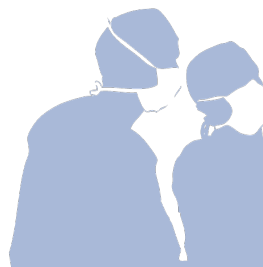
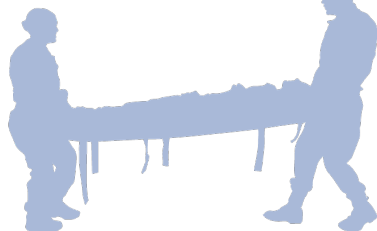


POCUS in trauma on the Battlefield

CMC Oct 2022

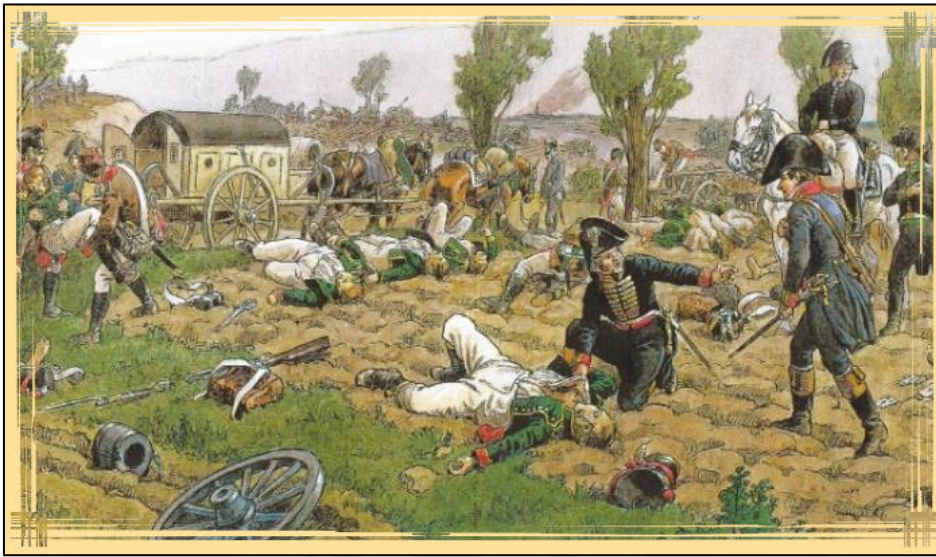


Disclosure

The opinions or assertions expressed here in are the private views of the authors and are not to be considered as reflecting the views of the French military medical service.

Conflicts of Interest and Source of Funding

There was no conflict of interest for this article and no exterior or private source of funding.



« Give me a Doctor, I'll give you back (with an US machine !) a batallion » N. B.



Photo ECPA
Patrice de Carfort essaye de sauver le sergent Camille Lambert, grièvement blessé.



US from 50'S to Now



Portable US



Sonoscan® ORCHEO LIGHT



SONOSITE® EDGE 2



GE® LOGIQ V2



Philips® INNOSIGHT

Ultraportable US



Philips Lumify



Sonosite iViz



GE Vscan

Multiple probes

128 or 256 elements piezzo per probe

Hardened shell

40 min Bat



Sonoscan ULITE®

Mechanism of injury

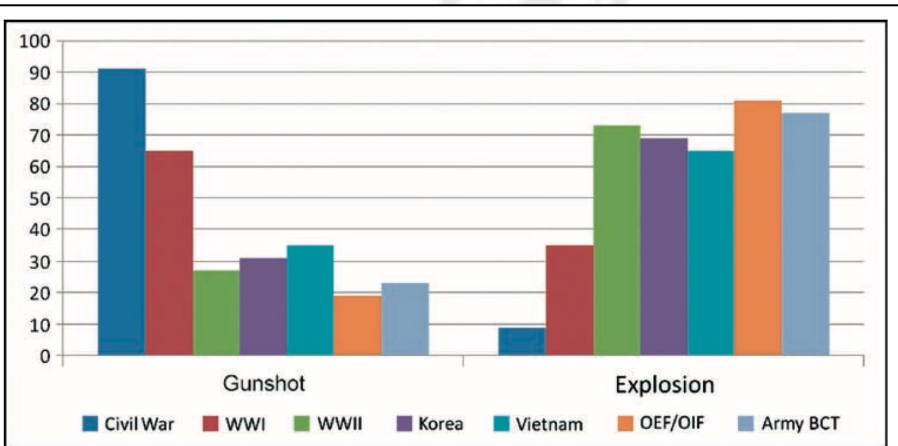


FIGURE 1 Percentage of mechanisms of injury from previous US wars (WIA — RTD).

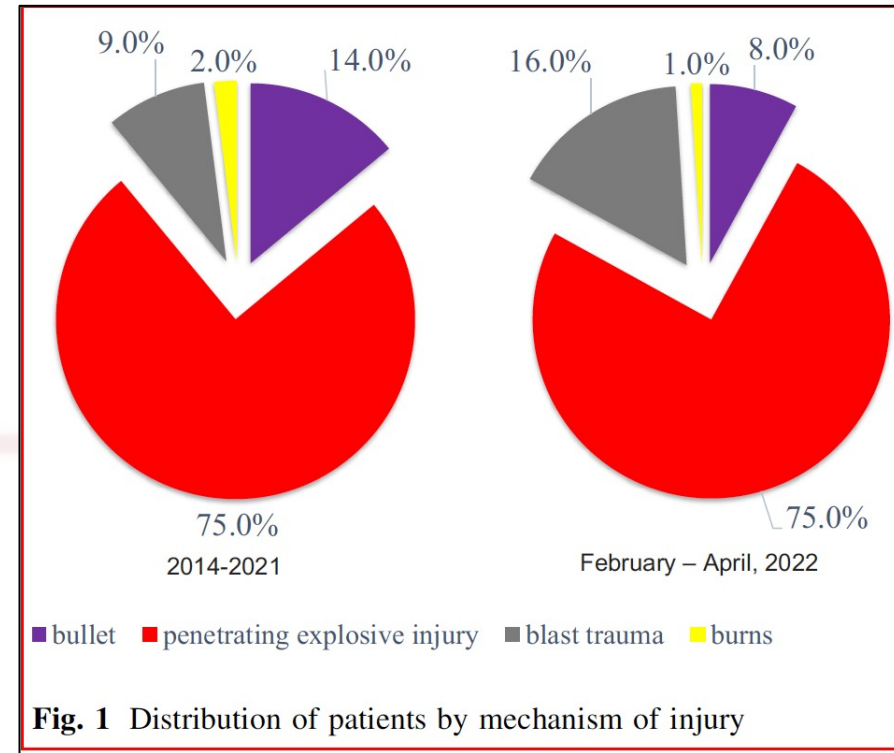
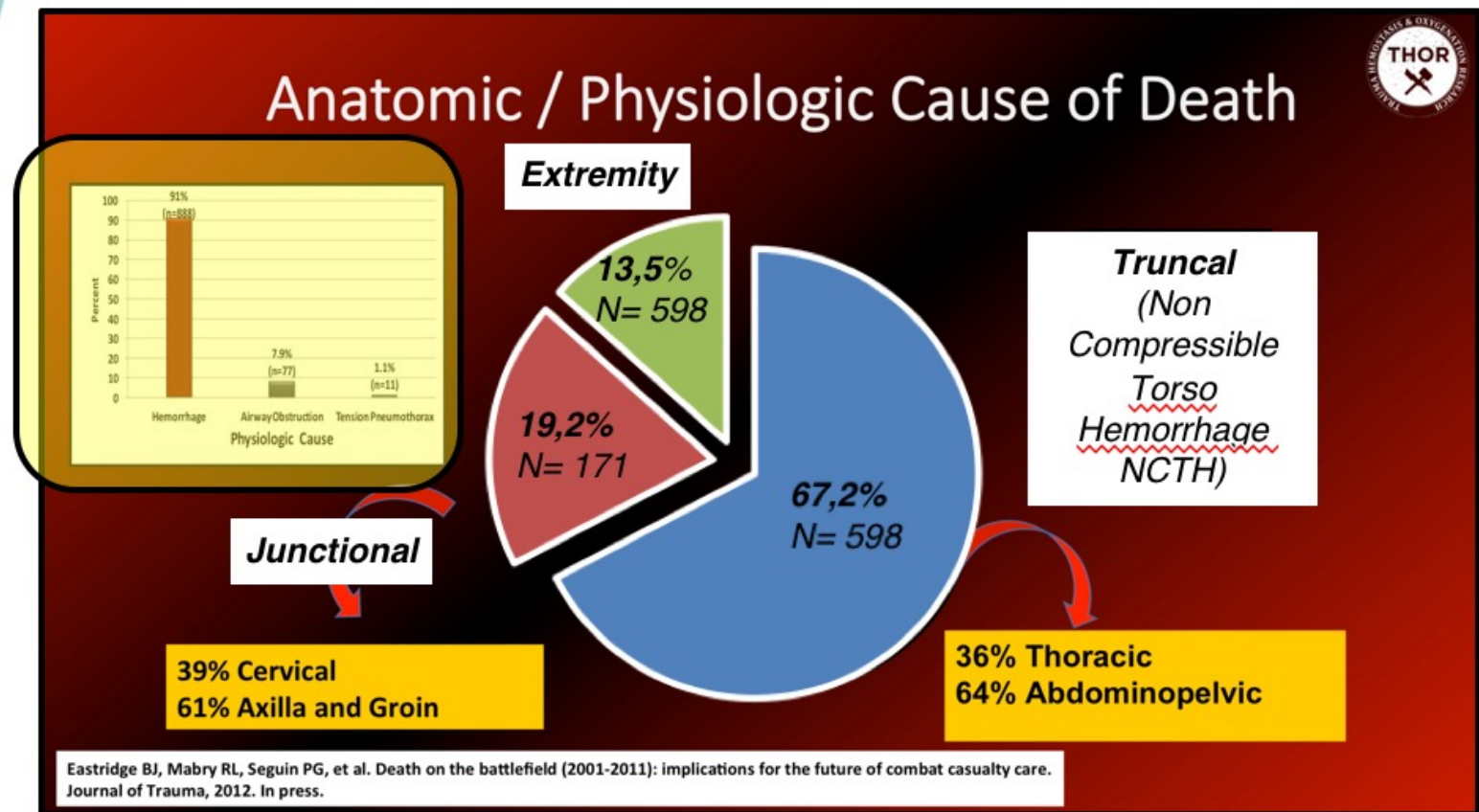


Fig. 1 Distribution of patients by mechanism of injury

Repartition of wounds for war casualties

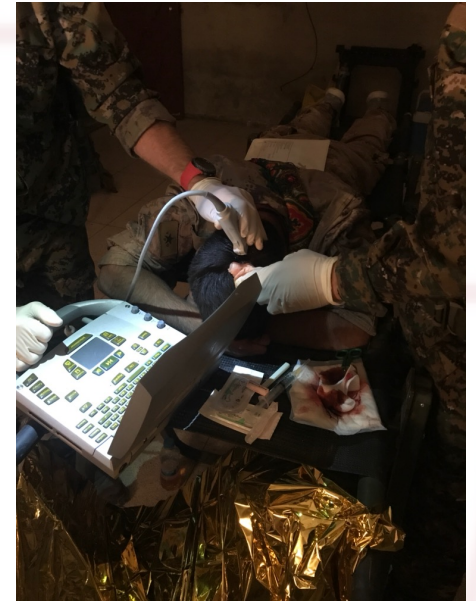


- **Massive Casualties MASCAL**
 - **Multiple wounds with superficial or penetrating shrapnel of the trunc**
 - **Lack of Operating Room OR**
- ➔ **need of accurate triage for Damage Control Ressuscitation DCR or Surgery DCS**



POCUS in war context

- **Where perform it ?**
- **When repeat it ?**
- **What type of US exam ?**
- **Who can do it ?**



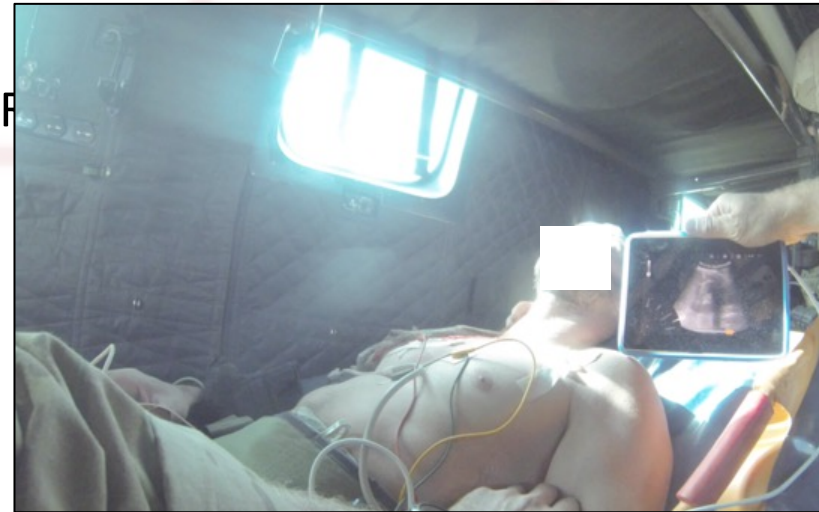
Where perform US exam ?

When repeat it ?

➔ Like physical exam : everywhere !

- ✓ On the Battlefield / Point Of Injury POI / R1
- ✓ During the EVAC
- ✓ At the surgical facility R2
- ✓ Postoperative

➔ Anyway, must be repeated !



What type of US exam ?

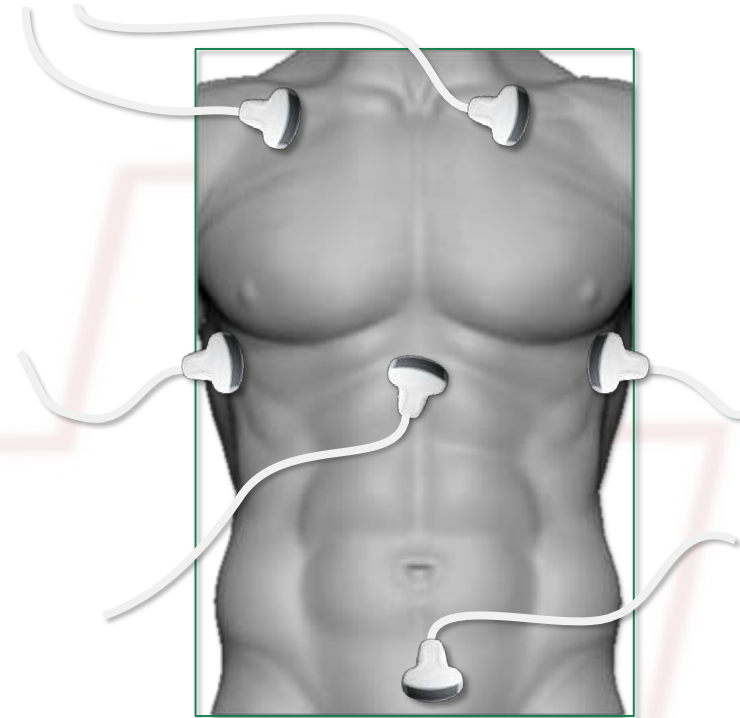
✓ **eFAST First**

➔ **4 views + extended pulmonary views**

Too long?

Too difficult?

No enough specific and sensible?

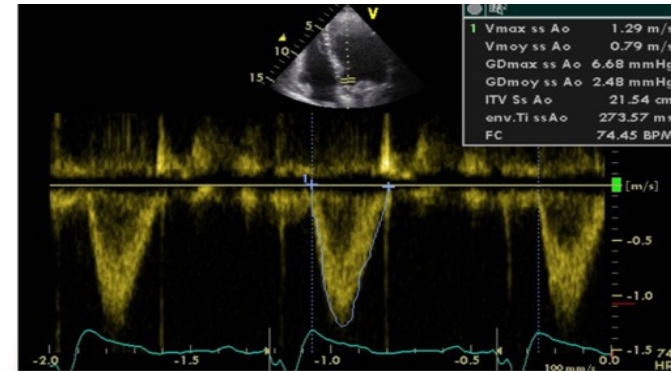
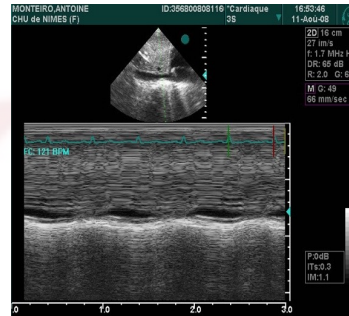


What type of US exam ?

✓ Of course eFAST, but not only !

➤ Hemodynamic

- evaluation IVC
- evaluation Cardiac index (*subaortic Velocity Time Integral*)

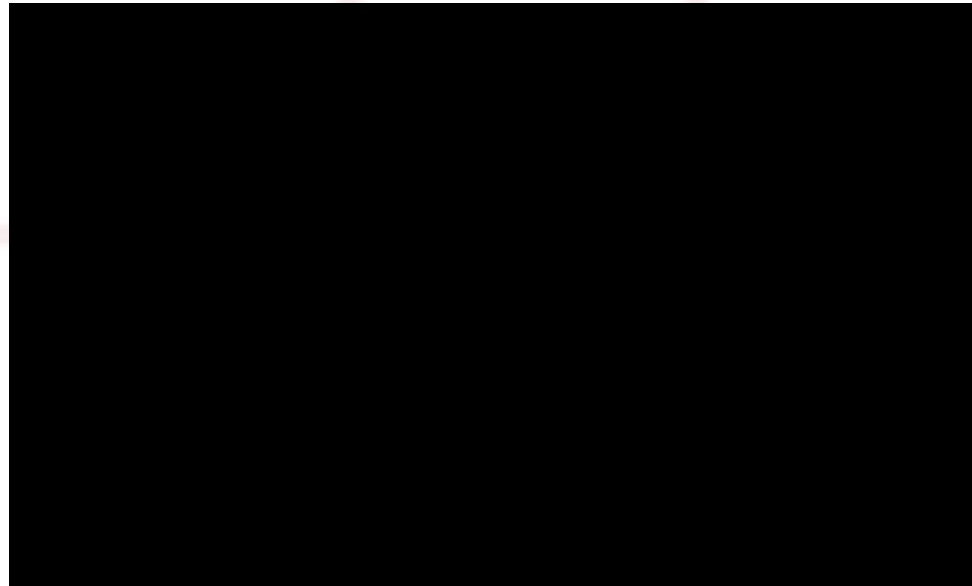


Orso J Intensive Care Med. 2020

Takada H., Am J Emerg Med. 2018

eFAST but not only !

- Vascularisation of peripheral arteries



eFAST but not only ! (2)

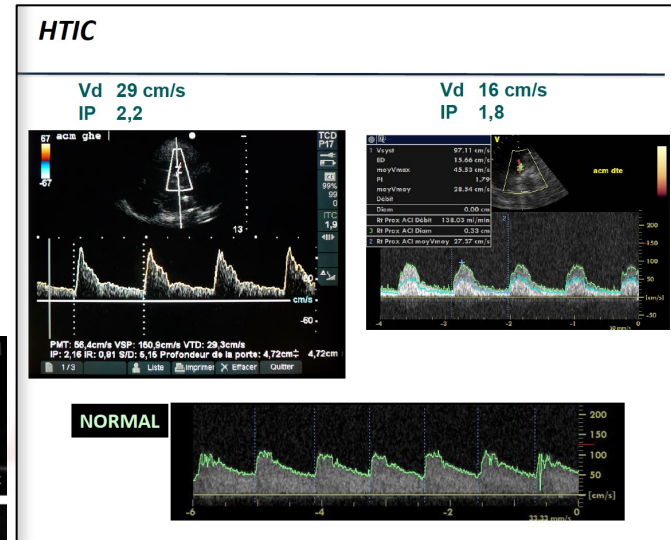
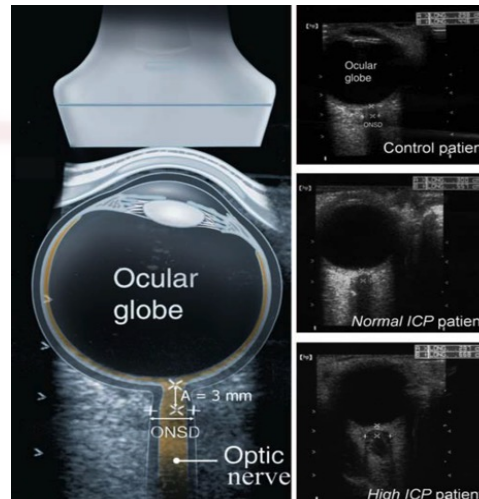
➤ Optical nerve sheath diameter

$ONSD > 6 \text{ mm} \rightarrow ICP > 20 \text{ mm Hg}$

➤ TransCranial Doppler TCD

$VD < 20 \text{ cm/s}$

$PI > 1,4$



eFAST but not only ! (4)

➤ US guidance

- **Central or peripheral arterial/intravenous access / Reboa positioning**
- **Chest tube / Thoracocentesis/ Coniotomy**
- **Hemopericardium drainage**
- **Positionning Endotracheal Tube**

POCUS MARCHE protocol

- Massive Bleeding control
 - Airways
 - Respiratory
 - Circulation
 - Hypothermie/Head
 - Evacuation
- FAST
 - Position of Endotracheal tube
 - Extended FAST
 - Hemodynamic US Eval
 - Transcranial Doppler/ONSD
 - Monitor and repeat !



Who can do it ?

➤ Physicians



EFSUMB

EUROPEAN FEDERATION OF SOCIETIES FOR ULTRASOUND IN MEDICINE AND BIOLOGY

'Building a European Ultrasound Community'

**MINIMUM TRAINING REQUIREMENTS FOR THE PRACTICE OF MEDICAL
ULTRASOUND IN EUROPE**

Appendix 13: Intensive Care Ultrasound

- Any healthcare provider(physician, paramedics)

✓ **French Military Health Service :**

- Basic POCUS:
eFAST
➔ 2 days course

- Advances POCUS for remote situations:
(including TCD, Abdominal, lung, gynecology, musculoskeletal)
➔ 5 days course



After initial training, You use it or you loose it !

- Non Health care provider with télé-médecine ?

Experience of use of ultrasound for care and triage of war casualties

www.jtrauma.com

The Journal of

**Trauma and
Acute Care
Surgery**

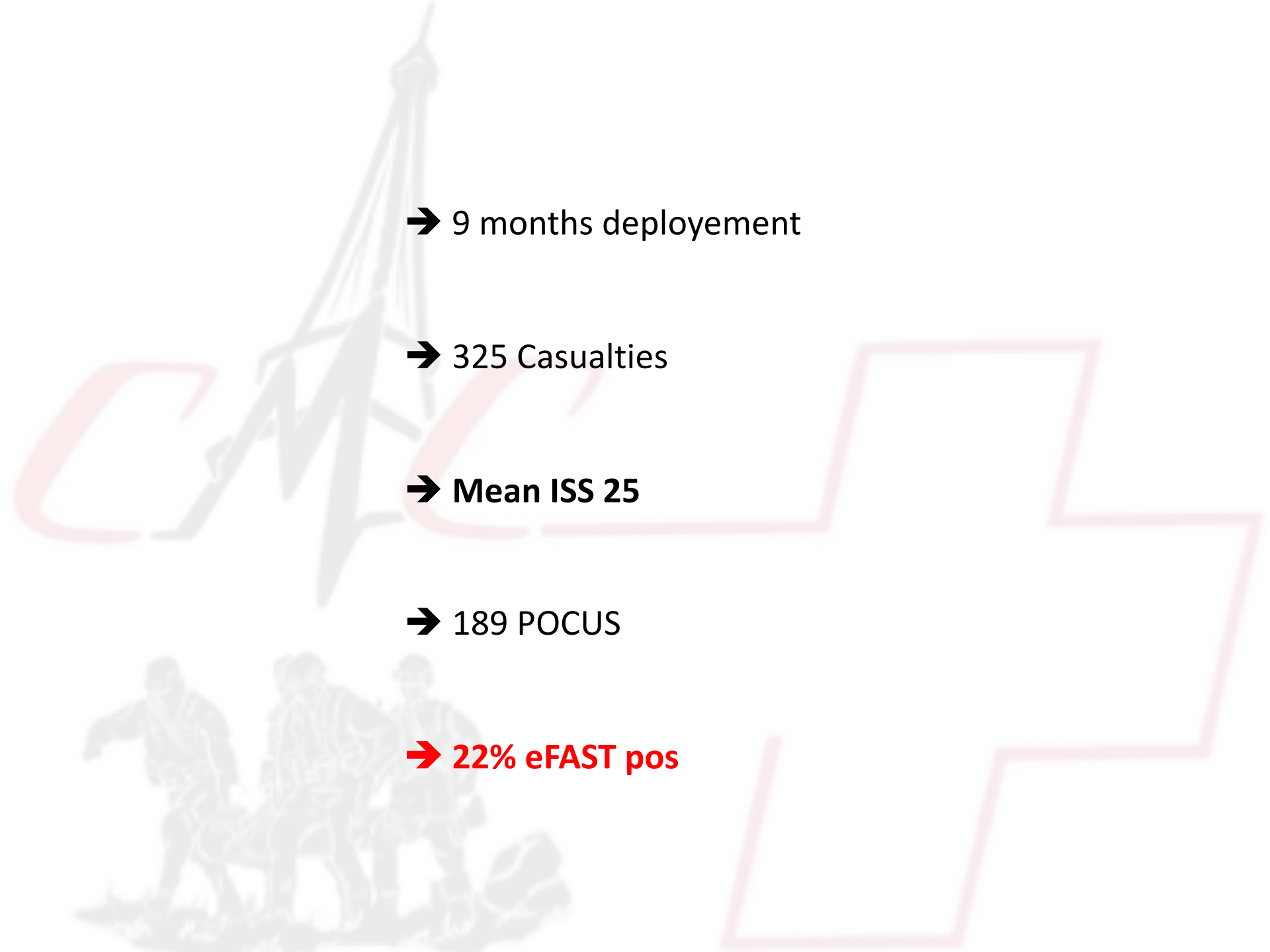
American Association for the Surgery of Trauma
Australian and New Zealand Association for the Surgery of Trauma
Eastern Association for the Surgery of Trauma
Trauma Association of Canada/Association Canadienne de Traumatologie
Western Trauma Association

2021 MILITARY SUPPLEMENT

Point-of-care ultrasound for treatment and triage in
austere military environments



- **Mutiple casualties**
 - **Multiple wounds**
 - **Poor clinical signs**
- ➔ **Do you diagnose, and perform triage the same way with and without ultrasound ?**



→ 9 months deployment

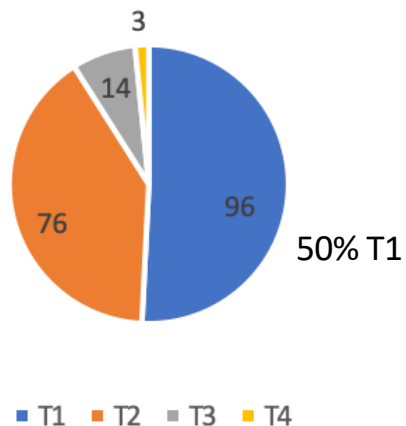
→ 325 Casualties

→ Mean ISS 25

→ 189 POCUS

→ 22% eFAST pos

NATO Categorization **BEFORE** Ultrasound

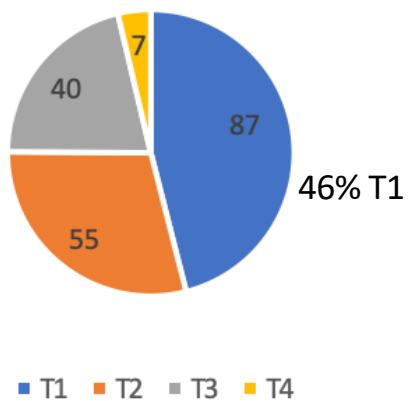


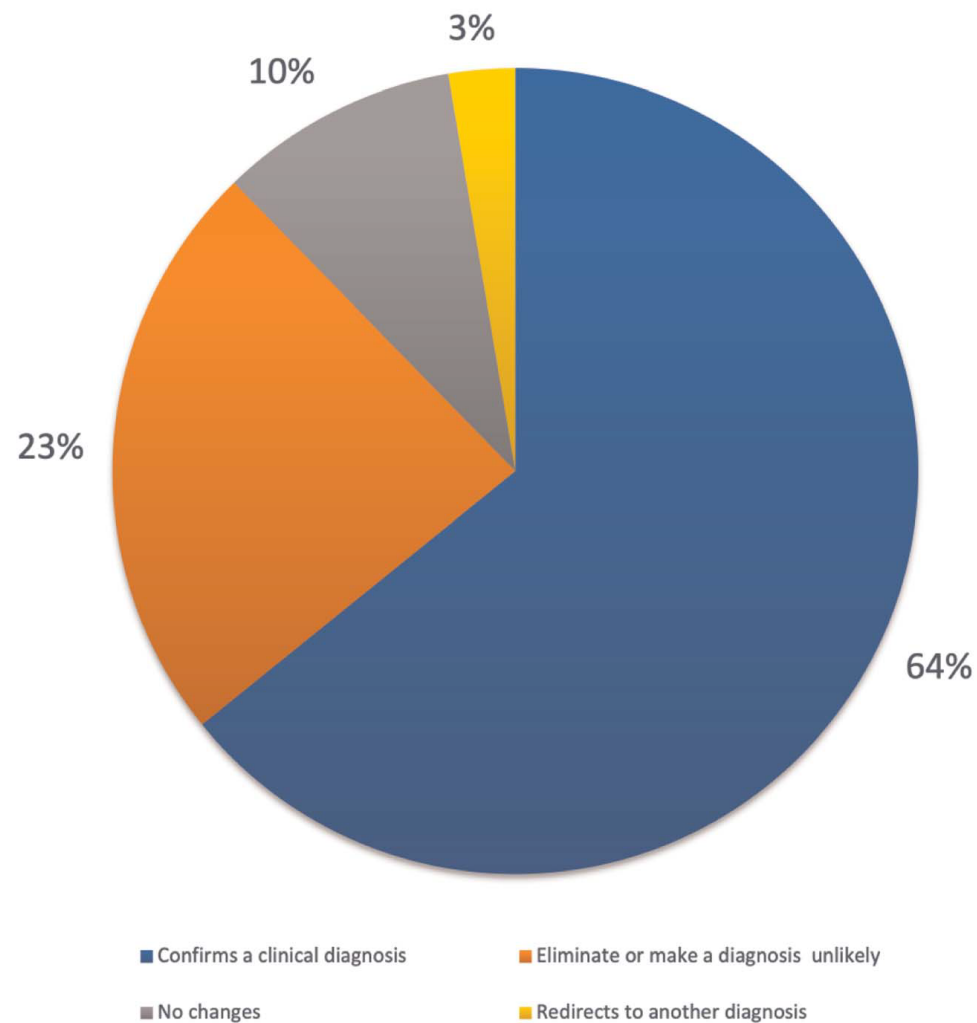
Change in triage categorization = 23 %

increased severity= 19%

Reduction severity = 81%

NATO Categorization **AFTER** Ultrasound

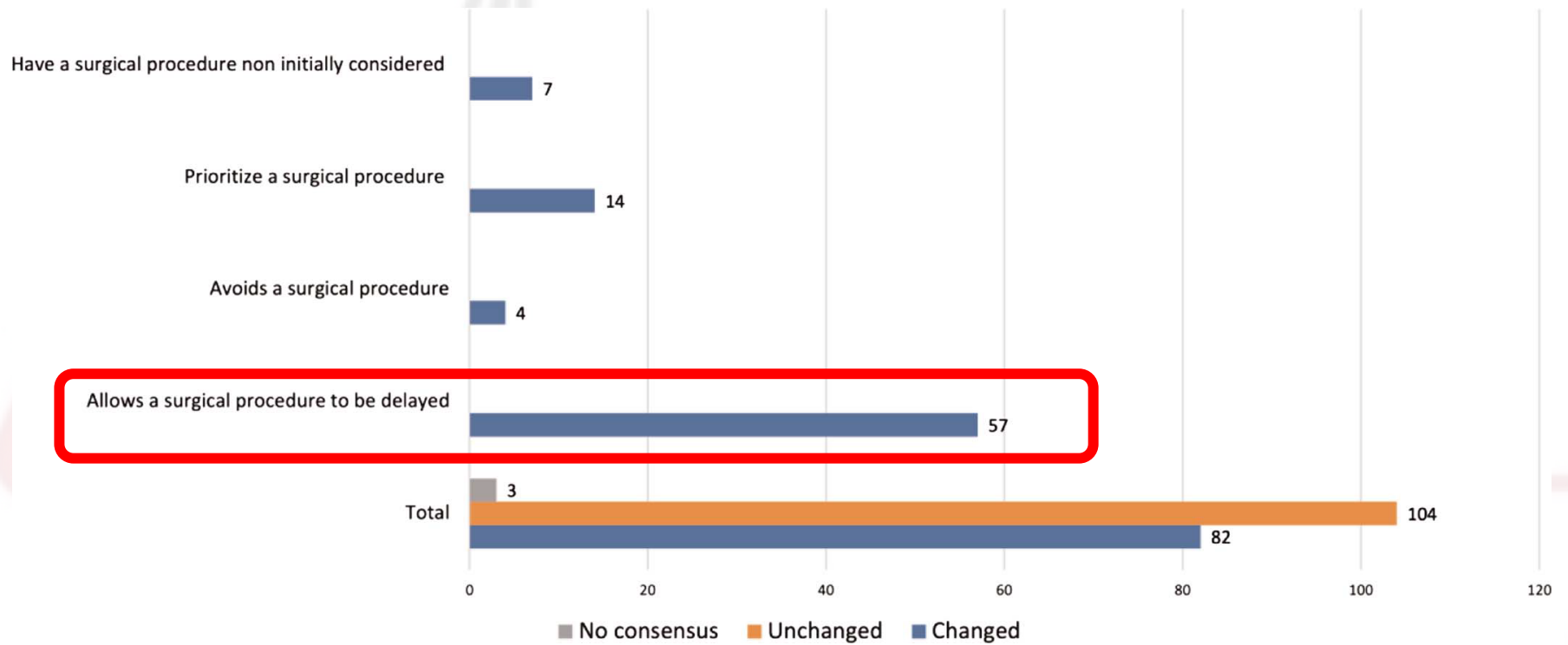




64% confirms a diagnosis

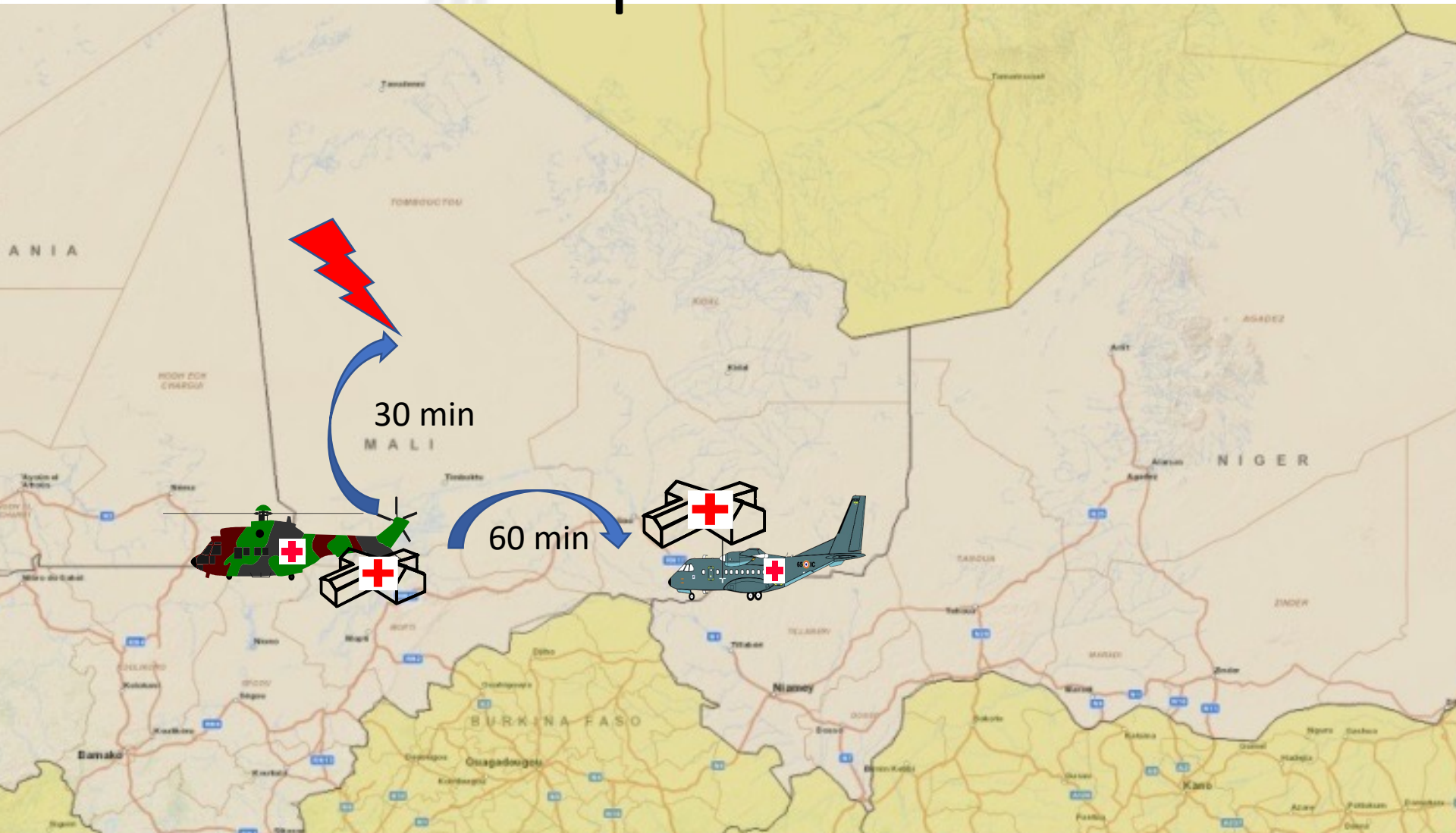
23% eliminates another possible diagnose

Only 10% of useless exams



Effect of US examination on the surgical decision

POCUS on the battlefield, real life expérience





Cas N°1 (Thigh GSW)

GSW in and out

No major bleeding, TA 150/80, FC 130

IV, Amxiclav, Morphine, Ketamine,

CAs N°2 (Abdo GSW)

TA 70/52, FC 140, Sat 90

IV x2, TXA, AMOXICLAv, Moprhine, Ketamine, PLyo x 1, Norepinephrine 1mg/h

Cas N°3 (Hip/jonctionnal GSW)

TA 80/54, FC 130

IV x2, TXA, AMOXICLAv, Moprhine, Ketamine, Plyo x1, epinephrine 2 x 0,1 mg

Who do prioritize to the OR first ?



18h05

POSER MEDEVAC

CONCLUSION

- **POCUS can be performed on the battlefield**
- **FAST, but not only**
- **Need to be trained, to practice and equipped !**



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