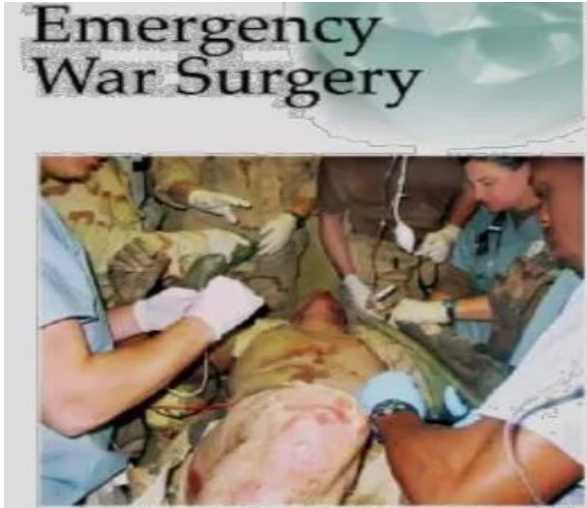
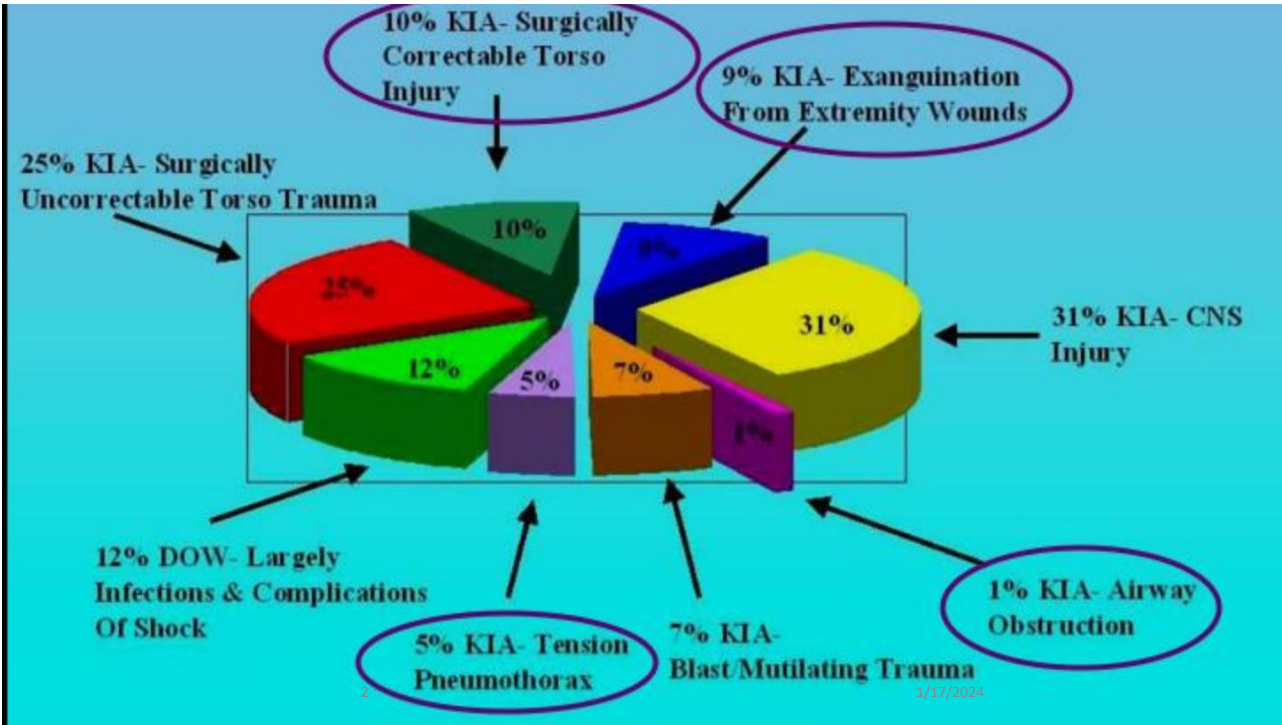


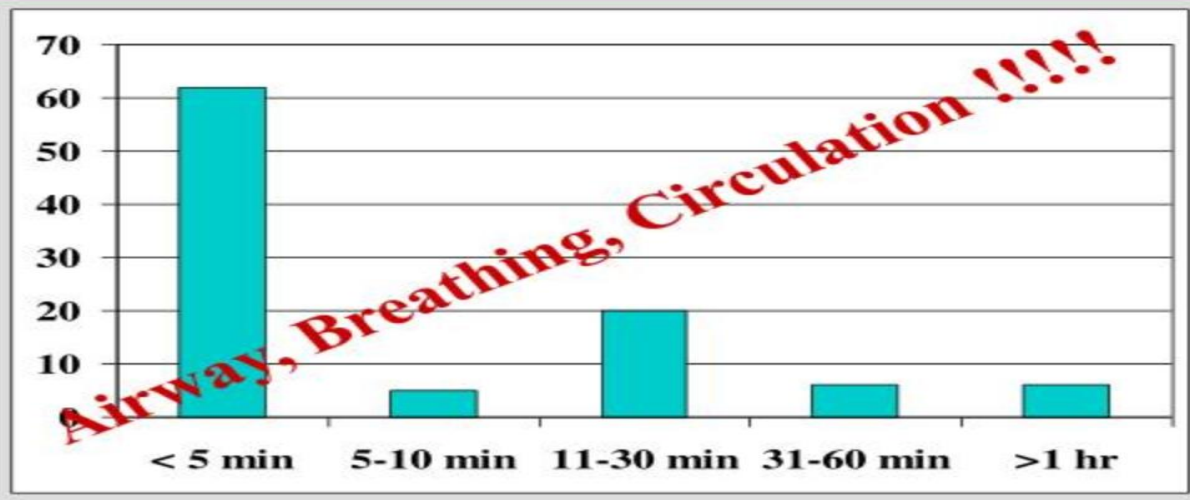
Warfare Injuries



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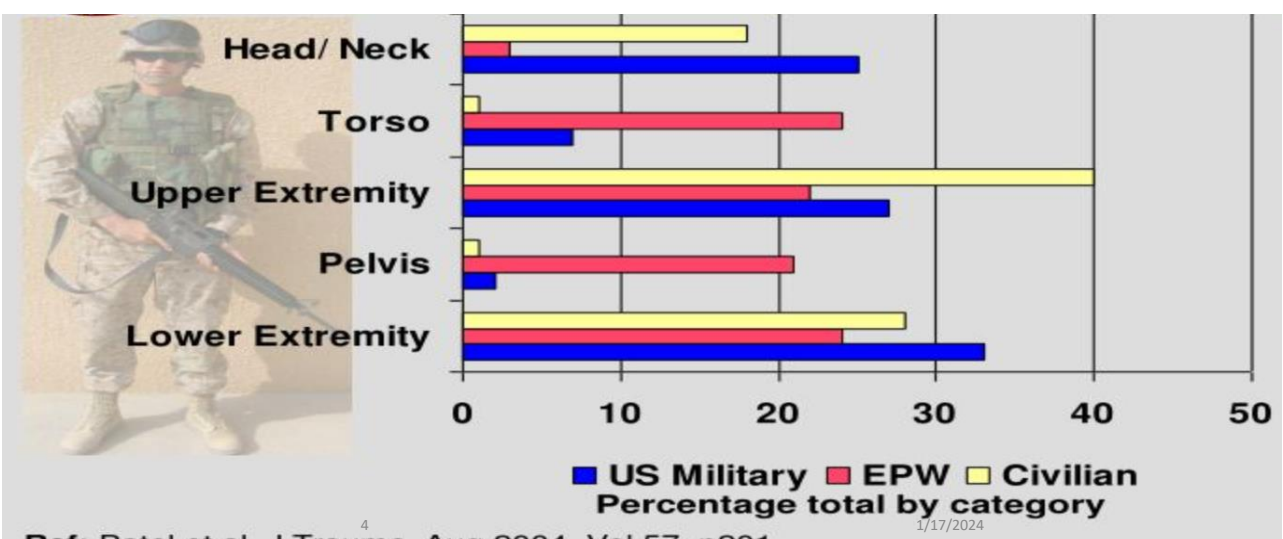
Military Fatality Rates



Estimated Time, Wounding to Death

(Zajtchuk, et al, Military Medicine, 1/17/2015)

Battlefield Distribution of wounds



Ref: Patel et al, J Trauma, Aug 2004, Vol 57, p201

Triage

- Triage is the dynamic process of sorting casualties to identify the priority of treatment and evacuation of the wounded, given the limitations of the current situation, the mission, and available resources (time, equipment, supplies, personnel, and evacuation capabilities).
- Vital signs defining the color-coded triage. RR: respiratory rate; SpO₂: saturation of peripheral oxygen (pulse oximetry); HR: heart rate; GCS: Glasgow Coma Score; Tp: temperature. Abnormal vital signs are strong predictors for intensive care unit admission and in-hospital mortality in adults triaged in the emergency department.

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Triage also sets priorities for evacuation and transport as follows

- Deceased are left where they fell. These include those who are not breathing and repositioning their airway efforts were unsuccessful.
- Immediate or Priority 1 (red) evacuation by MEDEVAC if available or ambulance as they need advanced medical care at once or within one hour. These people are in critical condition and would die without immediate assistance.
- Delayed or Priority 2 (yellow) can have their medical evacuation delayed until all immediate people have been transported. These people are in stable condition but require medical assistance.
- Minor or Priority 3 (green) are not evacuated until all immediate and delayed persons have been evacuated. These will not need advanced medical care for at least several hours. Continue to re-triage in case their condition worsens. These people are able to walk and may only need bandages and antiseptic.

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Triage Systems

- The scale consists of 5 levels, with 1 being the most critical (resuscitation), and 5 being the least critical (nonurgent).

Australasian Triage Scale

Level ↕	Description ↕	Should be seen by provider within ↕
1	Resuscitation	0 minutes
2	Emergency	10 minutes
3	Urgent	30 minutes
4	Semi-Urgent	60 minutes
5	Nonurgent	120 minutes

Canadian Triage and Acuity Scale (CTAS)

Level ↕	Description ↕	Should be seen by provider within ↕
1	Resuscitation	0 minutes
2	Emergency	15 minutes
3	Urgent	30 minutes
4	Less Urgent	60 minutes
5	Non Urgent	120 minutes

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	1 Red Resuscitation (0min)	2 Orange Urgent (15min)	3 Yellow Less urgent (60min)	4 Green Not urgent (180min)
A	Obstructed airway Stridor	Threatened airway		
B	SpO ₂ < 80 RR > 35 or < 8	SpO ₂ : 80-89 RR: 31 - 35	SpO ₂ : 90-94 RR: 26 - 30	SpO ₂ ≥ 95 RR: 8 - 25
C	HR > 130 BP _{sys} < 80	HR: 121 - 130 HR < 40 BT _{sys} : 80 - 89	HR: 111 - 120 HR: 40 - 49	HR: 50 - 110
D	GCS ≤ 8	GCS: 9 - 13	GCS = 14	GCS = 15
E		Tp > 40 Tp < 32	Tp: 38.1 - 40.0 Tp: 32 - 34	Tp: 34.1 - 38.0

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Goals of combat surgery

- 1- Return greatest number to combat
- 2- Save life
- 3- Save limb
- 4- Save eyesight



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Principles of combat surgery

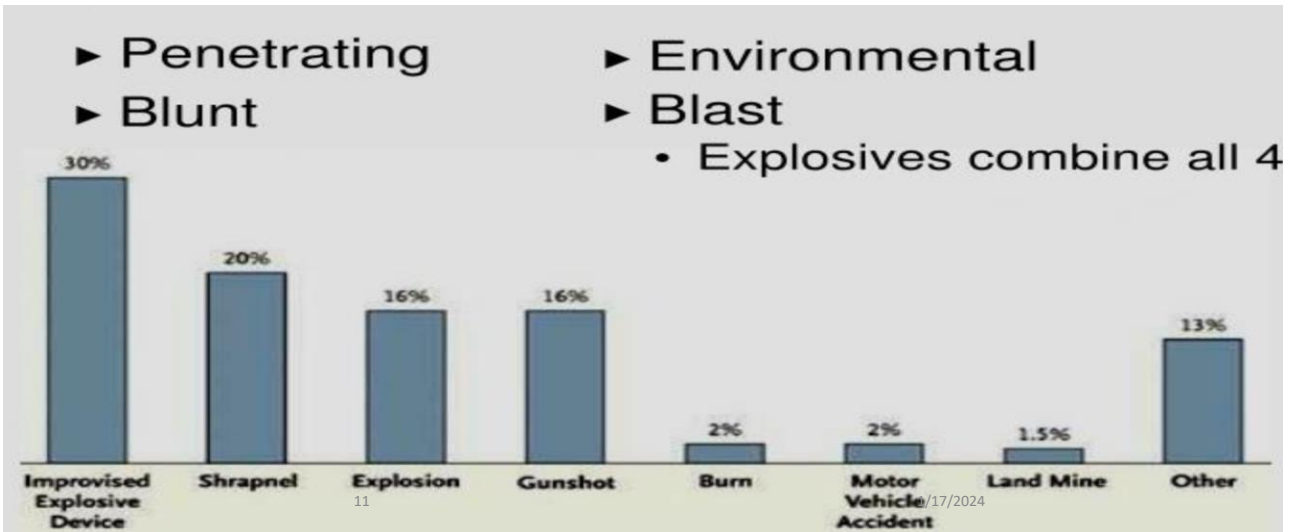
- 1- Establish priorities of care
- 2- Treat the wound not the weapon
- 3- prevent infectious complications
- 4- minimize residual disability



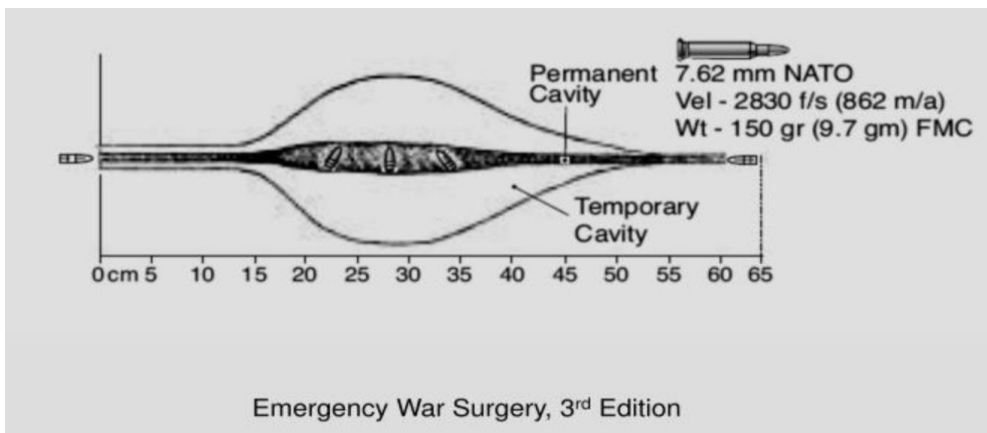
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Battle Injuries _ Mechanisms



High Velocity GSW



Fragments

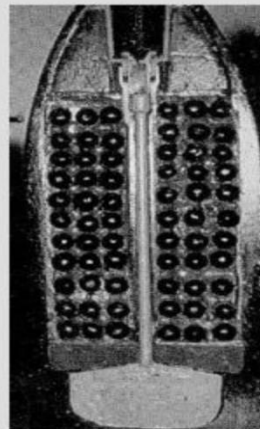
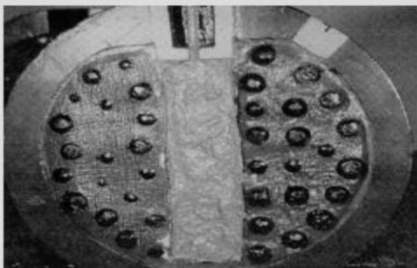
- 1- Derived from explosive munitions
 - . IEDs
 - . Grenades
 - . Homicide bombers
 - . Car bombers
- 2- variable
 - . Size
 - . Shape
 - . Composition



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Fragment ≠ Shrapnel

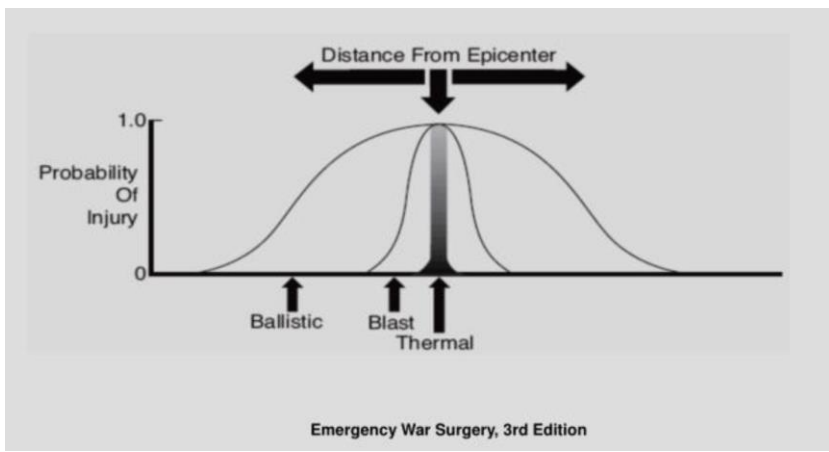


Shrapnel last used in World War I

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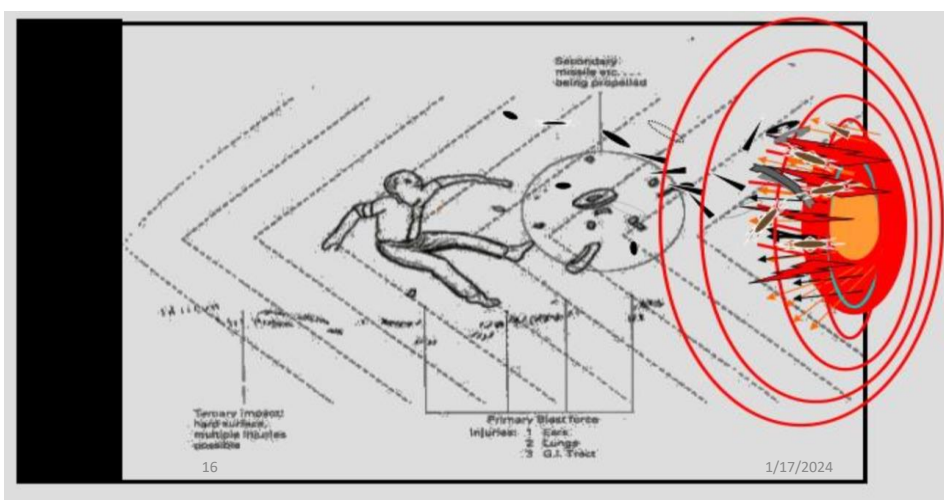
Explosive Mechanisms



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Blast Wave (Primary)



Primary

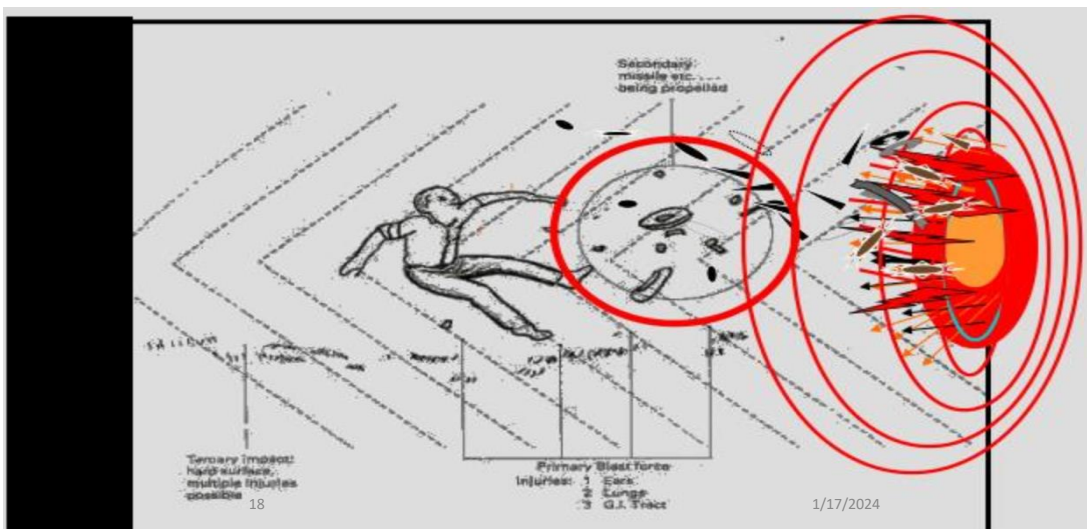
- Blast pressure wave
 - . Total lung barotrauma (blast lung)
 - . Tympanic membrane rupture
 - . Bowel perforation
 - . Severe cerebral contusions

Responsible for death

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Penetrating (Secondary)



Secondary

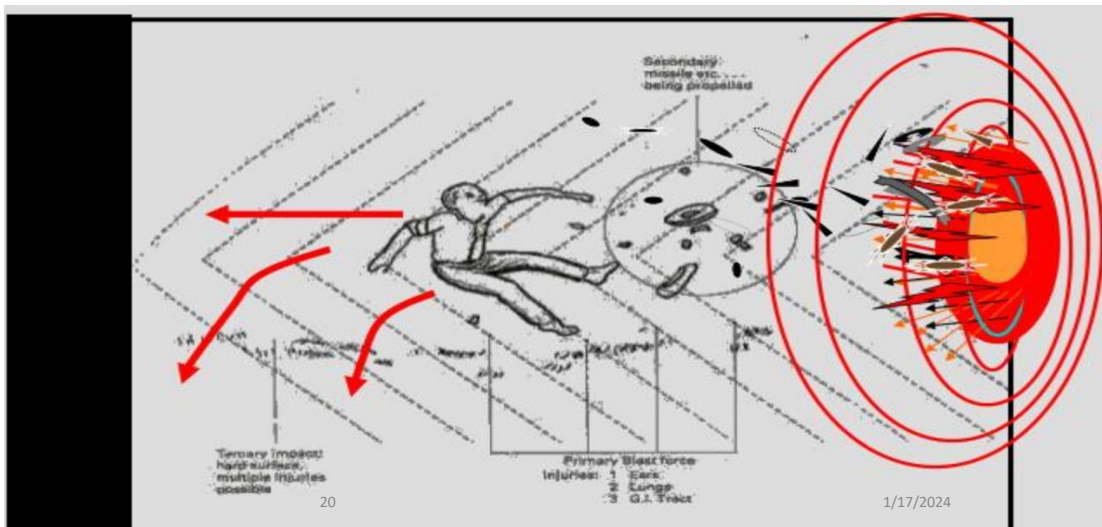
- Penetrating (fragments and debris)
 - . Unprotected torso
 - . Extremity
 - . Eye
 - . Head/ neck

Responsible for
wounding

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Blunt (Tertiary Blast Wind)



Tertiary

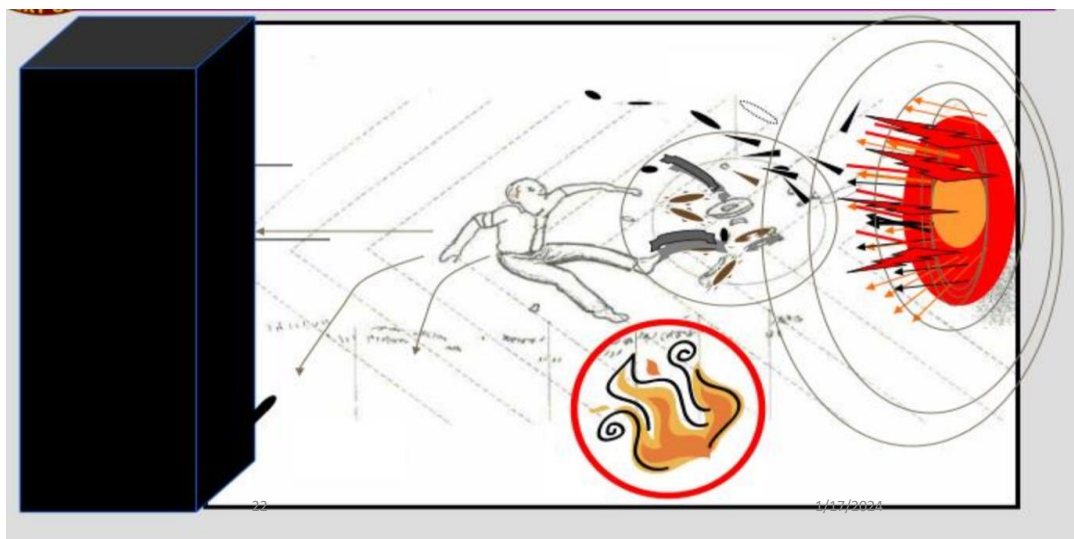
- Blunt (blast wind)
 - . Falls
 - . Crush



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Thermal(Quaternary)



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Quaternary

All other injuries/ illnesses
 . Thermal



 . Exacerbations of pre-existing conditions



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Casualties from Explosions

- Δ Type of explosive (high vs. Open)
- Δ Environment (confined vs. Open)
- Δ Nature of deliver
- Δ Radius from blast
- Δ Intervening protection

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Landmine Injury



Nothing is what it seems, so . . .

Emergency War Surgery, 3rd Edition
War Wounds of Limbs, ICRC

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**Emergency War Surgery Course
War Wounds**

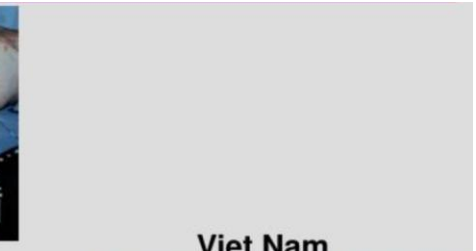


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New Wound?



Iraq



Viet Nam

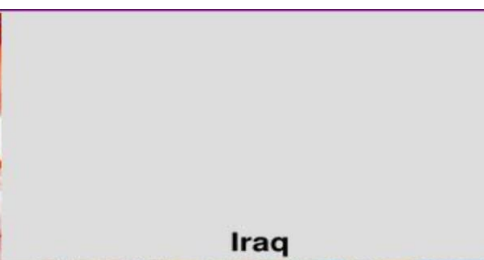


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New Wounds ?



Viet Nam



Iraq



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Armored Vehicles

