Società Italiana
Medicina d'Emergenza – Urgenza
Sezione Regionale Ligure

ici d'Urgenza, Pronto Soccorso ed Emergenza Territoriale

Congresso Regionale SIMEU Liguria
Martedì 23 Ottobre 2018

GESTIONE DEL TRAUMA "INTERMEDIO" IN PRONTO SOCCORSO

Dott. Stefano Sartini
UOC MECAU,
Ospedale Policlinico S.Martino

Workshop: il trauma intermedio

25 OTTOBRE 2018

SIMEU
Società Italiana di Medicina d'Emergenza-Urgenza

LUISA, 68aa

PURE LA CONTORSIONISTA STAMANI?!?!?

COSA FACCIO ORA?

COME LO CLASSIFICO?

DEFINIZIONE

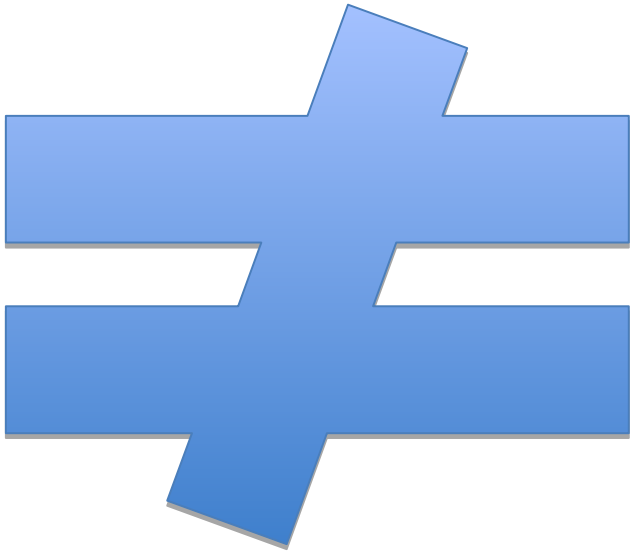
The definition of polytrauma revisited: An international consensus process and proposal of the new 'Berlin definition'

2014

Two injuries that are greater or equal to 3 on the AIS **and one** or more additional diagnoses (pathologic condition), that is, **hypotension** (systolic blood pressure e 90 mm Hg,), **unconsciousness** (GCS score e 8), **acidosis** (base deficit e j6.0), **coagulopathy** (PTT Q 40 seconds or INR Q 1.4), and **age** (Q70 years).

Pape et al. J Trauma Acute Care Surg 2014; 77 (5): 780-786

TRAUMA INTERMEDIO o MINORE



POLITRAUMA

POLITRAUMA

DEFINIZIONE

TRAUMA INTERMEDIO o MINORE

POLITRAUMA

DEFINIZIONE

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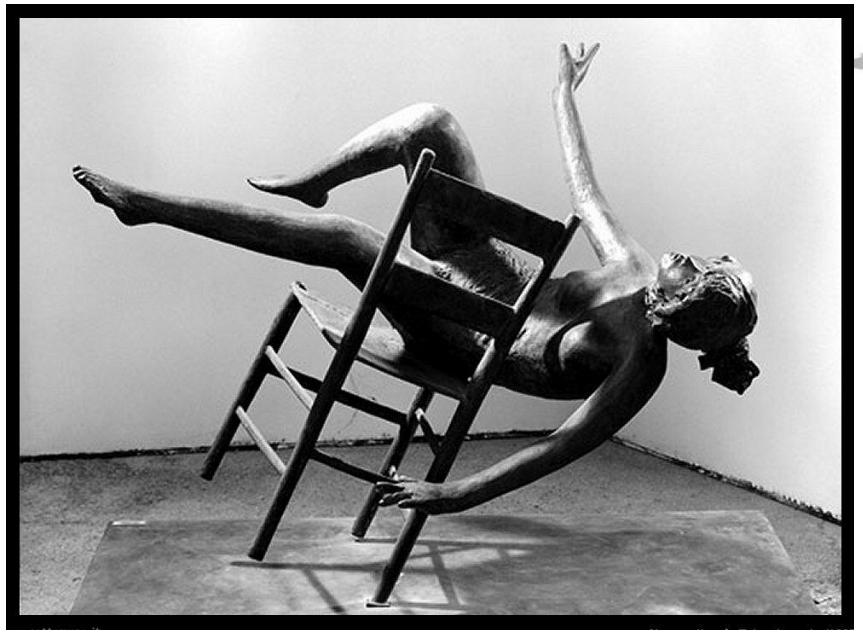
TRAUMA INTERMEDIO o MINORE



DEA I

DEA II

TRAUMA SCORES…

PREOSPEDALIERO

Revised Trauma Score
Trauma center se <4

Glasgow coma score	Systolic blood pressure	Respiratory rate	Coded value
13–15	>89	10–29	4
9–12	76–89	>29	3
6–8	50–75	6–9	2
4–5	1–49	1–5	1
3	0	0	0

Score Component	GAP Score (Point Range, 3–24)	MGAP Score (Point Range, 3–29)
Age < 60 y	+3	+5
SBP > 120 mm Hg	+6	+5
SBP of 60–120 mm Hg	+4	+3
GCS score	GCS value	GCS value
Blunt trauma (vs. penetrating)	—	+4

GCS score ranges from 3 points to 15 points.

Mechanism-GCS-Age-Blood pressure
23-29 basso rischio
18-22 rischio intermedio
<18 alto rischio

TRAUMA SCORES…

INTRAOSPEDALIERO

Region	AIS Score	Injury
Head & Neck	1	Minor
Face	2	Moderate
Chest	3	Serious
Abdomen	4	Severe
Extremity	5	Critical
External	6	Survivable

ISS	
1-8	Minor
9-15	Moderate
16-24	Serious
25-49	Severe
50-74	Critical
75	Maximum

TRISS

Correlazione RTS/ISS

TRAUMA SCORES…

Correlation Between the Revised Trauma Score and Injury Severity Score: Implications for Prehospital Trauma Triage

Physiological	Anatomical
Revised Trauma Score (RTS)	Injury Severity Score (ISS)
Triage-Revised Trauma Score (T-RTS)	New Injury Severity Score (NISS)
Glasgow, Age, and Arterial Pressure Score (GAP)	Abbreviated Injury Score (AIS)
Mechanism, Glasgow, Age, and Arterial Pressure Score (MGAP)	Trauma-Related Injury Severity Score (TRISS)*

Measure	AUROC	95% CI	Odds ratio (OR)
ISS	0.921	(0.915–0.927)	1.12
RTS Scene	0.884	(0.872–0.896)	2.07
RTS Admission	0.927	(0.919–0.936)	3.24
MGAP Scene	0.934	(0.927–0.942)	1.48
MGAP Admission	0.958	(0.953–0.963)	1.55

Galvagno et al. Prehospital Emergency Care, Aug 2018, DOI: 10.1080/10903127.2018.1489019

TRAUMA SCORES…

Prediction of intra-hospital mortality after severe trauma: which pre-hospital score is the most accurate?

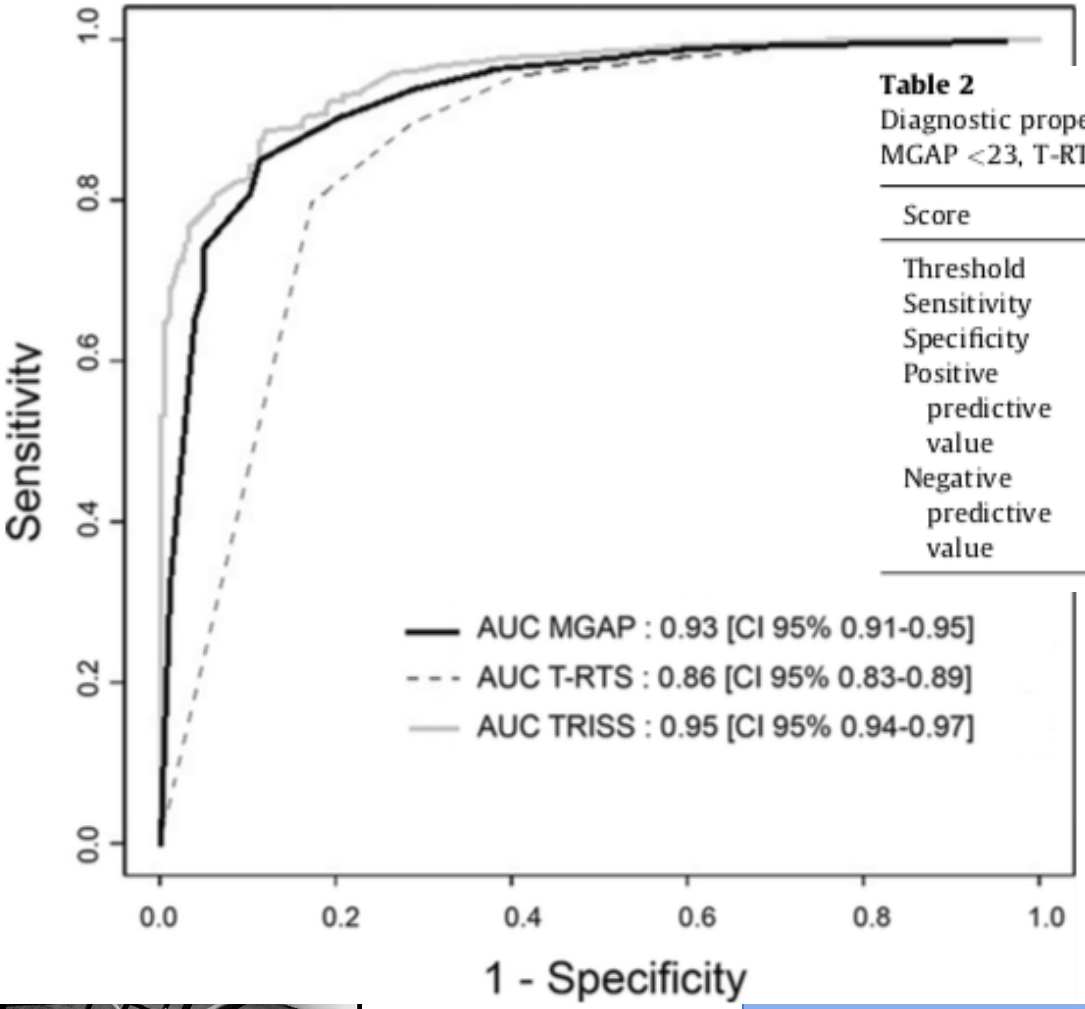
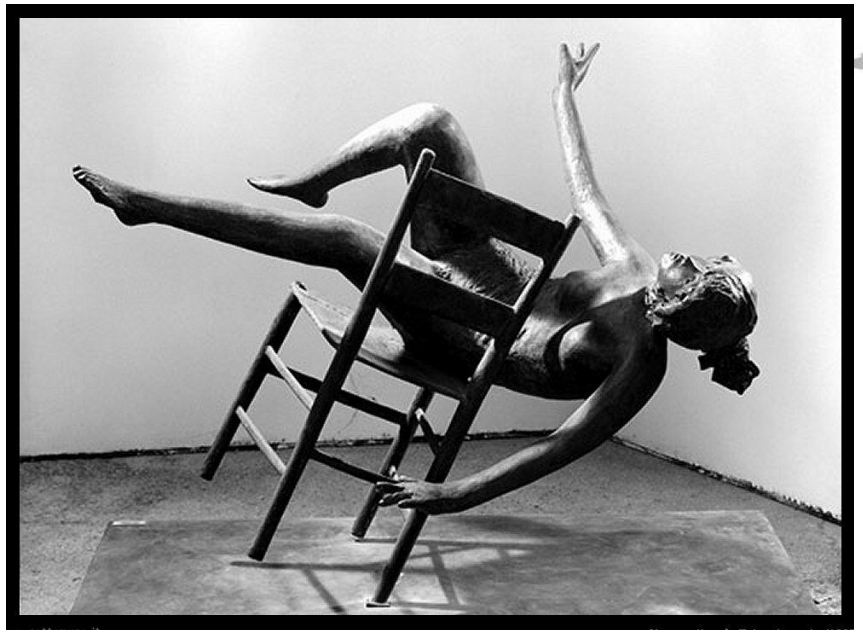
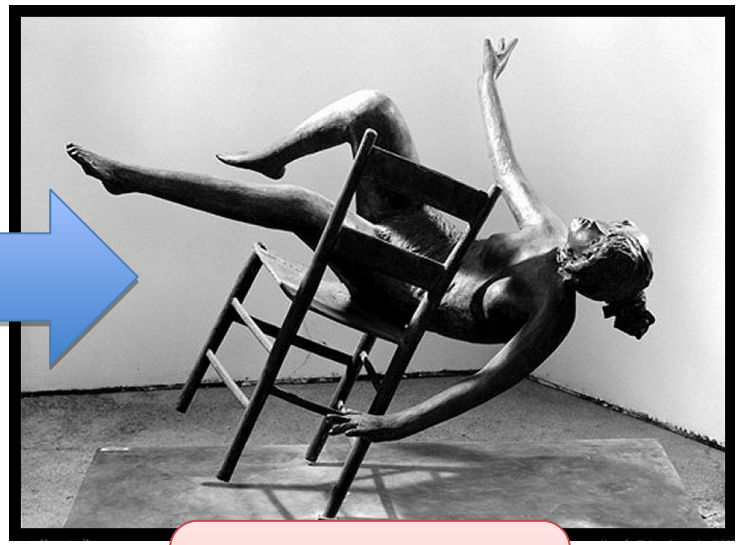


Table 2
Diagnostic properties of each score (MGAP, T-RTS and TRISS) at usual thresholds: MGAP <23, T-RTS <12 and TRISS <0.91.

Score	MGAP	T-RTS	TRISS
Threshold	< 23	< 12	< 0.91
Sensitivity	0.88 [0.87– 0.89]	0.79 [0.78– 0.80]	0.87 [0.86– 0.88]
Specificity	0.82 [0.81– 0.83]	0.88 [0.87– 0.89]	0.85 [0.84 –0.86]
Positive predictive value	0.26 [0.24– 0.28]	0.19 [0.18– 0.20]	0.29 [0.27– 0.31]
Negative predictive value	0.99 [0.99– 0.99]	0.98 [0.98–0.98]	0.99 [0.99– 0.99]

Bouzat et al.Injury, Int. J. Care Injured 47 (2016) 14–18





DEA I

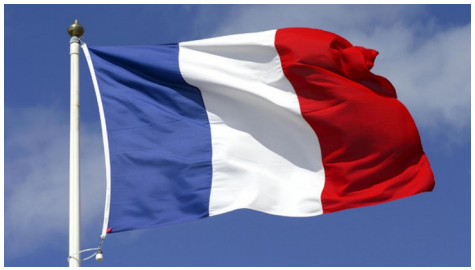
DEA II

TRAUMA CENTER

Step 1 (Physiological signs)

GCS < 13 &/or
SAP < 90 &/or
Sp02 < 90%

no



Step One

Measure vital signs and level of consciousness

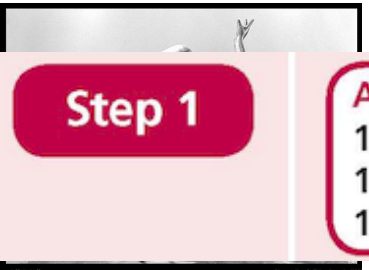
Glasgow Coma Scale	<14
Systolic blood pressure (mmHg)	<90 mmHg
Respiratory rate	<10 or >29 breaths per minute (<20 in infant aged <1 year*)

Yes

Take to a trauma center.† Steps One and Two attempt to identify the most seriously injured patients. These patients should be transported preferentially to the highest level of care within the trauma system.

No

Assess anatomy of injury.



Step 1

Assess vital signs and level of consciousness

- 1A Glasgow Coma Score of 13 or below
- 1B Sustained systolic blood pressure less than 90mmHg
- 1C Respiratory rate less than 10 or greater than 29bpm

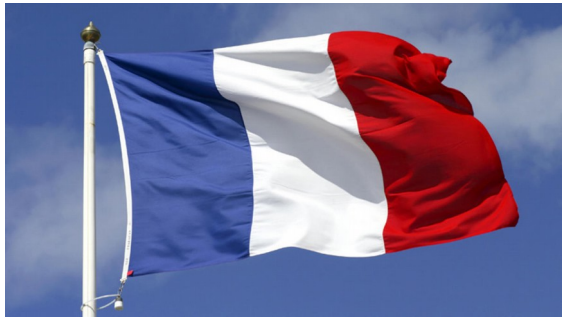
Yes to any one

TRAUMA CENTER

Step 2 (Global assessment of speed and mechanism)

Ejection from vehicule
Death in same passenger compartment
Fall > 6m
Victim thrown or projected
Global assessment of speed and potential injuries :
Vehicle deformation, estimated vehicle speed, no helmet, no seat belt
Blast

no



TRAUMA CENTER

Step Two[§]

- All penetrating injuries to head, neck, torso and extremities proximal to elbow and knee
- Flail chest
- Two or more proximal long-bone fractures
- Crushed, degloved, or mangled extremity
- Amputation proximal to wrist and ankle
- Pelvic fractures
- Open or depressed skull fracture
- Paralysis

Yes

Take to a trauma center. Steps One and Two attempt to identify the most seriously injured patients. These patients should be transported preferentially to the highest level of care within the trauma system.

No

Assess mechanism of injury and evidence of high-energy impact.

Step 2

Assess anatomy of injury

2A	Chest injury with altered physiology
2B	Traumatic amputation/mangled extremity proximal to wrist/ankle
2C	Penetrating trauma below the head above the knees (not arms)
2D	Suspected open and/or depressed skull fracture
2E	Suspected pelvic fracture
2F	Spinal trauma suggested by abnormal neurology
2G	Open fracture of the lower limb proximal to the ankle
2H	Burns/scald greater than 30 percent
2I	Facial burns with complete skin loss to lower half of face
2J	Circumferential burns from a flame injury

Yes to any one

TRAUMA CENTER

Step 3 (Anatomical injuries)

Penetrating trauma of head, neck, thorax, abdomen, arms or legs)
Flail chest
Severe burn
Pelvic fracture
Suspicion of medulla
Amputation at or abo
Acute limb ischemia

no

Step Three§

- Falls
  - — Adults: >20 feet (one story is equal to 10 feet)
  - — Children¶: >10 feet or two to three times the height of the child
- High-risk auto crash
  - — Intrusion**: >12 inches occupant site; >18 inches any site
  - — Ejection (partial or complete) from automobile
  - — Death in same passenger compartment
  - — Vehicle telemetry data consistent with high risk of injury
- Auto vs. pedestrian/bicyclist thrown, run over, or with significant (>20 mph) impact††
- Motorcycle crash >20 mph

Yes

No

Transport to closest trauma center, which, depending on the trauma system, need not be the highest level trauma center.§§

Assess special patient or system considerations.

Step 3

Assess mechanism of injury

- **3A** Traumatic death in same passenger compartment
- **3B** Falls >20 ft (two storeys)
- **3C** Person trapped under vehicle or large object (including 'one unders')
- **3D** Bullseye to the windscreen and/or damage to the 'A' post of the vehicle caused by impact of individual outside of the vehicle

TRAUMA CENTER

Step Four

- Age
  - Older adults[¶¶]: Risk of injury/death increases after age 55 years
  - Children: Should be triaged preferentially to pediatric-capable trauma center
- Anticoagulation and bleeding disorders
- Burns
  - Without other trauma mechanism: triage to burn facility[***]
  - With trauma mechanism: triage to trauma center[***]
- Time-sensitive extremity injury[†††]
- End-stage renal disease requiring dialysis
- Pregnancy > 20 weeks
- EMS[§§§] provider judgment

Yes

No

Step 4

Assess special patient consideration. Patients who have sustained trauma but do not fit any of the above criteria but are:

4A Older patients (>55years)

4B Pregnant (>20 weeks)

4C Known to have bleeding disorder or receiving current anti-coagulation therapy e.g. warfarin or novel oral anticoagulant agent

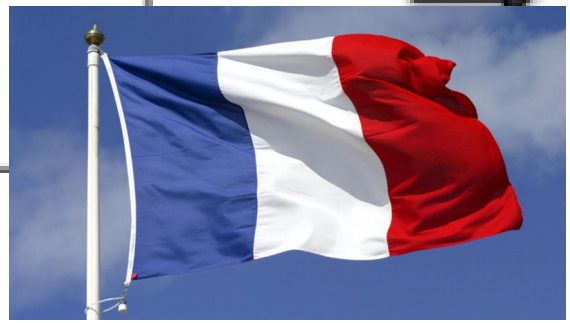
4D Morbidly obese

Yes to any one

TRAUMA CENTER

Step 5 (medical history)

Age > 65 y/o
Cardiac insufficiency, respiratory failure, or ischemic heart disease
Pregnancy (2nd and 3rd trimester)
Coagulation problems



no

Step 5

Assess system consideration. Patients who have sustained trauma but do not fit any of the above criteria but there is:

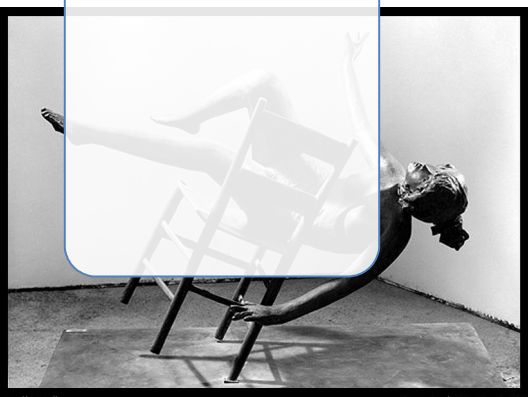
5A Significant crew concern only when discussed with a Trauma Paramedic within EOC

Yes to any one

Tornando a Luisa…

Step 1

- PA:110/70
- FC 90bpmR
- GCS 15/15
- Sat O2: 98%inaa



Step 2

- Caduta accidentale da sedia con trauma fianco sx, no trauma cranico.

Step 3

- ESAME OBIETTIVO
- Torace:MV ridotto base sx
- Cuore toni validi, ritmici
- Addome: trattabile dolorabile ipocondrio e fianco sx con ematoma, non ferite aperte
- EN nei limiti

Step 4

- ANAMNESI: Donna, 68 anni, assume Xarelto e Bisoprololo x FAC.Non allergie

Devo fare ESAMI EMATICI? Quali? accesso venoso?

Indagini strumentali? E-FAST? RX? O TC?

E se tutto è negativo…la dimetto?

Knottenbelt JD. Low initial hemoglobin levels in trauma patients: an important indicator of ongoing hemorrhage. J Trauma. 1991;31:1396–9.

Rose M. Hematocrit as a predictor of significant injury after penetrating trauma. Am J Emerg Med. 1997;15:224–8.

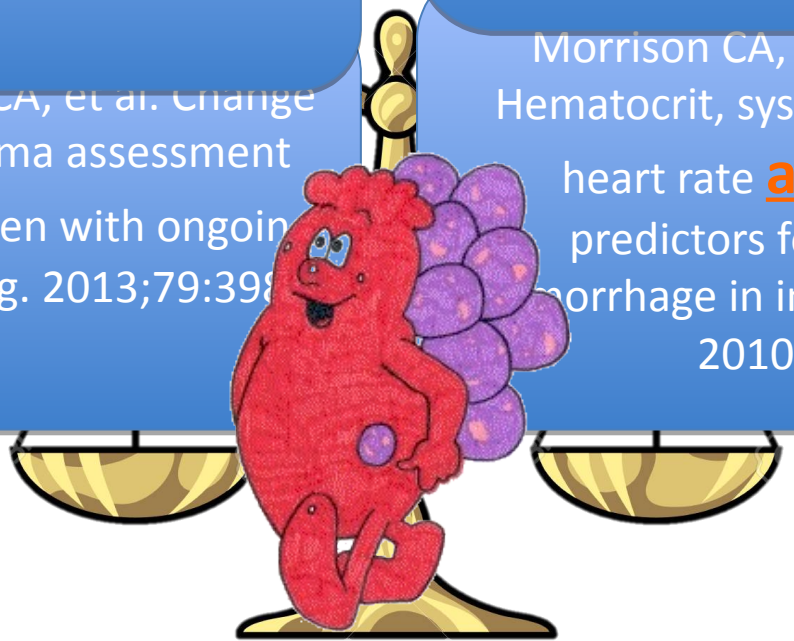
Minei JP, Gentilello LM, et al. Hemoglobin drops within minutes of injuries and predicts need for an intervention to stop hemorrhage. J Trauma. 2007;63:312–5.

Pereira R, Olloqui J, Otero CA, et al. Change in hematocrit during trauma assessment predicts bleeding even with ongoin fluid resuscitation. Am Surg. 2013;79:39 406.

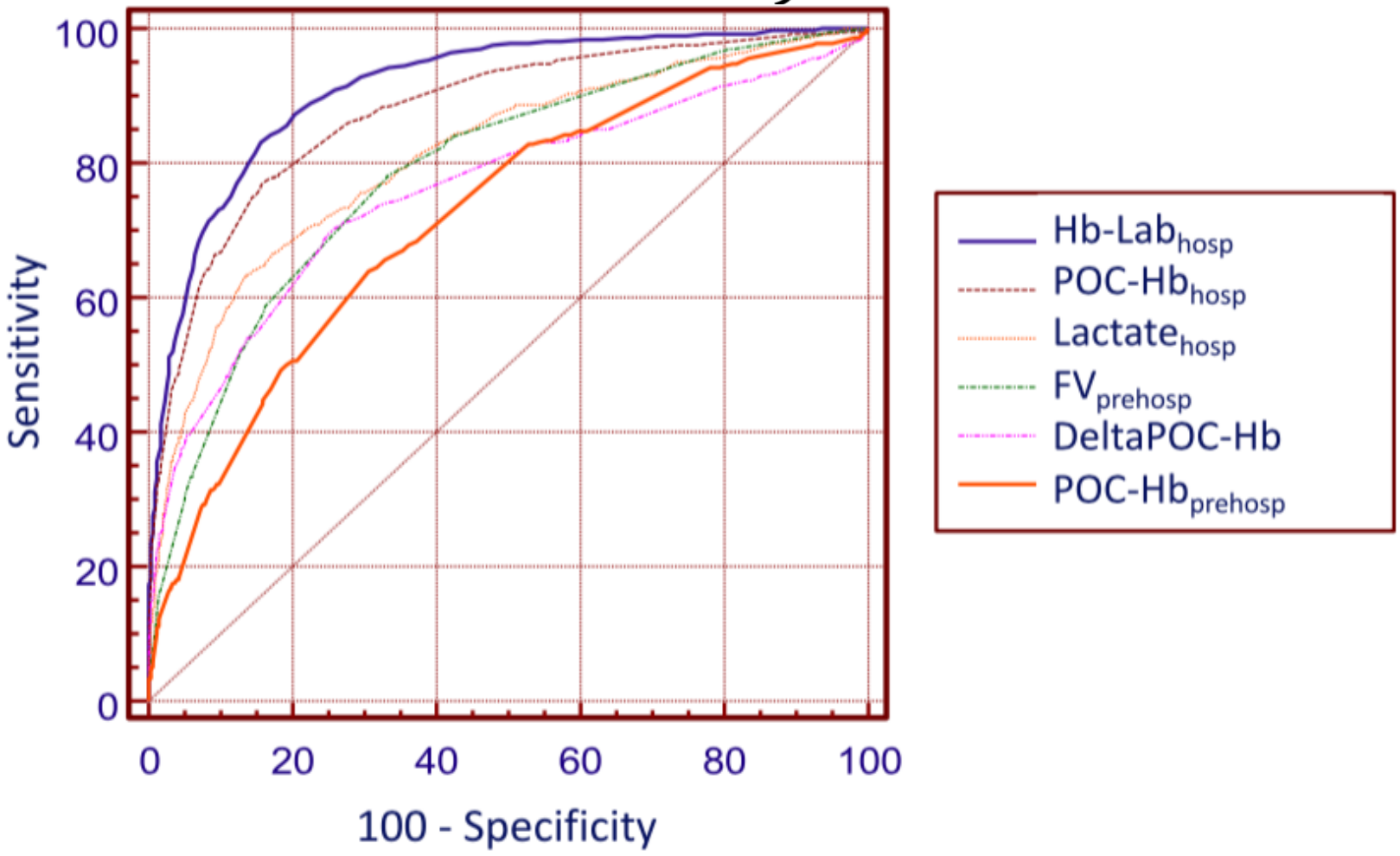
Madsen T, Dawson M, Bledsoe J, Bossart P. Serial hematocrit testing does not identify major injuries in trauma patients in an observation unit. Am J Emerg Med. 2010;28:472–6.

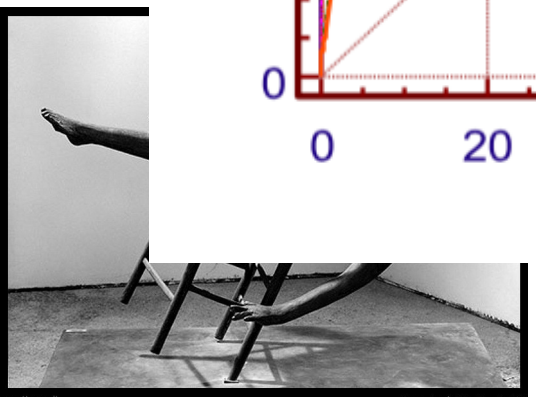
Acker SN, Petrun B, Partrick DA, Roosevelt GE, Bensard DD. Lack of utility of repeat monitoring of hemoglobin and hematocrit following blunt solid organ injury in children. J Trauma Acute Care Surg. 2015;79:991–4 **(discussion 994)**

Morrison CA, Mosher BD, Kepros JP. Hematocrit, systolic blood pressure and heart rate are not accurate predictors for surgery to control orrhage in injured patients. Am Surg. 2010;76:296–301.



How useful are hemoglobin concentration and its variations to predict significant hemorrhage in the early phase of trauma? A multicentric cohort study





Figueiredo *et al. Ann. Intensive Care (2018) 8:76*

Do lactate levels in the emergency department predict outcome in adult trauma patients? A systematic review

Severity of injury

ICU admission

Multi organ failure

CLEAR RELATIONSHIP **LACTATE** and **MORTALITY**

Mechanical ventilation

Respiratory complications

Surgery

Blood transfusion

Baxter et al.J Trauma Acute Care Surg 2016: 81(3) 555-566

Prevalence and Relief of Pain in Trauma Patients in Emergency Medical Services

TABLE 2. Prevalence of Pain (n=1407)

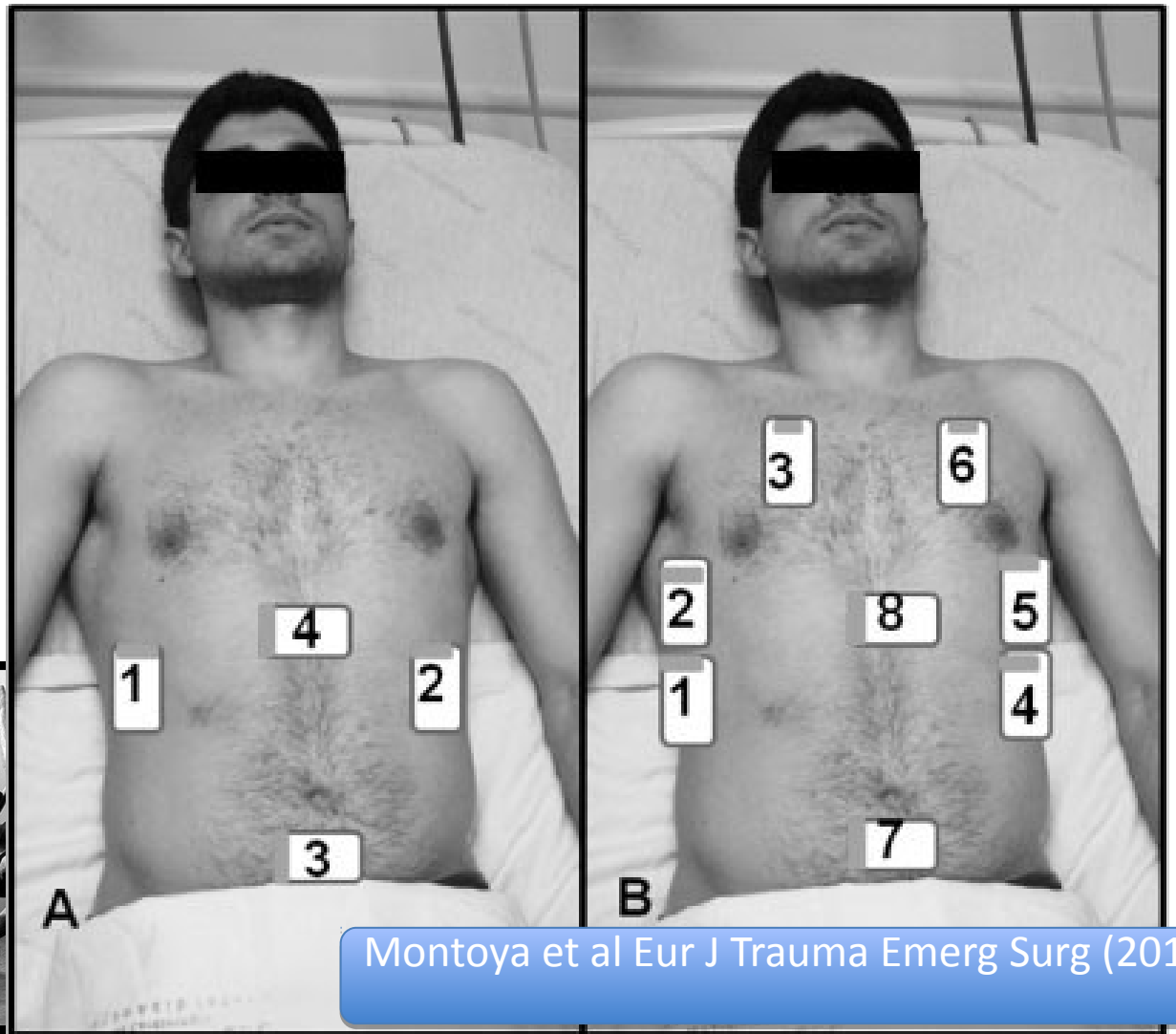
No report on pain in run sheets (missing values)		393
Report on presence of pain (n = 1014)		
No pain		34
NRS = 0	23	
Narrative report description: no pain	11	
Pain		980
1. Assessed with NRS:	288 (total)	
0 < NRS < 4	55	
NRS ≥ 4	233	
2. Narrative report:	620 (total)	
Mild pain	9	
Moderate pain	5	
Severe pain	113	
Unbearable pain	1	
Pain	492	
3. Pharmacological pain treatment, however, no report on pain:	72 (total)	
Total		1407

NRS indicates Numeric Rating Scale.

Baxter et al.J Trauma Acute Care Surg 2016: 81(3) 555-566

E la E-FAST???

From FAST to E-FAST: an overview of the evolution of ultrasound-based traumatic injury assessment



Montoya et al Eur J Trauma Emerg Surg (2016) 42:119–126

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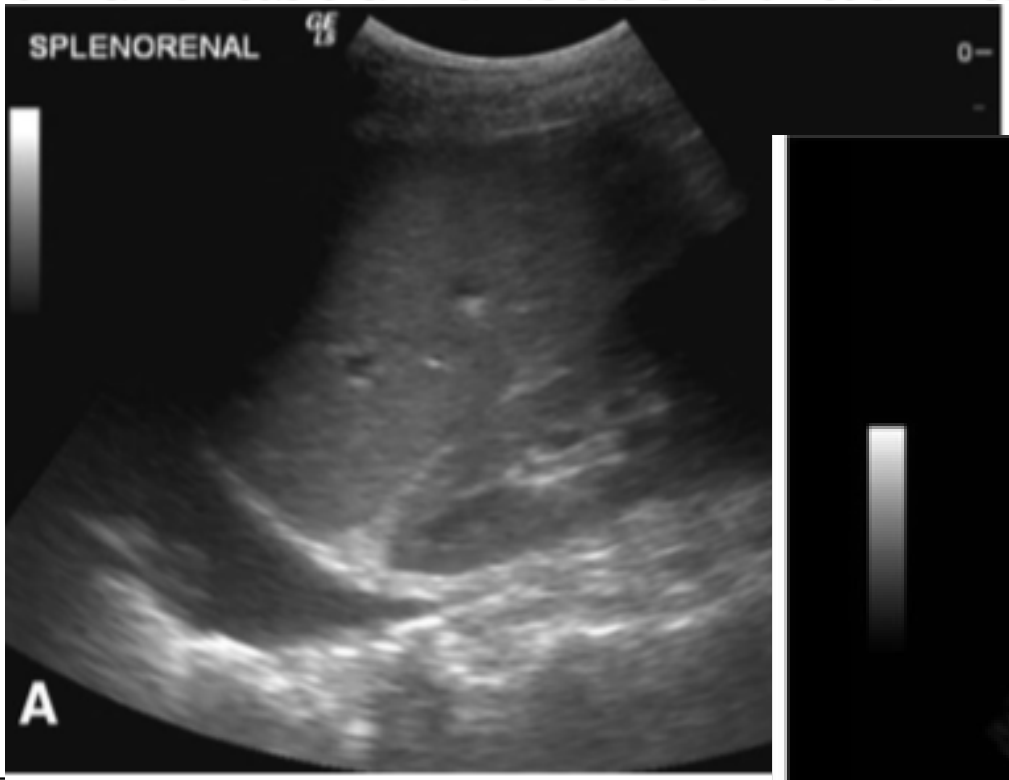

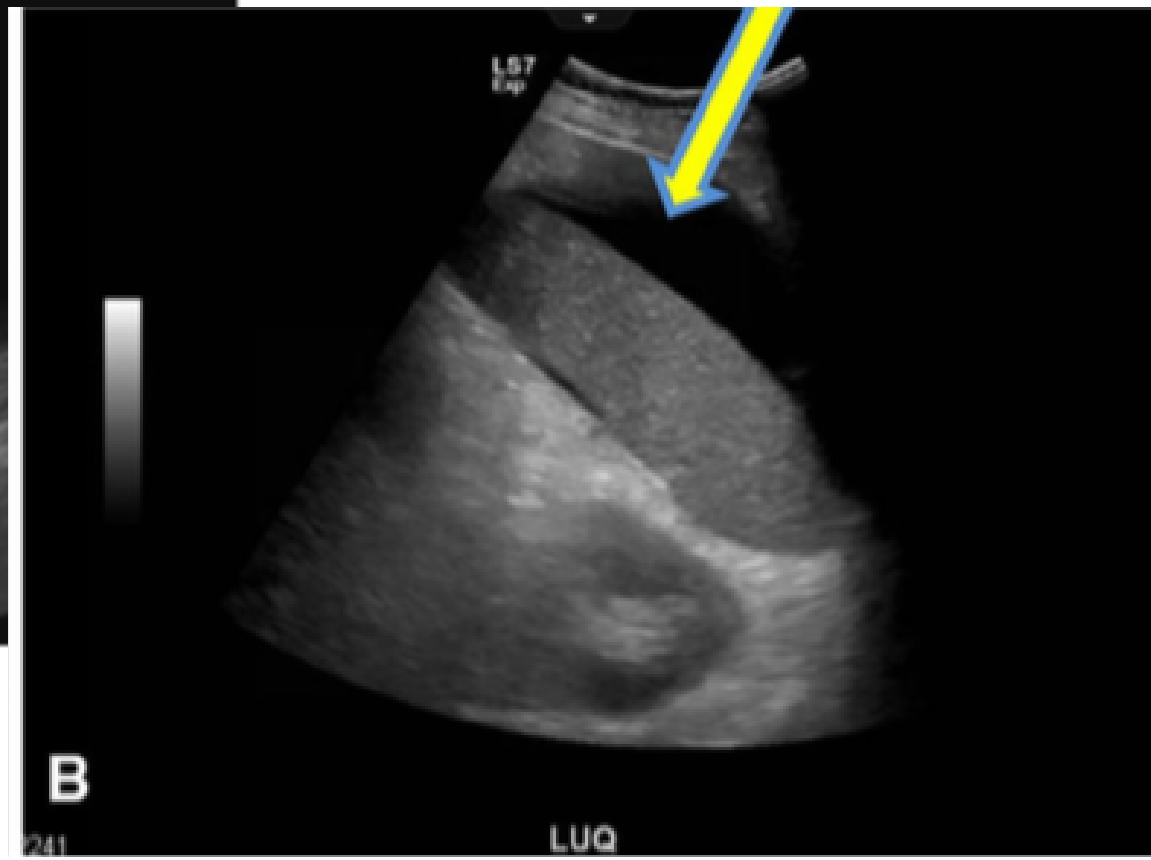

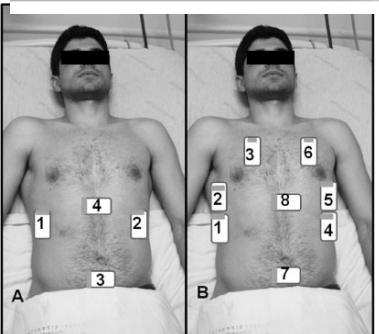

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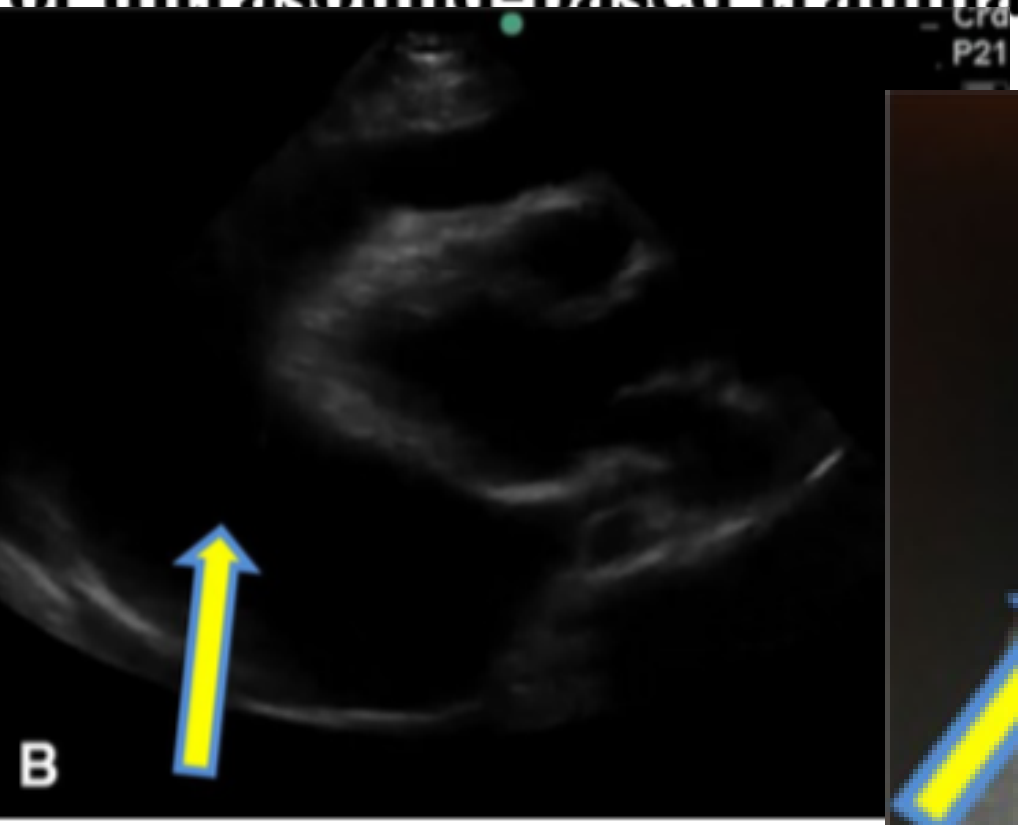

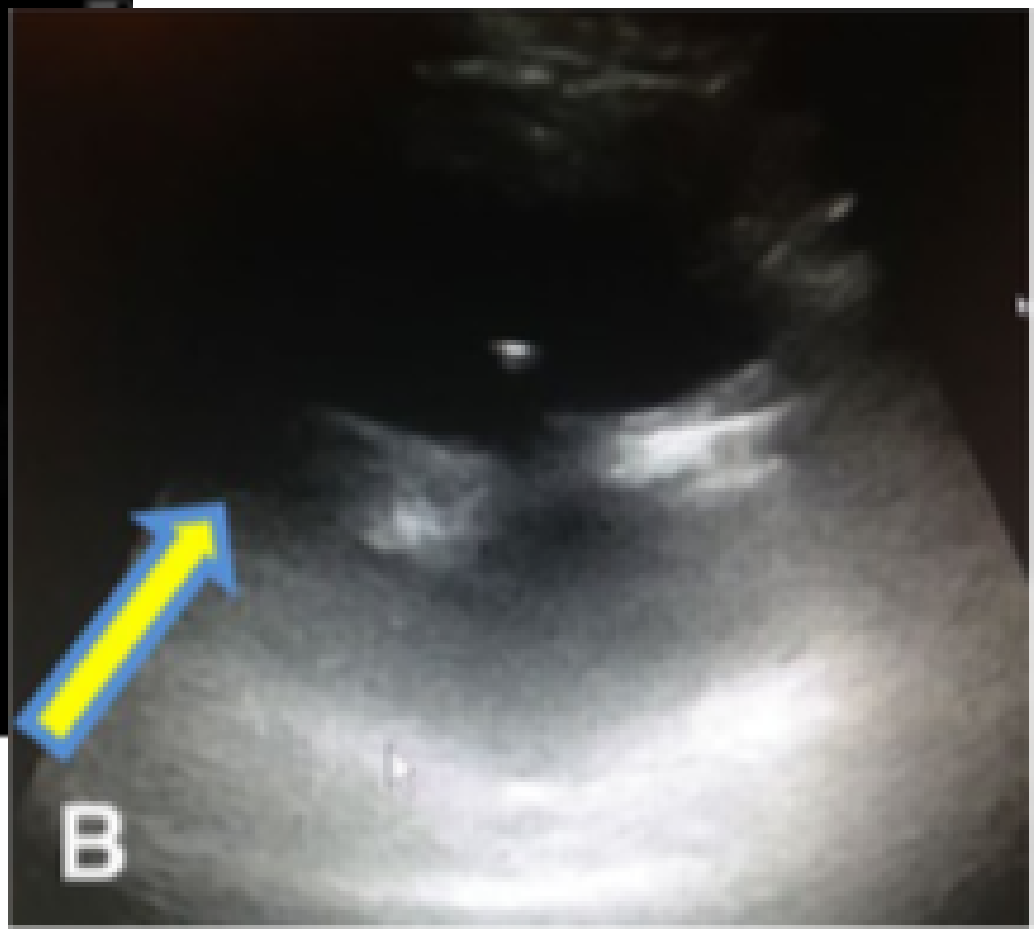

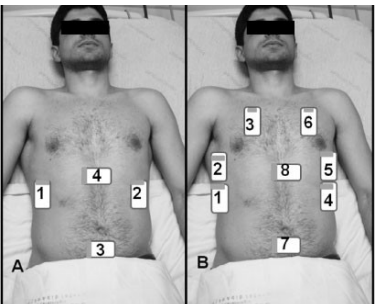

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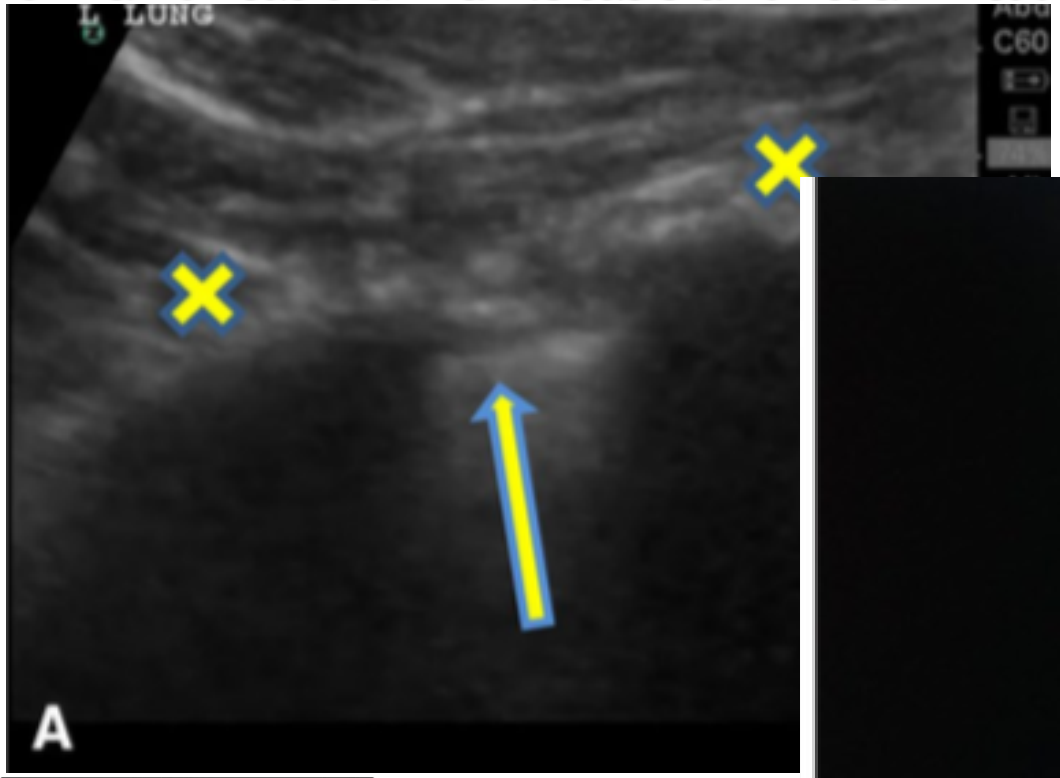
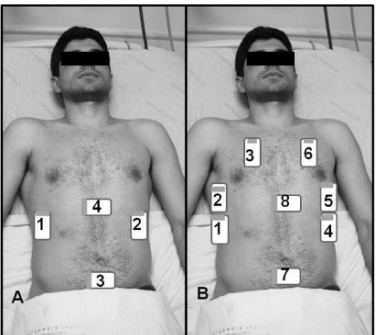




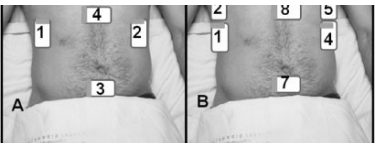
Montoya et al Eur J Trauma Emerg Surg (2016) 42:119–126

E la E-FAST???

From FAST to E-FAST: an overview of the evolution of ultrasound-based traumatic injury assessment

Table 1 Summary of selected clinical reports focusing on (thoracic) E-FAST, including basic study characteristics, traditional imaging comparator(s), and diagnostic accuracy data for ultrasound

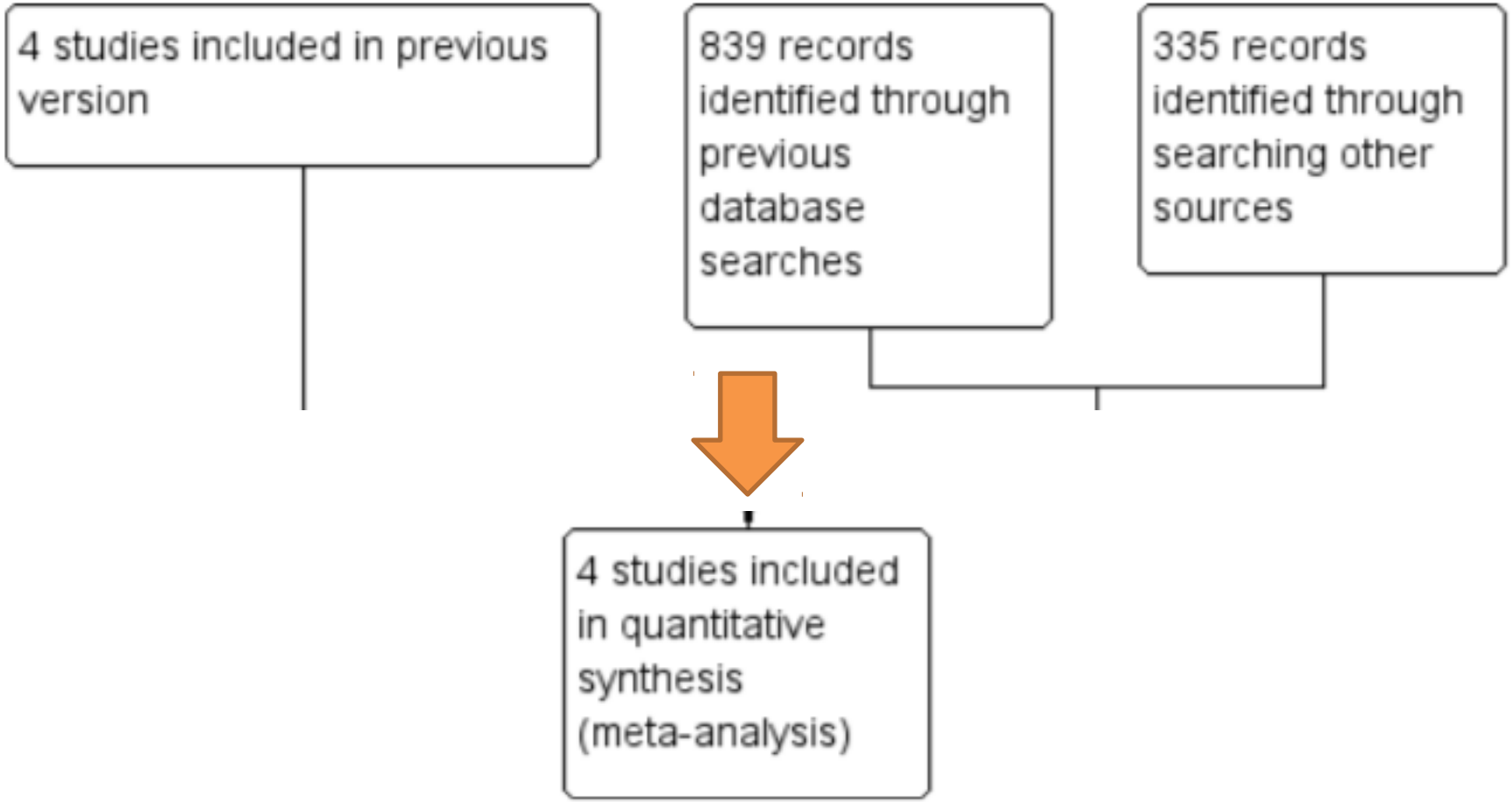
References	Sonographers	Patient characteristics (*n*, % ptx)[a]	Traditional assessment	E-FAST[b] Sensitivity[c] (%)	E-FAST[b] Specificity[c] (%)	E-FAST[b] PPV[c] (%)	E-FAST[b] NPV[c] (%)
Alrajab et al. [9]	Emergency physicians Intensivists Radiologists Surgeons	Meta-analysis of 13 studies (1514)[d]	Chest X-ray	78.6 (68.1–98.1)	98.4 (97.3–99.5)	Not reported	Not reported
Alrajhi et al. [35]	Emergency physicians Radiologists Surgeons	Meta-analysis of 7 studies[e]	Chest X-ray	90.9 (86.5–93.9)	98.2 (97.0–99.0)	94.4 %	97.0 %
Ianniello et al. [69]	Emergency radiologists	Trauma (736, 11.8 %)	CT scan	77.0 (66.8–85.4)	99.8 (99.2–99.9)	98.5 %	97.0 %
Nandipati et al. [61]	Surgeons	Trauma (204, 10.3 %)	Clinical exam CT scan Chest X-ray	95.3 (76.1–99.2)	99.5 (97.0–99.9)	95.2 %	99.5 %



Montoya et al Eur J Trauma Emerg Surg (2016) 42:119–126

E la E-FAST???

Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma (Review)



Stengel et al. Cochrane Database of Systematic Reviews 2015, Issue 9. Art. No.: CD004446

E la E-FAST???

Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma (Review)

US/CT CORRELATIONS

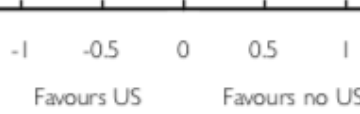
Study or subgroup	Ultrasound n/N	No ultrasound n/N	Risk Difference M-H,Random,95% CI	Weight	Risk Difference M-H,Random,95% CI
Arrillaga 1999	9/105	223/226		25.4 %	-0.90 [-0.96, -0.85]
Boulanger 1999	111/460	225/246		25.4 %	-0.67 [-0.73, -0.62]
Melniker 2006	53/111	85/106		24.7 %	-0.32 [-0.44, -0.20]
Rose 2001	37/104	54/104		24.5 %	-0.16 [-0.30, -0.03]
Total (95% CI)	**780**	**682**		**100.0 %**	**-0.52 [-0.83, -0.21]**

Total events: 210 (Ultrasound), 587 (No ultrasound)

Heterogeneity: $Tau^2 = 0.10$; $Chi^2 = 190.20$, df = 3 ($P<0.00001$); $I^2 = 98\%$

Test for overall effect: Z = 3.33 (P = 0.00086)

Test for subgroup differences: Not applicable



Stengel et al. Cochrane Database of Systematic Reviews 2015, Issue 9. Art. No.: CD004446

E la E-FAST???

Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma (Review)

US vs **Mortality** and Outcome

Study or subgroup	Ultrasound n/N	Weight	Risk Ratio M-H,Random,95% CI
Arrillaga 1999	9/105	26.9 %	1.49 [0.66, 3.38]
Boulanger 1999	59/460	36.3 %	1.37 [0.87, 2.16]
Melniker 2006	23/111	36.8 %	0.55 [0.35, 0.85]
Total (95% CI)	**676**	**100.0 %**	**1.00 [0.50, 2.00]**

Total events: 91 (Ultrasound), 76 (No ultrasou

Heterogeneity: $Tau^2 = 0.29$; $Chi^2 = 9.69$, df =

Test for overall effect: Z = 0.00 (P = 1.0)

Test for subgroup differences: Not applicable

The experimental evidence justifying FAST-based clinical pathways in diagnosing patients with suspected abdominal or multiple blunt trauma **remains poor**.

Stengel et al. Cochrane Database of Systematic Reviews 2015, Issue 9. Art. No.: CD004446

PNX

Size of pneumothorax

- In defining a management strategy, the size of a pneumothorax is less important than the degree of clinical compromise. (D)
- The differentiation of a 'large' from a 'small' pneumothorax continues to be the presence of a visible rim of >2 cm between the lung margin and the chest wall (at the level of the hilum) and is easily measured with the PACS system. (D)
- Accurate pneumothorax size calculations are best achieved by CT scanning. (C)

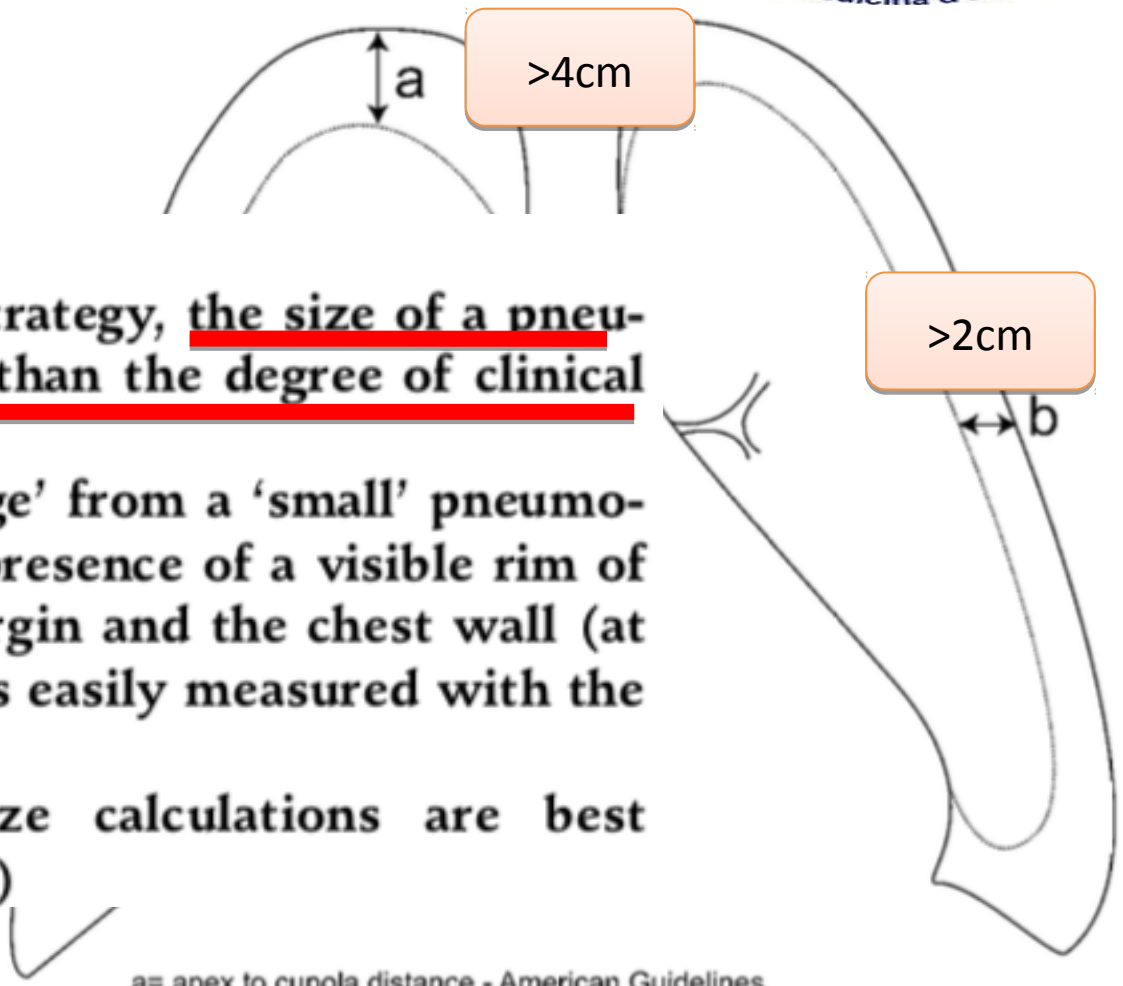


Figure 1 Depth of pneumothorax.

BTS Guideline 2010

FRATTURE COSTALI

ALTO RISCHIO

Frattura 1°-2° costa→alta energia

Frattura 9°-12° → danni organi addominali

FRATTURE COSTALI

Rib fractures and their association With solid organ injury: higher rib fractures have greater significance for solid organ injury screening

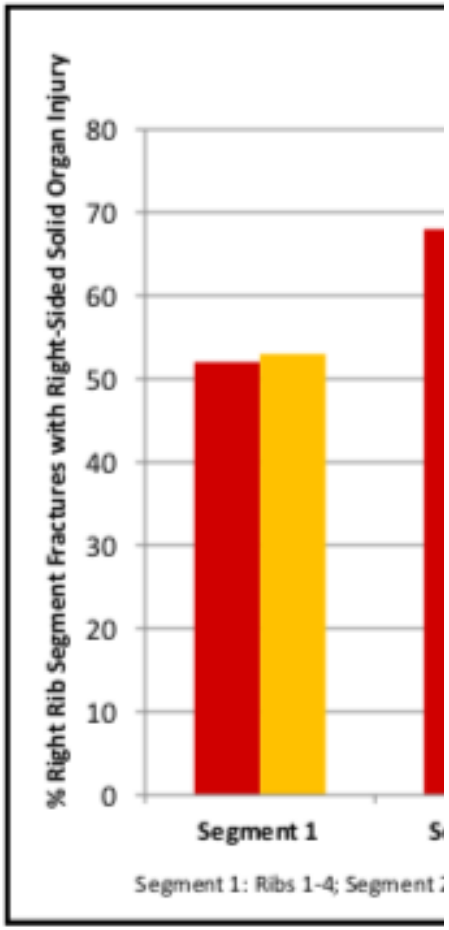


Figure 2 Right rib f
injuries.

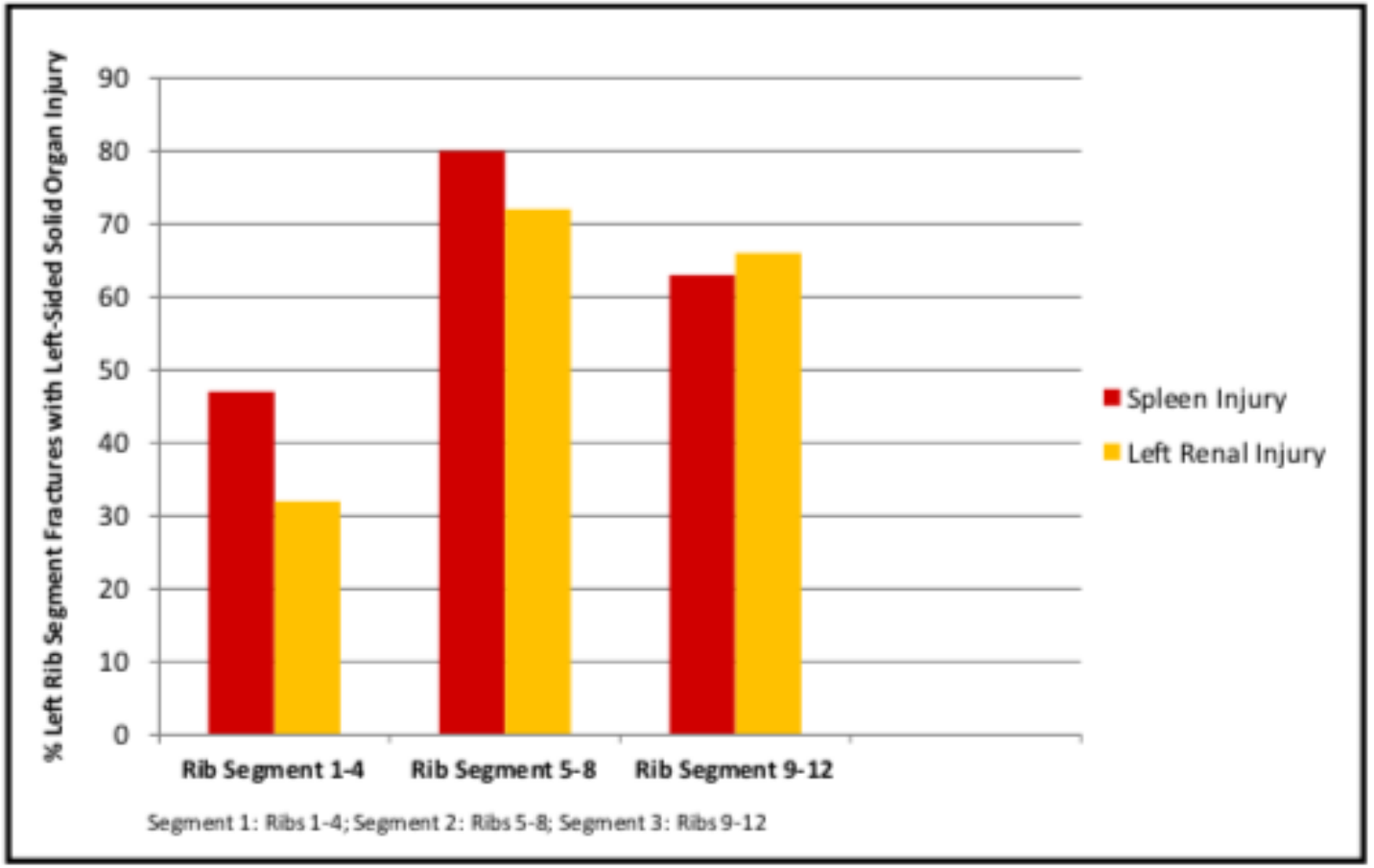


Figure 4 Left rib fracture segments and left-sided solid organ injuries.

Kostas et al. The American Journal of Surgery (2017) 213, 791-797

FRATTURE COSTALI

RibScore: A novel radiographic score based on fracture pattern that predicts pneumonia, respiratory failure, and tracheostomy

TABLE 2. Association of Individual RibScore Variables With Outcome Measures

Variable	Pneumonia, n (%)	Respiratory Failure, n (%)	Tracheostomy, n (%)
≥6 ribs fractured			
Present (n = 155)	33 (21.3)	68 (43.9)	39 (25.2)
Absent (n = 230)	19 (8.3)	56 (24.3)	21 (9.1)
Flail chest			
Present (n = 46)	11 (23.9)	29 (63.0)	17 (37.0)
Absent (n = 339)	41 (12.1)	95 (28.0)	43 (12.7)
Bilateral fractures			
Present (n = 120)	23 (19.2)	51 (42.5)	28 (23.3)
Absent (n = 265)	29 (10.9)	73 (27.5)	32 (12.1)
First rib fracture			
Present (n = 91)	21 (23.1)	44 (48.3)	26 (28.6)
Absent (n = 294)	31 (10.5)	80 (27.2)	34 (11.6)
≥3 displaced fractures			
Present (n = 52)	11 (34.4)	22 (68.8)	15 (46.8)
Absent (n = 253)	41 (11.6)	102 (28.9)	45 (12.7)
Fracture in each anatomic area			
Present (n = 58)	14 (24.1)	37 (63.8)	19 (32.8)
Absent (n = 327)	38 (11.6)	87 (26.6)	41 (12.5)

$p < 0.05$ for all associations tested.

SCORE ≥ 4

90% Specificità x POLMONITE/IRA/TRACHEOSTOMIA

…sensibilità 23.1%…

Chapman et al. J Trauma Acute Care Surg (2016); 80(1) : 95-101

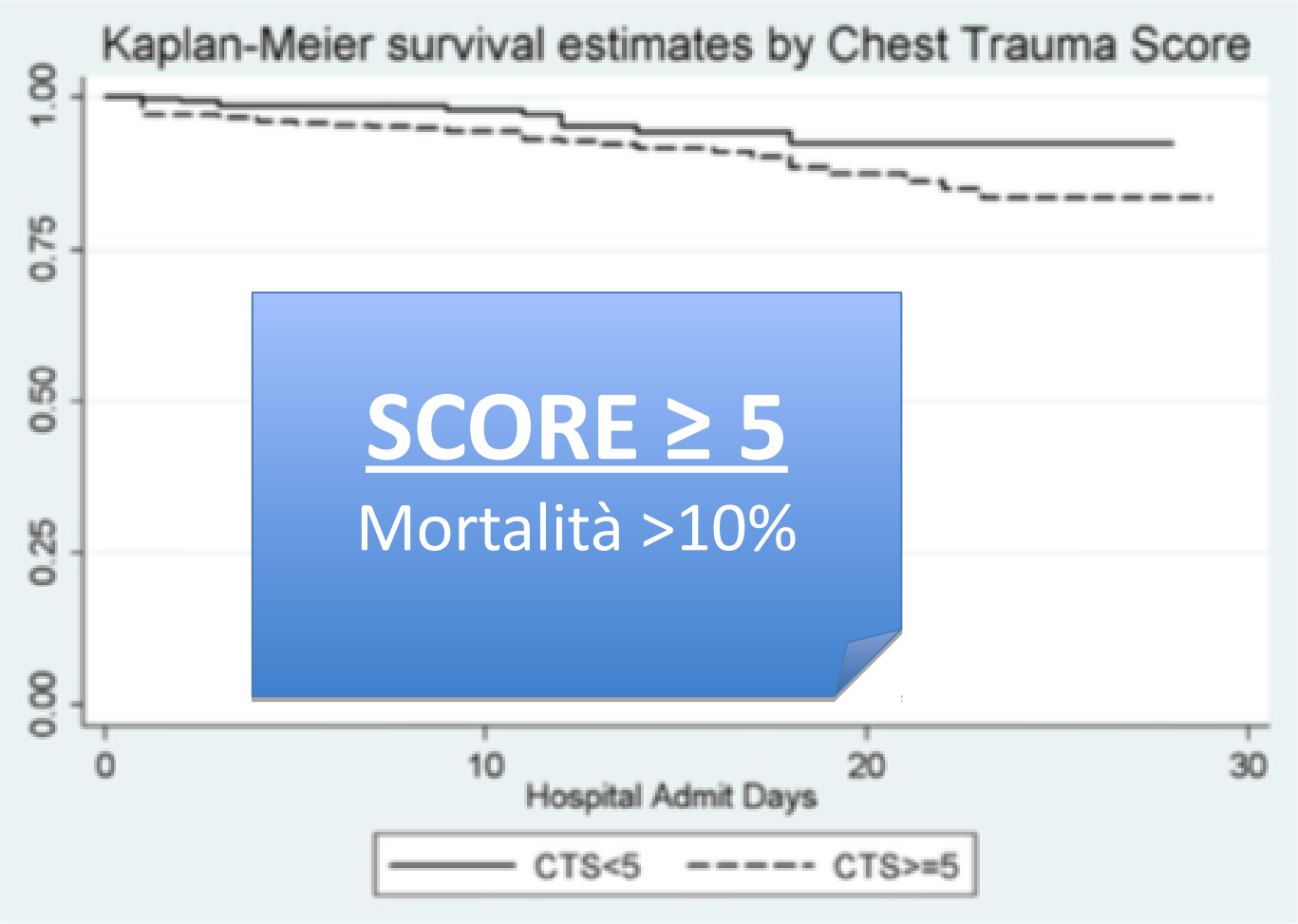
TRAUMA TORACICO

A chest trauma scoring system to predict outcomes

Table I. Chest scoring system

Age score
<45 y
45–65 y
>65 y
Pulmonary contusion score
None
Unilateral minor
Bilateral minor
Unilateral major
Bilateral major
Rib score
<3 RIBFX
3–5 RIBFX
>5 RIBFX
Bilateral RIBFX
No
Yes

RIBFX, Rib fracture.



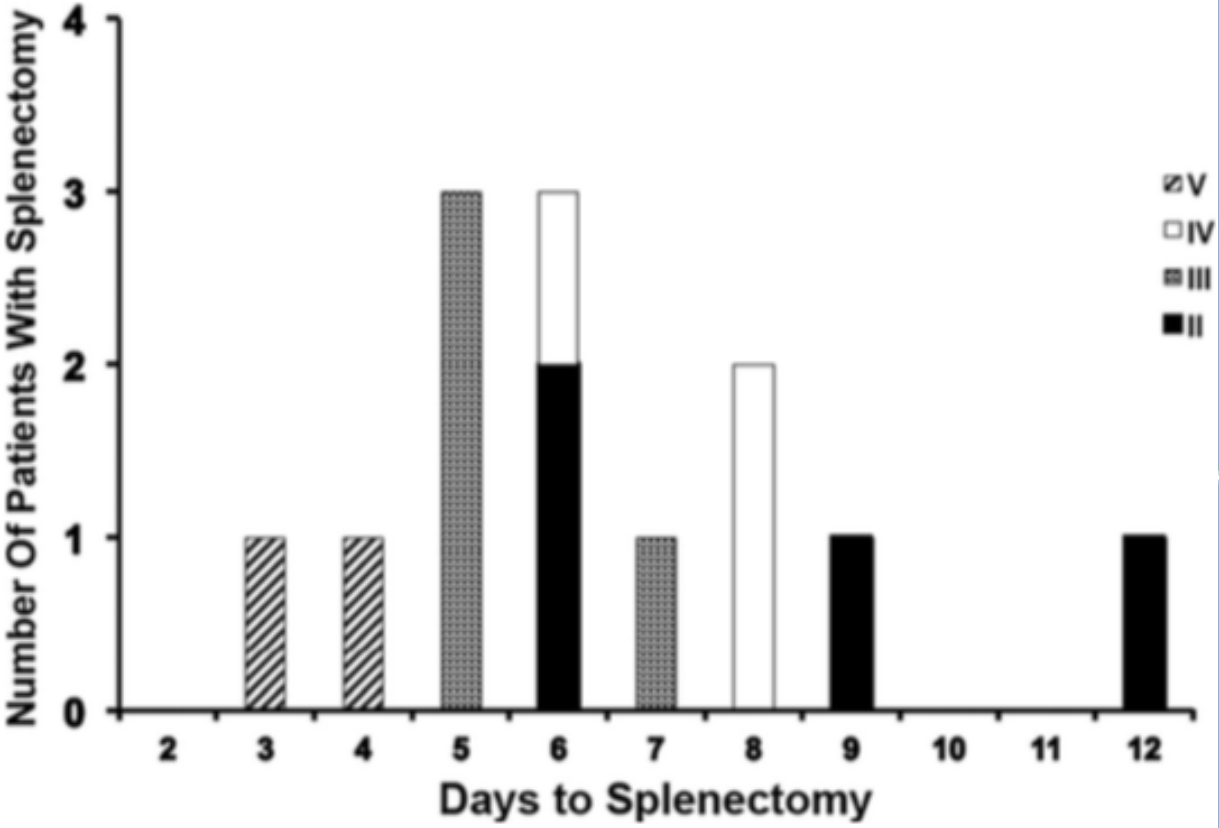
SCORE ≥ 5

Mortalità >10%

Chen et al. Surgery 2014;156:988-94

E la MILZA???

The splenic injury outcomes trial: An American Association for the Surgery of Trauma multi-institutional study



RESULTS

383 … enrolled. Of those enrolled, 371 were discharged alive with a spleen.

ANGIO+EMBO **18,7%**

Overall Mortality: **1,04%**

CONCLUSIONS

After the initial 24 hours, **no additional interventions are warranted for patients with Grade I injuries** as long as there are **no concerning features on admission CT** such as a splenic blush or a subcapsular hematoma.

Zarzaur et al. J Trauma Acute Care Surg. 2015;79: 335-342

TC TOTAL BODY???

REACT 2

Randomized study of Early Assessment by CT scanning in Trauma patients-2

CRITERI INCLUSIONE

- Compromissione emodinamica
- Sospetto clinico di danno grave
- Dinamica maggiore

- TC TOTAL BODY
- Atteggiamento convenzionale (ATLS)

END-POINTS:

1. In-hospital mortality
2. Mortality 24h, 30days, adverse outcome

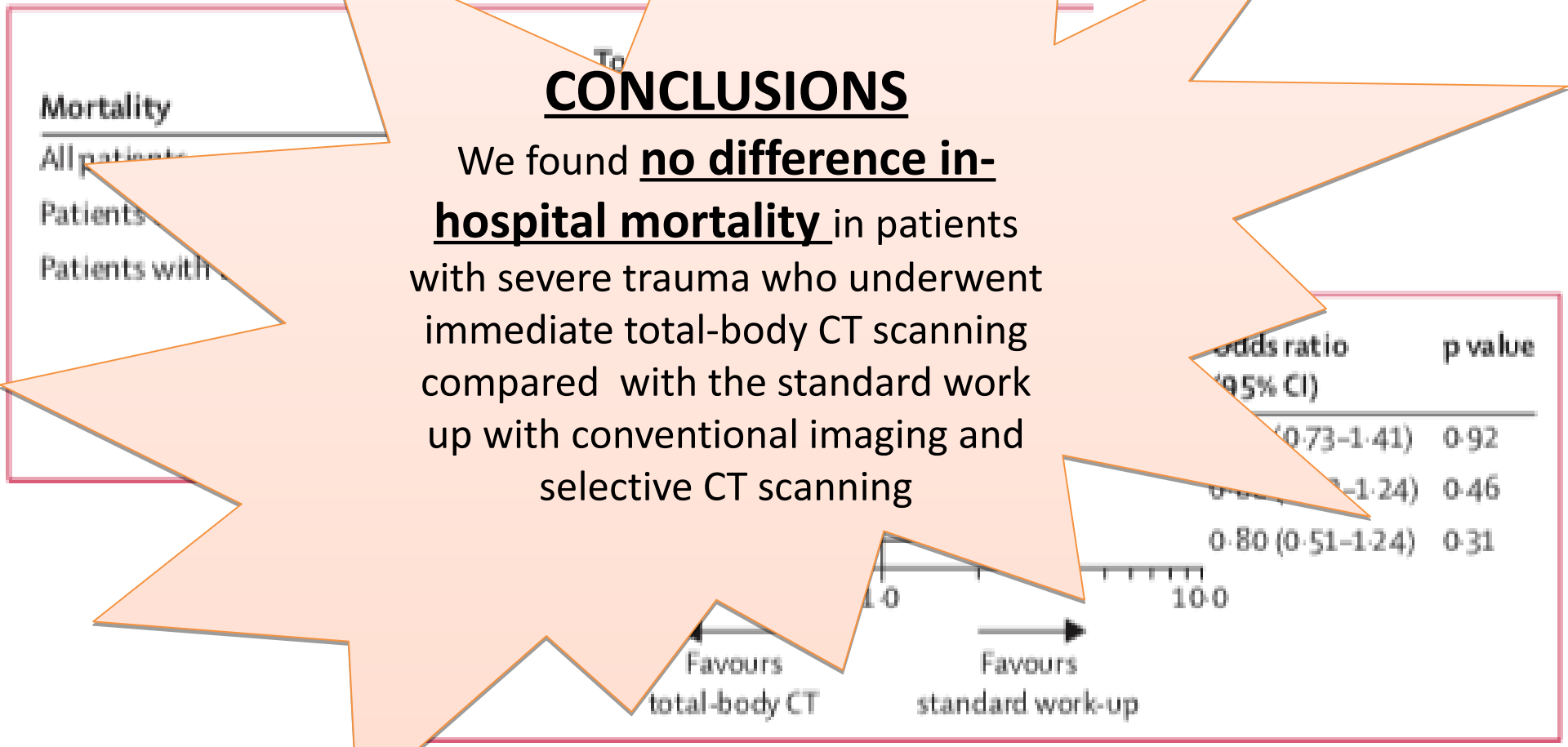
Sierink et al. BMC Emergency Medicine 2012, 12:4

TC TOTAL BODY???

Immediate total-body CT scanning ver us conventional imaging and selective CT anning i tients with severe trauma (REA T-2): a ran olled t al

CONCLUSIONS

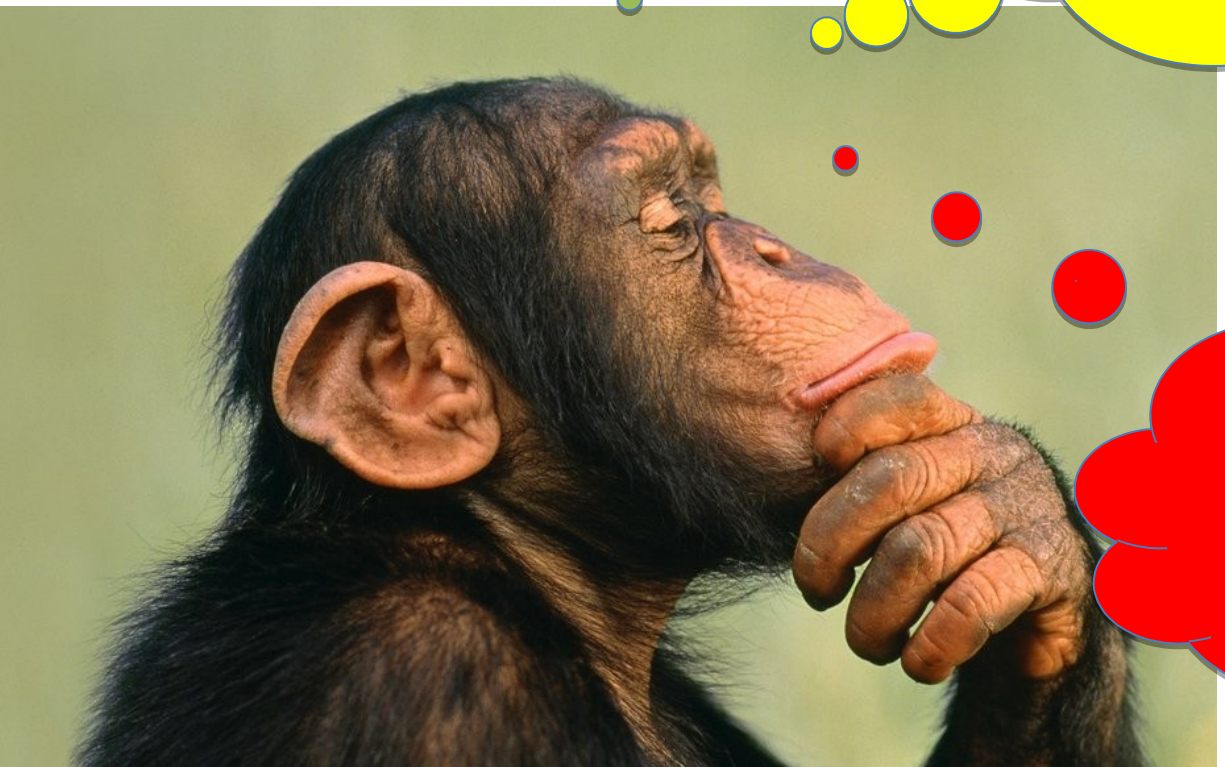
We found **no difference in-hospital mortality** in patients with severe trauma who underwent immediate total-body CT scanning compared with the standard work up with conventional imaging and selective CT scanning



Sierink et al. ***Lancet* 2016; 388: 673–83**

Devo fare ESAMI EMATICI? Quali? accesso venoso?

Indagini strumentali? E-FAST? RX? O TC?



E se tutto è negativo…la dimetto?

Sono un politrauma o no???

PIU DI DUE DISTRETTI INTERESSATI

ACIDOSI

IPOTENSIONE

COAGULOPATIA

INCOSCIENZA

ETA’ (68)


PA
Temp
SpO2
DX
IV
SAMPLE
ECG
EE
FR
FC
EGA


A
Airway
B
Breathing
C
Circulation
D
Disability
E
Exposure