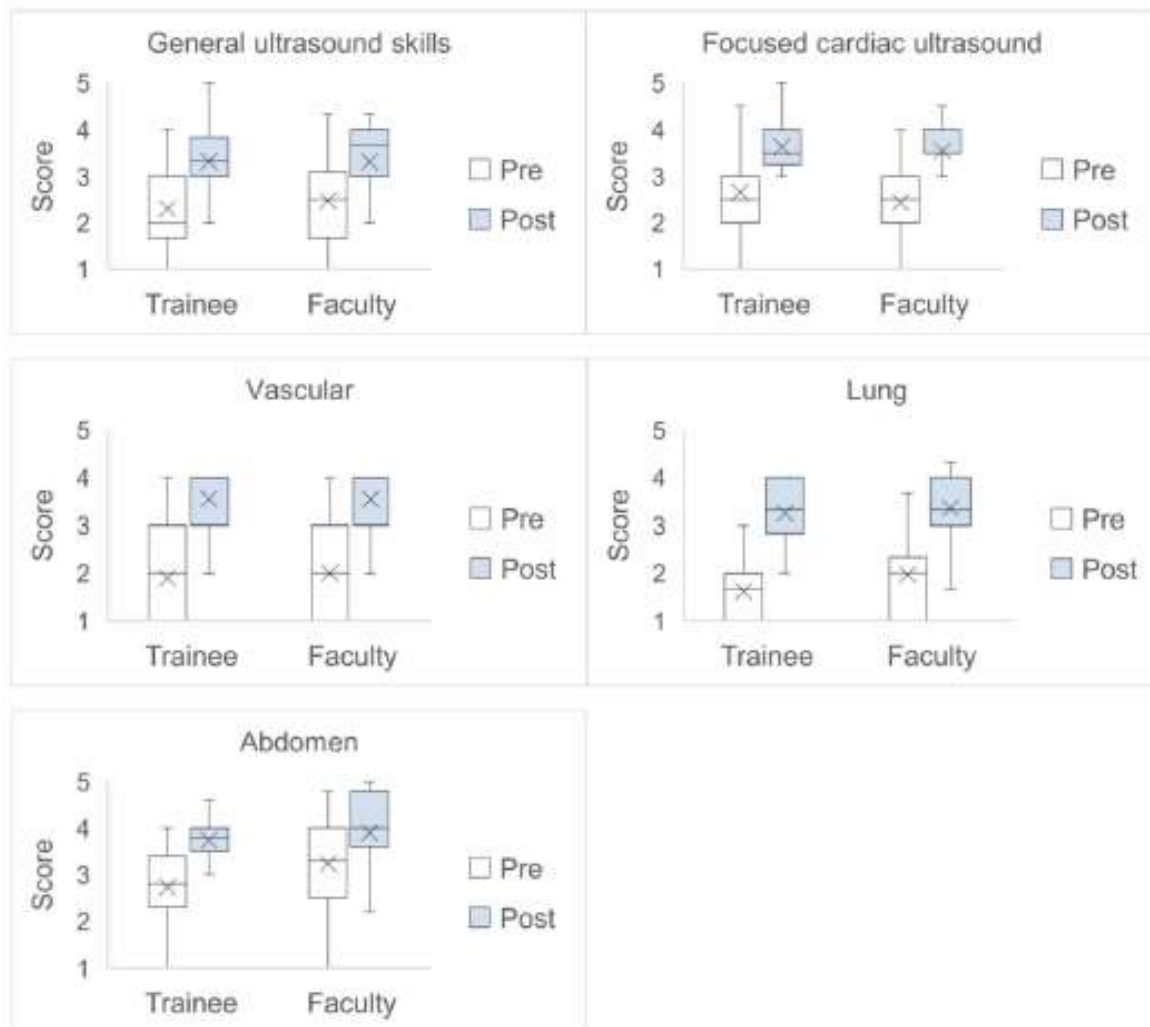


Toru Yamada<sup>1,2</sup>, Taro Minami<sup>3,4\*</sup> , Nilam J. Soni<sup>5</sup>, Eiji Hiraoka<sup>2</sup>, Hiromizu Takahashi<sup>6</sup>, Tomoya Okubo<sup>7</sup> and Juichi Sato<sup>1</sup>

**Table 1** Educational domains of the hands-on sessions

Domains	Main learning objectives
General principles and machine operation (included in each session)	Recognition of general principles and pitfalls of ultrasound Understanding differences in probes Recognition of adequate depth, gain and common artifacts
FOCUS (Sessions 1–3)	Acquisition of PLAX, PSAX, A4C, S4C, and IVC views Interpretation of LV systolic function, pericardial effusion, and IVC
Vascular (Session 4)	Identification of examination points on the lower extremity veins Performance of compression ultrasound study of the lower extremities
Lung/diaphragm (Session 5)	Recognition of normal lung ultrasound patterns (i.e., A-lines, sliding) Recognition of diaphragm and normal diaphragm function
Abdomen (Session 6)	Identification of normal abdominal structures (i.e., kidney, gallbladder, aorta, bladder)

**Abbreviations:** FOCUS Focused cardiac ultrasound, PLAX Parasternal long-axis view, PSAX Parasternal short-axis, mid-ventricular level view, A4C Apical 4-chamber view, S4C Subcostal 4-chamber view, IVC Inferior vena cava, LV Left ventricular



**Fig. 3** Box plot of physician survey results stratified by trainee and faculty.

## EDUCATIONAL ADVANCES

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# Pilot Point-of-Care Ultrasound Curriculum at Harvard Medical School: Early Experience

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**Fidencio Saldana, MD<sup>\*‡</sup>**

**Donald DiSalvo, MD<sup>\*¶</sup>**

**Navin Kumar, MD<sup>\*§</sup>**

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**Wilma Chan, MD<sup>\*†</sup>**

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DOI: 10.5811/westjem.2016.8.31387





**"Our conference brings together educators from anatomy and physiology to share experiences, expertise and set the course for incorporation of ultrasound into medical education."**





# Ultrasound Curricula in Undergraduate Medical Education

## A Scoping Review

*Usman Tarique, BHSc, Brandon Tang, BSc, Manni Singh, BSc, Kulamakan Mahan Kulasegaram, PhD, Jonathan Ailon, MD, FRCPC, MSc, BSc (Hon)* 

The clinical applications of point-of-care ultrasound (US) have expanded rapidly over the past decade. To promote early exposure to point-of-care US, there is widespread support for the integration of US curricula within undergraduate medical education. However, despite growing evidence and enthusiasm for point-of-care US education in undergraduate medical education, the curricular design and delivery across undergraduate medical education programs remain variable without widely adopted national standards and guidelines. This article highlights the educational and teaching applications of point-of-care US with a focus on outcomes. We then review the evidence on curricular design, delivery, and integration and the assessment of competency for point-of-care US in undergraduate medical education.

**Key Words**—curricula; education; point-of-care ultrasound; ultrasound; undergraduate

# Medical students

Open Access Original  
Article

DOI: 10.7759/cureus.25141

## Point-of-Care Ultrasound Education During a Pandemic: From Webinar to Progressive Dinner-Style Bedside Learning

lotzkus<sup>1</sup>, Paul M.

ation and Continuing  
edicine, Indiana University

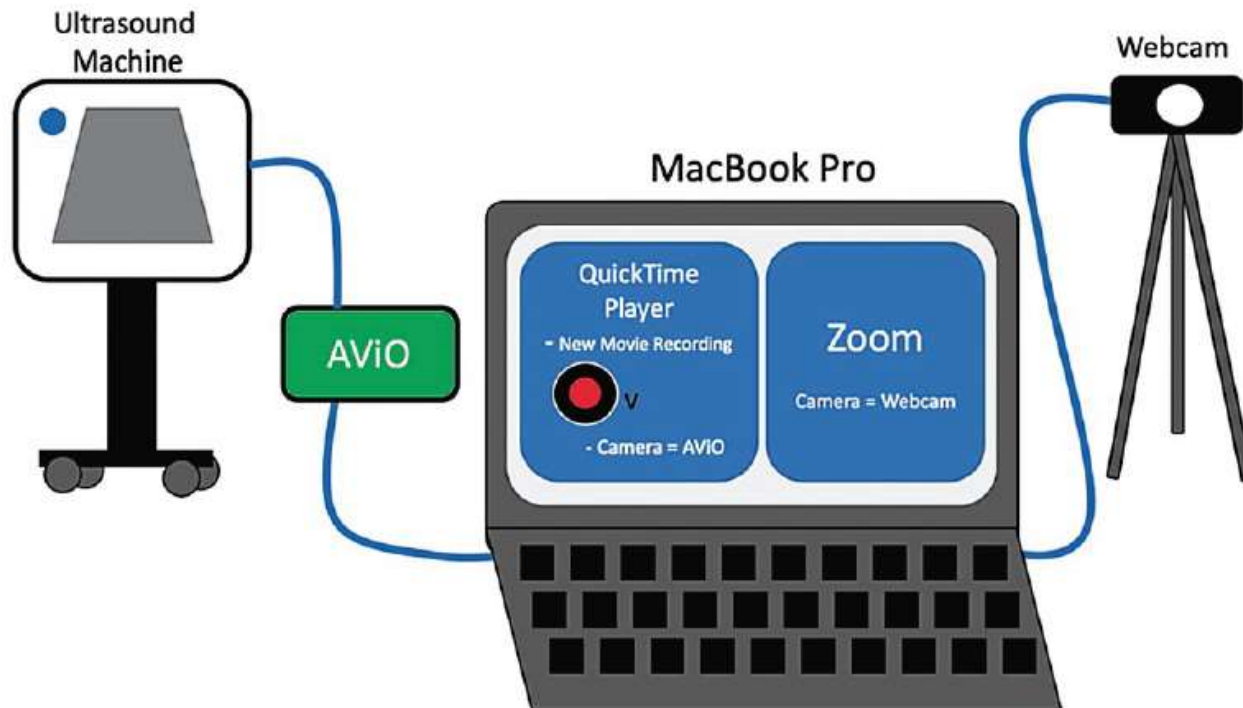


FIGURE 1: Ultrasound machine and webcam set-up



# Evaluation of a new goal-directed training curriculum for point-of-care ultrasound in the emergency department: impact on physician self-confidence and ultrasound skills

Di Shi<sup>1</sup> · Jihai Liu<sup>1</sup> · Jun Xu<sup>1</sup> · Huadong Zhu<sup>1</sup> · Xuezhong Yu<sup>1</sup>

# Point-of-Care Ultrasound Curriculum for Internal Medicine Residents During the COVID-19 Era: A Pilot Study

Review began 04/30/2022

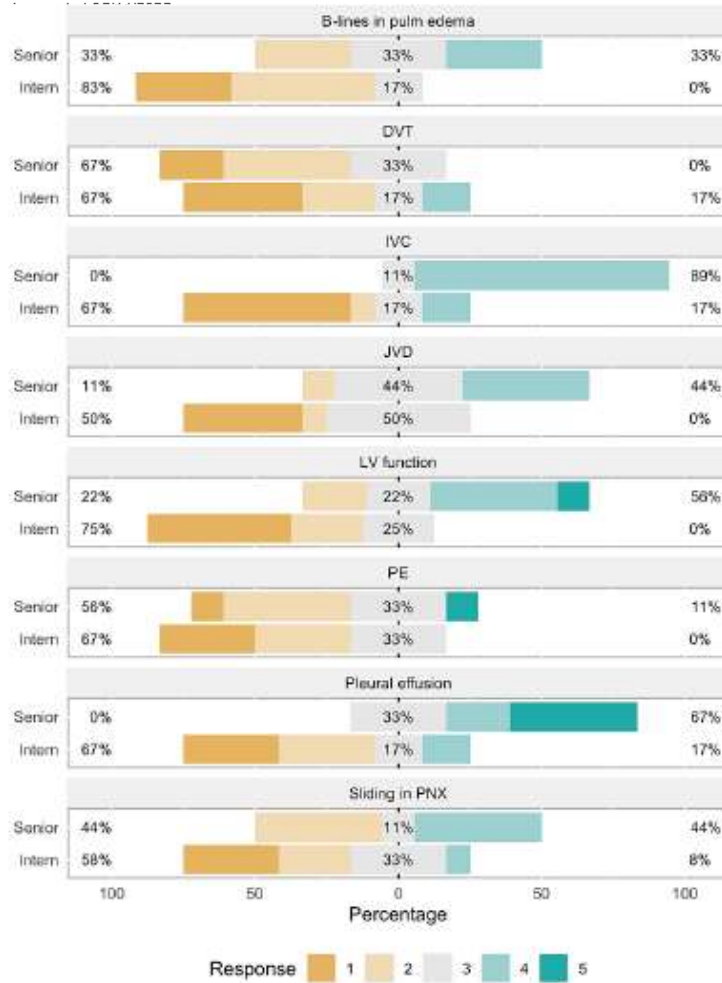


FIGURE 3: Bar graph showing pre-curriculum test results

This image depicts that majority of the interns did not score well as compared to the senior residents

PNX - Pneumothorax; PE - Pulmonary embolism; IVC - Inferior vena cava; JVD - Jugular venous distention; LV - Left ventricle

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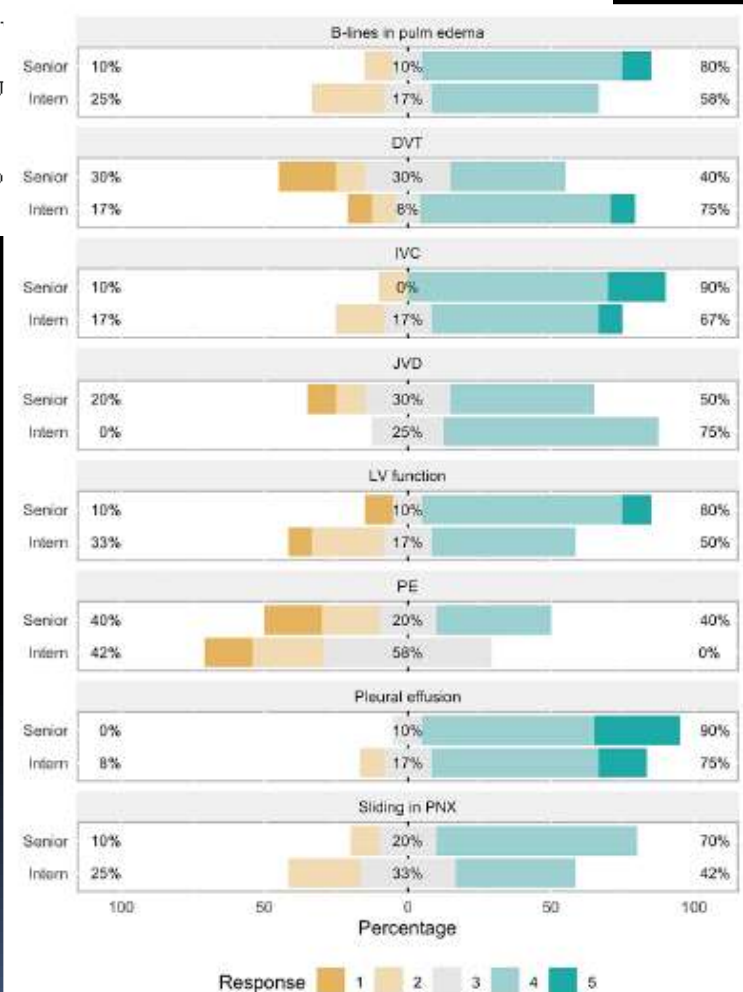


FIGURE 4: Bar graph representing post-curriculum test

This image shows an improvement in scores especially for interns compared to senior residents, but the results were not statistically significant.

# Piloting a Graduate Medical Education Point-of-Care Ultrasound Curriculum

Robinson M. Ferre<sup>1</sup>, Frances M. Russell<sup>1</sup>, Dina Peterson<sup>2</sup>, Bitu Zakeri<sup>3</sup>, Audrey Herbert<sup>1</sup>, Benjamin Nti<sup>1</sup>

		Very	Somewhat	Neutral	Somewhat not	Not at all	p-value
Undifferentiated hypotension	Pre		8 (33.3%)	1 (4.2%)	9 (37.5%)	6 (25%)	<0.001>
	Post	3 (15.8%)	13 (68.4%)	3 (15.8%)			
Cardiac arrest	Pre		7 (29.2%)	1 (4.2%)	6 (25%)	10 (41.7%)	<0.001>
	Post	5 (26.3%)	10 (52.6%)	3 (15.8%)	1 (5.3%)		
Heart failure diagnosis and management	Pre		8 (33.3%)	1 (4.2%)	9 (37.5%)	6 (25%)	<0.001>
	Post	7 (36.8%)	8 (42.1%)	4 (21.1%)			
Undifferentiated shortness of breath	Pre		2 (8.3%)	4 (16.7%)	10 (41.7%)	8 (33.3%)	<0.001>
	Post	7 (36.8%)	7 (36.8%)	5 (26.3%)			
Soft tissue abscess detection	Pre	2 (8.3%)	5 (20.8%)	3 (12.5%)	6 (25%)	8 (33.3%)	0.005*
	Post	9 (47.4%)	4 (21.1%)	2 (10.5%)	1 (5.3%)	3 (15.8%)	

Wilcoxon signed ranked sum test was used for comparison. \*Indicates statistically significant results. Pre n = 24, post n = 19.

**TABLE 3: Comparison of pre- and post-curriculum self-reported resident comfort level with POCUS based on the indication.**

POCUS: point-of-care-ultrasound.

## The effect of e-learning on point-of-care ultrasound education in novices

Wan-Ching Lien, Phone Lin, Chih-Heng Chang, Meng-Che Wu & Cheng-Yi Wu

To cite this article: Wan-Ching Lien, Phone Lin, Chih-Heng Chang, Meng-Che Wu & Cheng-Yi Wu (2023) The effect of e-learning on point-of-care ultrasound education in novices, Medical Education Online, 28:1, 2152522, DOI: [10.1080/10872981.2022.2152522](https://doi.org/10.1080/10872981.2022.2152522)

To link to this article: <https://doi.org/10.1080/10872981.2022.2152522>



Zoom In Zoom Out Reset

Is there any free fluid in the peritoneal cavity?



Zoom In Zoom Out Reset

Is there any free fluid in the peritoneal cavity?



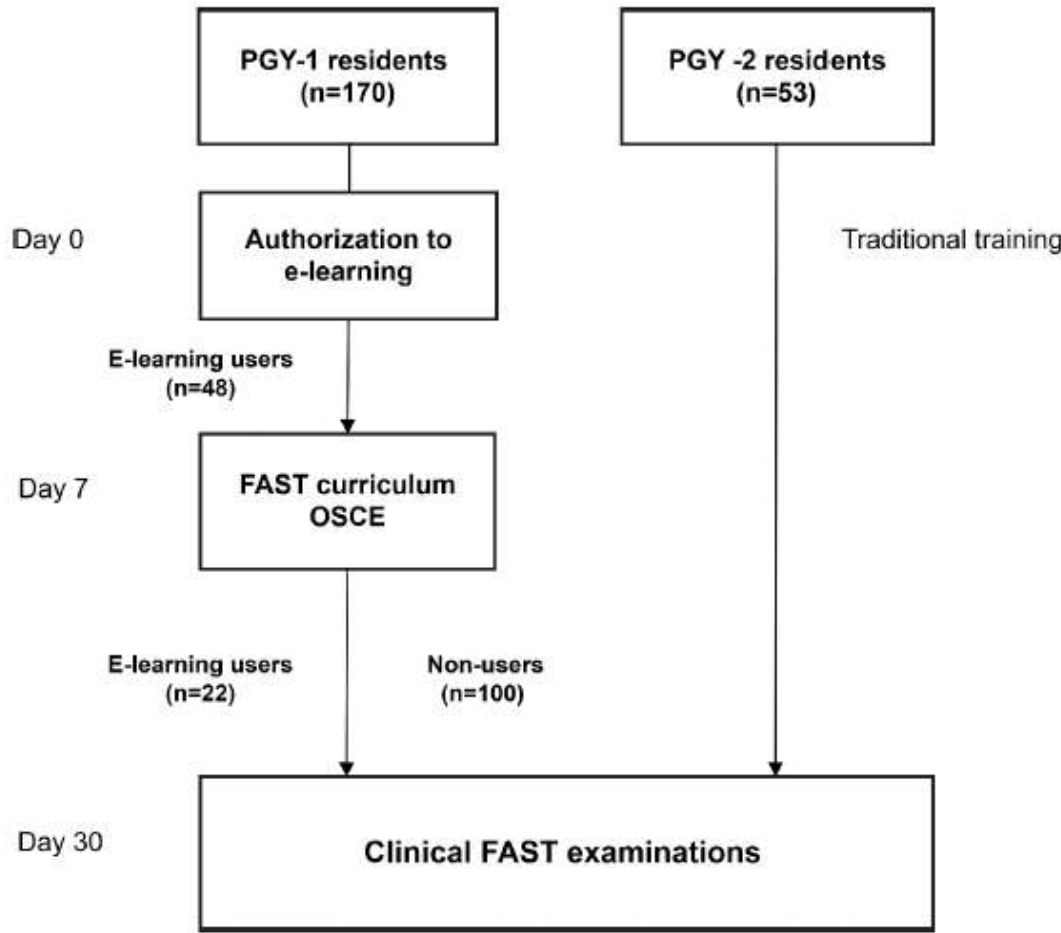
# Medical Education Online

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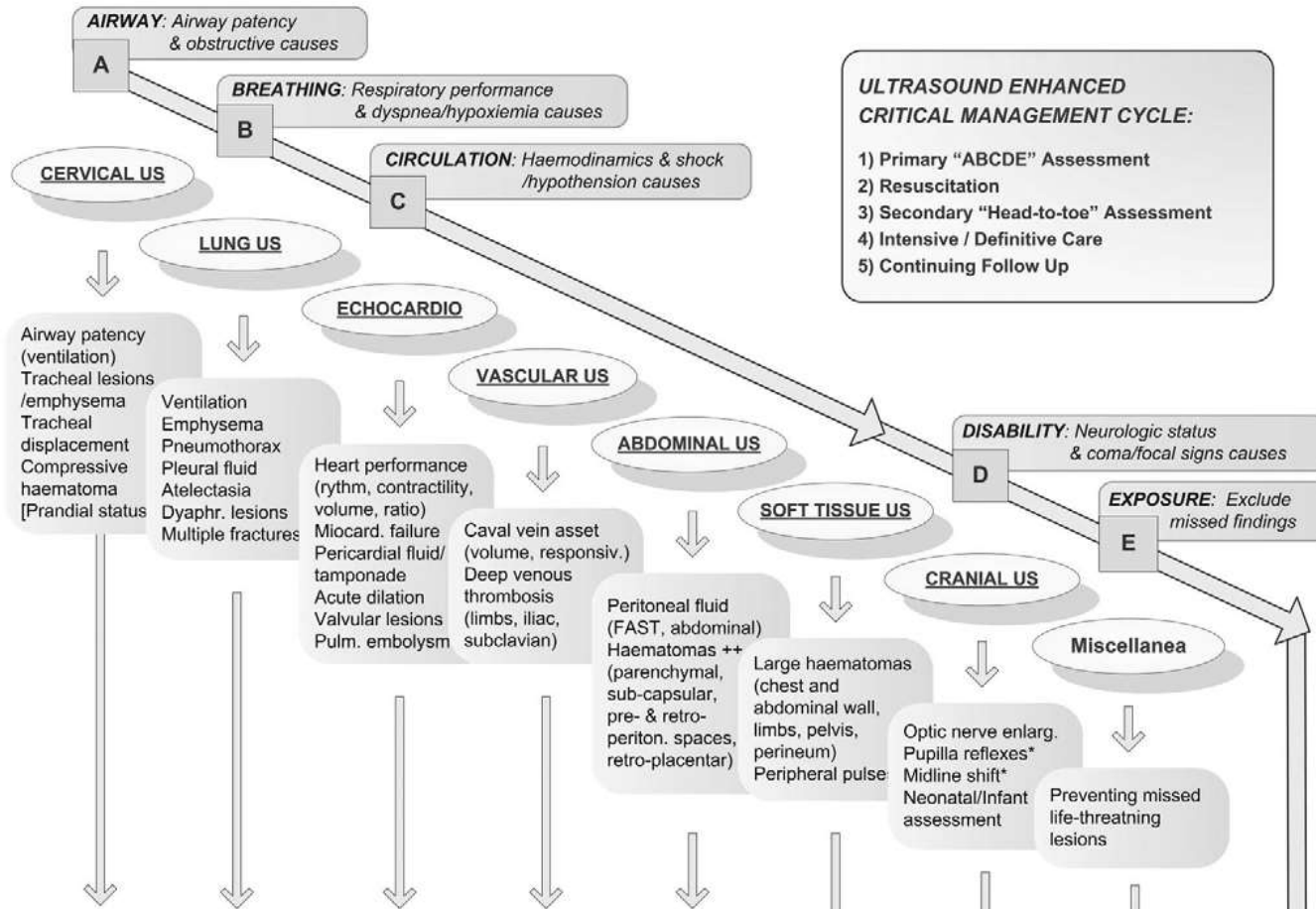
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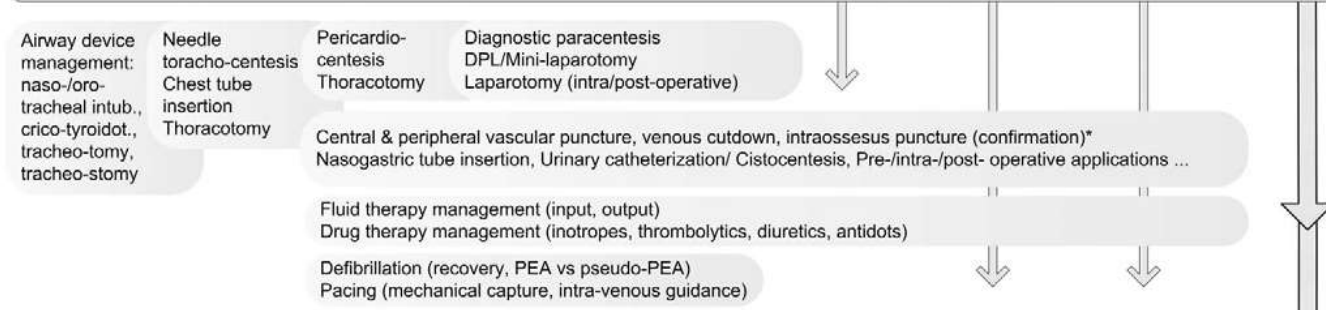


# "LEVEL 1" ULTRASOUND LEARNING GOALS in TRAUMA CRITICAL CARE

## 1. "ABCDE" PRIMARY ASSESSMENT (Vital signs, anomalies, detectable causes, responses, complications)



## 2. "ABCDE" RESUSCITATION (Electric, Fluid/Drug, Interventional)





**Table 7.** Diagnostic tools for differential diagnoses.

<b>Patients Who Came to Emergency Department for Chest Pain and Dyspnea</b>	
<b>Diagnostic Suspicion</b>	<b>Role of Diagnostic Tests and POCUS</b>
Acute coronary syndrome (ACS)	Performing ECG and troponin assay
Aortic dissection	The gold standard is represented by CT angiography or trans-oesophageal echocardiography, while POCUS can help in cases where these tests cannot be performed
Pericardial effusion and cardiac tamponade	POCUS is one of the tests that allows diagnosis
Pulmonary embolism	The gold standard is represented by CT angiography, and POCUS can select which patients should undergo this examination
Acute pulmonary edema	POCUS is one of the tests that allows diagnosis
PNX	Chest X-ray is the first-level examination, and thoracic ultrasound is quite accurate. E-FAST is the first choice for the trauma patient.
Pleural effusion or hemothorax	Chest X-ray is the first-level examination, and thoracic ultrasound is quite accurate. E-FAST is the first choice for the trauma patient.
Pneumonia	Blood tests with inflammatory indices and a chest X-ray comprise the first level of examination, and thoracic ultrasound is quite accurate.
COVID-19 pneumonia	The findings of ultrasound changes suggestive of infection can be isolated early; chest CT remains the most accurate examination.
Exacerbation of asthma and COPD	In this case, the finding of a normal type A pattern without pleural or parenchymal changes can be suggestive of these pathologies.

Review

# Use of POC Department

Andrea Piccioni <sup>1,\*</sup>  
Benedetta Simeoni <sup>1</sup>

10,

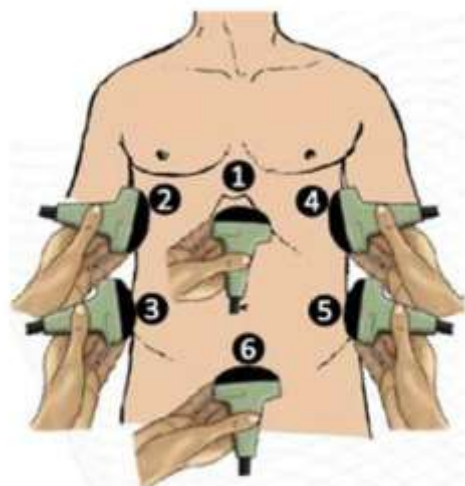
RESEARCH

Open Access



## Impact of ultrasound on management for dyspnea presentations in a Rwandan emergency department

Olivier Felix Umuhire<sup>1\*</sup>, Michael B. Henry<sup>2</sup>, Adam Carl Levine<sup>3</sup>, Giles N. Cattermole<sup>4</sup> and Patricia Henwood<sup>5</sup>



**Fig. 2** Schematic drawing of the ultrasound probe positions during the FAST examination [17]

### Table 4 Pre- and post-POCUS diagnosis accuracy compared to discharge diagnosis

Discharge diagnosis	<i>N</i>	Pre-POCUS Correct % ( <i>n</i> )	Post-POCUS Correct % ( <i>n</i> )	<i>P</i> value
ADHF	26	53.8% (14)	100% (26)	0.0004
Pneumonia	21	38.0% (8)	85.7% (18)	0.0015
EPTB	7	14.2% (1)	85.7% (6)	0.0075
Massive PE	4	25.0% (1)	100% (4)	0.0989
Pleural effusion	10	10.0% (1)	100% (10)	0.0002
COPD	1	0% (0)	100% (1)	0.7094

Contents lists available at [ScienceDirect](#)

## Air Medical Journal

journal homepage: <http://www.airmedicaljournal.com/>



Literature Review

### Articles That May Change Your Practice: Prehospital Ultrasound

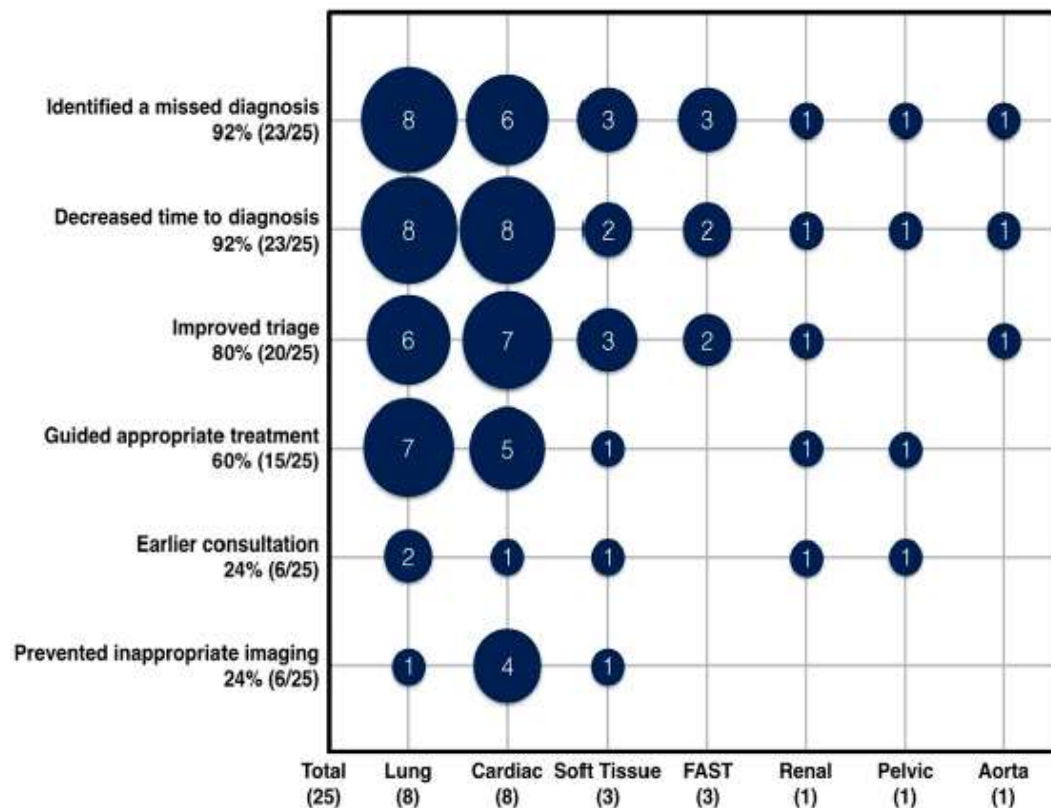
Russell D. MacDonald, MD, MPH, FCFP, FRCPC, Selma Alqattan, MB BCh, BAO, SBEM

# Point-of-care Ultrasound in Morbidity and Mortality Cases in Emergency Medicine: Who Benefits the Most?

Andrew J. Goldsmith, MD, MBA\*\*  
 Hamid Shokoohi, MD MPH\*\*†  
 Michael Loesche, MD, PhD\*\*‡  
 Ravish C. Patel\*\*§  
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Section Editor: Jason Fields, MD  
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 Full text available through open access at <http://escholarship.org/doi/10.5811/westjem.2020.7.47486>



**Figure 2.** Perceived impact of point-of-care ultrasound: applications versus mechanism by which POCUS may have reduced or prevented morbidity and mortality (N = 25 cases, multiple mechanisms per case were possible).

FAST, focused assessment with sonography in trauma.

Utilidad de POCUS

Nektaria Xirouchaki  
Eumorfia Kondili  
George Prinianakis  
Polychronis Malliotakis  
Dimitrios Georgopoulos

## Impact of lung ultrasound on clinical decision making in critically ill patients

Received: 21 June 2013  
Accepted: 4 October 2013  
Published online: 25 October 2013  
© Springer-Verlag Berlin Heidelberg and ESICM 2013

**Take-home message:** In mechanically ventilated critically ill patients lung ultrasound has a significant impact on clinical decision making and therapeutic management.

**Electronic supplementary material**  
The online version of this article (doi:10.1007/s00134-013-3133-3) contains supplementary material, which is available to authorized users.

**Abstract Purpose:** To assess the impact of lung ultrasound (LU) on clinical decision making in mechanically ventilated critically ill patients.

**Methods:** One hundred and eighty-nine patients took part in this prospective study. The patients were enrolled in the study when LU was requested by the primary physician for (1) unexplained deterioration of arterial blood gases and (2) a suspected pathologic entity

[pneumothorax, significant pleural effusion (including parapneumonic effusion, empyema, or hemothorax), unilateral atelectasis (lobar or total), pneumonia and diffuse interstitial syndrome (pulmonary edema)].

**Results:** Two hundred and fifty-three LU examinations were performed; 108 studies (42.7 %) were performed for unexplained deterioration of arterial blood gases, and 145 (57.3 %) for a suspected pathologic entity (60 for pneumothorax, 34 for significant pleural effusion, 22 for

process. The management was changed directly as a result of information provided by the LU in 119 out of 253 cases (47 %). In 81 cases, the change in patient management involved invasive interventions (chest tube, bronchoscopy, diagnostic thoracentesis/fluid drainage, continuous venous–venous hemofiltration, abdominal decompression, tracheotomy), and in 38 cases, non-invasive (PEEP change/titration, recruitment maneuver, diuretics, physiotherapy, change in bed position, antibiotics initiation/change). In 53 out of 253 cases (21 %), LU revealed findings which supported diagnoses not suspected by the primary physician (7 cases of pneumothorax, 9 of significant pleural effusion, 9 of pneumonia, 16 of unilateral atelectasis, and 12 of diffuse interstitial syndrome). **Conclusion:** Our study shows that LU has a significant impact on decision making and therapeutic management.

**Table 2.** Description of cases that POCUS may have contributed to the M&M.

Case	Case description	Ultrasound contribution	Type of error		
			Incorrectly interpreted	Incorrectly performed	Incorrectly integrated
1	Possible septic shock with acute on chronic RV failure.	Severe RV dysfunction correctly identified, however 4L of IVF given causing fluid overload.			X
2	Hemothorax. Liver injury occurred during chest tube placement.	Hemothorax correctly identified but ultrasound not used to guide chest tube placement.		X	X
3	Persistent tachycardia. PE not considered.	RV dilatation correctly identified but not incorporated into care.			X
4	Hemothorax after ultrasound-guided ipsilateral central line placement.	Presumed vascular injury secondary to central venous access attempt. Unclear how procedure was done.		X	
5	Trauma with hypotension.	+FAST correctly identified. No surgery consults until after CT.			X
6	Leg infection treated as cellulitis as outpatient. Returned with necrotizing fasciitis.	Ultrasound correctly identified soft tissue edema, but providers missed subcutaneous air, which was visible.	X		
7	Shortness of breath. Pleural and pericardial effusions identified, admitted.	Pericardial effusion correctly identified, but not read as early tamponade delaying emergent consults.	X		
Total (8 errors/7cases)			25% (2/8)	25% (2/8)	50% (4/8)


M&M, morbidity and mortality; RV, right ventricle; IVF, intravenous fluid; PE, pulmonary embolism; FAST, focused assessment with sonography in trauma; CT, computed tomography.

ORIGINAL ARTICLE

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# Impact of an ultrasound-driven diagnostic protocol at early intensive-care stay: a randomized-controlled trial

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**Table 3 Description of changes in clinical information or decisions led by ultrasound**

Modification in diagnosis and therapeutic decisions led by US	No. changes	No. patients
Related to clinical decision-making, total	48	36
New or unidentified diagnosis:	10	8
Pneumonia, 2; significant pleural effusion, 5; pneumothorax, 1; significant pericardial effusion, 1; cholecystitis, 1		
Clinical diagnosis:	4	4
Pneumonia to respiratory distress due to biliary sepsis, 1; pneumonia to heart failure, 2; asthma to pneumonia, 1		
Pharmacological therapy:	24	16
Fluid challenges, 6; start diuretics, 5; dobutamine, 5; noradrenaline, 2; antibiotics, 5; alteplase, 1		
Invasive procedures:	9	7
Thoracic drainage, 5; emergency bronchoscopy, 2; laparotomy, 1; suprapubic bladder catheterization, 1		
Alveolar recruitment maneuver, 1	1	1
No changes	0	4

US ultrasound

## The Top Patient Safety Strategies That Can Be Encouraged for Adoption Now

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Over the past 12 years, since the publication of the Institute of Medicine's report, "To Err is Human: Building a Safer Health System," improving patient safety has been the focus of considerable public and professional interest. Although such efforts required changes in policies; education; workforce; and health care financing, organization, and delivery, the most important gap has arguably been in research. Specifically, to improve patient safety we needed to identify hazards, determine how to measure them accurately, and identify solutions that work to reduce patient harm. A 2001 report commissioned by the Agency for Healthcare Research and Quality, "Making Health Care Safer: A Critical Analysis of Patient Safety Practices"

We chose 18 topics for in-depth reviews. As a first step for the reviews, we searched for existing relevant systematic reviews. To assess the potential utility of such reviews, we followed procedures proposed by Whitlock and colleagues (3) and asked the following questions: Is the existing review sufficiently "on topic" to be of use? Is the review of sufficient quality to foster confidence in the results? If we determined that the existing systematic review was sufficiently on topic and of acceptable quality, we took 1 of 2 further steps. In some cases, we did an "update" search (that is, we searched databases for all new relevant evidence published since the search end date in the existing systematic review); in others, we conducted searches for "signals

Table 2. Patient Safety Strategies Ready for Adoption Now

### Strongly encouraged

- Preoperative checklists and anesthesia checklists to prevent operative and postoperative events
- Bundles that include checklists to prevent central line–associated bloodstream infections
- Interventions to reduce urinary catheter use, including catheter reminders, stop orders, or nurse-initiated removal protocols
- Bundles that include head-of-bed elevation, sedation vacations, oral care with chlorhexidine, and subglottic suctioning endotracheal tubes to prevent ventilator-associated pneumonia
- Hand hygiene
- The do-not-use list for hazardous abbreviations
- Multicomponent interventions to reduce pressure ulcers
- Barrier precautions to prevent health care–associated infections
- Use of real-time ultrasonography for central line placement
- Interventions to improve prophylaxis for venous thromboembolisms

### Encouraged

- Multicomponent interventions to reduce falls
- Use of clinical pharmacists to reduce adverse drug events
- Documentation of patient preferences for life-sustaining treatment
- Obtaining informed consent to improve patients' understanding of the potential risks of procedures
- Team training
- Medication reconciliation
- Practices to reduce radiation exposure from fluoroscopy and CT
- The use of surgical outcome measurements and report cards, such as those from ACS NSQIP
- Rapid-response systems
- Use of complementary methods for detecting adverse events or medical errors to monitor for patient safety problems
- Computerized provider order entry
- Use of simulation exercises in patient safety efforts

ACS = American College of Surgeons; CT = computed tomography; NSQIP = National Surgical Quality Improvement Program.



# POCUS

- AL MEDICO BUENO

- Al medico regular

- Al medico malo



- Lo hace EXCELENTE

- Lo hace bueno/mejor

- Lo hace aprender

- I listen ... and I forget
- I see ... and I remember



- I do and I understand

- Tao Te Ching