



Lao PDR Integrated Emergency Response Training 2025

Chiang Khong Crown Prince Hospital, Chiang Rai Province, Thailand.
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Update in EMS

Mass Casualty Incident: Specific Care

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With the support of the French Embassy in Lao	

Specific situations

- Conventional situation + multiple victims

- Major fire
- Major road accident
- Mass shooting
- Explosion

→ Saturation of Healthcare system

- Non-Conventional situation +/- multiple victims

- CBRN event
- Dirty bomb / Terrorist attack

→ Incapacitation of Healthcare system



Conventional situations



Weapon and firearm injuries

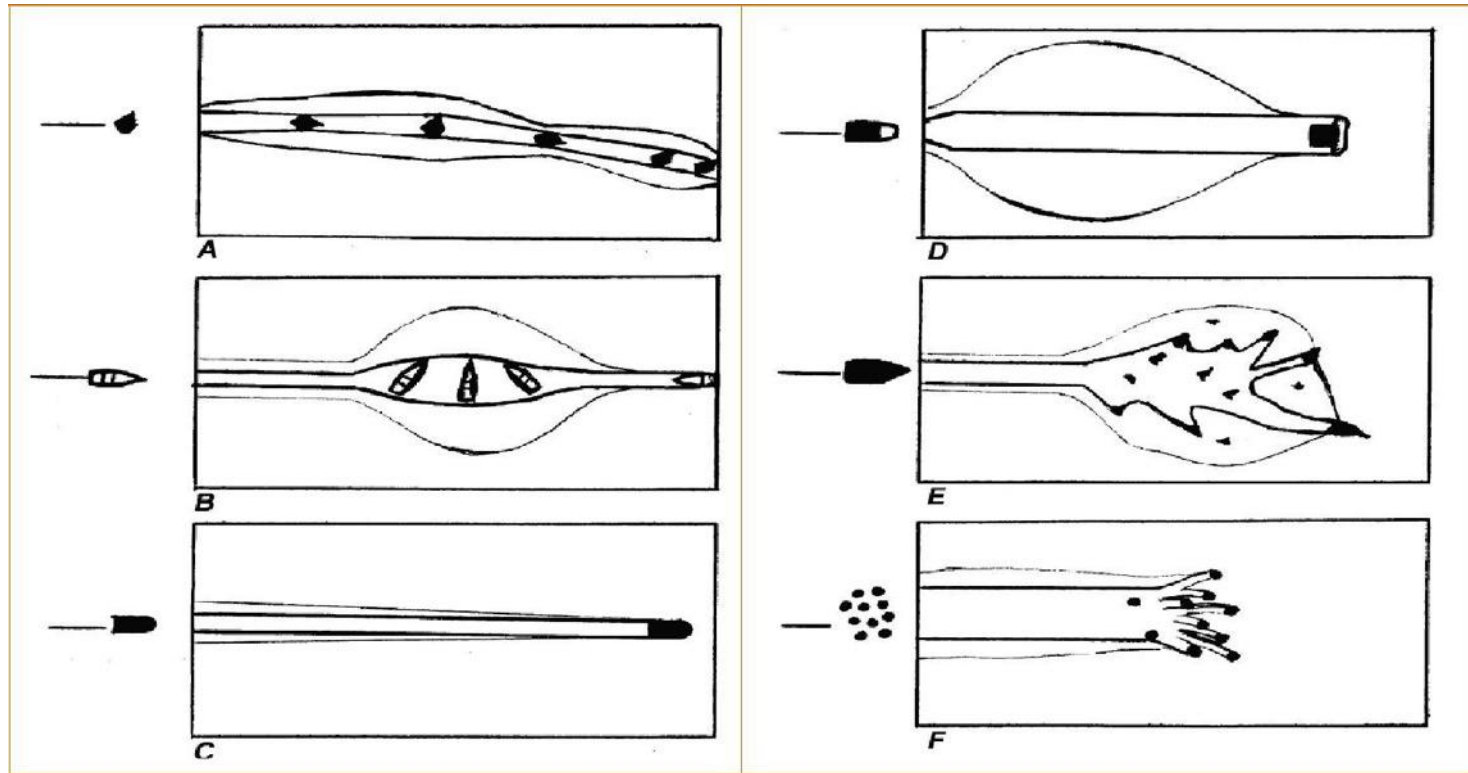
- Weapons (excl. firearms) \neq firearms \Leftrightarrow pathophysiological mechanism
- 2 distinct traumas :
 - Penetrating traumas:
 - Cutting
 - Crushing
 - Stretching
 - Blunt traumas:
 - Bursting
 - Breaking anatomical structures

Firearm injury

- Severity of firearms injuries depend on:
 - Types of bullets and cartridges
 - Types of firearms
 - Characteristics of affected tissues



Terminal Ballistic and lesion



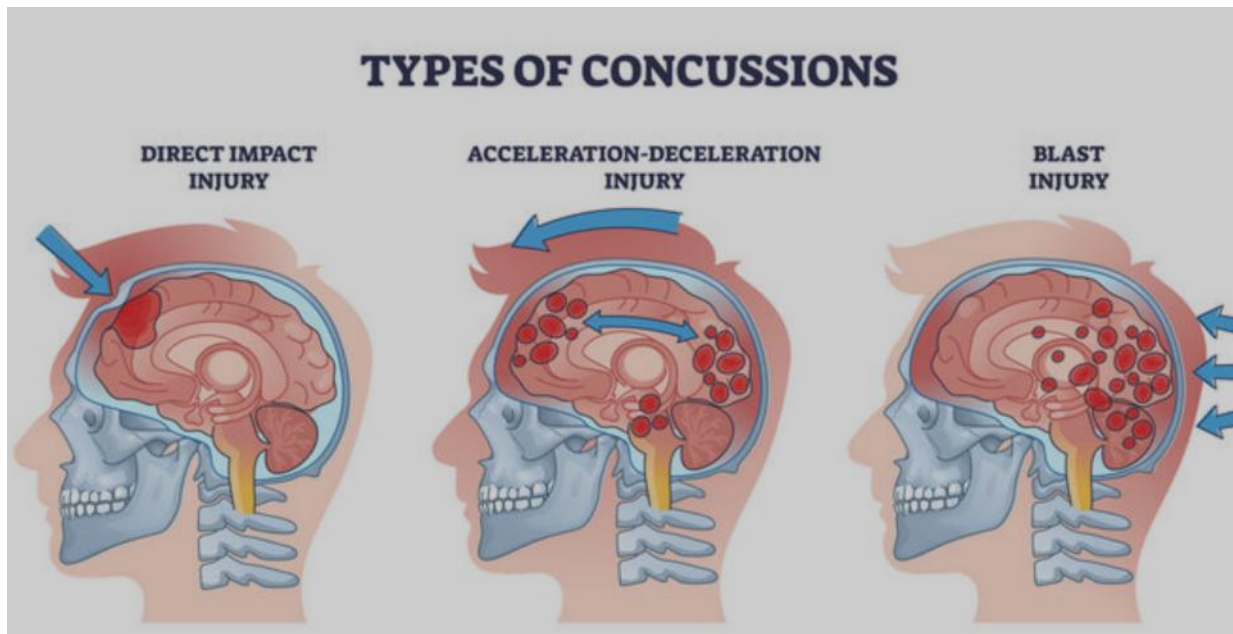
Permanent cavity ⇔ CRUSH cavity : cutting/crushing

Temporary cavity ⇔ STRETCH cavity : stretching (necrosis)

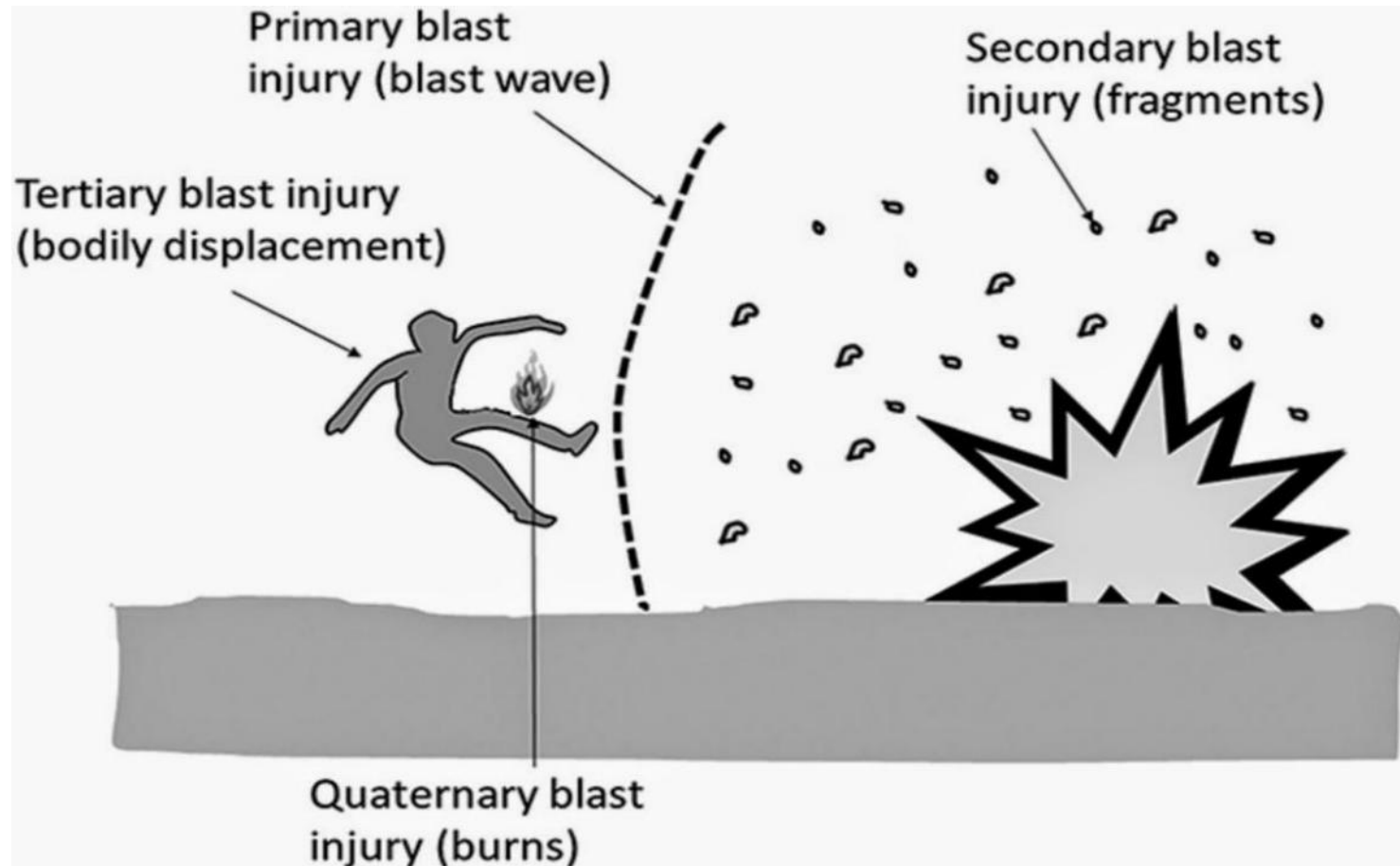


Blunt trauma

- 3 types of lesion:
 - Injuries caused by direct shock
 - Injuries caused by acceleration/deceleration
 - Injuries caused by blast effect



Explosion



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Treatment

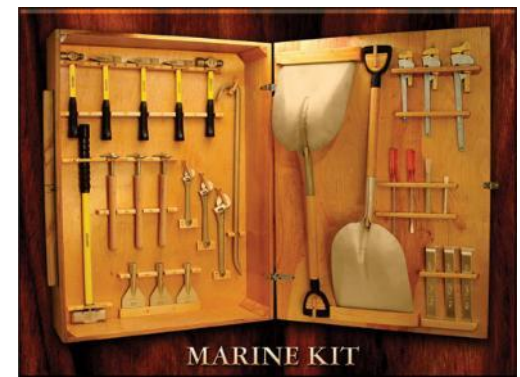
- **Golden-hour**
- **Damage control**
 - CAT (Combat Application Tourniquet)
 - Hemostatic dressing (Kaolin+)
 - Compressive dressing
- **xABCDE approach:**
 - Xtreme Bleeding
 - Airway
 - Breathing
 - Circulation
 - Disability
 - Exposure

Golden hour



- The golden hour : the critical time period after a traumatic injury->prompt treatment prevents death.
- This term now refers to the principle of rapid intervention in trauma cases.
- Patients' chances of survival are greatest if they receive care within a short period of time after a severe injury.

Damage Control

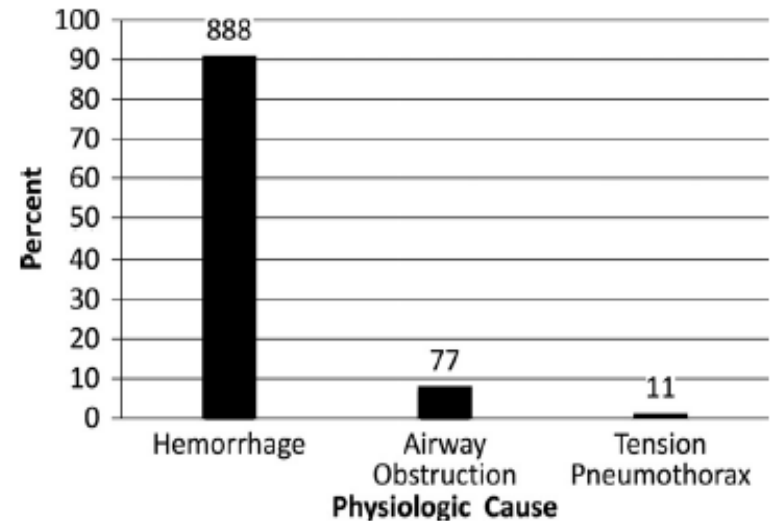


Mortality and trauma

~ 50% of early mortality in trauma is linked to hemorrhage

Hemorrhage: 83 to 87% of preventable deaths

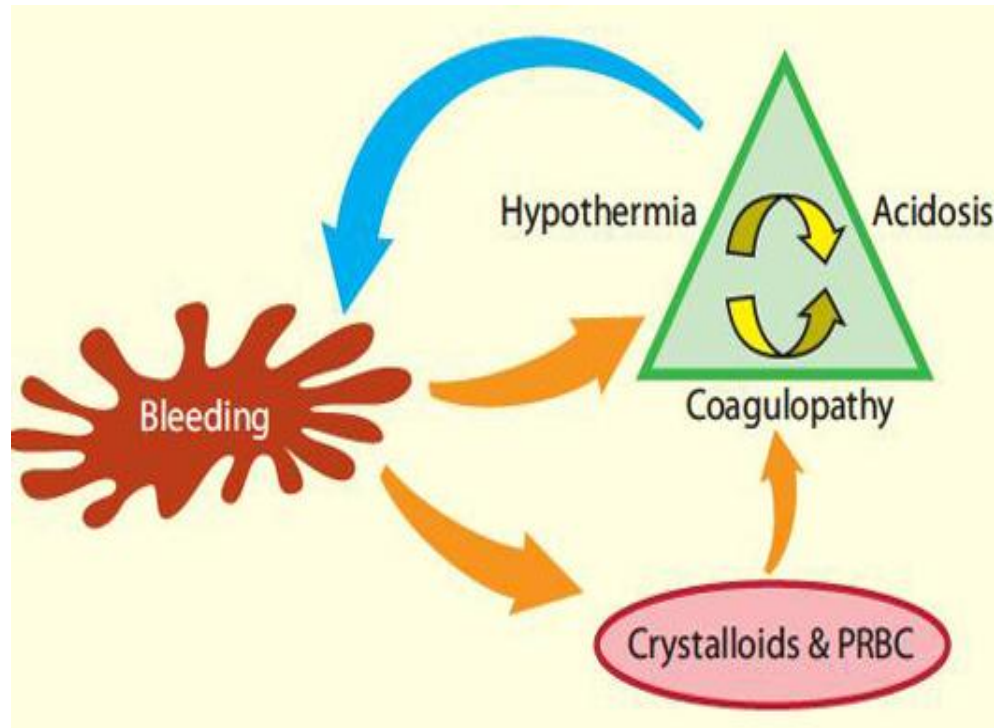
Efforts must focus on bleeding control



Eastridge et al. Death on the battlefield (2001-2011) J Trauma 2012

The death triad

- Bleeding => hemorrhagic shock => vicious cycle



Damage Control Resuscitation

Early consideration of the death triad in 4 points :

1. Control of external bleeding
2. Control of hypothermia
3. Infusion / Vasopressor amines
4. Use of anti-fibrinolytic agents

Major Fire

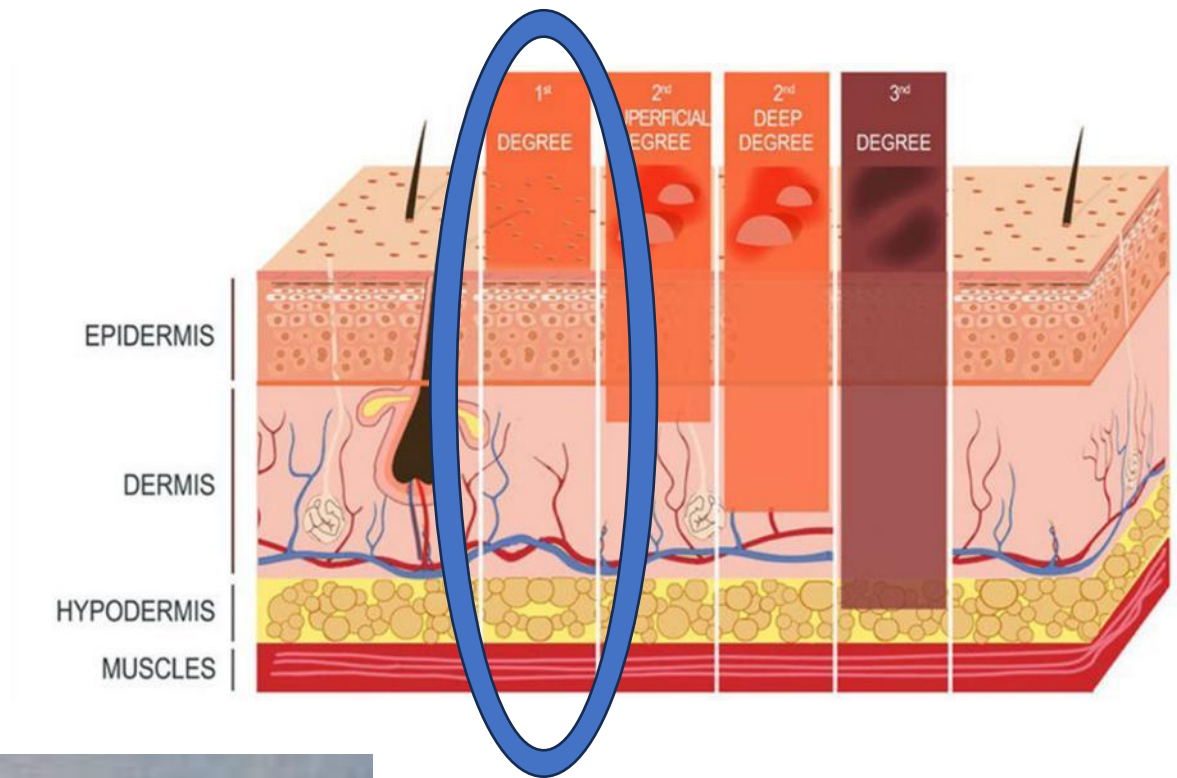


- Two main types of lesion :
 - Burn
 - Inhalation of asphyxiants like Carbon Monoxide (CO) or Cyanide (CN)
- Possibility of a large number of victims
- Need for EMS to begin pre-hospital care



Burns

1st degree



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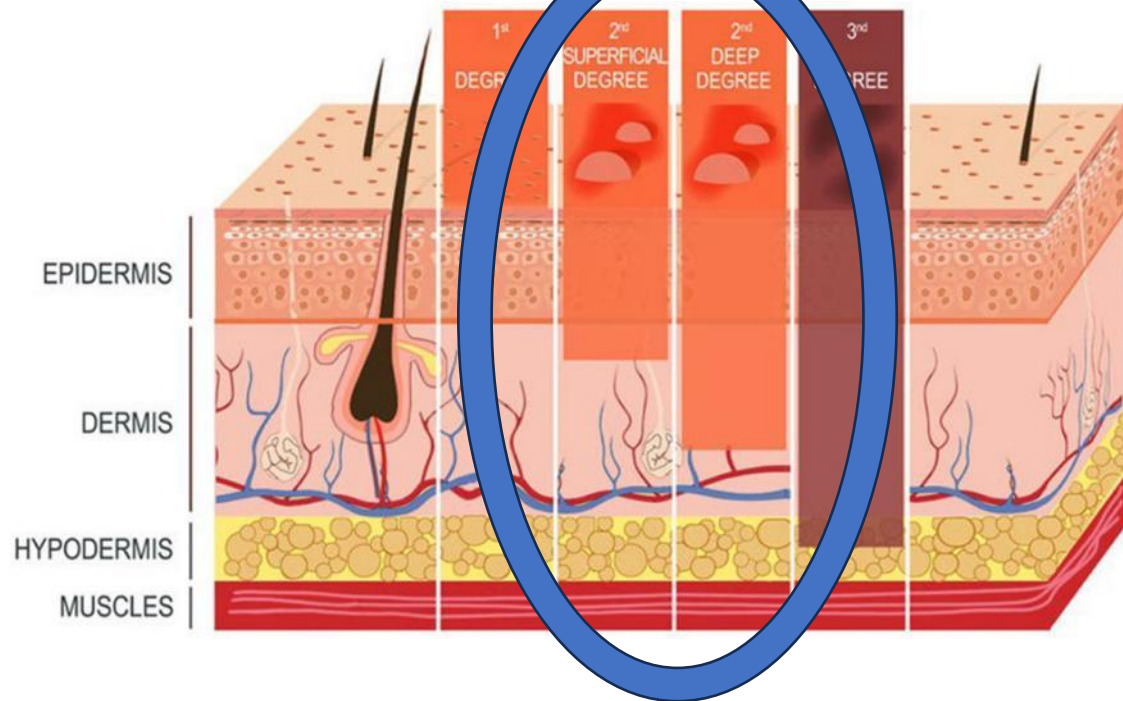
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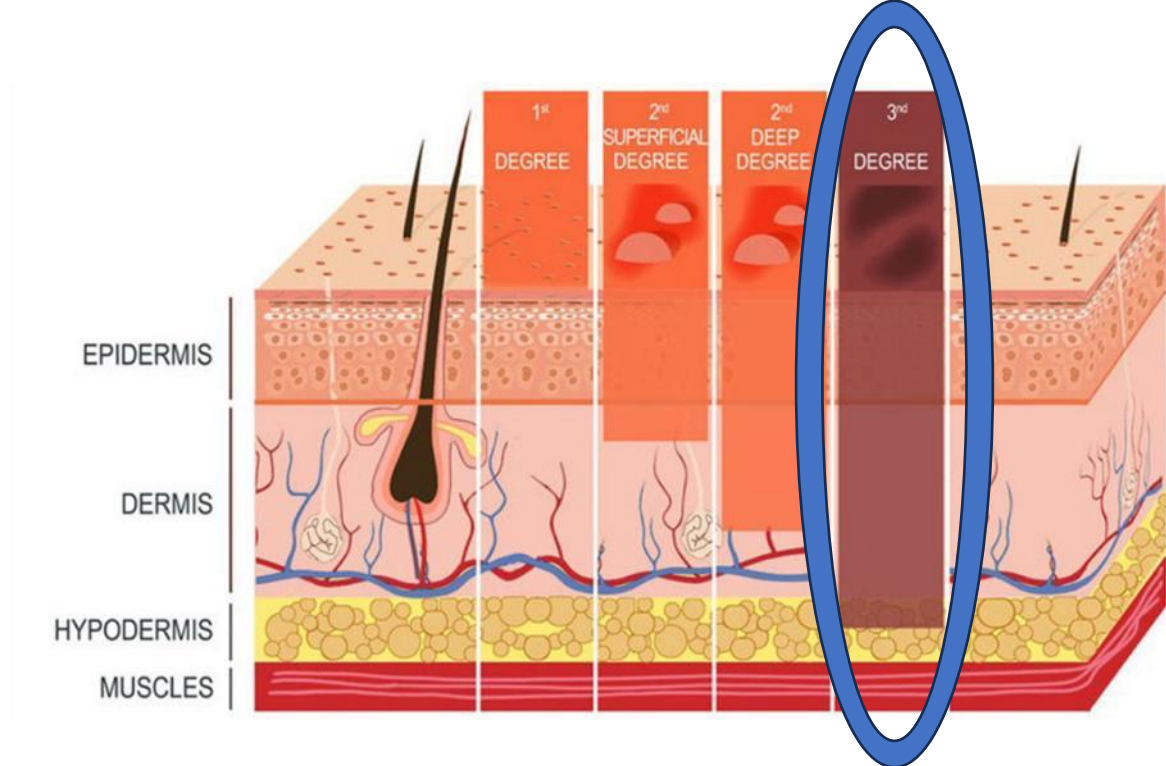
Burns

2nd degree



Burns

3rd degree



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Inhalation of asphyxiants

Summary of Common Chemical Toxins Related to Inhalation Injuries		
	Cyanide (CN)	Carbon Monoxide (CO)
Odour	Bitter almonds, some cannot detect	Odourless
Sources	Fires, chemical or synthetic combustion, pesticides and synthetic manufacturing, metal extraction, chemical labs	Combustion of carbon compounds (e.g. engines, cooking stoves in enclosed spaces)
Mechanism	Inhibits mitochondrial cytochrome oxidase - halting aerobic metabolism	High affinity for Hgb, displaces oxygen - decreased oxygen delivery
Signs / Symptoms	<p>Early or mild effects: vague - dizziness, headache, nausea, anxiety</p> <p>Late or severe effects: tachycardia, hypotension, respiratory depression, seizure, coma; ARDS and pulmonary edema; acidosis</p>	<p>Vague symptoms (high index of suspicion required) - confusion, stupor, coma, seizures, and myocardial infarction</p>
Treatment	<p>Supportive (oxygen, mechanical ventilation)</p> <p>Hydroxocobalamin 5 g IV over 15min, can repeat</p>	<p>100% Oxygen – shortens half-life to ~30-90 min</p> <p>Hyperbaric oxygen – shortens half-life to ~20min</p>



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Non-Conventional situations

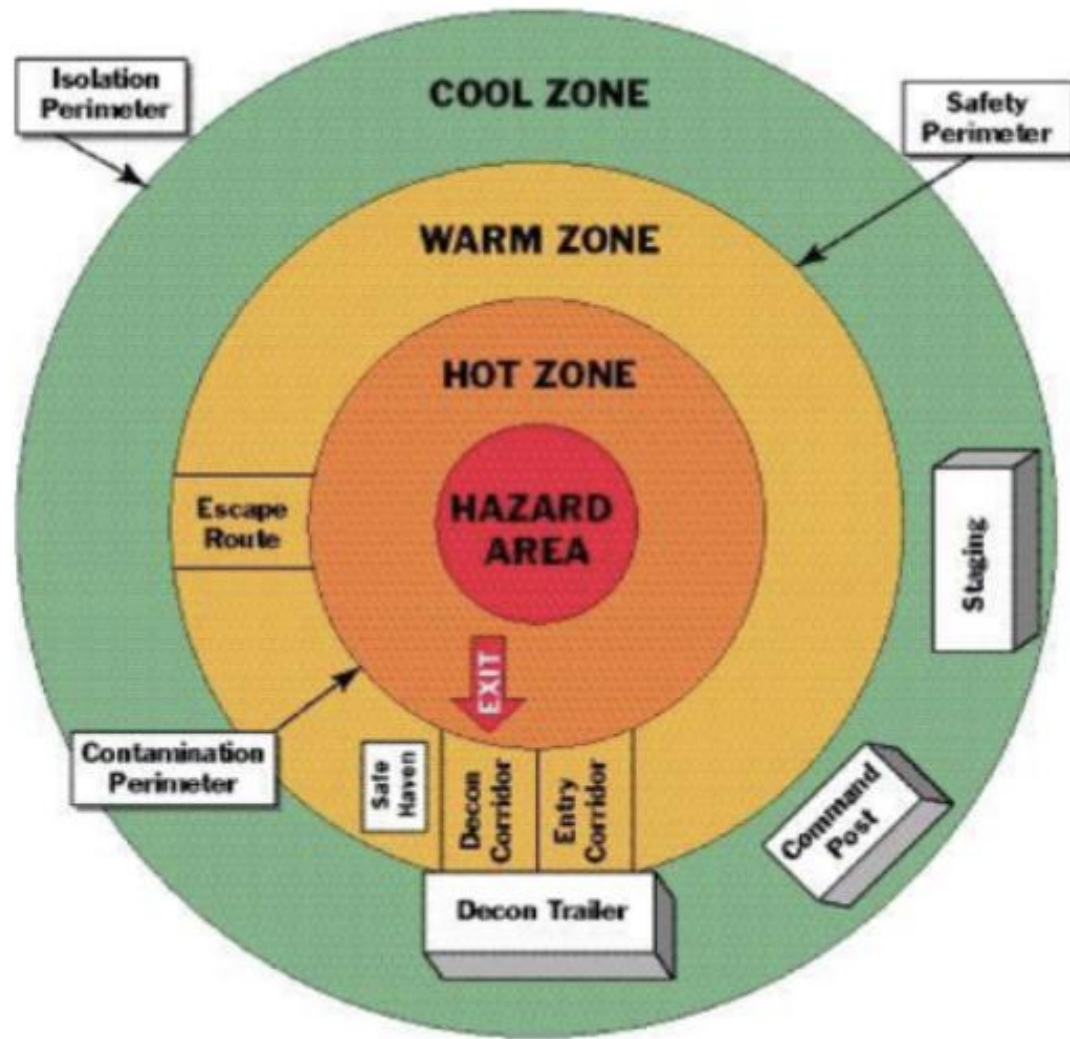


CBRN event

- The chemical and the nuclear hazards can be accidental or intentional in origin
- These events need specific adaptations :
 - Zoning adapted to medical care in the contaminated area
 - Use suits of protection
 - Decontamination process with:
 - Undressing
 - Absorbent material
 - Showers
 - Administration of antidotes



Zoning in case of CBRN event



Personal Protective Equipment (PPE) for CBRN

Protective suits

CLD



C3P



TYCHEM[®]

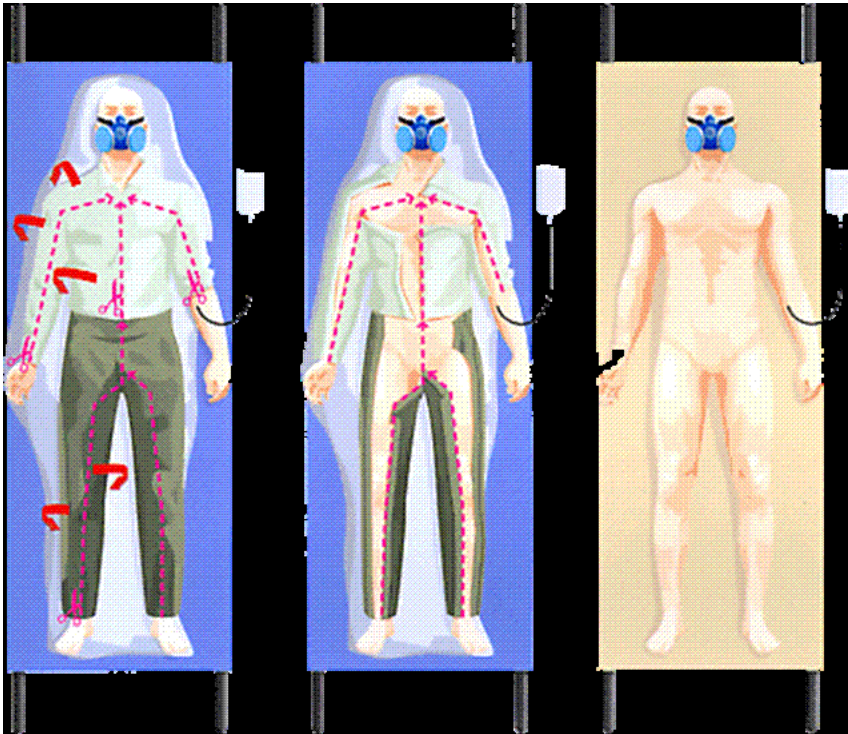


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The dry decontamination

Undress/Absorbent material



The wet decontamination

Mobile unit of decontamination (inflatable tent)



The wet decontamination

Mobile unit of decontamination (truck)



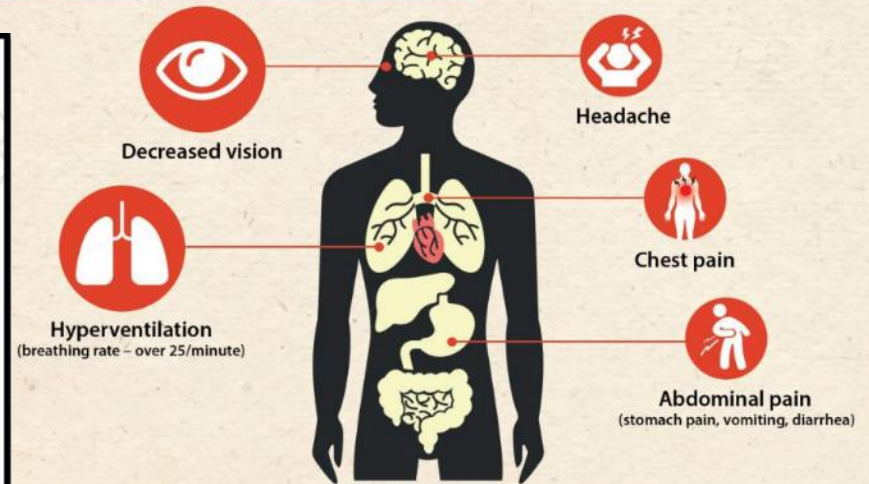
A chemical event in a bar



Methanol

Methanol is commonly used as an industrial alcohol. It can be absorbed into the body through ingestion, inhalation, and skin contact and metabolised into highly toxic formic acid which can lead to metabolic acidosis.

Symptoms of methanol poisoning



Drug Expert

@drugexpert_drx

Methanol poisoning & Antidote

Methanol

alcohol dehydrogenase

Inhibit

"Antidote"

fomepizole

Formaldehyde "TOXIC"

aldehyde dehydrogenase

Formic acid

"TOXIC"

Leads to

CNS depression, metabolic acidosis, permanent neurologic dysfunction, blurring or complete loss of vision, coma, respiratory failure, death

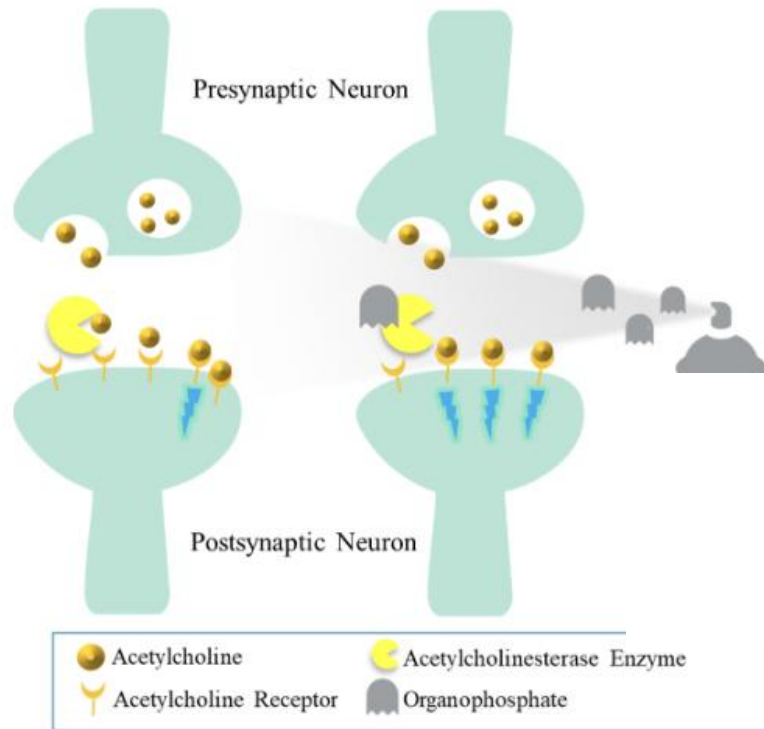
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Non-terrorist chemical event in the fields



Organophosphates/Nerve Agents



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