

L'ECOGRAFIA NELLA SEPSI

DIAGNOSI PRECOCE E IDENTIFICAZIONE DELLA FONTE

F.Cortellaro

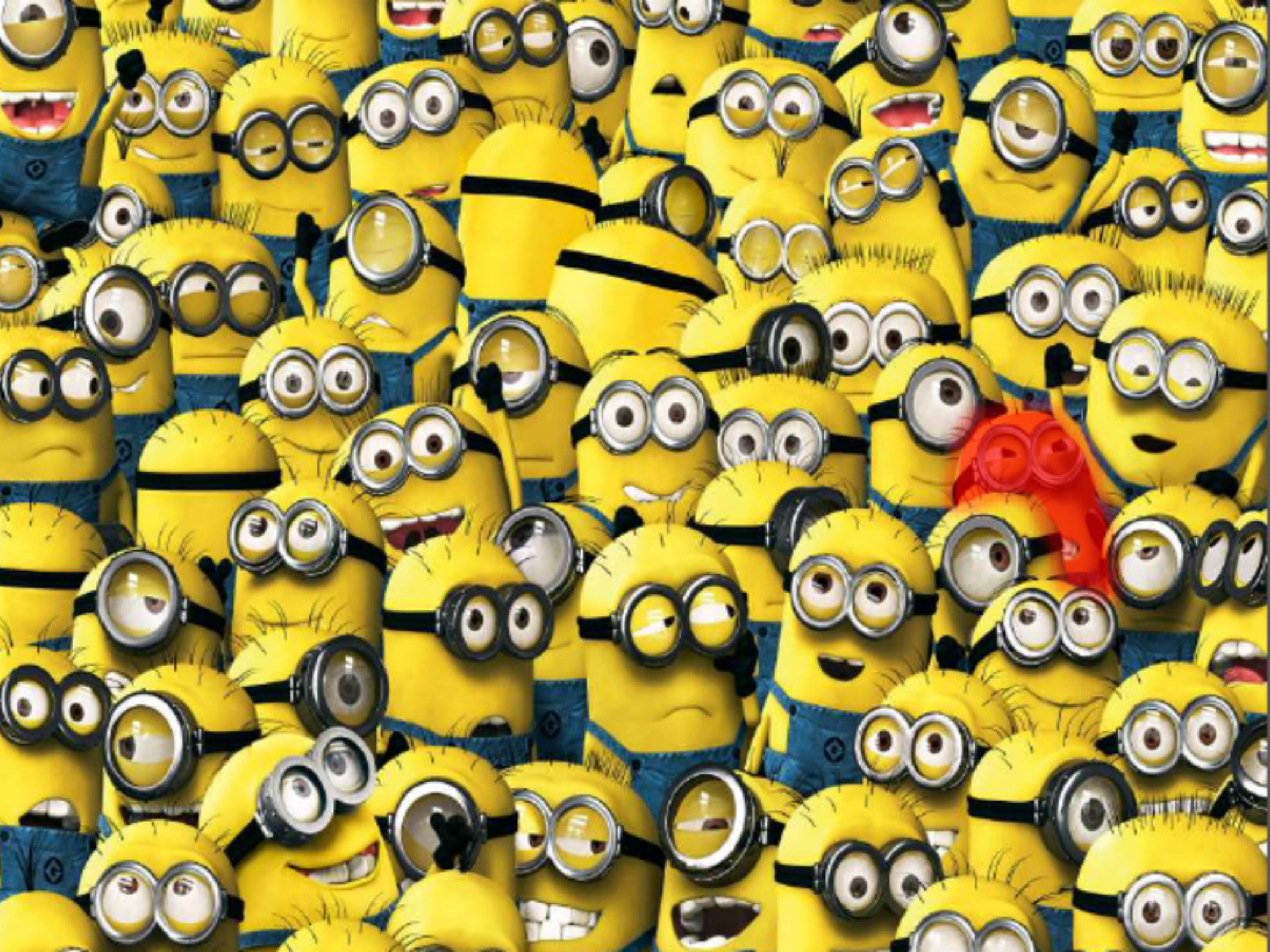
*Medicina d'Urgenza e Pronto Soccorso
A.O. Ospedale Niguarda Ca' Granda (Milano)*

SEPSI: Obiettivi

- 1) Diagnosi precoce:
- 2) ABT precoce e appropriata
- 3) Ottimizzare l'apporto tissutale
- 4) Evitare il controllo fonte

L'ECOGRAFIA CI PUO' AIUTARE?

IDENTIFICAZIONE PRECOCE DELLA SEPSI



identificazione precoce



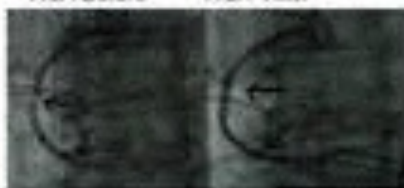
Azienda Ospedaliera
Ospedale Niguarda Ca' Granda

STEMI ALERT – May 25, 2010



RCA Before

RCA After



81 Y/O Female, Occlusion of Right Coronary Artery (RCA)

ED Arrival

ED Departure

Balloon Inflated

1200 PM

1251 PM

1213 PM



CCFR
Unit R 19

D2B Time: 22 Minutes

*******RECORD D2B TIME*******

Figure 1. This information is posted in the ED for the EMS for every STEMI. This is how we celebrate our collaboration! Twenty-two minutes is currently our record D2B time, and we DID NOT bypass the ED.

PERCORSI “DEDICATI”



IDENTIFICAZIONE PRECOCE DELLA SEPSI

SPAZIO PER L'ECOGRAFIA?

diagnosi differenziale
precoce ...
nel paziente malperfuso

IDENTIFICAZIONE PRECOCE DELLA SEPSI

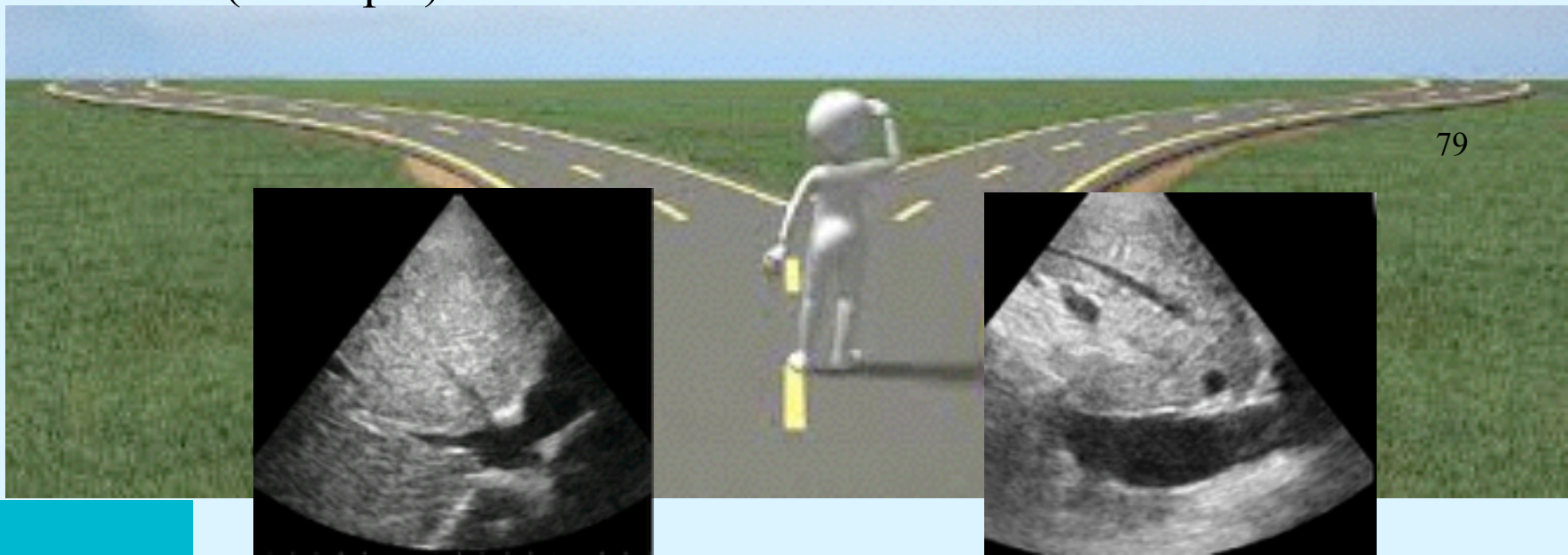
Randomized, controlled trial of immediate versus delayed goal-directed ultrasound to identify the cause of nontraumatic hypotension in emergency department patients*

Alan E. Jones, MD; Vivek S. Tayal, MD; D. Matthew Sullivan, MD; Jeffrey A. Kline, MD

Crit Care 2004 32:1703

75% è problema di volemia
(2/3 sepsi)

15% non è problema di volemia





CHEST

Postgraduate Education Corner

CONTEMPORARY REVIEWS IN CRITICAL CARE MEDICINE

Shock

Ultrasound to Guide Diagnosis and Therapy

Gregory A. Schmidt, MD, FCCP; Seth Koenig, MD; and Paul H. Mayo, MD, FCCP

The RUSH Exam 2012: Rapid Ultrasound in Shock in the Evaluation of the Critically Ill Patient

Phillips Perera, MD, RDMS^{a,*}, Thomas Mailhot, MD, RDMS^a,
David Riley, MD, MS, RDMS^b, Diku Mandavia, MD, FRCPC^a

KEYWORDS

• Rapid ultrasound in shock examination • RUSH exam
• Shock • Ultrasound

Review

Septic Shock

Advances in Diagnosis and Treatment

JAMA. 2015;314(7):708-717.

Christopher W. Seymour, MD, MSc; Matthew R. Rosengart, MD, MPH



**DIAGNOSTIC ACCURACY OF LEFT VENTRICULAR FUNCTION FOR
IDENTIFYING SEPSIS AMONG EMERGENCY DEPARTMENT PATIENTS
WITH NONTRAUMATIC SYMPTOMATIC UNDIFFERENTIATED
HYPOTENSION**

Alan E. Jones, Patrick A. Craddock, Vivek S. Tayal, and Jeffrey A. Kline

Department of Emergency Medicine, Carolinas Medical Center, Charlotte, North Carolina

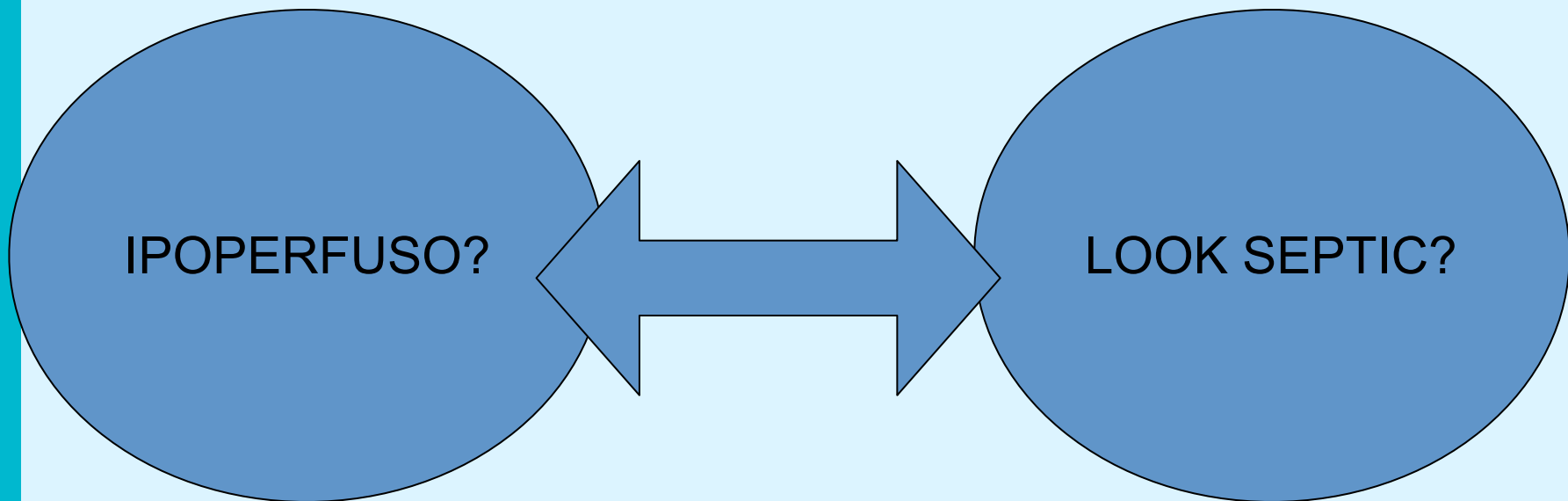
Submitted 26 Jul 2005; first review completed 17 Aug 2005; accepted in final form 6 Sep 2005

ABSTRACT—The hypothesis of this study states that in emergency department (ED) patients with nontraumatic symptomatic hypotension, the presence of hyperdynamic left ventricular function (LVF) is specific for sepsis as the etiology

Spec 94% (Sens 33%)
Hyperdynamic LVF had a
positive likelihood ratio of 5.3 and was a
strong independent predictor of sepsis

DIAGNOSI e amplificazione

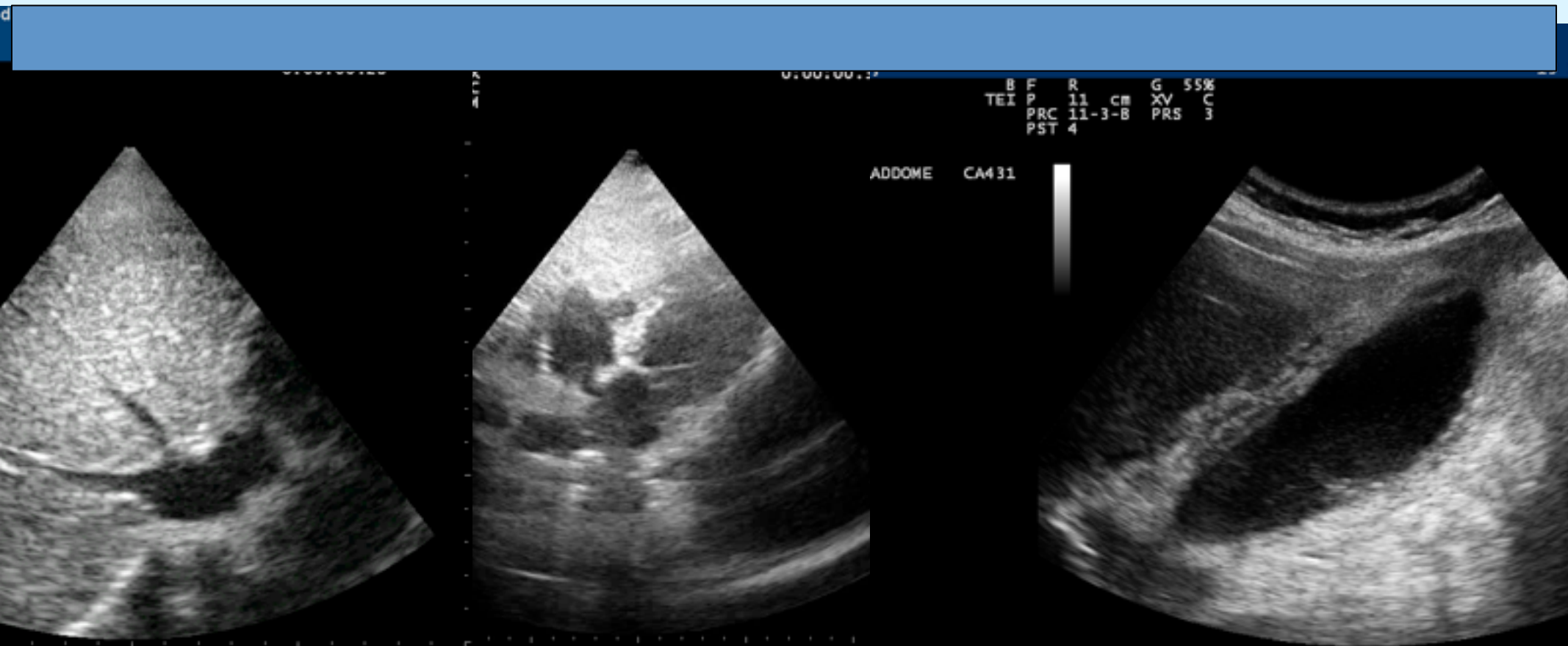
Considera settico ogni ipoperfuso e
cerca l'ipoperfusione in ogni settico



CONSIDERA SETTICO L'IPOPERFUSO..

donna 65 aa

PA 75/45, FC 120 r, FR 35 TA 38, soporosa
dubbio dolore addominale.

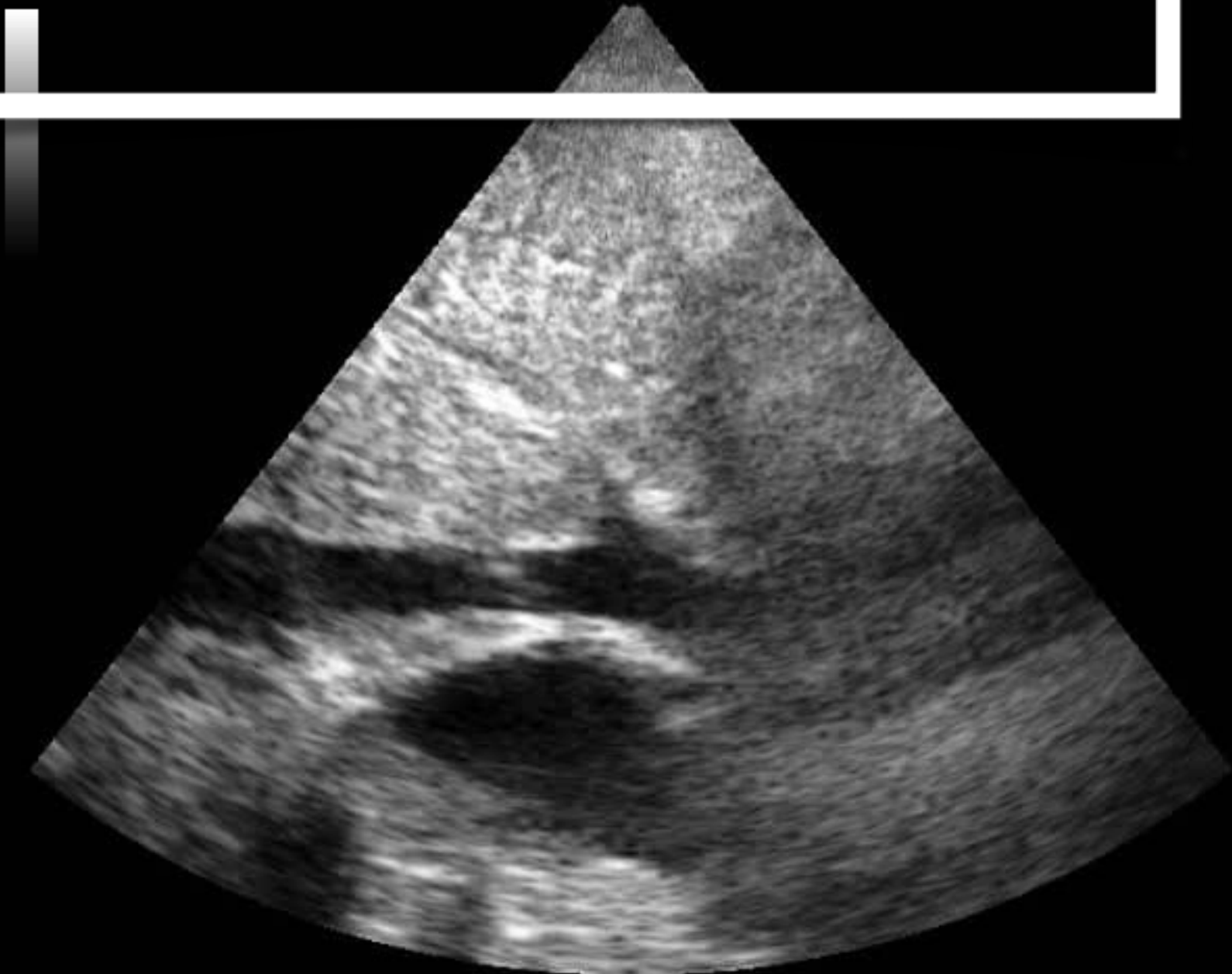


B F P G 94%
TEI P 15 cm XV C
PRC 7-3-B PRS M
PST 1

0:00:00.24

cava intermedia?

PA230





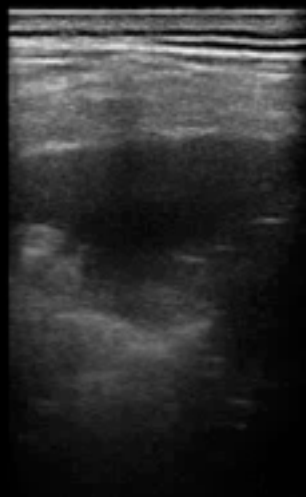
@saote MyLab Osp. Niguarda Medicina d'urgenza

@saote MyLab Osp. Niguarda Medicina d'urgenza

07 FEB 2015 19:14
0:00:00.35

B	F	10	MHz	G	58%
P	7	cm	XV	C	
PRC	9-4-A		PRS	5	
PST	4		MV	-	

MUSC/SCH LA332

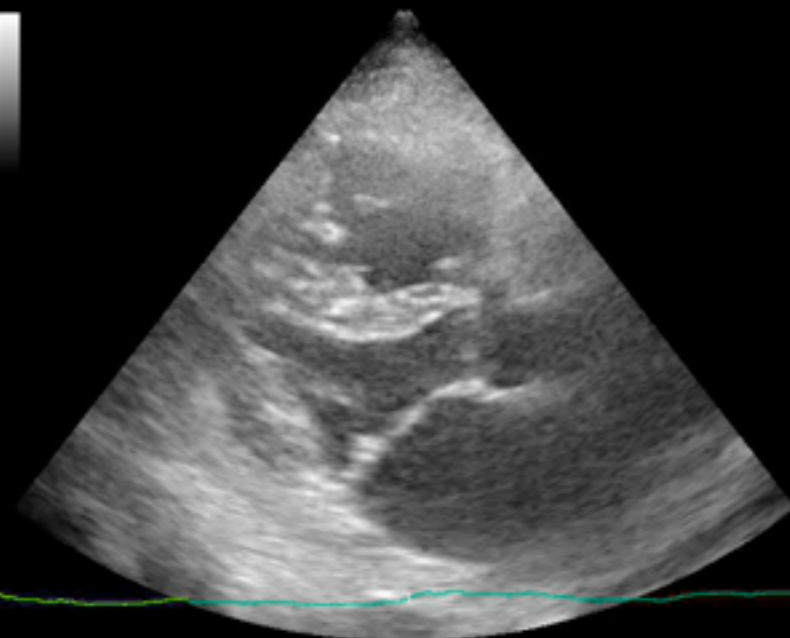


23 MAR 2015 11:14
0:00:00.47

B	F	G	GA	64%	
TEI	P	14	cm	XV	C
PRC	9-3-B		PRS	M	
PST	1				

CARDIO PA240

FC <<

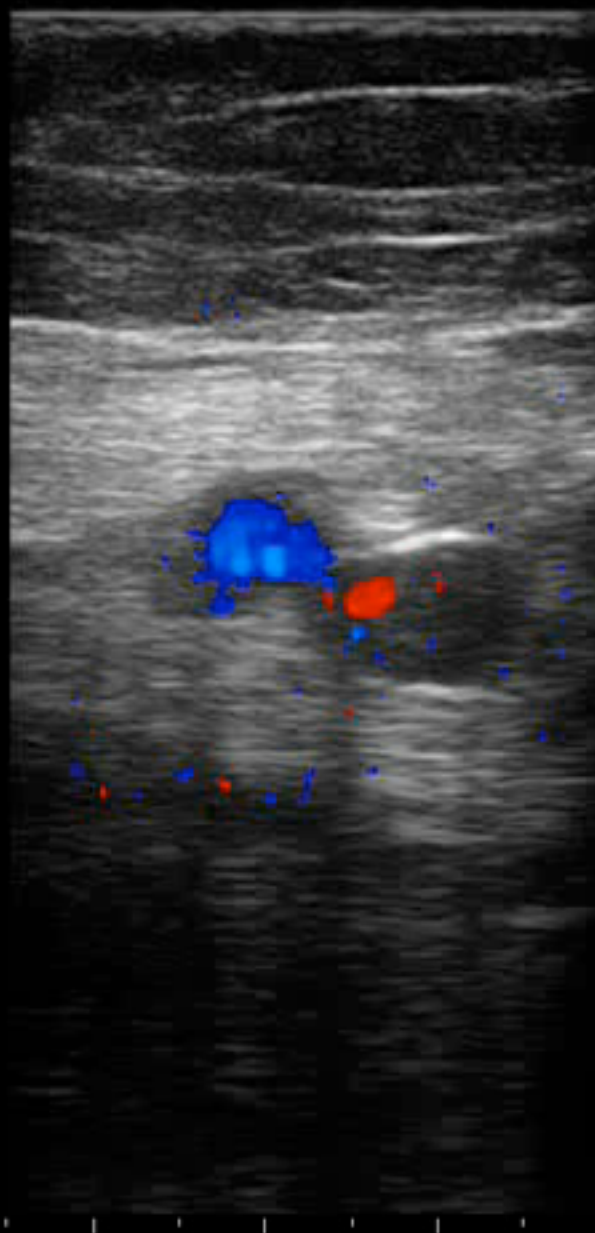


B	F	6.6	MHz	G	52%	CFM	F	3.3	MHz	G	70%
	P	7	cm	XV	C		PRF	1.0	kHz		
	PRC	9-5-A		PRS	5		PRC	3-B-A		PRS	5
	PST	4					FP	SA		S	

0:00:00.55

VASC.VEN LA332

femorale sup sin



PRE 7 5 B PRS M
PST 1

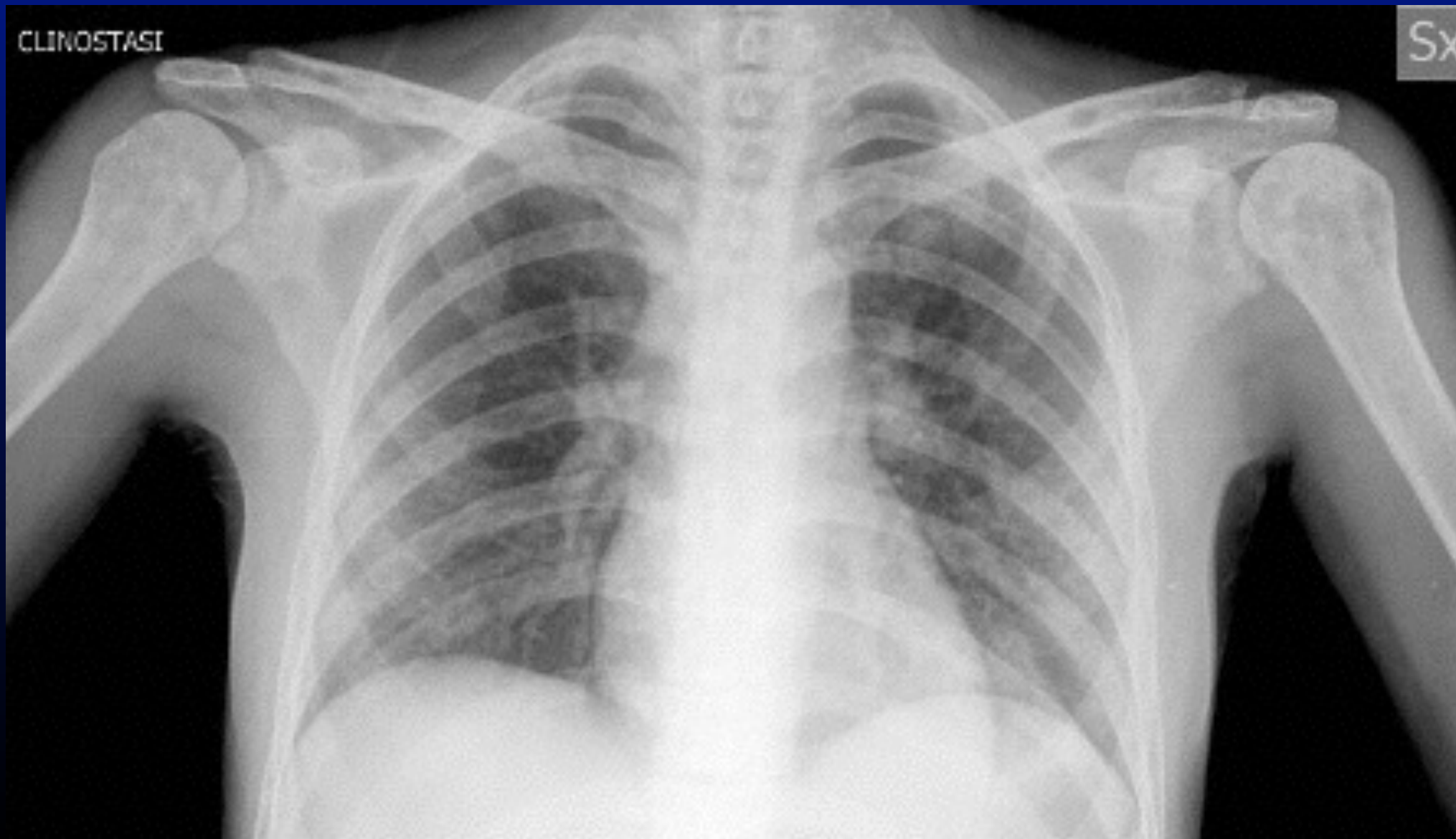
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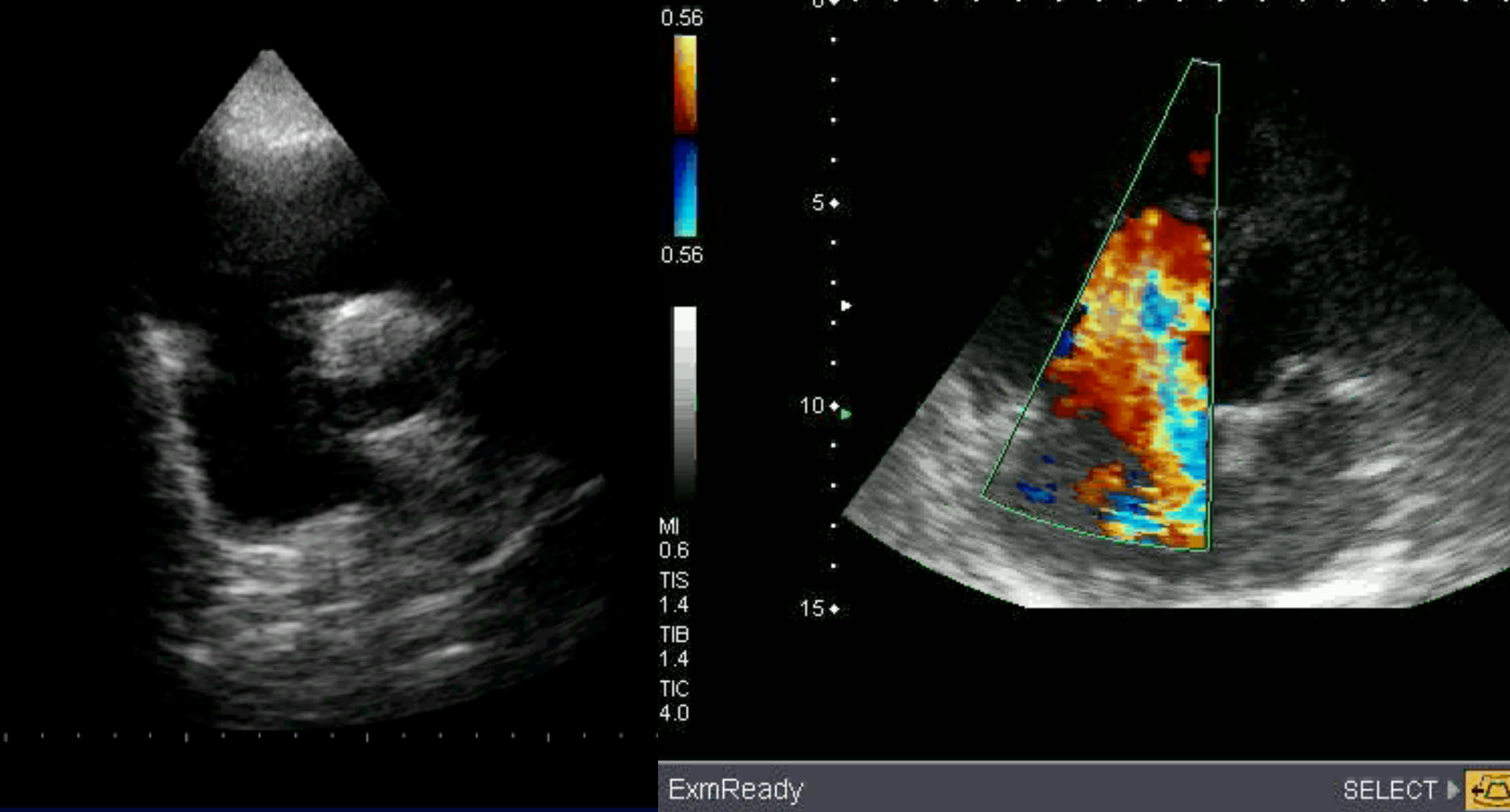
cava intermedia?



CLINOSTASI

Sx





- ***Diagnosi e trattamento precoce della fonte***

SPAZIO PER L'ECOGRAFIA?

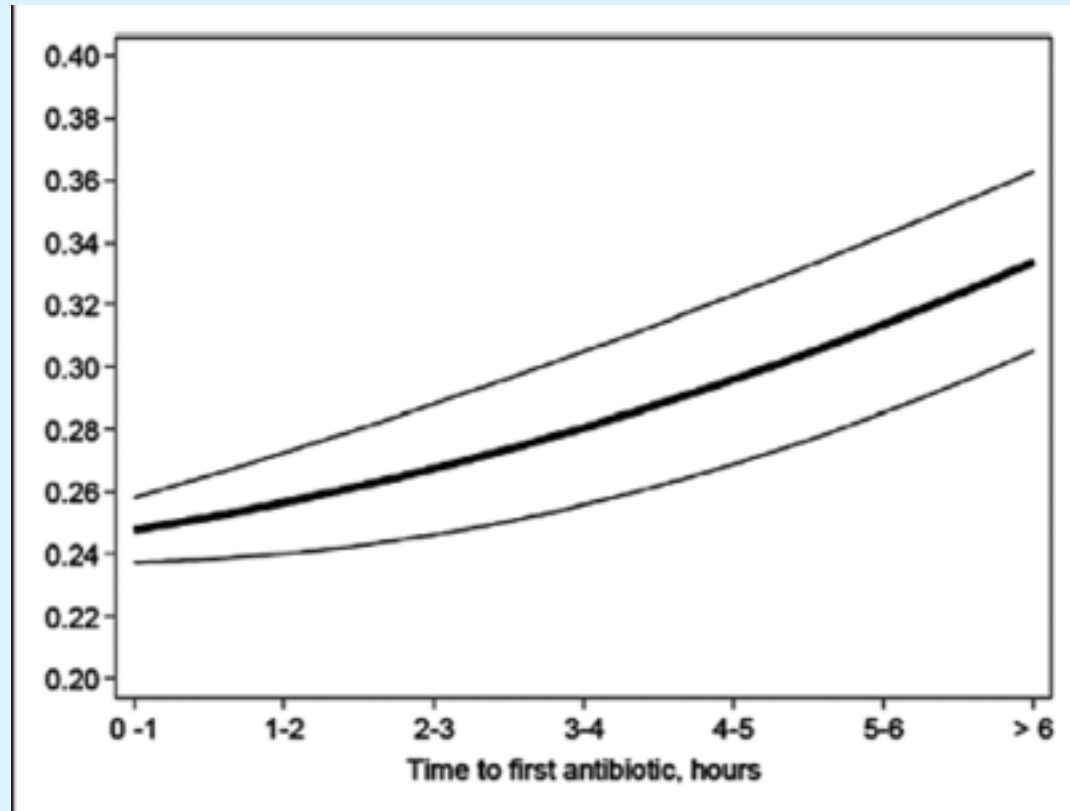


2. We recommend that imaging studies be performed promptly in attempts to confirm a potential source of infection. Sampling of potential sources of infection should occur as they are identified; however, some patients may be too unstable to warrant certain invasive procedures or transport outside of the ICU. Bedside studies, such as ultrasound, are useful in these circumstances (Grade 1C).

Empiric Antibiotic Treatment Reduces Mortality in Severe Sepsis and Septic Shock From the First Hour: Results From a Guideline-Based Performance Improvement Program*

Ricard Ferrer, MD, PhD¹; Ignacio Martin-Loeches, MD, PhD²; Gary Phillips, MAS³;

Crit Care Med 2014; 42:1749–1755)



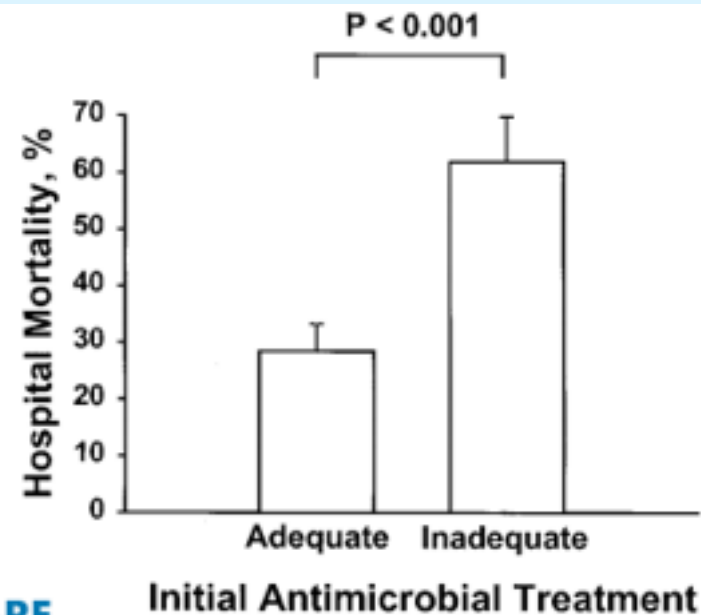
underscore the importance of early identification and treatment
sepsis Crit Care Med 2014; 42:1749–1755)

should be recognized as an urgent situation that requires immediate response.

The Influence of Inadequate Antimicrobial Treatment of Bloodstream Infections on Patient Outcomes in the ICU Setting*

Emad H. Ibrahim, MD; Glenda Sherman, RN; Suzanne Ward, RN;
Victoria J. Fraser, MD; and Marin H. Kollef, MD, FCCP

(CHEST 2000; 118:146–155)



Marquet et al. *Critical Care* (2015) 19:63
DOI 10.1186/s13054-015-0795-y



RESEARCH

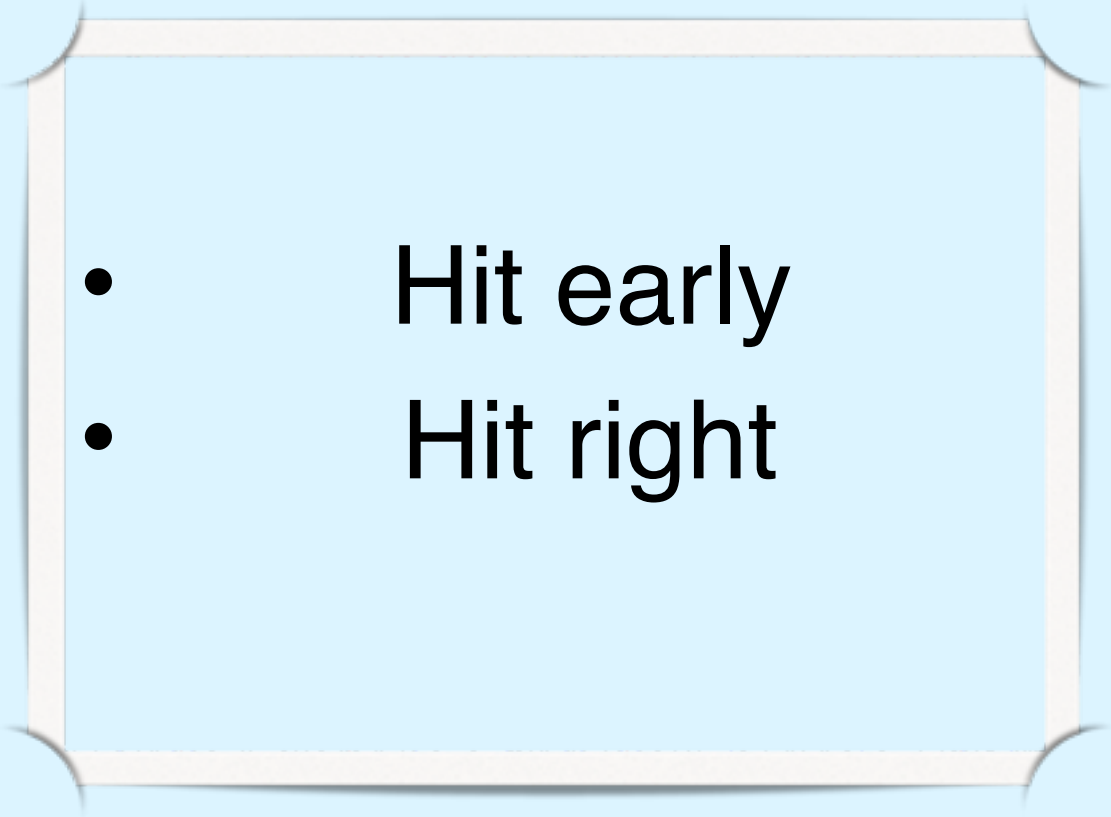
Open Access

Incidence and outcome of inappropriate in-hospital empiric antibiotics for severe infection: a systematic review and meta-analysis

Kristel Marquet^{1,2*}, An Liesenborgs², Jochen Bergs³, Arthur Vleugels^{1,4} and Neree Claes^{1,5}

Conclusions: This systematic review with meta-analysis provides evidence that inappropriate use of empiric antibiotics increases 30-day and in-hospital mortality in patients with a severe infection

.....scorretta nel 50% dei casi

- 
- Hit early
 - Hit right

C'è il sospetto di un' infezione?

Tosse produttiva, dolore toracico, dispnea;

Dolore addominale, diarrea vomito;

Disuria, urine torbide, dolore al fianco;

Cefalea con rigor nucale, alterazione sensorio, otalgia, faringite;

**Dolore localizzato $\pm$ flogosi cute o articolazioni
Endocardite.**



ECOGRAFIA point of care:POCUS



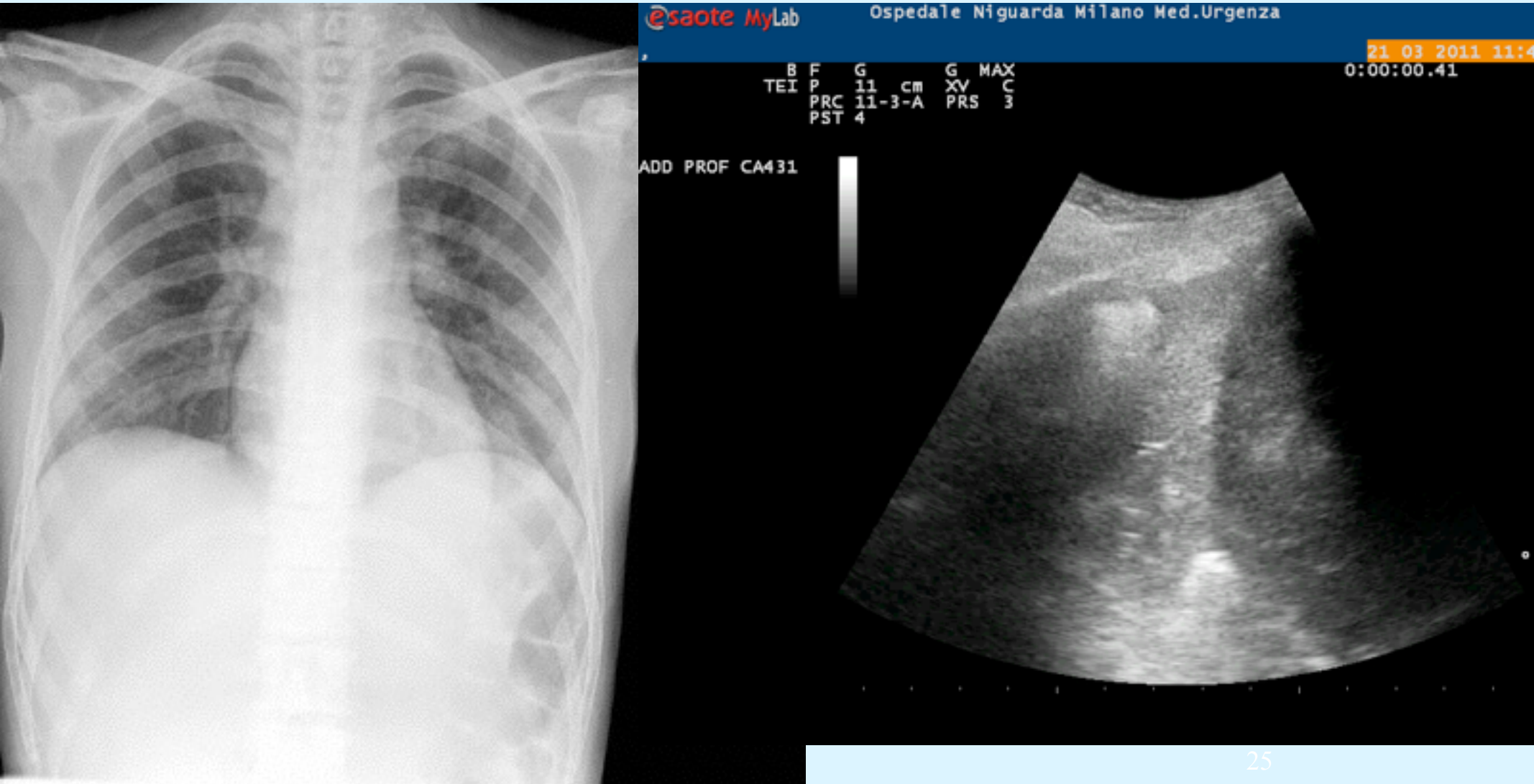
cuore:
endocarditi

Torace
pleurite
empiema
polmonite
ascesso

Addome
diffuse: peritonite,
perforazione, ischemia
intestinale
focali : appendice-diveritcoli,
colecisti

parti molli
articolazioni

- ***Diagnosi e trattamento precoce della fonte***



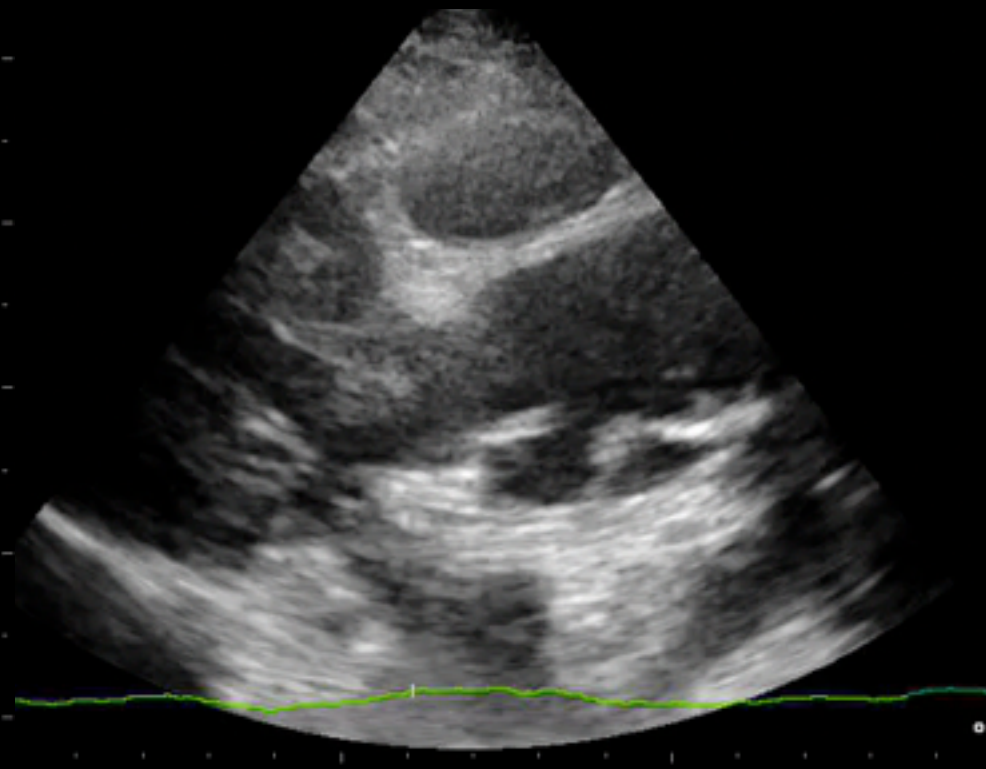
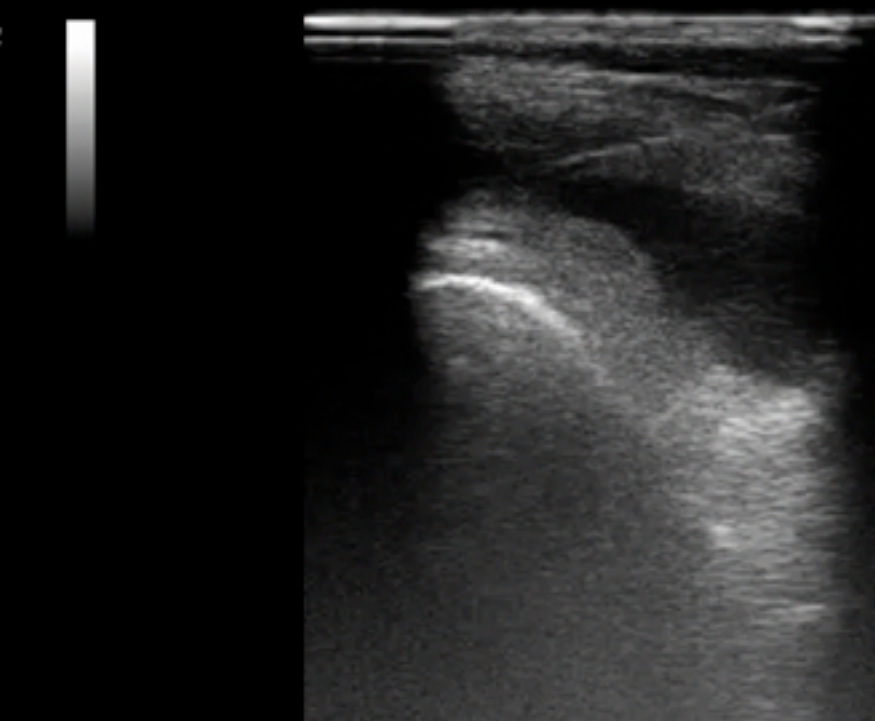
*artrite e....
artrocentesi
S.agalatie*

@saote MyLab

Osp. Niguarda Medicina d'urgenza

24 MAR 2015 09:29
0:00:00.35

F 10 MHz G 79%
P 5 cm XV C
PRC 10-4-A PRS 5
PST 4 MV -



**MA CON L'ECOGRAFIA
BEDSIDE SIAMO ACCURATI?**

Accuracy of point of care ultrasound to identify the source of infection in septic patients: a prospective study

Francesca Cortellaro¹ · Laura Ferrari¹ · Francesco Molteni² · Paolo Aseni¹ ·
Marta Velati¹ · Linda Guarnieri¹ · Katia Barbara Cazzola¹ · Silvia Colombo¹ ·
Daniele Coen¹

Received: 7 March 2016 / Accepted: 14 May 2016
© SIMI 2016

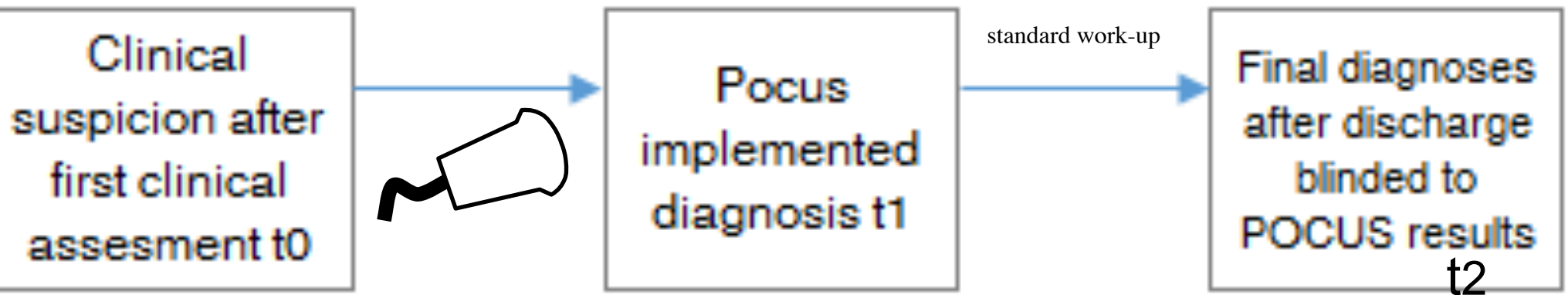
Objective:

The aim of this study was to compare the accuracy of the standard diagnostic work-up of septic patients with an integrated approach using early point of care ultrasound (POCUS) to identify the source of infection and to speed up the time to diagnosis, compared with the final diagnosis.

STUDY DESIGN:

Prospective clinical study (March 2015-September 2015)

Fig. 1. Study Protocol



t2 : two emergency physicians, blinded to POCUS results and experienced in sepsis, independently reviewed the entire medical records of patients and indicated the source of patient's sepsis.

Results:
200 patients

**A diagnosis of septic source
after standard work-up
was possible in
178/200 patients (89%).**

Table 1. Identified Septic Sources

	no.	%
Respiratory infections	79	39,5
Pneumonia	79	39,5
Abdominal infections	39	19,5
Cholecystitis	13	6,5
Cholangitis	11	5,5
Appendicitis	6	3,0
Diverticulitis	6	3,0
Intra-abdominal abscesses	3	1,5
Urosepsis	46	23,0
Urinary tract infections (UTI)	29	14,5
Hydronephrosis/Pyelonephritis	17	8,5
Endocarditis	2	1,0
Joint abscesses	1	0,5
Musculoskeletal abscesses	2	1,0
Hepatic abscesses	1	0,5
Meningitis	2	1,0
Others	6	3,0
Total identified	178	89,0
Unidentified Septic Source	22	11,0
Total	200	100,0

Table 5. Sensitivity and Specificity of clinical suspicion Vs Final Diagnosis (standard reference)

	Final Diagnosis ^a +	Final Diagnosis ^a -	TOT.
Clinical ^b +	86 (48%)	3 (14%)	131
Clinical ^b -	92 (52%)	19 (86%)	69
TOT.	178	22	200

^a: Final diagnosis at t2

^b: Clinical suspicion at t0

Accuracy of diagnosis after clinical suspicion was 52,5%

POCUS implemented diagnoses
Sensitivity of 73% (IC 95% 66- 79%)
Specificity of 95% (IC 95% 77- 99%).

Table 4. Sensitivity and Specificity of POCUS diagnosis Vs Final Diagnosis (standard reference)

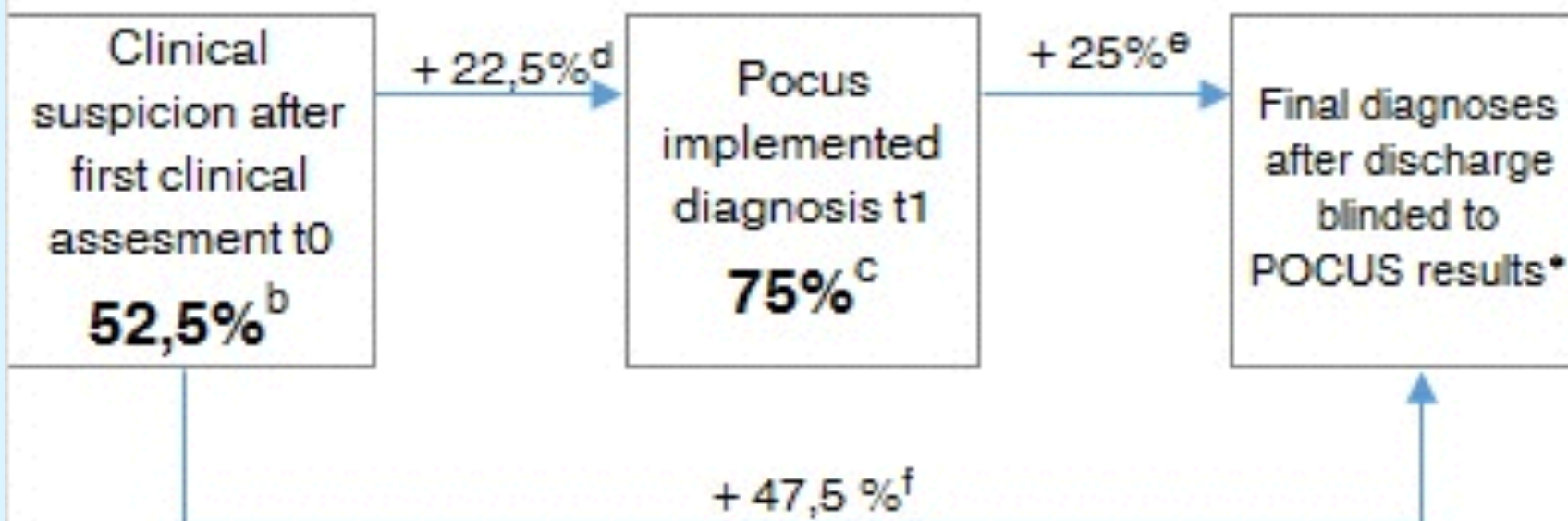
	Final Diagnosis ^a +	Final Diagnosis ^a -	TOT.
POCUS ^b +	130 (73%)	1 (4%)	131
POCUS ^b -	48 (27%)	21 (96%)	69
TOT.	178	22	200

^a: Final diagnosis at t2

^b: POCUS diagnosis at t1

**Accuracy of diagnosis POCUS
 implemented diagnosis was 75%**

Fig. 3. POCUS accuracy improvements^a



a: $p < 00,1$ with two-tailed McNemar test

b: accuracy of clinical suspicious

c: accuracy of POCUS implemented diagnoses

d: improvement in accuracy between t0 and t1

e: improvement in accuracy between t1 and t2

f: improvement in accuracy between t0 and t2

*Gold Standard

Table 7. Sensitivity of POCUS diagnosis Vs Final Diagnosis (Standard Reference) grouped by anatomic district

		95%CI-	95%CI+
Respiratory infections	SENS: 0,97 ± 0,03	0,93	- 1,00
Abdominal infections	SENS: 0,79 ± 0,13	0,67	- 0,92
Urosepsis	SENS: 0,33 ± 0,14	0,19	- 0,46
Endocarditis ^a	SENS: 0,50 ± 0,69	0,00	- 1,00
Joint abscesses ^a	SENS: 1,00 ± 0,00	1,00	- 1,00
Musculoskeletal abscesses ^a	SENS: 1,00 ± 0,00	1,00	- 1,00
Others	SENS: 0,33 ± 0,31	0,03	- 0,64

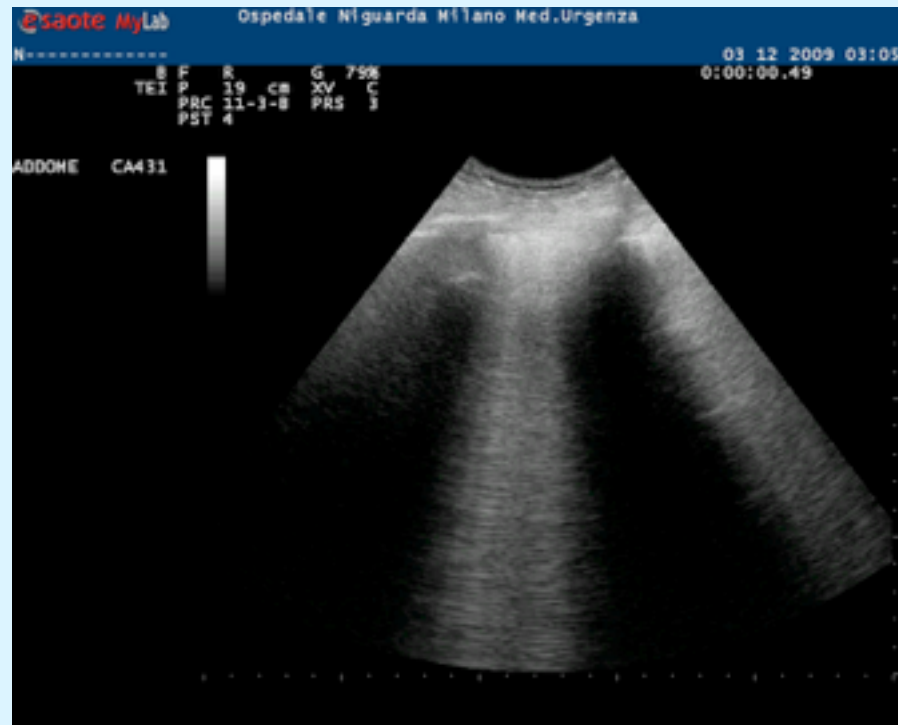
^a: inadequate sub-sample size

A 75% accuracy of POCUS-based work-up in our study should be considered a (very) good result as we included in diagnostic work up with ultrasound also patients with suspected urosepsis.

Specificity of 95%.....Needless antimicrobial therapy

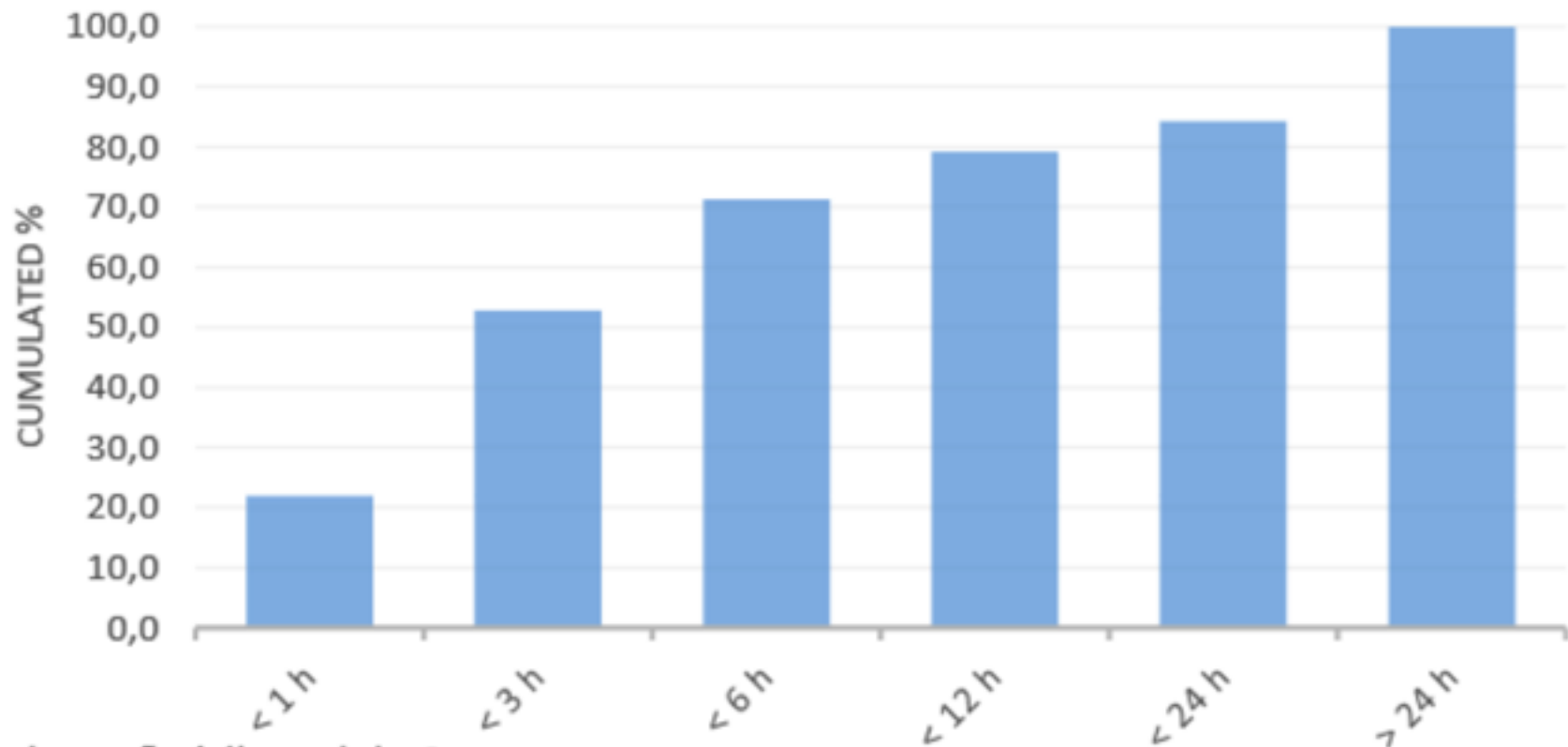
Relevant and emerging problem

CAP: 17% of patients hospitalized did not have an infection



Time to diagnosis after standard work-up

Graph 2. Timing to diagnosis^a



^a: time to final diagnosis in t2

**Standard imaging work-up diagnosis:
within 1 hour in only 21.9% , within 3 hours in 52.8%**

POCUS & EARLY MANAGEMENT :

- POCUS results influenced the **early** management of patients in **35%**
 - in 24% the **antimicrobial therapy** chosen after the first clinical evaluation was changed
 - in 22% --> **interventional source control:**
 - surgery
 - drainage of thoracic empyema or septic arthritis
 - endoscopic removal of biliary tract calculi in cholangitis
 - nephrostomy in ureteral calculi
- NECESSITA' DI PROTOCOLLI CONDIVISI

B	F	R	G	79%
TEI	P	19 cm	XV	C
	PRC	11-3-B	PRS	3
	PST	4		

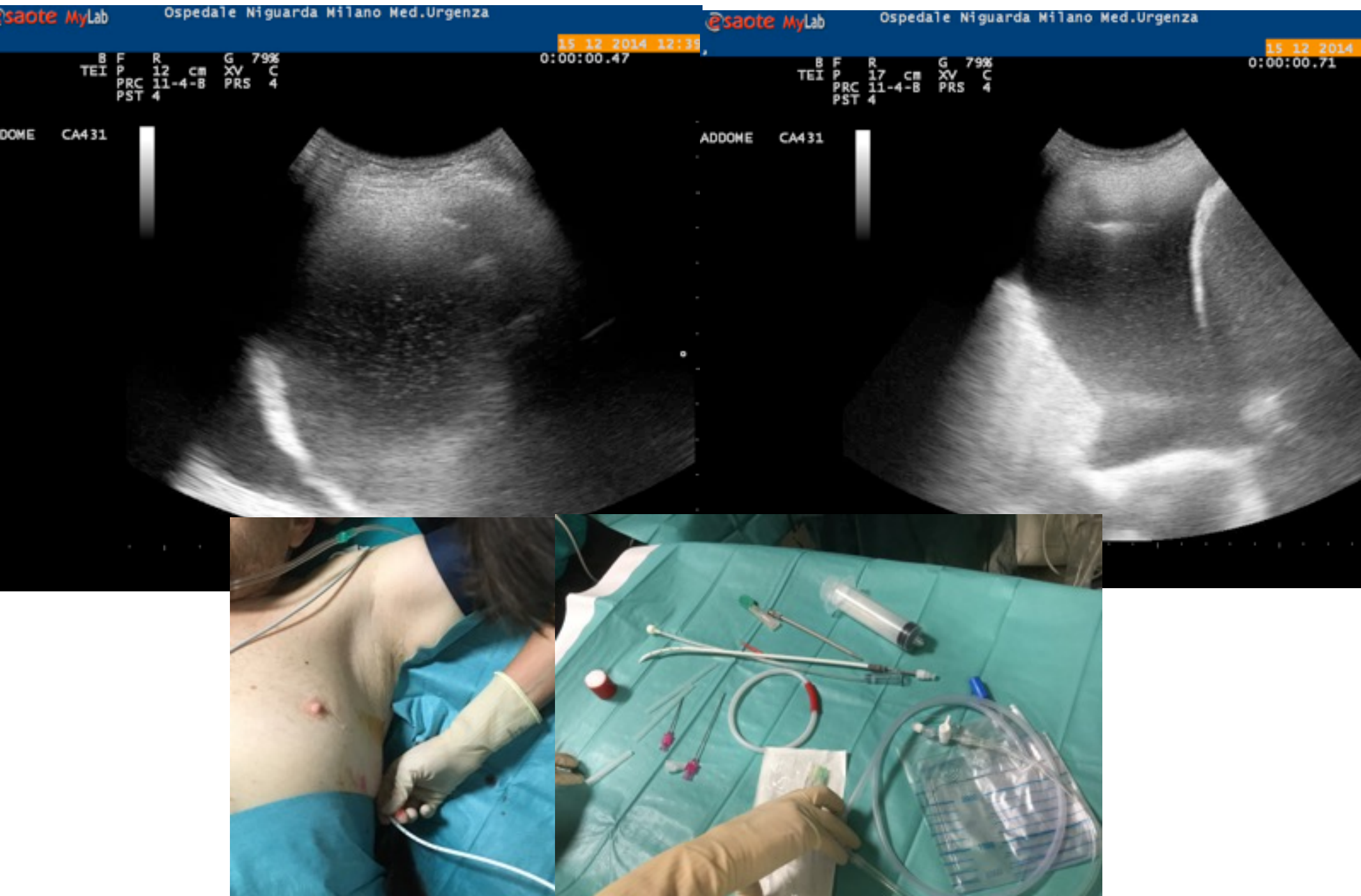
ADDOME CA431





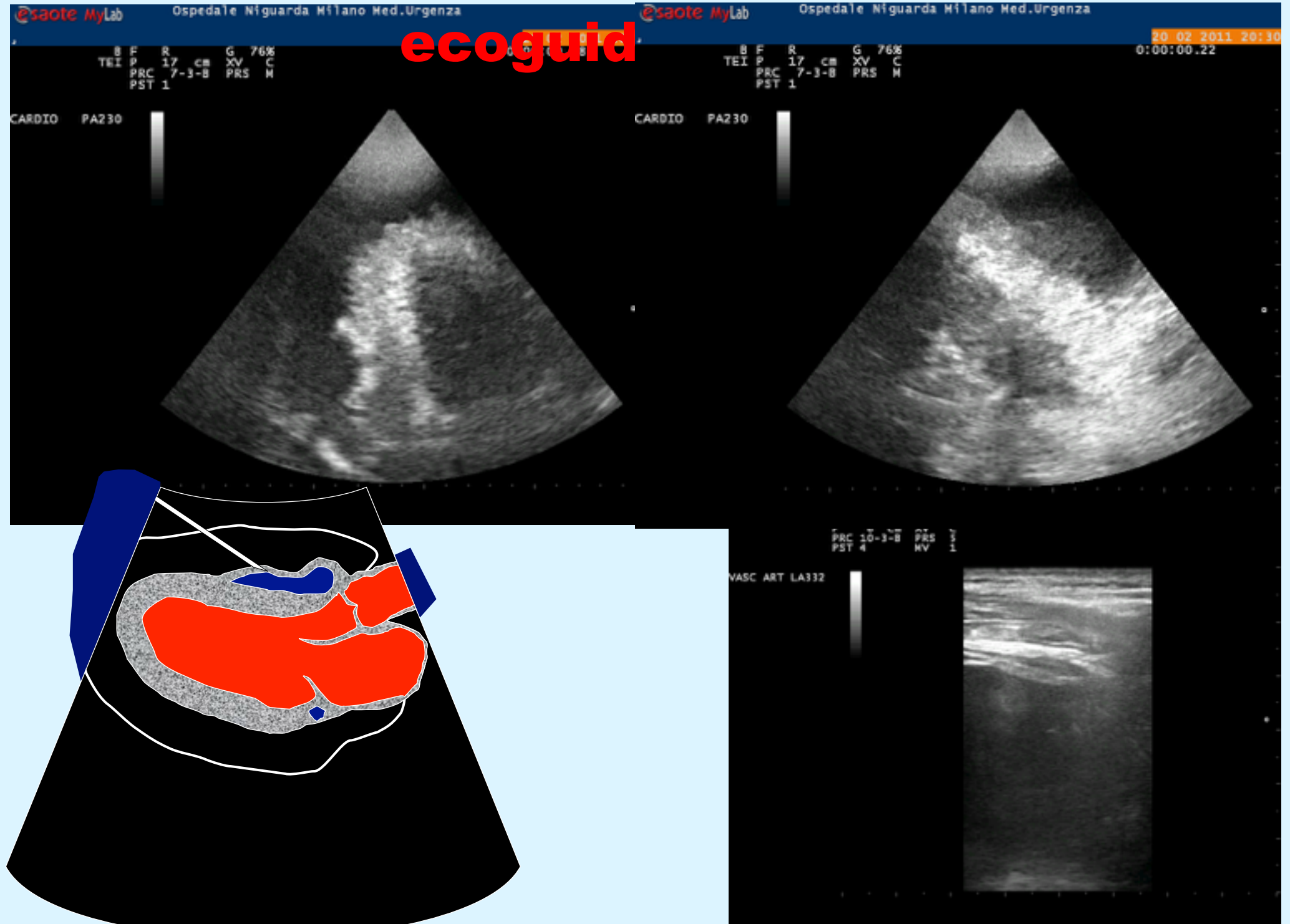
Idronefrosi dx con ureterolitiasi:
contattato radiologo interventista per nefrostomia
percutanea

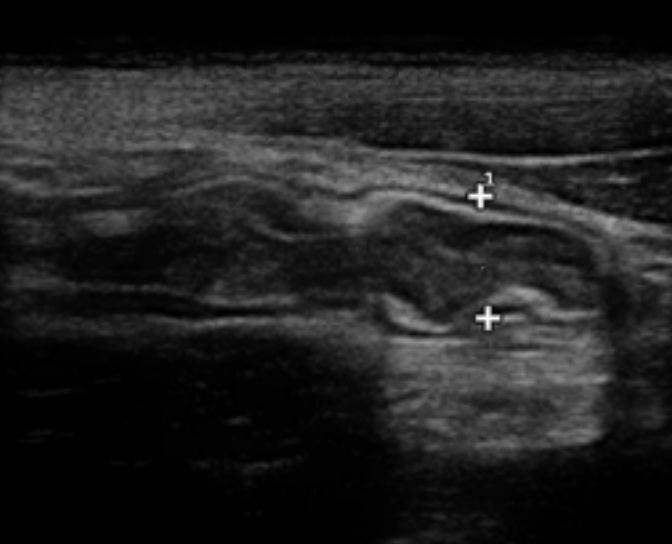
- FEBBRE IN DIALIZZATO PERITONEALE



Pericardite tubercolare

ecoguid





ADDOME CA431

TEI P 12 cm XV C
PRC 11-3-B PRS 3
PST 4



Di Saverio et al. *World Journal of Emergency Surgery* (2016) 11:34
DOI 10.1186/s13017-016-0090-5

World Journal of
Emergency Surgery

REVIEW

Open Access



WSES Jerusalem guidelines for diagnosis and treatment of acute appendicitis

Statement 7.1: Percutaneous drainage of a periappendicular abscess, if accessible, is an appropriate treatment in addition to antibiotics for complicated appendicitis. (EL 2, GOR B)

Statement 7.2: Non-operative management is a reasonable first line treatment for appendicitis with phlegmon or abscess. (EL 1, GOR A)

- ***Diagnosi precoce FONTE SETTICA...***

ORIGINAL ARTICLE



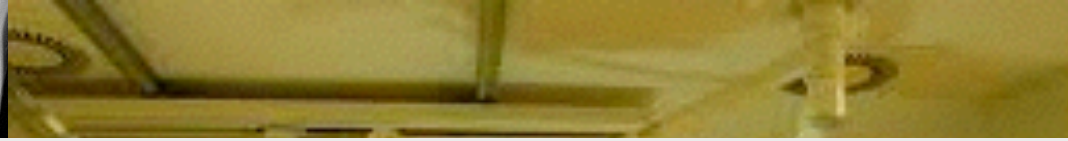
Association between Source of Infection and Hospital Mortality in Patients Who Have Septic Shock

Aleksandra Leligdowicz¹, Peter M. Dodek^{2,3}, Monica Norena³, Hubert Wong^{3,4}, Aseem Kumar⁵, and Anand Kumar⁶; for the Co-operative Antimicrobial Therapy of Septic Shock Database Research Group*

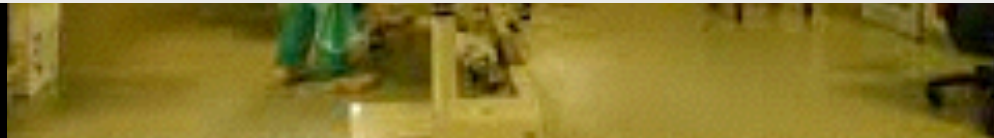
Am J Respir Crit Care Med Vol 189, Iss 10, pp 1204–1213, May 15, 2014

- **Studio osservazionale retrospettivo** in 29 ICU di 3 paesi (Canada, USA Arabia Saudita), tra il 1989 e il 2008 –
- **8670 pazienti consecutivi con shock settico**
 - Infezioni comunitarie 61% – ospedaliere 39%
 - Esami culturali positivi nel 69% dei casi (emoculture positive nel 33%)
 - gram negativi 50%, gram positivi 37%, anaerobi 5%, funghi e M.Tuberculosis 8%

Fonte infettiva	Prevalenza	Mortalità
Infezione disseminata	1,5%	> 70%
Intestino ischemico	5,3%	
Peritonite batterica spontanea	2,0%	
Colite da Cl. Difficile	2,6%	54-70%
Altre infezioni endo-addominali	0,5%	
Infezione primaria del sangue	5,0%	
Viscere perforato	9,4%	54%
Polmone	40,1%	
Peritonite / ascesso / ostruzione ileale	3,7%	40-54%
Artrite / osteomielite	0,8%	
Pancreatite	1,1%	
Infezione del SNC	0,8%	
Infezione di sito chirurgico	1,1%	
Cellulite / fascite necrotizzante / decubito	6,9%	
Catetere intravascolare	3,2%	
Colecistite / colangite	4,2%	<40%
Altre	0,9%	
Pielonefrite	9,4%	
Enterocolite / diverticolite	0,3%	
Uropatia ostruttiva con infezione	1,2%	



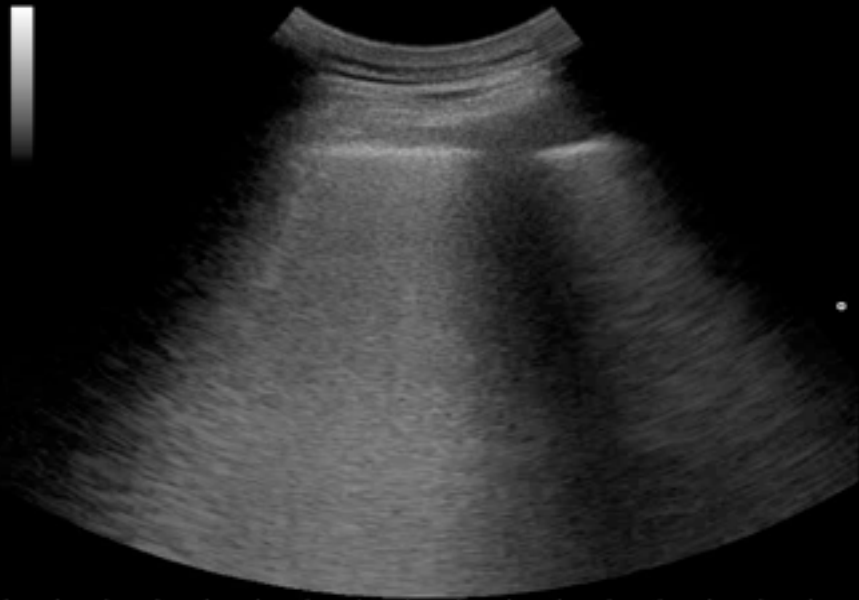
- It is likely that wider use of POCUS will allow a faster diagnosis, conducive to a more prompt and appropriate antimicrobial therapy and source control strategy.



17 MAG 2012 14:27
0:00:00.41

B F G G 76%
TEI P 13 cm XV C
PRC 13-3-A PRS 4
PST C#2 MV 1

ADDOME CA431



B F G G 76%
TEI P 13 cm XV C
PRC 13-3-A PRS 4
PST C#2 MV 1

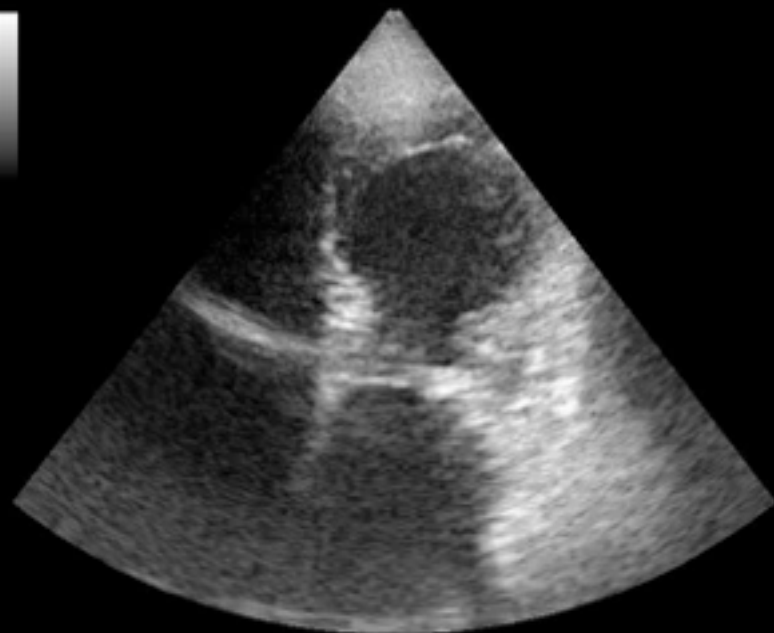
ADDOME CA431



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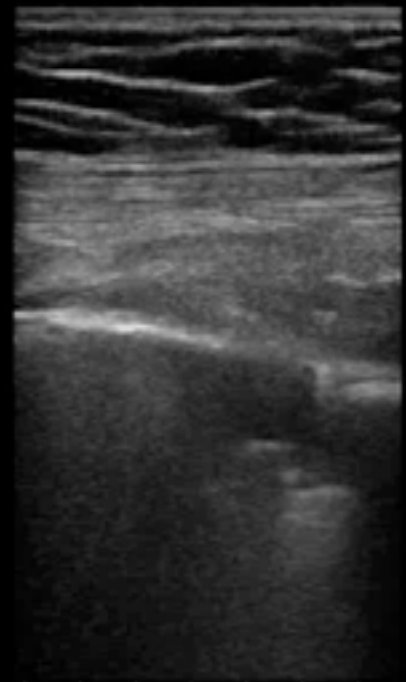
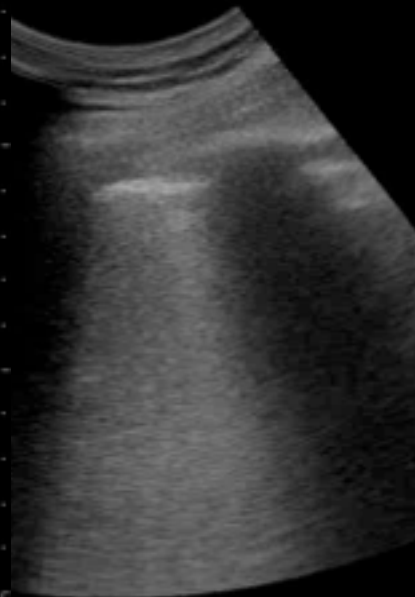
PRC 7-3-B PRS 1
PST 2

PA230



17 MAG 2012
0:00:00.3

PARTI M LA332





“Experience is simply the name we give our mistakes.”
Oscar Wilde



francesca.cortellaro@gmail.com