INSTITUT UNIVERSITAIRE DE CARDIOLOGIE ET DE PNEUMOLOGIE DE QUÉBEC

AFFILIÉ À UNIVERSITÉ LAVAL

Utilité de l'échographie en réanimation - cas cliniques

Dr Julien Turgeon
Interniste-intensiviste
IUCPQ-UL
2025-11-21

Conflits d'intérêts

Aucun

Objectifs de la présentation

- Au terme de la présentation, le participant pourra :
- Décrire l'utilité de l'échographie de chevet pour préciser le type de choc d'un patient
- Énumérer les pathologies plus rares où l'échographie de chevet peut être utile au diagnostic
- Discuter de la valeur pronostique de l'échographie de chevet en arrêt cardiorespiratoire

Cas 1

Cas 1

- H 56 ans
- Pas antécédents

- Consulte à l'urgence pour symptomes urinaires & hyperthermie
- TA 70/52 arrivée, FC 125 sinusal
- SMU +, Hémocs + BGN 4/4 en 6h
- Tazocin débuté, 5 L cristalloides donnés

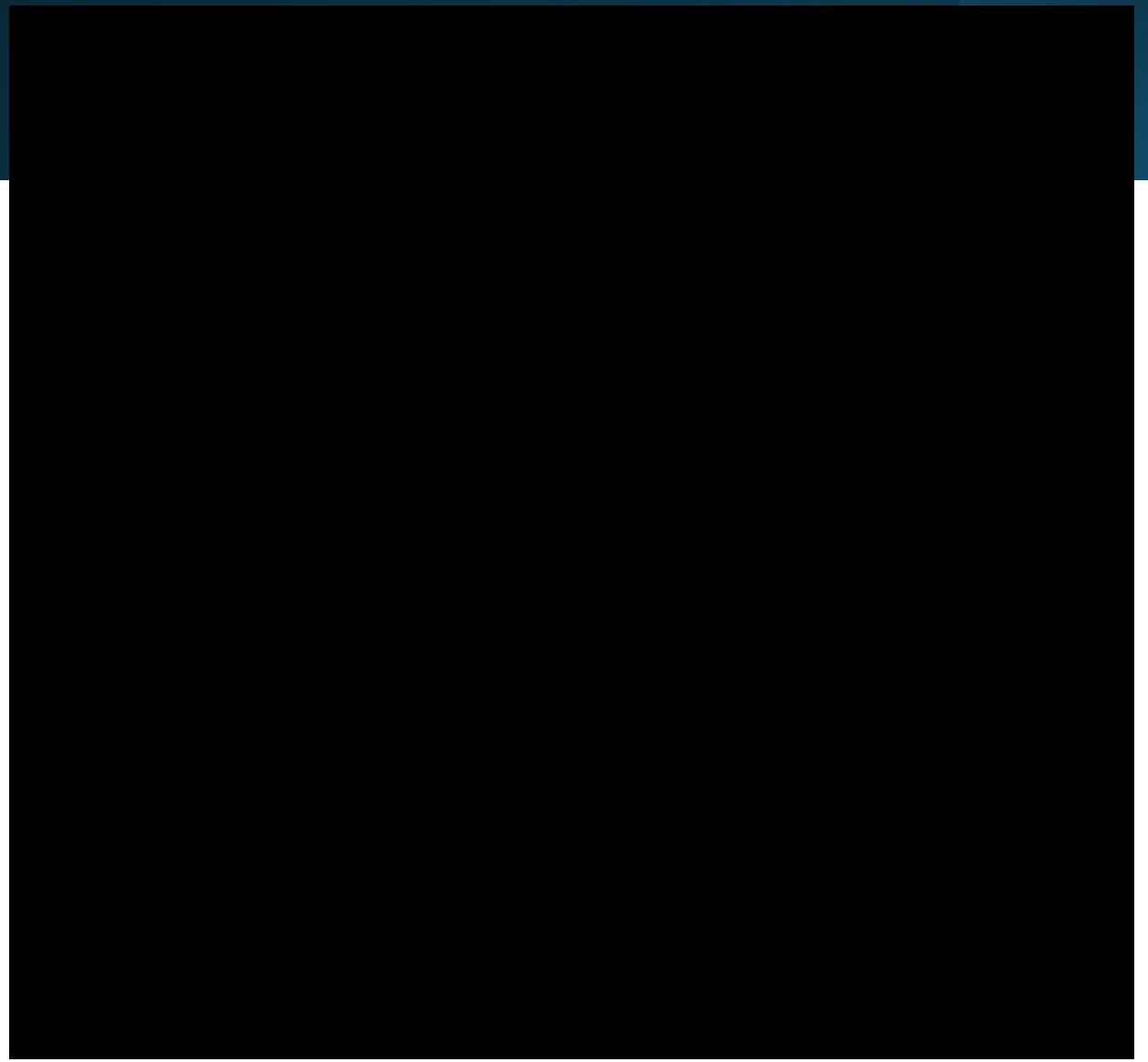
Cas 1

- Appel à l'intensiviste de garde
- Levophed 0,20 mcg/kg/min IV malgré réanimation volémique
- TDM ne démontre pas obstruction de l'arbre urinaire

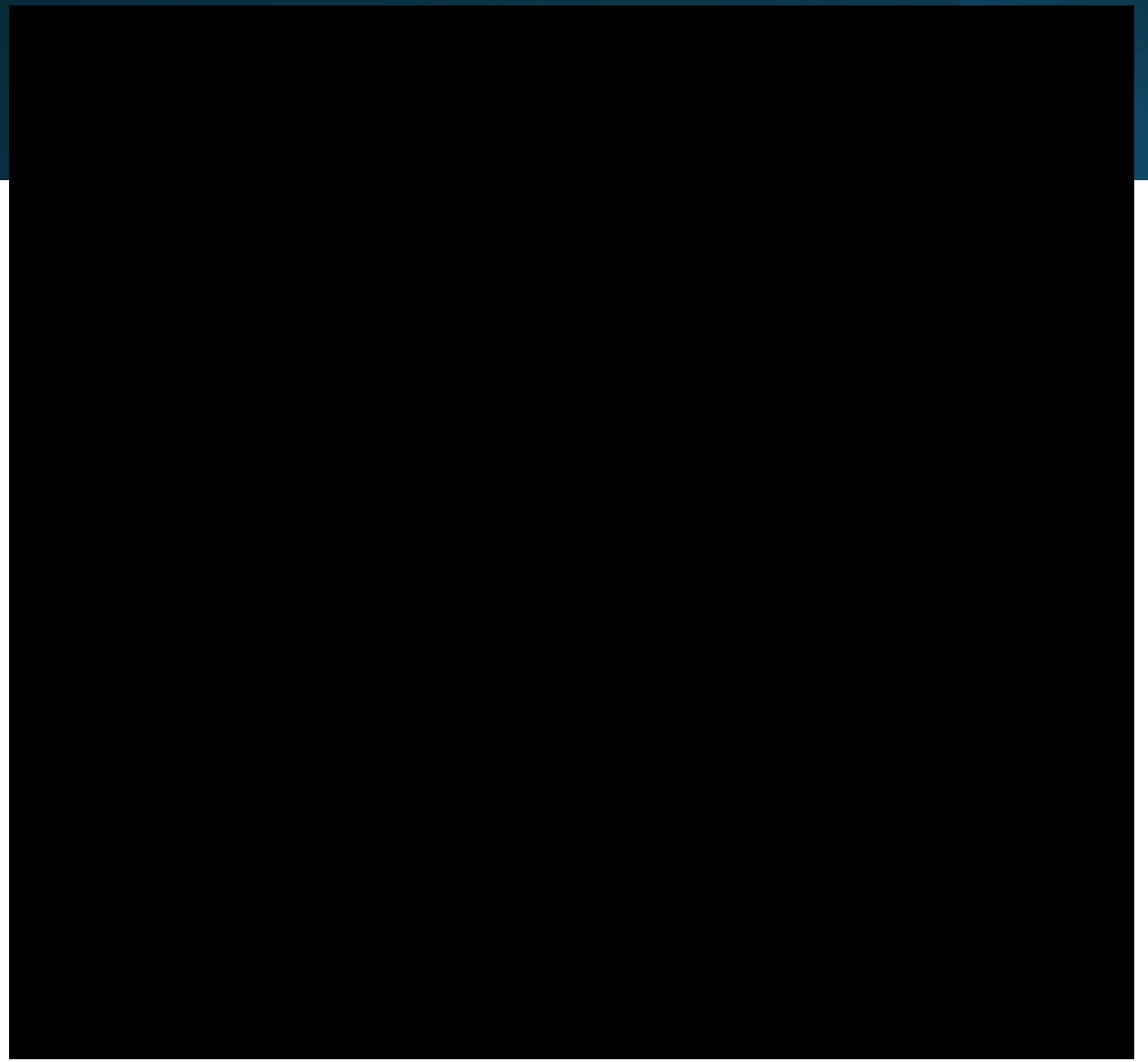
- Lactates 6,0 mmol/L
- Oligurique

- Que se passe t'il ?

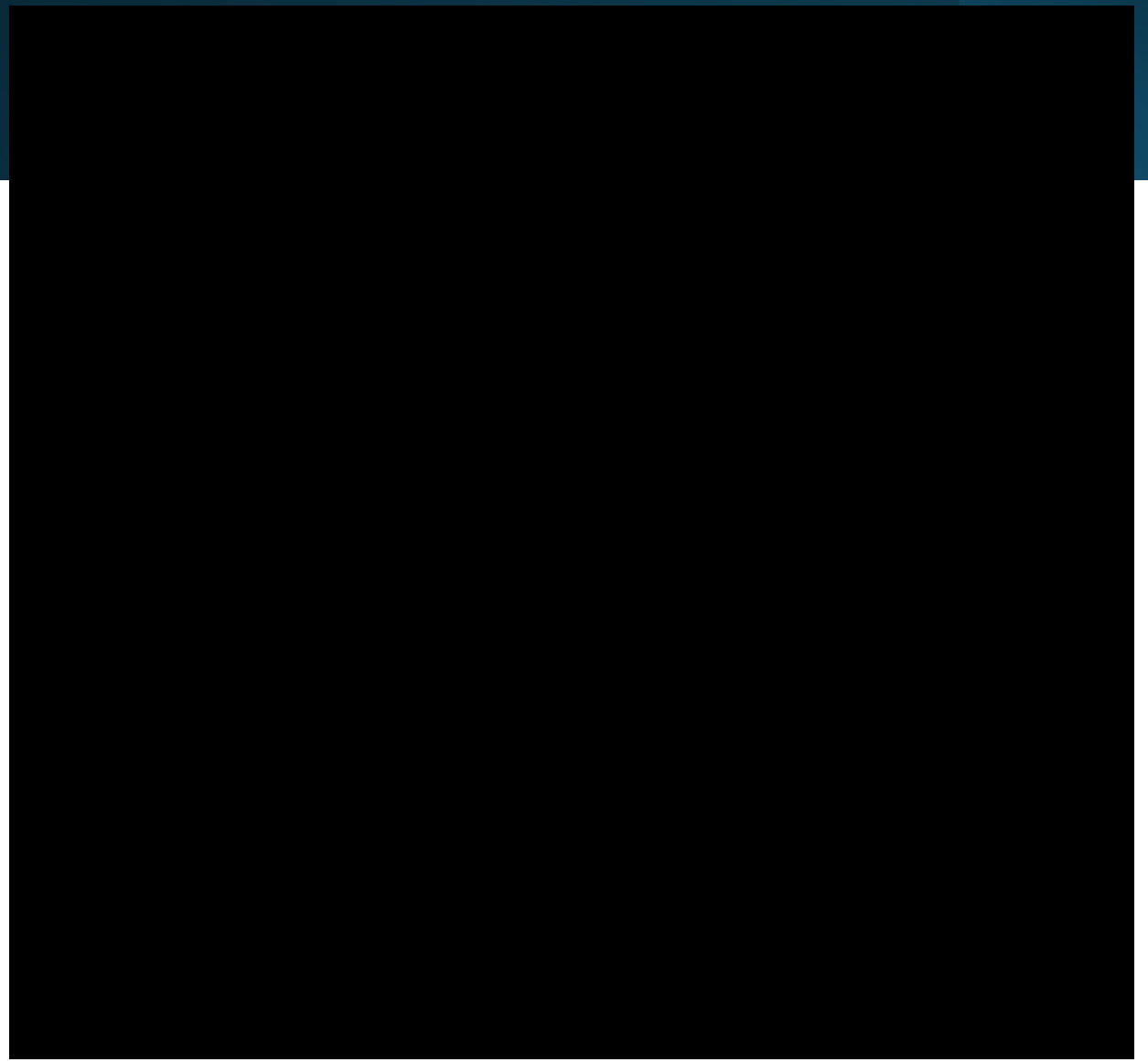
Cas 1



Cas 1

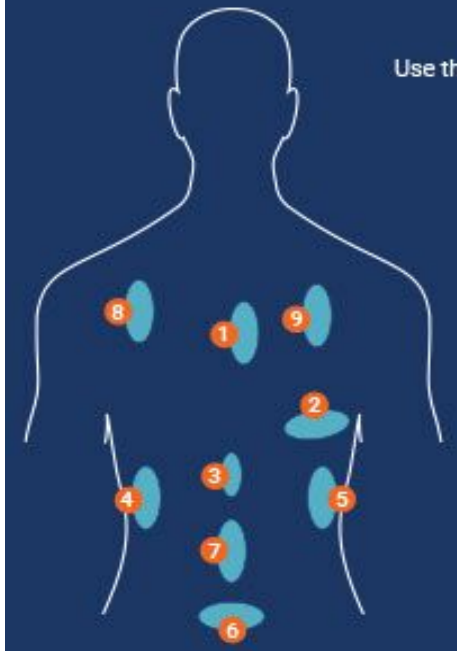


Cas 1



Rush Exam Protocol

Rapid Ultrasound for Shock and Hypotension



Use the mnemonic **HIMAP-"ED"** to remember...

Heart

1. Parasternal long cardiac view
2. Apical 4-chamber cardiac view

Ivc

3. Inferior Vena Cava View

Morison's

4. RUQ Morison's view
5. LUQ splenorenal view
6. Bladder view

Aorta

7. Aortic slide views

Pulmonary

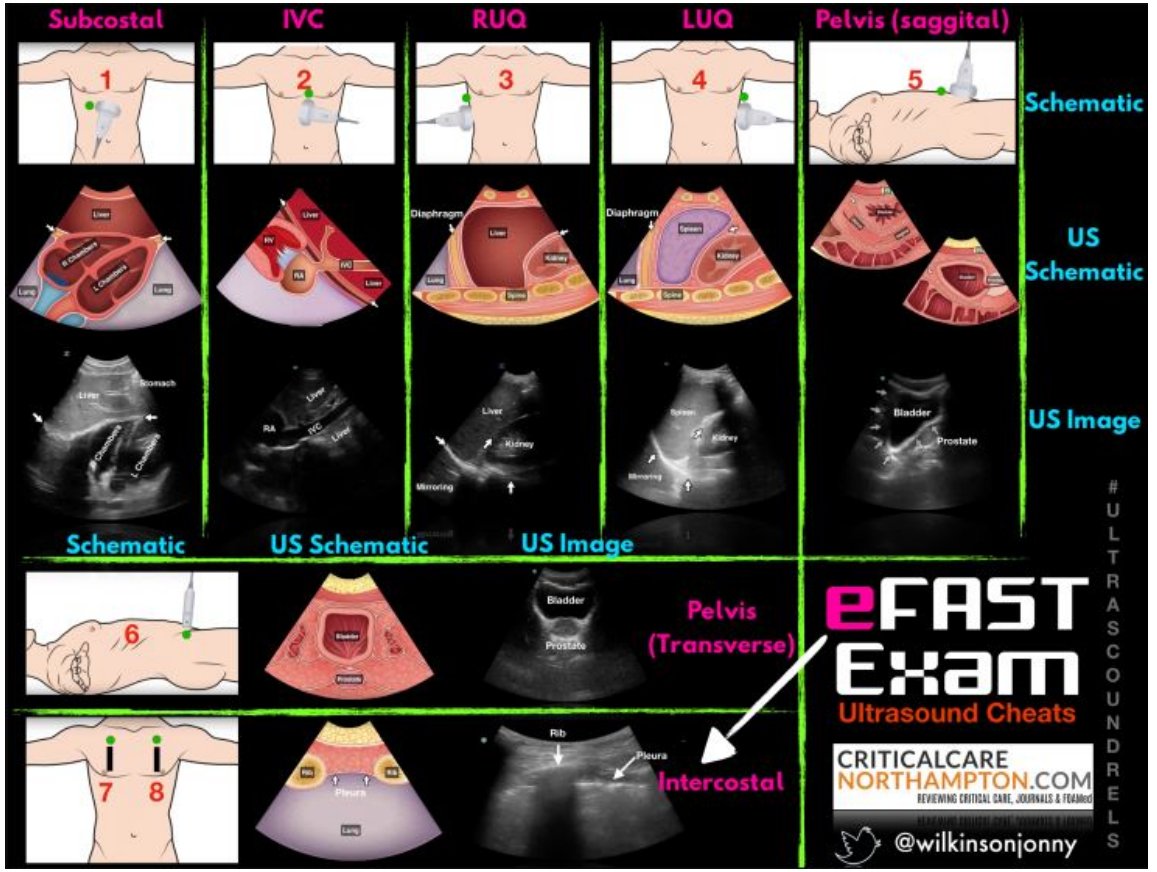
8. Left Lung zone #1
9. Right Lung zone #5

✓ Use a curvilinear array for all views.
✓ Add in a search for ectopic pregnancy and DVT depending upon clinical circumstances.

POCUS
Point-of-Care Ultrasound Certification Academy

The Point-of-Care Ultrasound (POCUS) Certification Academy™ exists to provide physicians and advanced care providers the opportunity to collaborate in the shared mission of improving global health and setting the standards of excellence in POCUS.

Pocus.org/Tips



Can J Anesth/J Can Anesth (2025) 72:1118–1129
https://doi.org/10.1007/s12630-025-02997-1

EDITOR'S CHOICE: REPORTS OF ORIGINAL INVESTIGATIONS

The diagnostic accuracy of point-of-care ultrasound in shock: a systematic review and meta-analysis

La précision diagnostique de l'échographie ciblée pour l'état de choc : une revue systématique et méta-analyse

John Basmaji, MD · J. Elaine Tang, MD · Robert Arntfield, MD · Karishma Desai, MD · Ian M. Ball, MD, MSc · Kyle Fiorini, MD · Marat Slessarev, MD · Kimia Honarmand, MD, MSc · Phil Jones, MD, MSc · Vincent Lau, MD · Kimberley Lewis, MD, MSc · Nicolas Orozco, MD · Maureen Meade, MD, MSc · Brian Park, BSc · Ross Prager, MD · Bram Rochwerg, MD, MSc · Lehana Thabane, PhD · Michelle Y. S. Wong, MSc · Gordon Guyatt, MD, PhD

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Table 2 Pooled summary estimates of the performance of point-of-care ultrasound in diagnosing shock subtype underlying causes of shock

	Sensitivity (95% CI)	Specificity (95% CI)	Diagnostic odds ratio (95% CI)	Positive likelihood ratio (95% CI)	Negative likelihood ratio (95% CI)
Shock subtype					
Distributive	78% (69 to 85)	97% (94 to 99)	116.54 (40.41 to 336.07)	26.43 (12.14 to 57.52)	0.23 (0.16 to 0.33)
Cardiogenic	95% (84 to 98)	98% (97 to 99)	754.55 (204.03 to 2790.50)	42.12 (27.40 to 64.76)	0.06 (0.02 to 0.17)
Hypovolemic	90% (81 to 95)	95% (90 to 97)	151.80 (61.22 to 376.37)	16.70 (8.59 to 32.81)	0.11 (0.06 to 0.21)
Obstructive	94% (85 to 97)	99% (98 to 100)	2,545.59 (566.24 to 11,443.85)	166.31 (48.06 to 575.55)	0.07 (0.03 to 0.16)
Mixed shock	85% (77 to 91)	98% (91 to 100)	279.79 (52.91 to 1,479.56)	42.54 (9.47 to 191.10)	0.15 (0.10 to 0.24)
Shock diagnosis					
Pulmonary embolism	92% (71 to 98)	99% (83 to 100)	833.84 (30.35 to 22,911.12)	64.69 (4.49 to 932.03)	0.08 (0.02 to 0.34)
Cardiac tamponade	100% (69 to 100)	100% (98 to 100)	769.92 (72.92 to 8,128.80)	95.47 (19.08 to 477.67)	0.13 (0.03 to 0.57)
Sepsis	78% (18 to 98)	96% (87 to 99)	82.07 (5.36 to 1,256.68)	18.94 (5.62 to 63.86)	0.23 (0.03 to 1.97)

CI = confidence interval

Basmaji 2025

Can J Anesth/J Can Anesth (2025) 72:1118–1129
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Table 4 Summary of findings for the diagnostic accuracy of point-of-care ultrasound for specific etiology of shock

Cause of shock	Sensitivity and specificity (95% CI)	Test result	Number of results per 1,000 patients tested (95% CI)			Number of participants (studies)	Certainty of the evidence (GRADE)
			Prevalence 10% Typically seen in	Prevalence 50% Typically seen in	Prevalence 90% Typically seen in		
Pulmonary embolism	**Pooled sensitivity**: 92% (71 to 98)	**True positives**	**92** (71 to 98)	**460** (355 to 490)	**828** (639 to 882)	56 (3)	⨁⨁◯◯ **Low** (serious risk of bias, serious imprecision)
		False negatives	**8** (2 to 29)	**40** (10 to 145)	**72** (18 to 261)		
	Pooled specificity: 99% (83 to 100)	**True negatives**	**891** (747 to 900)	**495** (415 to 500)	**99** (83 to 100)	252 (2)	⨁⨁◯◯ **Low** (Serious risk of bias, serious inconsistency)
		False positives	**9** (0 to 153)	**5** (0 to 85)	**1** (0 to 17)		
Cardiac tamponade	**Pooled sensitivity**: 100% (63 to 100)	**True positives**	**10** (7 to 10)	**500** (345 to 500)	**900** (621 to 900)	8 (3)	⨁⨁⨁◯ **Moderate** (serious risk of bias)
		False negatives	**0** (0 to 3)	**0** (0 to 155)	**0** (0 to 279)		
	Pooled specificity: 100% (98 to 100)	**True negatives**	**990** (970 to 990)	**500** (490 to 500)	**100** (98 to 100)	199 (3)	⨁⨁⨁◯ **Moderate** (serious risk of bias)
		False positives	**0** (0 to 20)	**0** (0 to 10)	**0** (0 to 2)		
Septic shock	**Pooled sensitivity:** 78% (18 to 98)	**True positives**	**78** (18 to 98)	**390** (90 to 490)	**702** (162 to 882)	65 (3)	⨁◯◯◯ **Very Low** (Serious risk of bias, very serious imprecision)
		False negatives	**22** (2 to 82)	**110** (10 to 410)	**198** (18 to 738)		
	Pooled specificity: 96% (89 to 99)	**True negatives**	**864** (801 to 891)	**480** (445 to 495)	**96** (89 to 99)	162 (3)	⨁⨁⨁◯ **Moderate** (serious risk of bias)
		False positives	**36** (9 to 99)	**20** (5 to 55)	**4** (1 to 11)		

CI = confidence interval

Basmaji 2025

RESEARCH ARTICLE

Accuracy of Point-Of-Care Cardiac Ultrasound Performed on Patients Admitted to a Pediatric Intensive Care Unit in Shock

Suhasini Chico[1] | Sean Connolly[2] | Jobayer Hossain[3] | Yosef Levenbrown[1]

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Received: 11 September 2024 | **Revised:** 2 October 2024 | **Accepted:** 8 October 2024

Funding: The authors received no specific funding for this work.

Keywords: cardiac function | echocardiography | pediatric intensive care | POCUS | point-of-care ultrasound

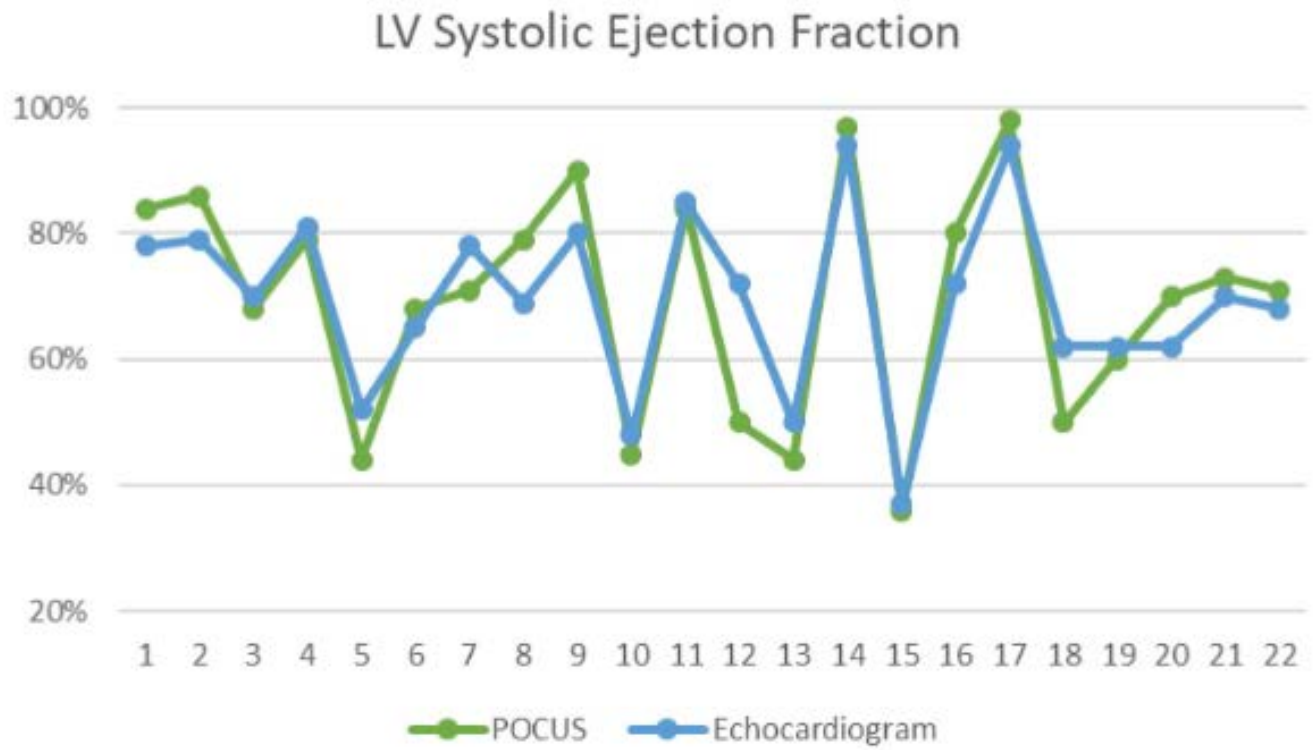


FIGURE 1 | Comparison between left ventricular systolic ejection fraction measurements obtained using point-of-care ultrasound (POCUS) and echocardiogram.

Chico 2025

Cas 2

Cas 2

- H70 ans
- HTA, DLPD, DB II

- Arrêt cardiorespiratoire au domicile
- Intervalle de 10 minutes entre arrêt et début RCR
- Asystolie à l'arrivée des ambulanciers
- Transporté au CH en arrêt cardiaque

- À l'arrivée, RCR depuis 20 minutes : asystolie / ETCO2 15
- Épinéphrine x 3

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

Ultrasound use during cardiopulmonary resuscitation is associated with delays in chest compressions☆

Maite A. Huis in 't Veld[a], Michael G. Allison[b], David S. Bostick[a], Kiondra R. Fisher[c], Olga G. Goloubeva[d], Michael D. Witting[e], Michael E. Winters[e,*]

[a] E-Department of Emergency Medicine, University of Maryland Medical Center, Baltimore, MD, United States
[b] Critical Care Medicine, Saint Agnes Hospital, Baltimore, MD, United States
[c] University of Maryland School of Medicine, Baltimore, MD, United States
[d] Department of Epidemiology & Public Health, University of Maryland School of Medicine, Baltimore, MD, United States
[e] Department of Emergency Medicine, University of Maryland School of Medicine, Baltimore, MD, United States

Table 2
Mean duration of pulse checks, calculated by treating each pulse check as an independent observation.

Type of pulse check	Mean duration in seconds	95% CI
Without POCUS	13	12–15
With POCUS	21	18–24

Table 3
Effects of intervention on pulse check duration estimated by the mixed-effects model.

Intervention	Mean time (sec)	Standard error (sec)	P-value
POCUS use	8.4	1.6	<0.0001
Procedure performed	2.9	1.7	0.08

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

Implementation of the Cardiac Arrest Sonographic Assessment (CASA) protocol for patients with cardiac arrest is associated with shorter CPR pulse checks☆

Eben J. Clattenburg[a,*], Peter C. Wroe[a], Kevin Gardner[a], Cody Schultz[a], Jon Gelber[a], Amandeep Singh[a], Arun Nagdev[a,b]

[a] Department of Emergency Medicine, Highland Hospital—Alameda Health System, Oakland, CA, United States
[b] School of Medicine, University of California, San Francisco, CA, United States

Table 2
Uncorrected CPR pulse check duration differences between the pre and post intervention groups.

	Pre (sec)	Post (sec)	Difference (sec)	p-value
CPR pulse check pause duration, mean (SE)[a]	18.1 (0.8)	15.1 (0.6)	3.0 (1.0–5.0)	0.003
CPR pulse check pause duration with POCUS, mean (SE)[b]	19.8 (1.0)	15.8 (0.7)	4.0 (1.7–6.3)	0.0008
CPR pulse check pause duration without POCUS, mean (SE)[c]	15.4 (1.0)	12.8 (0.7)	2.6 (−1.2 to 6.4)	0.18

[a] pre n = 160; post n = 140.
[b] pre n = 100; post n = 110.
[c] pre n = 60; post n = 30.

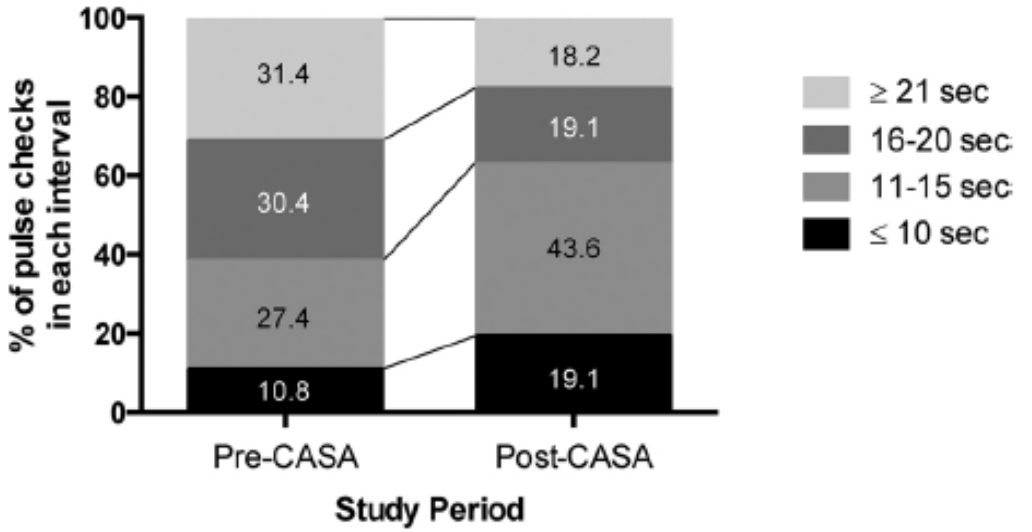


Fig. 3. Proportion of pauses ≤10 s, 11–15 seconds, 16–20 seconds, and ≥21 s by pre and post CASA intervention time periods.

Clattenburg 2019

Heydari et al.
Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine
(2025) 33:129
https://doi.org/10.1186/s13049-025-01447-7

Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine

RESEARCH Open Access

The role of serial point-of-care ultrasound during cardiac arrest to predict termination of resuscitation

Farhad Heydari[1], Mehdi Nasr Isfahani[1,2*], Babak Masoumi[1], Sayed Hamed Khajebashi[1], Forough Hajian[1] and Fatemeh Soleimani[1]

Table 1 Clinical and demographic factors associated with ROSC: a comparative analysis

Variable	All Patients (*n* = 154)	ROSC (*n* = 38)	No ROSC (*n* = 116)	*P* Value
Age (years, mean ± SD)	65.19 ± 11.63	63.18 ± 12.42	65.84 ± 11.34	0.222
Gender, n (%)				0.273
Male	117 (76.0)	26 (22.2)	91 (77.8)	-
Female	37 (24.0)	12 (32.4)	25 (67.6)	-
Initial Rhythm, n (%)				
Asystole	90 (58.4)	8 (8.9)	82 (91.1)	< 0.001
PEA	64 (41.6)	30 (46.9)	34 (53.1)	< 0.001
Arrest Location, n (%)				
OHCA	126 (81.8)	24 (19.0)	102 (81.0)	0.01
IHCA	28 (18.2)	14 (50.0)	14 (50.0)	0.01
Cardiac Activity on Initial US, n (%)				
Yes	48 (31.2)	25 (52.1)	23 (47.9)	< 0.001
No	106 (68.8)	13 (12.3)	93 (87.7)	< 0.001
Cardiac Standstill Duration (min, mean ± SD)	15.03 ± 11.71	2.79 ± 2.73	19.03 ± 10.70	< 0.001
Survival to Hospital Discharge, n (%)	9 (5.8)	9 (23.7)	0 (0.0)	< 0.001

IHCA: in hospital cardiac arrest, OHCA: out-of-hospital cardiac arrest, PEA: pulseless electrical activity, ROSC: return of spontaneous circulation, US: ultrasound

Circulation

CURRENT ISSUE | ARCHIVE

RESEARCH ARTICLE | Originally Published 22 October 2025 |

Check for updates

Part 9: Adult Advanced Life Support: 2025 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care

Jane G. Wigginton, MD, MSCS, Vice Chair, Sachin Agarwal, MD, MPH, Jason A Bartos, MD, PhD, Ryan A. Coute, DO, Ian R. Drennan, ACP, PhD, Ameera Haamid, MD, Peter J. Kudenchuk, MD, ... SHOW ALL ... , and Michael C. Kurz, MD, MS, Chair | AUTHOR INFO & AFFILIATIONS

Circulation • Volume 152, Number 16_suppl_2 • https://doi.org/10.1161/CIR.0000000000001376

2b	C-LD	2. Use of point-of-care ultrasonography during adult cardiac arrest resuscitation to diagnose reversible causes is not well established.
2b	C-LD	3. Use of point-of-care echocardiography to assess cardiac function for prognostication during adult cardiac arrest resuscitation is not well established.

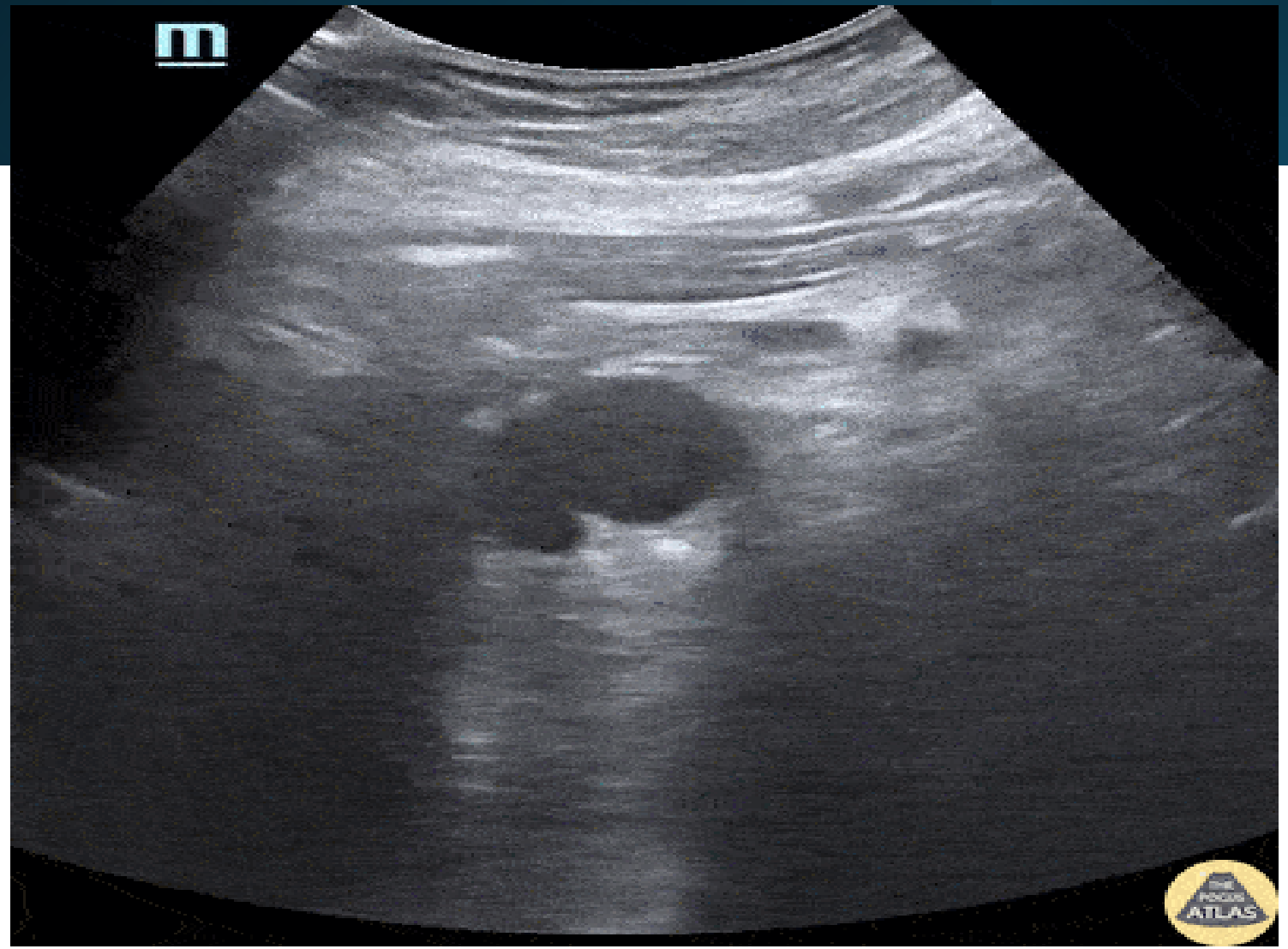
Cas 3

Cas 3

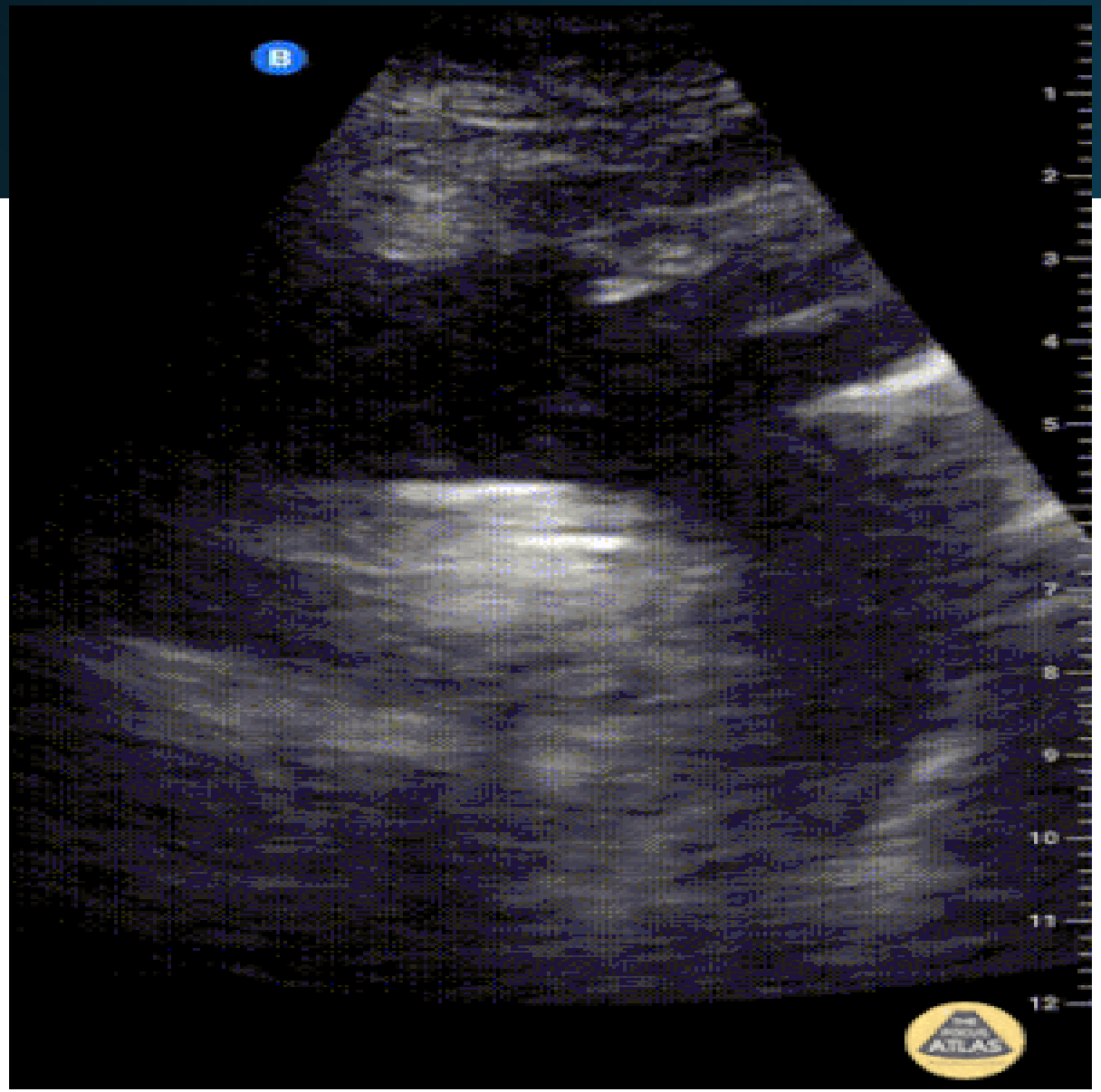
- H 75 ans
- HTA DLPD DB II
- Consulte à l'urgence pour parésie MIG subite
- Code AVC lancé
- TA 195/105 - pas de traitement vu suspicion AVC

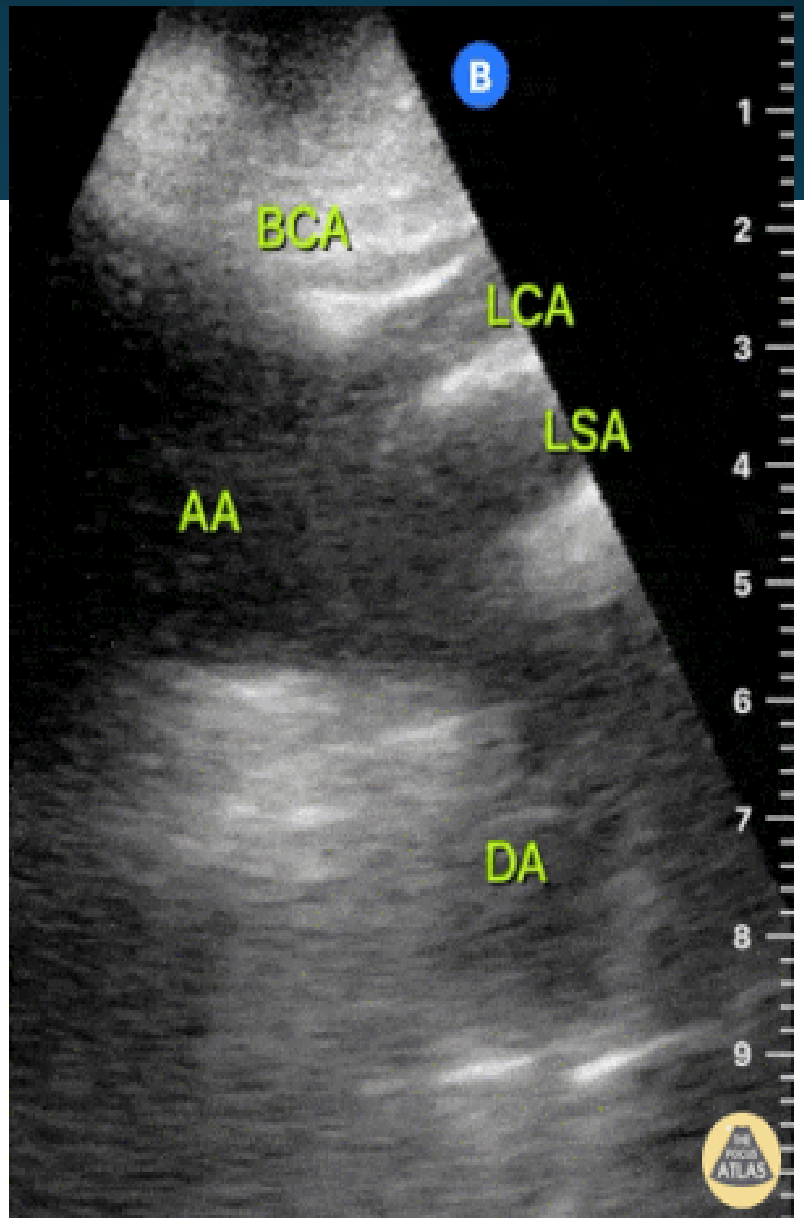
- Symptômes fluctuants à l'examen physique
- DRS légère modérée et dyspnée associés
- Angio-CT tête et cou demandé

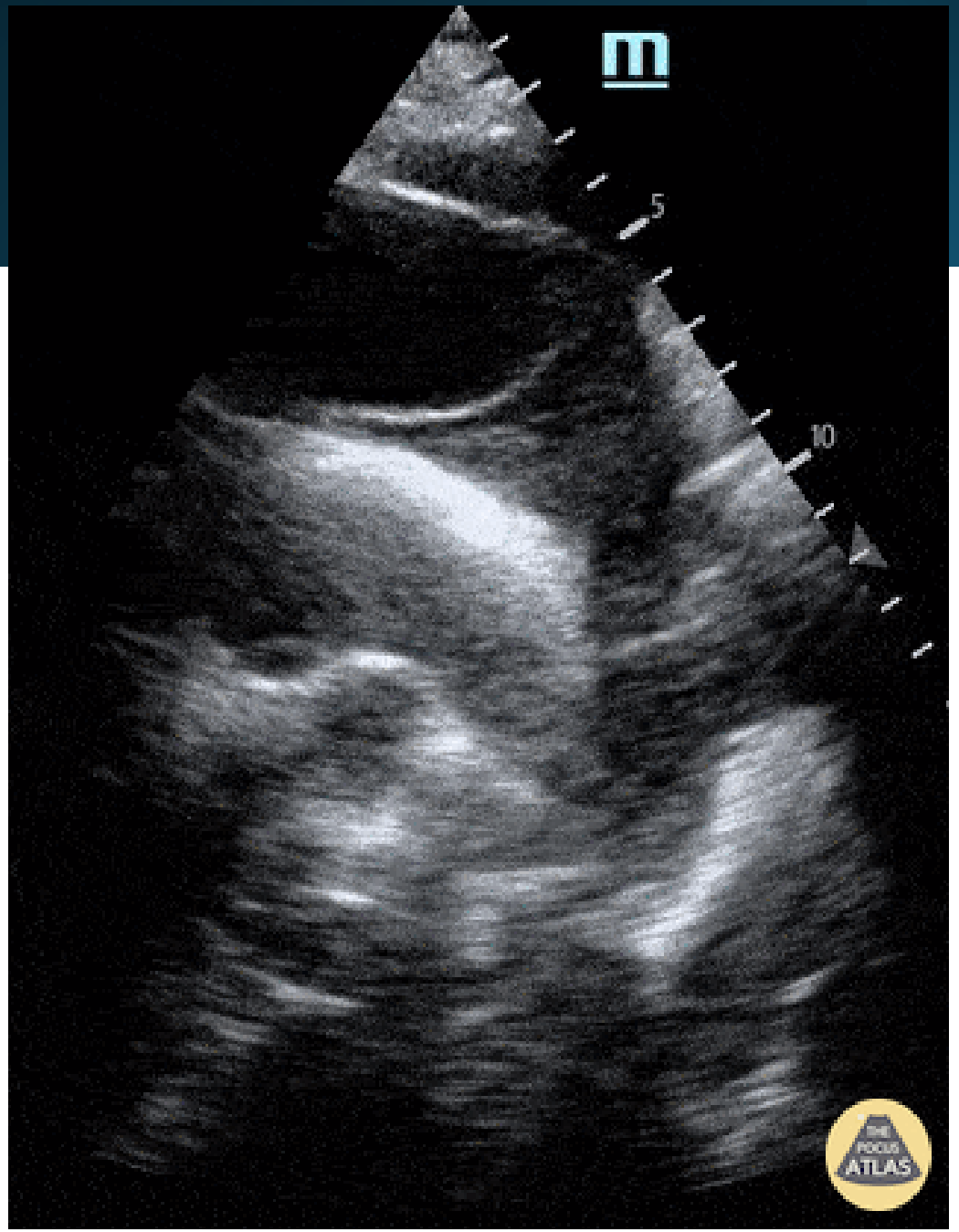

PHILIPS
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TIS 0.0
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64
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SAG
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THE POCUS ATLAS

The Journal of Emergency Medicine
Volume 67, Issue 3, September 2024, Pages e288-e297

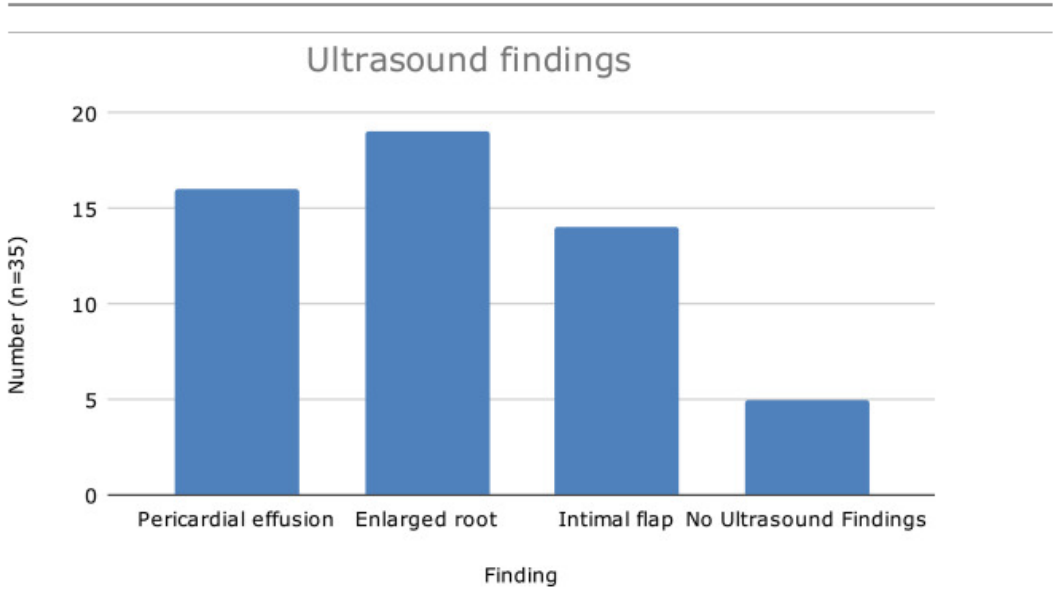
Ultrasound in Emergency Medicine

A 12-year Retrospective Cohort Study of Point-of-care Ultrasound and Aortic Dissection Risk Score in Type A Aortic Dissection

Danielle Aston DO, Thomas Burgess DO, Sarah Badach DO, Komal Paladugu MD, Brian Thompson DO, Elizabeth Schoenfeld MD, Gavin Budhram MD

Table 4. Ultrasound (US) Findings and Incidence of Death Prior to Discharge.

Individual Ultrasound Findings	Number (n = 35)	Mortality (# With US Finding and Death/# With Finding)
Any ultrasound findings	30 (86%)	10/30 (33%)
No ultrasound findings	5 (14%)	3/5 (60%)
Isolated pericardial effusion	7 (20%)	5/7 (71%)
Any pericardial effusion*	16 (46%)	8/16 (50%)
Isolated widened aortic root	5 (14%)	1/5 (20%)
Any widened aortic root*	19 (54%)	4/19 (21%)
Isolated intimal flap	2 (6%)	2/2 (100%)
Any intimal flap*	14 (40%)	4/14 (28%)

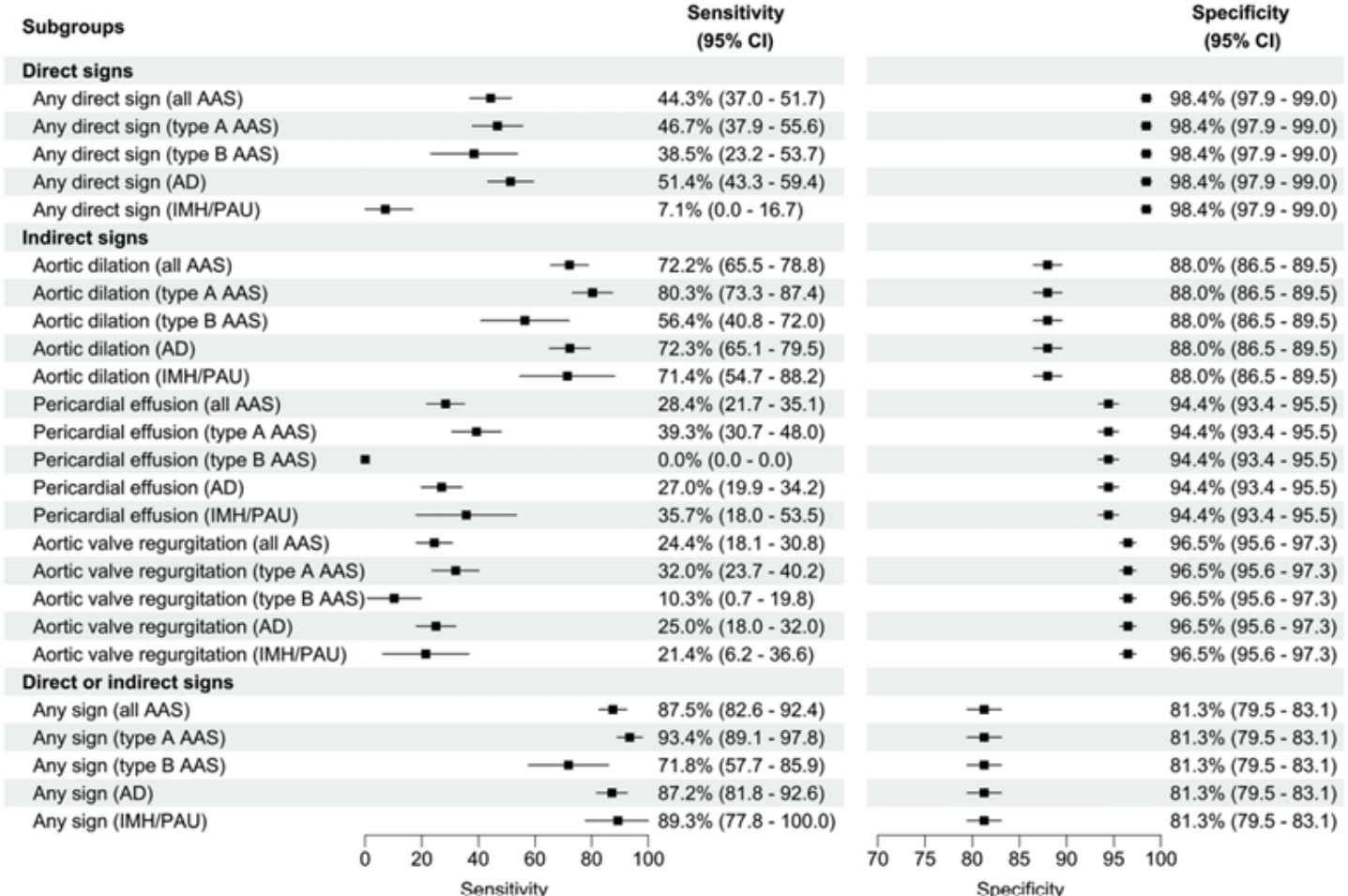


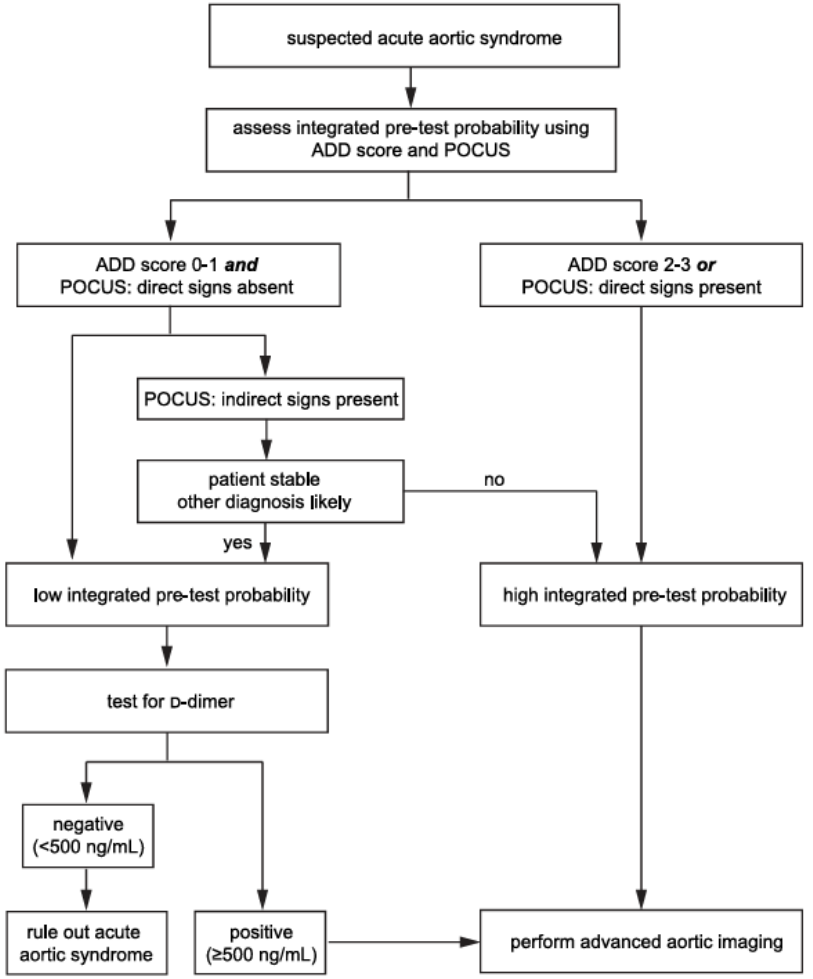
FULL TEXT ARTICLE

Diagnosis of acute aortic syndromes with ultrasound and d-dimer: the PROFUNDUS study

Fulvio Morello, Paolo Bima, Matteo Castelli, Elisa Capretti, Alexandre de Matos Soeiro, Alessandro Cipriano, Giorgio Costantino, Simone Vanni, Bernd A. Leidel, Beat A. Kaufmann, Adi Osman, Marcello Candelli, Nicolò Capsoni, Wilhelm Behringer, Marialessia Capuano, Giovanni Ascione, Tatiana de Carvalho Andreucci Torres Leal, Lorenzo Ghiadoni, Emanuele Pivetta, Stefano Grifoni, Enrico Lupia and Peiman Nazerian

European Journal of Internal Medicine, 2024-10-01, Volume 128, Pages 94-103, Copyright © 2024 The Authors





Cas 4

Références

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Table 1 Overview of studies evaluating the diagnostic accuracy of point-of-care ultrasound in patients with shock

Study	*N*	Population	POCUS					Reference standard	
			Protocol	Operator and experience	Device	Timing of POCUS scan from shock diagnosis and [illegible] exams year			
Agmy 2017[10]	63	ICU patients with circulatory shock	FALL	Ghane 2015[7]	77	ED patients with shock during working shift of designated POCUS experts	RUSH	ED or radiology physicians	Portable SonoScape	Performed concurrently with ongoing care of each patient	Second physician in charge of patient after ED discharge
Ahn 2017[11]	352	ED patients with hypotension SBP < 90 and/or signs and symptoms of shock	SEAR	Ienghong 2022[16]	102	ED patients with hypotension (SBP < 90 mm Hg, MAP < 65 mm Hg, or reduction of SBP by 40 mm Hg from baseline and hyperlactatemia	Cardiac and lung ultrasound	ED residents/trainees who completed one month of POCUS training	Mindray M9	Within 1–2 hr after presentation	Chart review conducted by two blinded investigators
Atkinson 2018[12]	138	ED patients with sustained SBP < 100 mm Hg or shock index > 1.0	RUSH AC	Javali 2020[17]	100	ED patients shock on initial presentation, with at least one sign/ symptom of hypoperfusion	RUSH	ED physicians trained in POCUS	FUJUFILM Sonosite M-Turbo	Conducted after initial clinical assessment	Blinded treating physician, after patient is transferred out of ED
Bagheri-Hariri 2015[13]	148	ED patients with shock	RUSH	Jones 2006[26]	184	ED patients presenting with clinical signs of undifferentiated shock	Focused cardiac ultrasound	ED physicians with focused training in emergency echocardiography	Shimadzu SDU-400 US	Within 30 min of patient identification	Blinded chart review by three reviewers
Dezfuli 2019[23]	52	ED patients with shock	RUSH								
				physicians				ongoing care of each patient			
Elbaih 2018[14]	100	ED patients with shock due to polytrauma	RUSH	Not reported		Not reported		Following primary and secondary survey	Final chart review and CT imaging		
Geng 2022[15]	112	EICU patients with SBP < 90 or shock index pulse > 1 and at least one sign/ symptom of hypoperfusion	THIRD	ED physicians who completed a 20-hr US workshop, have 3 years of experience, and perform > 300 US exams year		Philips Sparq		Not reported	Independent chart review by panel of three physicians		

				exams year			
Ghane 2015[7]	77	ED patients with shock during working shift of designated POCUS experts	RUSH	ED or radiology physicians	Portable SonoScape	Performed concurrently with ongoing care of each patient	Second physician in charge of patient after ED discharge
Ienghong 2022[16]	102	ED patients with hypotension (SBP < 90 mm Hg, MAP < 65 mm Hg, or reduction of SBP by 40 mm Hg from baseline and hyperlactatemia	Cardiac and lung ultrasound	ED residents/trainees who completed one month of POCUS training	Mindray M9	Within 1–2 hr after presentation	Chart review conducted by two blinded investigators
Javali 2020[17]	100	ED patients shock on initial presentation, with at least one sign/ symptom of hypoperfusion	RUSH	ED physicians trained in POCUS	FUJUFILM Sonosite M-Turbo	Conducted after initial clinical assessment	Blinded treating physician, after patient is transferred out of ED
Jones 2006[26]	184	ED patients presenting with clinical signs of undifferentiated shock	Focused cardiac ultrasound	ED physicians with focused training in emergency echocardiography	Shimadzu SDU-400 US	Within 30 min of patient identification	Blinded chart review by three reviewers
LeRoux 2021[24]	85	ED patients with a SBP < 100 mm Hg or more than 40 mm Hg drop from baseline and one sign of inadequate tissue perfusion	echoSHOCK protocol	ED physicians have performed over 100 cardiac examinations	Not reported	Not reported	Chart review by panel of three experts in emergency medicine
Nazerian 2018[25]	105	ED patients with shock and suspected PE at the time of evaluation	Focused cardiac and venous ultrasound	Blinded ultrasonographers	MyLab™30Gold, MyLab™40, MyLab™Alpha (Esaote), and Philips HD7	Within 3 hr from inclusion and before any diagnostic tests	M-CTPA, lung scintigraphy, digital subtraction pulmonary angio-graphy, or autopsy with full chart review by independent expert
Rahulkumar 2019[18]	97	ED patients with clinical features of shock	RUSH	Not reported	MyLab™30 (Easote)	In parallel to resuscitation	Final diagnosis made within 48 hr by admitting physician
Ramadan 2022[19]	140	ED patients with SBP < 90 mm Hg or shock index pulse > 1	Cardiac, lung, abdominal, and lower extremity venous ultrasound	ED physicians with echocardiography certification and 5 years experience with US	Vivid E (GE HealthCare); Mindray DC-30, DP-5, and DP-20	Not reported	Independent chart review by panel of physicians