Casualty Care

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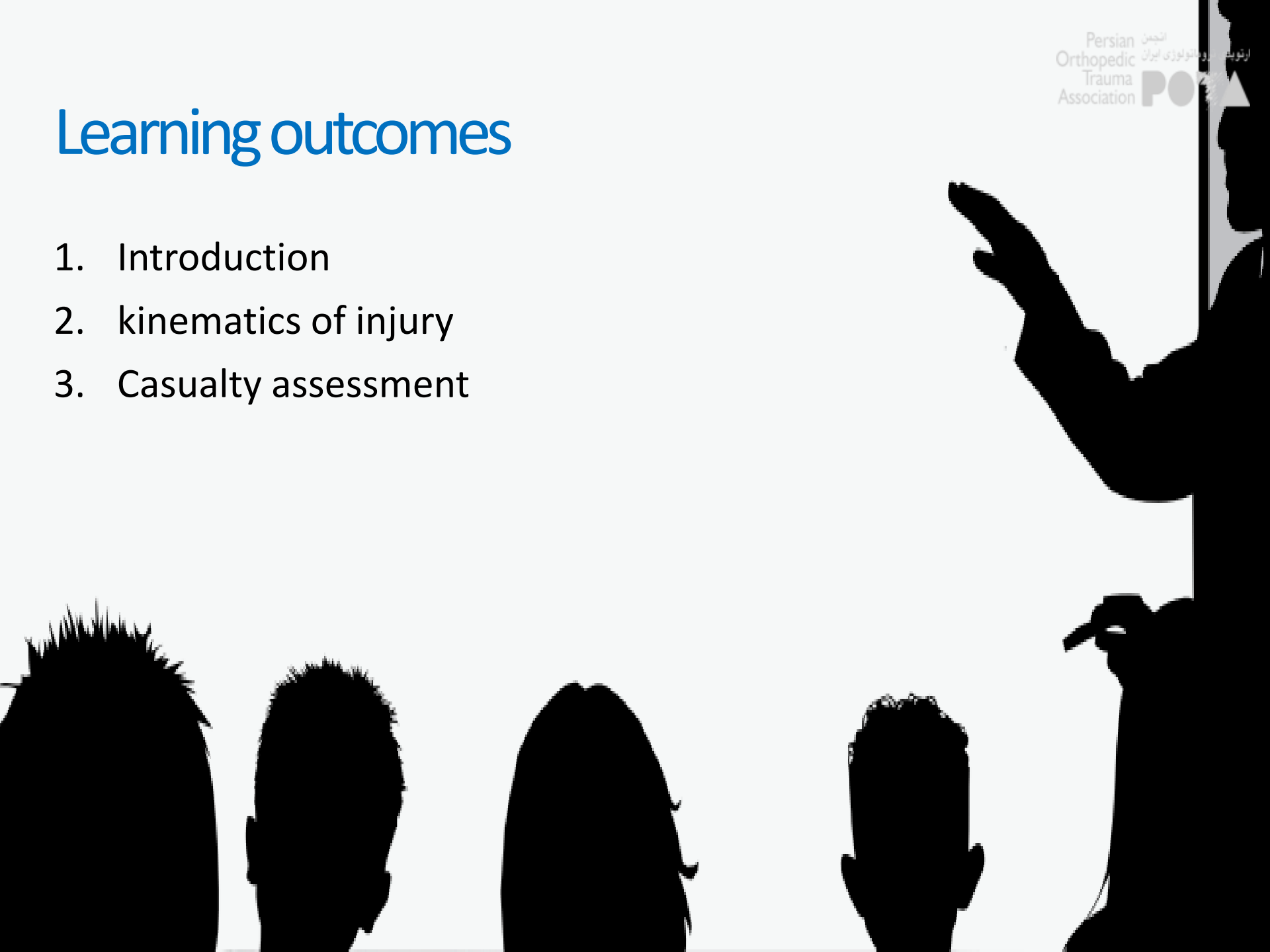
POTA president

International road safety congress

14-16.Feb.2016

Learning outcomes

1. Introduction
2. kinematics of injury
3. Casualty assessment



1.Introduction

Introduction

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A rescuer should not attempt to administer medical first aid unless trained to do so

Introduction

Standard Infection Control Precautions

Casualty is carrying a blood borne virus or bacteria?

Rescuer may be exposed

Personnel protection by using:

- Hand washing procedures
- Safety glasses
- Surgical gloves
- Correct PPE (personal protective equipment)
- Avoided direct mouth–to–mouth contact

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2. kinematics of injury

Kinematics of injury

- How injury is caused?
- What type of injuries may have occurred?
- How much is the extent and seriousness of injury?

The treatment to be given.

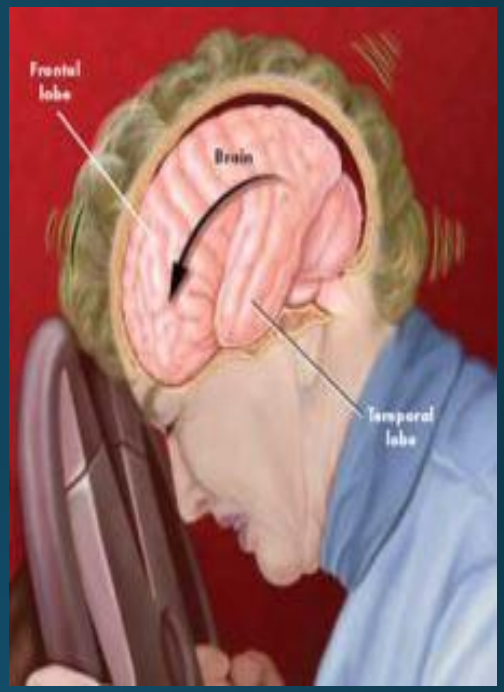
Three separate impacts

1) **Initial impact:** The vehicle is brought to a stop, kinetic energy is absorbed by the vehicle's impact and crumple zones.
2) **Second impact:** Occupants inside the vehicle, traveling at the same speed as the vehicle collide with the seat belt/vehicle components etc.
3) **Third impact:** When the internal organs of the body collide against the structures of the body as it comes to rest. i.e. skull, chest.

Types of impact injuries

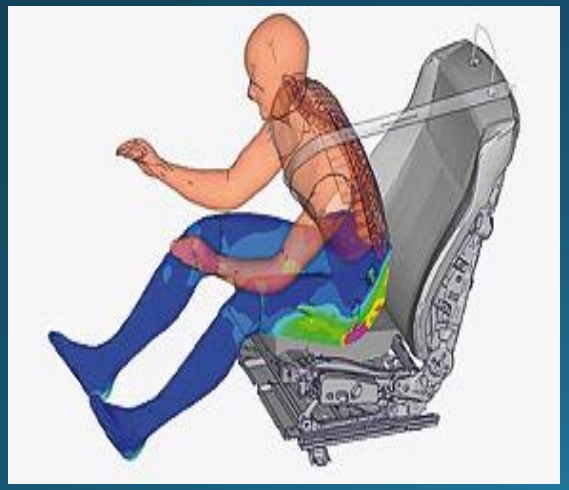
1) Head-on collision
2) Down-and-under injuries
3) Up-and-over injuries
4) Seatbelt injuries
5) Side impact collision
6) Overturned vehicles
7) Rear-end collision

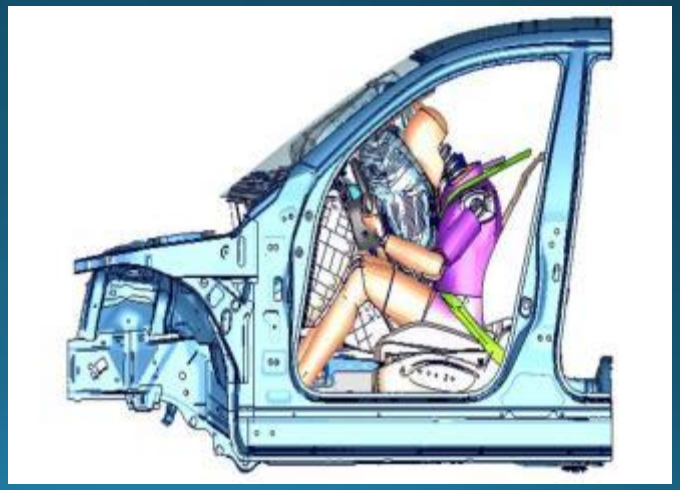
Types of impact injuries



1) Head-on collision

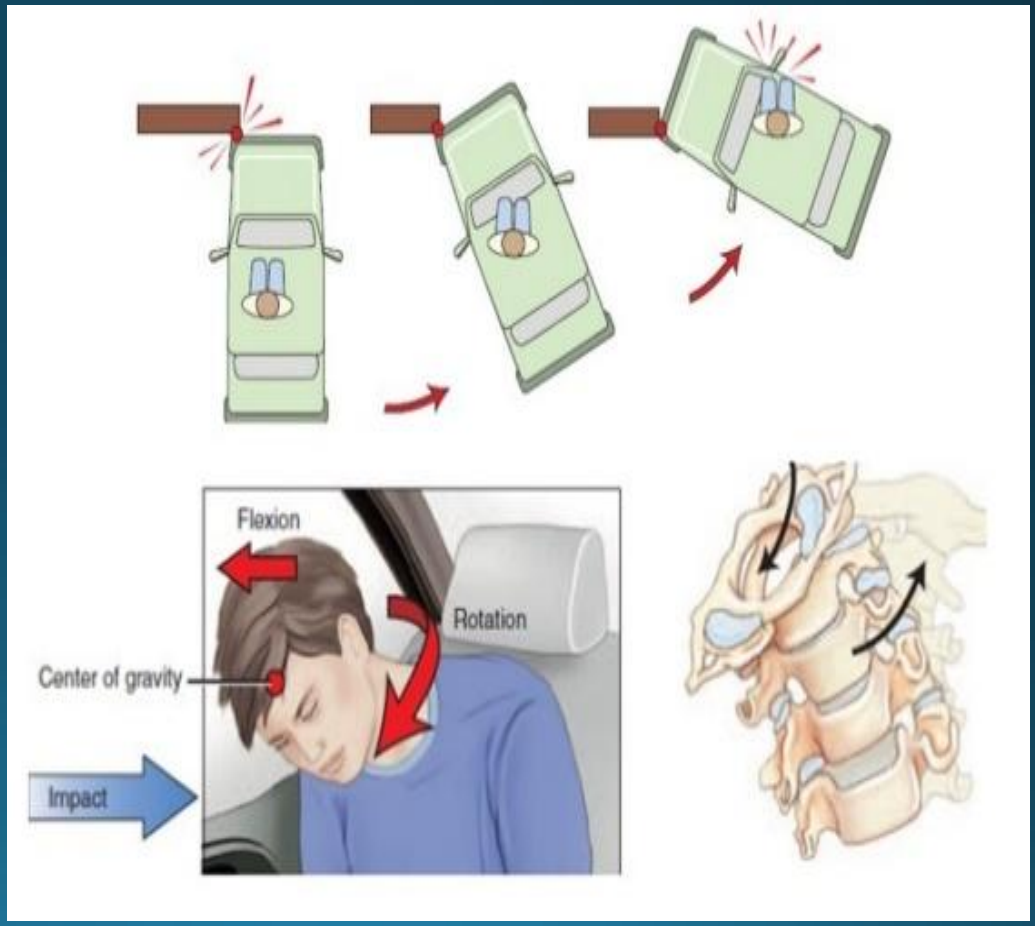
Frontal impact. The casualty is thrown forward and brought to a sudden halt against objects, seatbelt restraint, airbags, dashboard or windscreen.





Types of impact injuries

Rotational impact



Types of impact injuries

2) Down-and-under injuries

Sliding forward and making impact with the dashboard or steering wheel

- Dashboard collision: leg and hip injuries
- Steering wheel collision: head, neck, chest

cardiac arrest or damage to the internal organs

Types of impact injuries

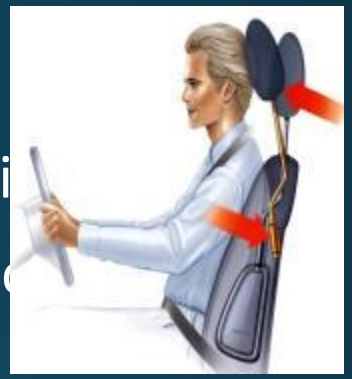
3) Up-and-over injuries

Going up and over the dashboard, strikes the windscreen with the head. Head and cervical spinal inju

If the windscreen is cracked or broken the rescuer should assume cervical spinal injury until proven otherwise

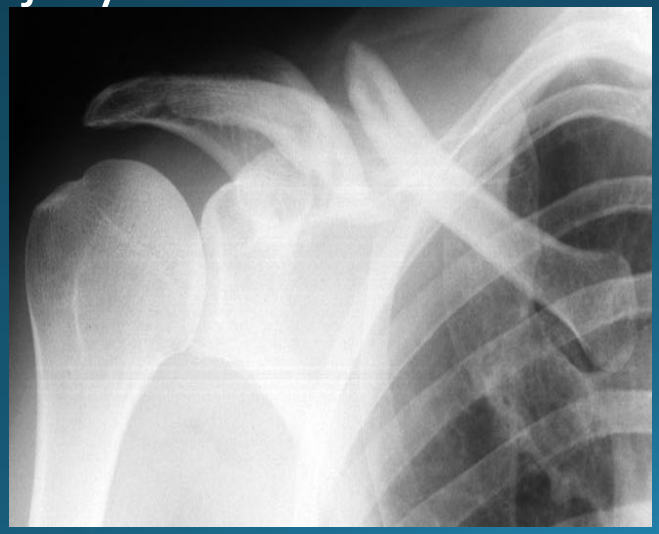
Types of impact injuries

4) Seatbelt injuries



With modern seatbelt the casualty is restrained in the ini

- Whiplash injury, damage the cervical or upper thoraci
- Collarbone injury



Types of impact injuries

4) Seatbelt injuries

- Abdominal organs
- Chest organ damage, trouble breathing

Any patient with a seat belt sign must have an abdominal CT

Types of impact injuries

5) Side impact collision

- Seatbelts offer little protection
- Impaction with door pillars
- Fx. of collarbone, arm, hip and leg
- Head and spinal injuries

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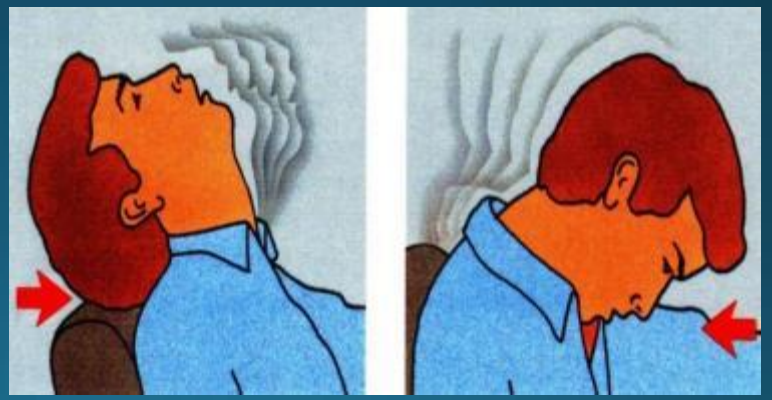
Types of impact injuries

- **6) Overturned vehicles**
- The injury will depend on the force of impact.
- Occupants may be thrown from the vehicle (high mortality rate)
- Persons inside the vehicle may suffer from several impacts

Types of impact injuries

7) Rear-end collision

Vehicle is struck from behind → whiplash neck injuries



Points to note

- A cracked windscreen or displaced rear mirror may indicate head or spinal injury.
- Deformed steering wheel or column may indicate chest injuries.
- Deformed dashboard may indicate lower limb injuries.
- Deformed gear change lever may indicate lower limb damage.
- Deployed airbag may indicate facial injuries.
- Seat belt sign may indicate abdominal or chest injuries

3. Casualty assessment

Casualty assessment

Life-threatening injuries

Prioritisation

treatment

Advanced trauma life support

ATLS

ABCDE

- A - Airway
- B - Breathing
- C - Circulation
- D - Disability/Neurologic assessment
- E - Exposure and environmental control

Casualty assessment

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Airway assessment

- **Look for:** objects in the mouth (food, debris, swallowed tongue, vomit, blood, excess saliva)
- **Look for:** signs of swelling, compromise the airway
- **Listen for:** gurgling, wheezing, other unusual sounds, could indicate an airway blockage

Casualty assessment

Obtaining a clear airway

Techniques:

1. Trauma Jaw Thrust
2. Trauma Chin Lift
3. Head Tilt
4. Head Tilt / Chin Lift

Assisted:

1. Using a BVM
2. Supplementary oxygen
3. CPR, absence of circulation

Casualty assessment

Obtaining a clear airway

Trauma Jaw Thrust: suspected spinal injuries h

- Wear correct PPE
- Stabilize the head and cervical spine
- One hand on each side of the jaw, pull the ja
- Open the mouth slightly with the thumbs of
- Check for obstructions

Casualty assessment

Obtaining a clear airway

Trauma Chin Lift: when facial injuries have oc

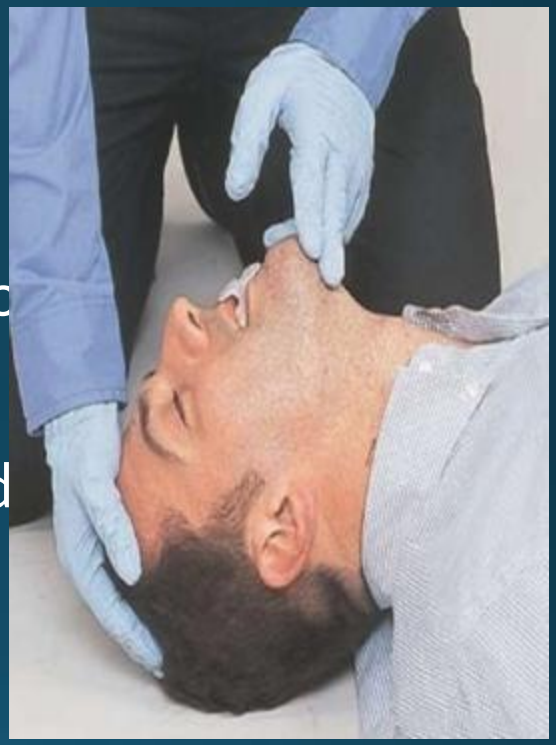
- Wear correct PPE
- Two person operation
- Stabilise the head and cervical spine
- Take the tip of the jaw with the thumb and index finger or place the thumb inside the mouth, behind the lower teeth
- Pull the jaw gently forward
- Open the mouth and check for obstructions

Casualty assessment

Obtaining a clear airway

Head tilt/chin lift: provides maximum airway c

- Wear correct PPE
- Use one hand to push back on the forehead
- Place index finger and thumb on tip of chin
- Gently pull the chin forward
- Open the casualty's mouth and check for ob



This technique is not reco mmended
if a cervical spine injury is s uspected

Casualty assessment

Obtaining a clear airway

Suction (Aspirator) :

- Removes fluids such as vomit, blood a
- Several types of suction devices

  hand operated, battery or pneumatic devices

Casualty assessment

Obtaining a clear airway

OPA (oropharyngeal airway): Used in unresponsive patients without a gag reflex

- Relieves airway obstructions by the tongue
- Curved rigid device, placed over the tongue

Should only be fitted
by a qualified person

Casualty assessment

Obtaining a clear airway

Airway management in children

- Relatively large tongues, can cause blockages of the airway
- Large head to short neck ratio, can make airway opening techniques difficult
- Delicate mucus membranes of the mouth and throat, extreme caution should be taking

Casualty assessment

Breathing

Starvation of oxygen for any length of time → Major organ damage

Look, listen and feel for:

- Skin color
  - Pinkish co → Good blood oxygenation
  - Blueness of lips, mouth, neck, chest o[illegible]mities → Poor blood oxygenation
- Breathing Rate, Normal = for an adult 12 – 20 /m
  - Depth, watching chest movements while breathing
  - Regularity, regular or irregular
  - Symmetry, equal on both sides of the chest

Casualty assessment

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Breathing

Possible signs of serious breathing difficulty

- Increased effort in breathing
- Flared nostrils
- Muscles use to aid breathing (such as the neck and chest)
- Tracheal deviation
- Inability/difficulty in speaking
- Distension of the abdomen when the chest exhales

Casualty assessment

Breathing (oxygen administration)

Supplementary oxygen for any of the following:

- Respiratory or circulatory system compromise
- Reduced levels of consciousness
- Serious trauma
- Hypoxia
- Inhalation of toxic gases
- Respiratory or Cardiopulmonary arrest

Casualty assessment

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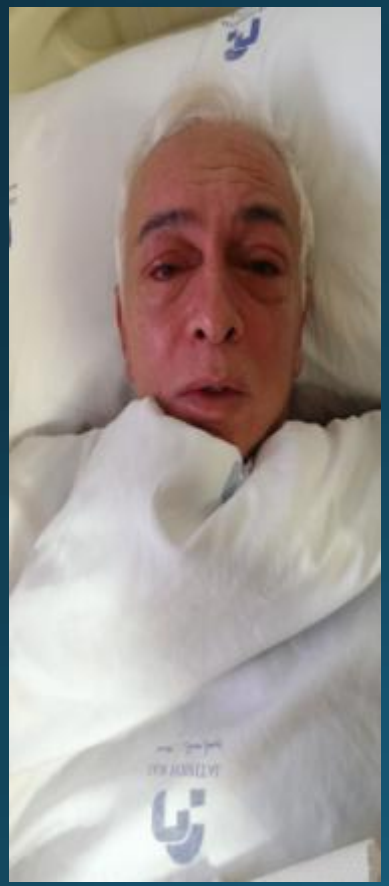
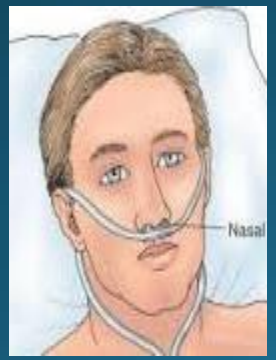
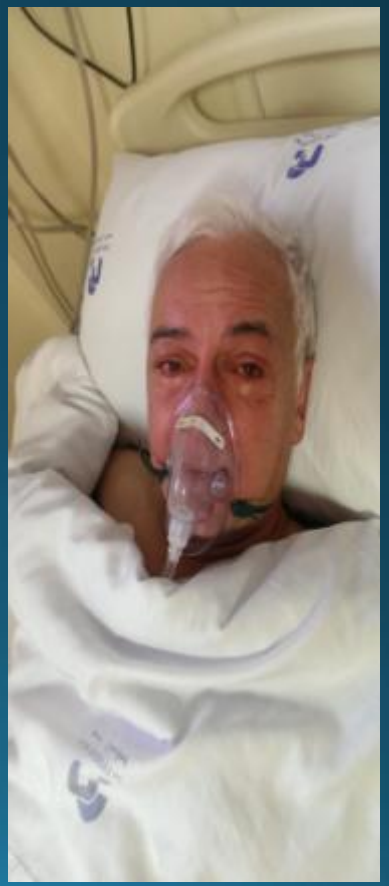
It is important to recognize the need of oxygen therapy,
applied in the correct manner and using by trained persons







Casualty assessment

Breathing (artificial ventilation)

Only if the casualty is not breathing or the breath rate cannot sustain adequate oxygenation

- **Mouth–to–mouth ventilation,** should only be undertaken if full Body Substance Isolation
- **Pocket face masks,** isolates the rescuer from the casualty with a non-return breather valve
- **Bag valve mask,** one rescuer places the mask over the face and the other squeezes the bag

Casualty assessment

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Circulation

Signs of internal and external haemorrhage

- Skin color
- Skin temperature
- Pulse rates, strength, regularity normal range from 60–100 beats /m for adults
- Capillary refill

Casualty assessment

Circulation (Shock)

Signs and symptoms :

- Confusion, restlessness or anxiety
- Cold, clammy, sweaty, pale skin
- Rapid breathing
- Rapid, weak pulse
- Increased capillary refill time
- Nausea and vomiting
- Weakness or fainting
- Thirst

Casualty assessment

Circulation (Shock)

Treatment tips :

- Correct position
- The cause of shock treatment
- Body temperature maintenance, placing blankets under and over the patient
- Other treatments assistance (such as administering oxygen)
- Immediate and prompt transport to an appropriate medical facility

Casualty assessment

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Circulation (Shock)

Cardiac Arrest - CPR (Cardio Pulmonary Resuscitation)

If a shock is not delivered for 4-5 minutes after collapse

(Unresponsive patient, No breathing, No pulse)

CPR

Points to note

- Personnel protection
- Trained rescuer
- Kinematics of injury
- ATLS, PHTLS
- Techniques to obtain a clear air way
- Oxygen therapy

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Thank you


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Open Fractures

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Orthopedic sergeuon

Trauma research center
POTA

Definition

- Break in the skin and underlying soft tissue leading directly into or communicating with the fracture and its hematoma

history

Open fractures

- Treatment = amputation
- Mortality = 75%
- Function in **survivors** poor

History

- Last century, high mortality with open fractures of long bones
- Early amputation in order to prevent death
- WWI, mortality of open femur fractures > 70%
- 1939 Trueta “closed treatment of war fractures”
  - Included open wound treatment and then enclosure of the extremity in a cast
  - “Greatest danger of infection lay in muscle, not bone”

Trueta J: "Closed" treatment of war fractures, *Lacet* 1939;1:1452-1455

History

- 1943 PCN on the battlefield quickly reduced rate of wound sepsis
- Delayed closure of wounds
- Hampton: closure btwn 4th and 7th day
- Larger defects continued to be left open to heal by secondary intention

Hampton OP Jr: Basic principles in management of open fractures; *JAMA* 1955; 159:417-419

History

- Advances shifted the focus
  - Preservation of life and limb → preservation of function and prevention of complications
- However, amputation rates still exceed 50% in the most severe open tibial fractures assoc with vascular injury*

Lange RH, Bach AW, Hansen ST et al: Open tibial fractures with associated vascular injuries: prognosis for limb salvage. *J Trauma*; 25(3):203-208

Epidemiology of open FX a 15 year review

- incidence 2.6% of 5271 case
- Adult male highest incidence 15-19 Y
- Adult male females highest incidence 80-89 Y
- Finger phalanges, tibia and fibula, distal radius and ankle
- Crush, Fall , Cut , Rta

Charles.M. injury. Int.43(2012)-891

Why use this classification?

- Grades of soft tissue injury correlates with infection and fracture healing

Grade	1	2	3A	3B	3C
Infection Rates	0-2%	2-7%	10-25%	10-50%	25-50%
Fracture Healing (weeks)	21-28	28-28	30-35	30-35	
Amputation Rate					50%

Goals of treatment

- 1. preserve life
- 2. preserve limb
- 3. preserve function

- Also….
  - Prevent infection
  - Fracture stabilization
  - Soft tissue coverage

Stages of care for open fractures

1	Initial assessment	ABC`s (according to ATLS: airways, breathing, circulation)
		Emergency room management
		Wound dressing and fracture splinting
2	Primary operations	Staged wound debridement
		Fracture stabilization
3	Secondary operations	Skin and soft-tissue reconstruction
		Bone reconstruction
4	Rehabilitation	

help


AMBULANCE
AMBULANCE
wikiHow to Treat an Open Fracture During First Aid


wikiHow to Treat an Open Fracture During First Aid

Nocosomial infection?!!!!

- Only 1[illegible]% [illegible] by the same [illegible] per[illegible]
- [illegible] by [illegible] bac[illegible] [illegible] hospi[illegible]

Cover the wounds quickly

*Patzakis MJ, Wilkins J, Moore TM: Considerations in reducing the infection rate in open tibial fractures. Clin Orthop Relat Res. 1983 Sep;(178):36-41.
*Patzakis MJ, Bains RS, Lee J, Shepherd L, Singer G, Ressler R, Harvey F, Holtom P: Prospective, randomized, double-blind study comparing single antibiotic therapy, ciprofloxacin, to combo antibiotic therapy in open fracture wounds. *J Orthop Trauma.* 2000 Nov;14(8):529-33.
**Carsenti-Etesse H, Doyon F, Desplaces N, Gagey O, Tancrede C, Pradier C, Dunais B, Dellamonica P. Epidemiology of bacterial infection during management of open leg fractures. *Eur J Clin Microbiol Infect Dis*. 1999;18:315-23.

Bleeding control

Dressing &Splint


wikiHow to Treat an Open Fracture During First Aid

Antibiotic:

- Start abx as soon as possible*
  - Less than 3 hours → 4.7 % infection rate
  - Greater than 3 hours → 7.4%
- No difference btwn 1 and 5 days of post op abx treatment**
- Mass Gen recommended treatment:***
  - Cefazolin Q 8 until 24 hours after wound closed
  - Gentamicin or levofloxacin added for type 3

*Patzakis MJ, Wilkins J. Factors influencing infection rate in open fracture wounds. *Clin Orthop Relat Res.* 1989;243:36-40.
**Dellinger EP, Caplan ES, Weaver LD, Wertz MJ, Brumback R, Burgess A, Poka A, Benirschke SK, Lennard S, Lou MA. Duration of preventive antibiotic administration for open extremity fractures. *Arch Surg.* 1988;123:333-9.
***Okike K, Bhattacharyya T: Trends in the management of open fractures. A critical analysis. *J Bone Joint Surg.* 2006 Dec;88(12):2739-48.

Antibiotic injection<1 h

Antibiotics - locally

Antibiotic	Infection Rate
IV Abx	12%
IV Abx + local aminoglycoside impregnated PMMA beads	3.7%

- Prevents secondary contamination by nocosomial pathogens
- Useful adjunct to systemic abx
- Potential for abx impregnated bone graft, bone graft substitute, and abx coated IMN

Ostermann PA, Seligson D, Henry SL: Local antibiotic therapy for severe open fractures. A review of 1085 consecutive cases; *J Bone Joint Surg Br*. 1995 Jan;77(1):93-7.

Antibiotic Beads

- Pros
  - Very high levels of antibiotics locally
  - Dead space management

- Cons
  - Requires removal
  - Limited to heat stable antibiotics
  - Increased drainage from wound

BOX 4-3 PROCEDURES INVOLVED IN THE TREATMENT OF OPEN FRACTURES

- **Debridement**
  - Skin
  - Fat and fascia
  - Muscle
  - Bone
- **Wound closure**
- **Antibiotics**
  - Intravenous
  - Bead pouch technique
- **Fracture stabilization**
- **Secondary debridement**
- **Soft tissue cover**

Initial assessment & management

- ABC's
- Assess entire patient
- Careful PE, neurovasc
- Abx and tetanus
- Local irrigation 1-2 liters

Lee J. Efficacy of cultures in the management of open fractures. *Clin Orthop Relat Res*. 1997;339:71-5.

Initial assessment & management in ED

- Sterile compressive dressings
- Realign fracture and splint
- Do not culture wound in the ED*
  - 8% of bugs grown caused deep infection
  - cultures were of no value and not to be done
- Recheck pulse, motor and sensation

Lee J. Efficacy of cultures in the management of open fractures. *Clin Orthop Relat Res*. 1997;339:71-5.

I&D in the OR

- Trauma scrub
  - Soap and saline to remove gross debris
- “Zone of injury”
  - Skin wound is the window through which the true wound communicates with the exterior
- Extend the traumatic wound
  - Excise margins
  - Resect muscle and skin to healthy tissue
    - color, consistency, capacity to bleed and contractility

I&D in the OR

- Bone ends are exposed and debrided
- Irrigate
- Serial debridements?
  - If needed, 2nd or 3rd debridement after 24-48 hours should be planned

The Irrigation

- Amount
  - No good data, copious is better
  - Animal studies show improved removal of particulate matter and bacteria but effect plateaus
  - Irrigation bags typically contain 3 L of fluid
  - Anglen recommends:*
    - 3L (one bag) for type 1
    - 6L (two bags) for type 2
    - 9L (three bags) for type 3

*Anglen JO. "Wound Irrigation in Musculoskeletal Injury." *JAAOS* 2001. 9: 219-226.

How to deliver the irrigation? (what animal studies show)

- Bulb Syringe vs Pulsatile Lavage
  - Pulsatile lavage
    - Detrimental for early bone healing
      - this is no longer present at 2 wks*
    - More soft tissue destruction**
    - More effective in removing particulate matter and bacteria***

*Dirschl DR, Duff GP, Dahners LE, Edin M, Rahn BA, Miclau T. "High Pressure Pulsatile Lavage Irrigation of Intraarticular Fractures: Effects on Fracture Healing." *JOT* 1998. 12(7): 460-463.

**Boyd JI, Wongworawat MD. "High-Pressure Pulsatile Lavage Causes Soft Tissue Damage." *CORR* 2004. 427: 13-17

***Bhandari M, Schemitsch EH, Adili A, Lachowski RJ, Shaughnessy SG. "High and Low Pressure Pulsatile Lavage of Contaminated Tibial Fractures: An in vitro Study of Bacterial Adherence and Bone Damage." *JOT* 1999. 13: 526-533.

How to deliver the irrigation? (what animal studies show)

- High or low pressure?
  - Higher pressure
    - Better bone cleaning
    - Worse soft tissue cleaning
    - Slows bone healing

*Dirschl DR, Duff GP, Dahners LE, Edin M, Rahn BA, Miclau T. "High Pressure Pulsatile Lavage Irrigation of Intraarticular Fractures: Effects on Fracture Healing." *JOT* 1998. 12(7): 460-463.
**Boyd JI, Wongworawat MD. "High-Pressure Pulsatile Lavage Causes Soft Tissue Damage." *CORR* 2004. 427: 13-17
***Bhandari M, Schemitsch EH, Adili A, Lachowski RJ, Shaughnessy SG. "High and Low Pressure Pulsatile Lavage of Contaminated Tibial Fractures: An in vitro Study of Bacterial Adherence and Bone Damage." *JOT* 1999. 13: 526-533.

Dressings

- Temporary closures – rubber bands
- Wet to dry dressings
- Semi-permeable membranes
- Antibiotic bead pouch
- VAC

VAC

- Vacuum assisted wound closure
  - Recommended for temporary management
  - Mechanically induced negative pressure in a closed system
  - Removes fluid from extravascular space
  - Reduced edema
  - Improves microcirculation
  - Enhances proliferation of reparative granulation tissue
- Open cell polyurethane foam dressing ensures an even distribution of negative pressure

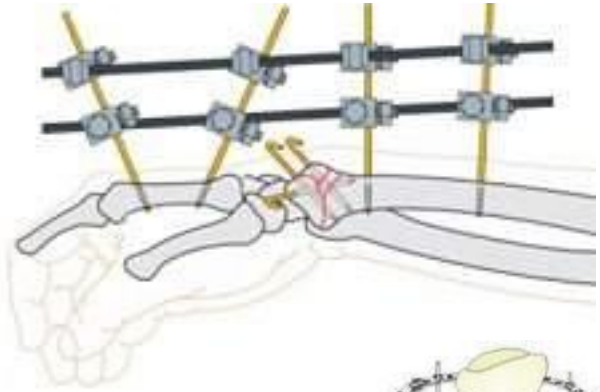
-Webb LX: New techniques in wound management: vacuum-assisted wound closure. *J Am Acad Orthop Surg*. 2002 Sep-Oct;10(5):303-11.
-Dedmond BT, Kortesis B, Punger K, Simpson J, Argenta A, Kulp B, Morykwas M, Webb L. "The use of Negative Pressure Wound Therapy in the Temporary Treatment of Soft Tissue Injuries associated with High Energy Open Tibial Shaft Fractures." *JOT*. 2007

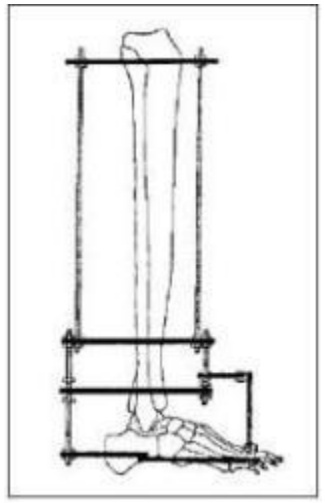
Types of fracture stabilization

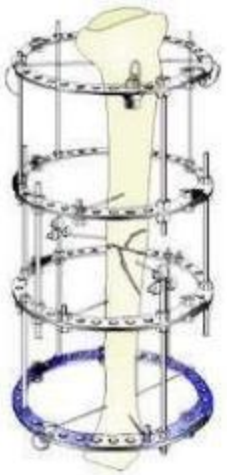
- Splint
  - Good option if operative fixation not required
- Internal fixation
  - Wound is clean and soft tissue coverage available
- External fixation
  - Dirty wounds or extensive soft tissue injury

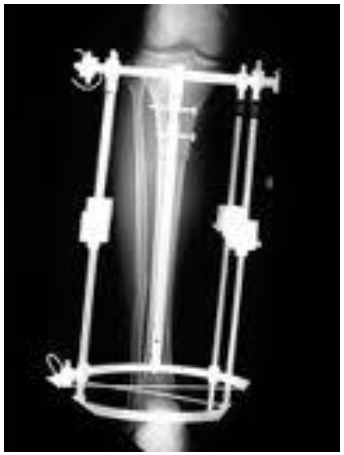
When to use external fixation?

- Diaphyseal fractures not amenable to IM nails
- Ring fixators for periarticular fractures
- Temporary joint spanning ex fix is popular for knee, ankle, elbow and wrist
- If temporary, plan for conversion to IM nail within 3 weeks









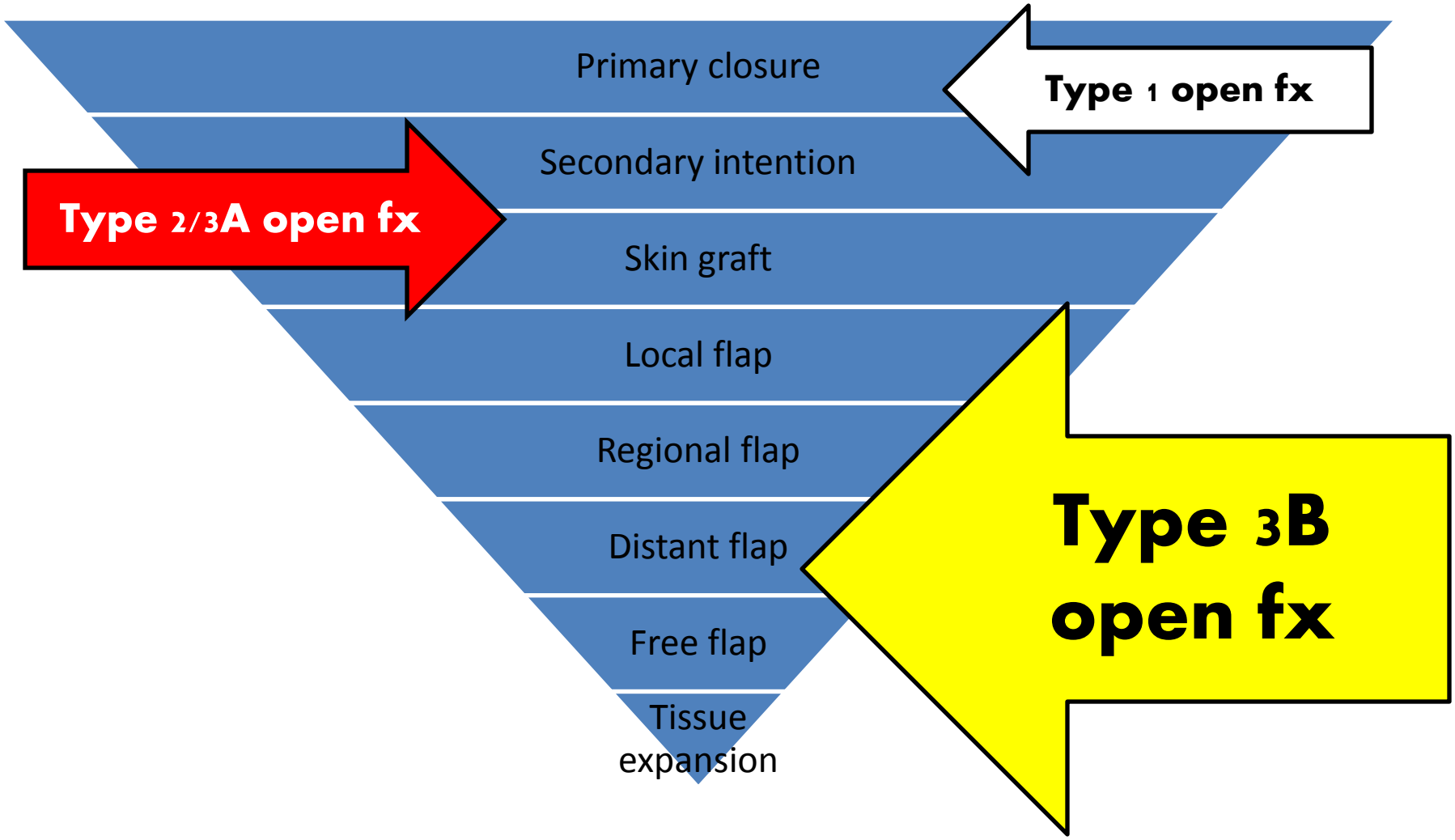
Skin cover and soft tissue reconstruction

- Do these early!
- 19

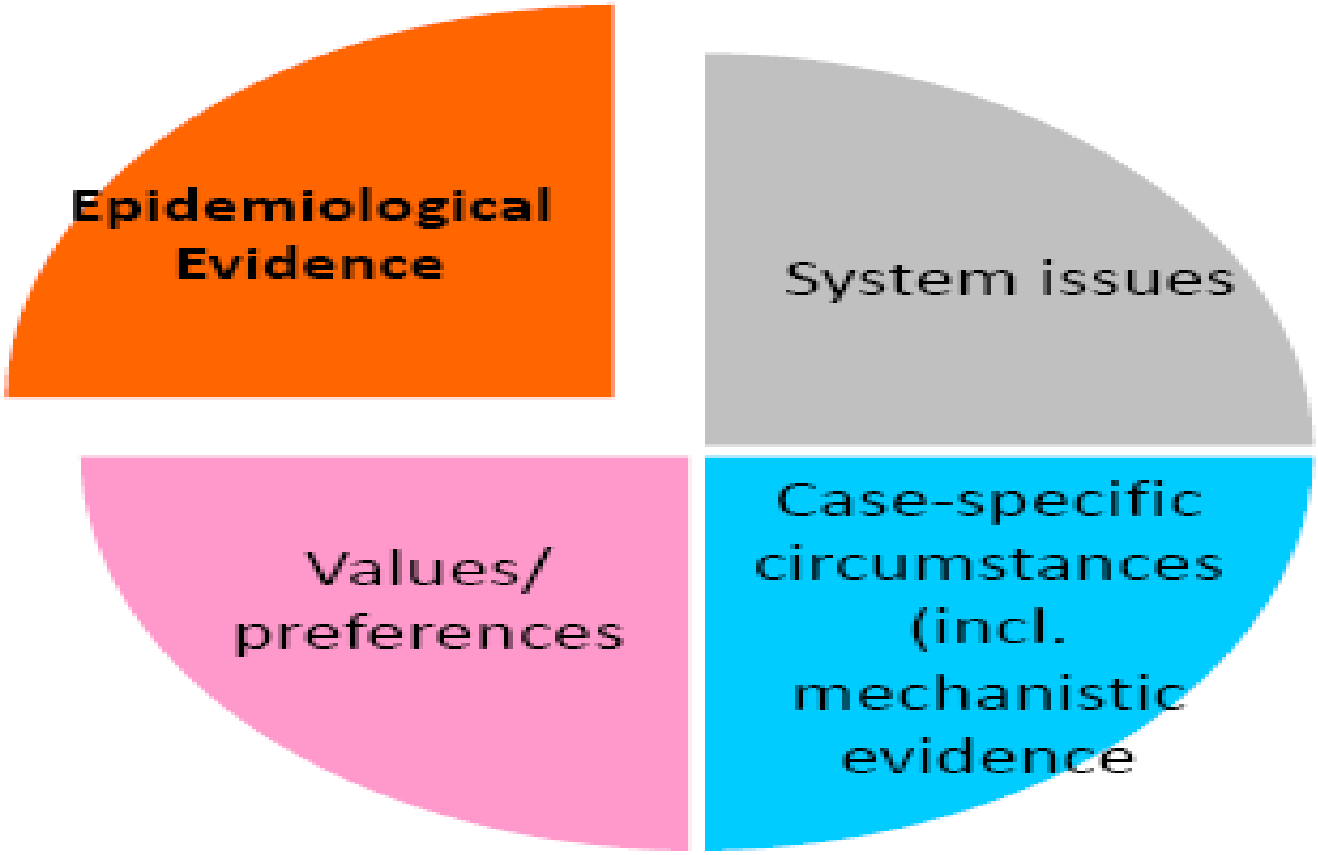
Infection risk increases if wound open > 7 days

*Ostermann PA, Seligson D, Henry SL: Local antibiotic therapy for severe open fractures: A review of 1085 consecutive cases. *J Bone Joint Surg Br* 1995;77:93–97.

Reconstructive ladder: options for wound coverage



advances:


Epidemiological Evidence
System issues
Values/ preferences
Case-specific circumstances (incl. mechanistic evidence

Advances…

- BMPs
  - 40% decreased infection rate with BMP in type 3 open tibia fractures*
- Antibiotic Laden Bone Graft**
  - Tobramycin-impregnated calcium sulfate pellets with demineralized bone matrix
  - Animal study: successful in preventing infection

*BESTT Study Group, Govender S, Csimma C, Genant H, Valentin-Opran A. "Recombinant Human Bone Morphogenetic Protein-2 for Treatment of Open Tibial Fractures: A prospective, controlled, randomized study of four hundred and fifty patients." *JBJS-A* 2002. 84(12): 2123-2134.

**Beardmore AA, Brooks DE, Wenke JC, Thomas DB. "Effectiveness of local antibiotic delivery with an osteoinductive and osteoconductive bone-graft substitute." *JBJS-A* 2005. 87(1): 107-112.

THANK’S FOR YOUR ATTENTION

Trauma surgery and Injury prevention

Tahami . MD

Assistant professor of orthopedics

Shiraz University of Medical Sciences

Purpose

- Define the injury
- Detail the impact of injury
- Identify control strategies
- Identify role of trauma surgery in injury prevention

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Definition

- *Injury:* Physical damage due to transfer of energy (kinetic, thermal, chemical, electrical, or radiant)
- Absence of oxygen or heat
- Over a period of time, “exposure” that is either acute or chronic

Epidemiologic Datas

- 59 million (1 in 4) Americans injured per year
- 36 million ED visits
- 2.6 million hospital discharges annually
- More than 145,000 deaths
- Estimate costs at $260 billion; acute care costs are 30% of total

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Disability, Outcomes

- Disability far exceeds death rate
- First, age 1 through 44
- "Years of life lost" (YLL) concept:
  - Life expectancy for young shortened by death from injury
  - Numbers comparable with YLL from heart disease and cancer
  - Most productive members of society!

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Epidemiologic Datas (Iran)

- 800000 RTA yearly
- 1/40 of RTA of the world
- Mortality Rate 30/100000 (highest in the region)
- 3rd cause of death in our country(59,231 deaths)
- 80 % male
- Highest age group 20-34 Y/O

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Economic burden

- 15 hospitalizations/death
- 70 outpatient visit /death
- 1st rank of YPLL (69,523,346)
- 2.7 billion US $ in 2009
- 2.19 % of Gross Domestic Production(GDP)

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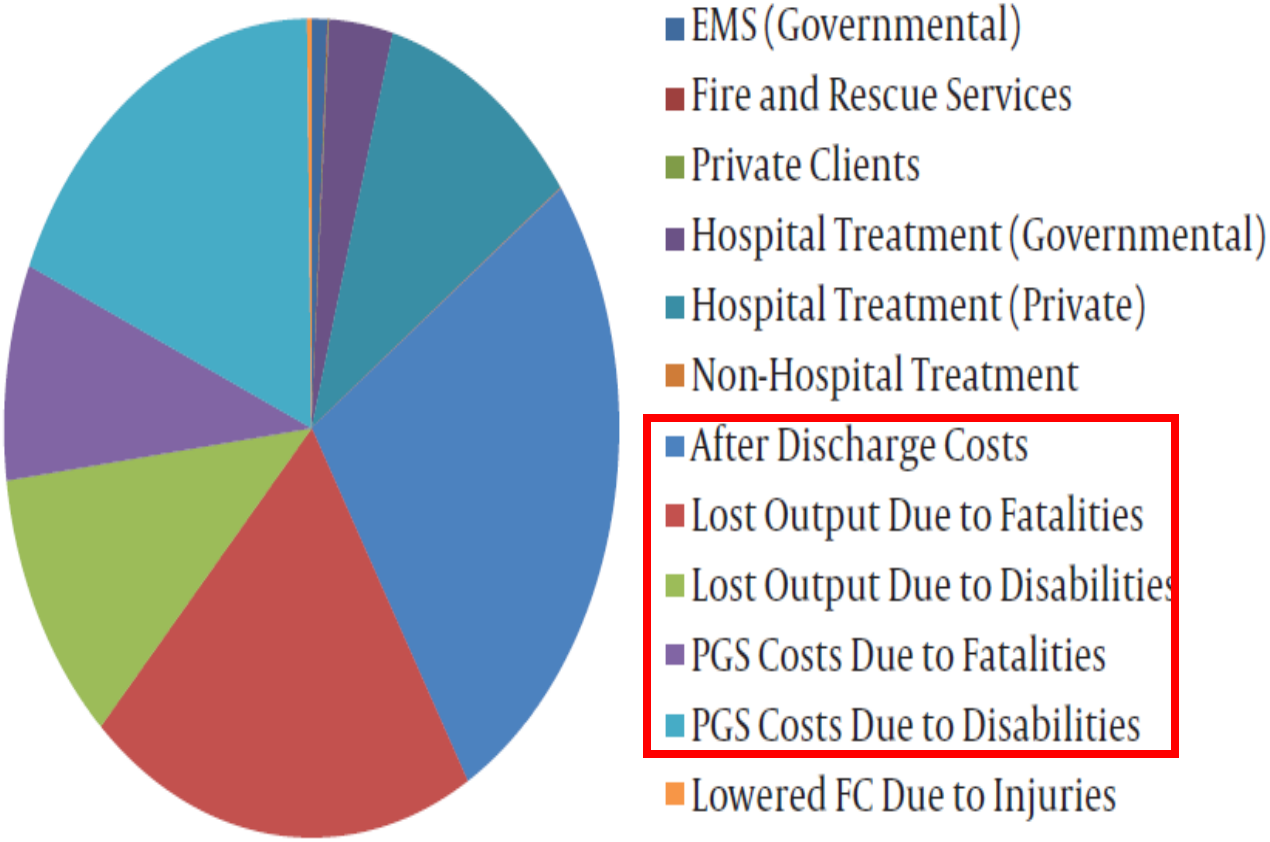
Trauma Mon. inpress(inpress):e35997. doi: 10.5812/traumamon.35997.

Published online 2016 August 10. Research Article

Medical Costs and Economic Burden Caused by Road Traffic Injuries in Iran

Hamid Reza Behnood,[1,*] Mashyaneh Haddadi,[2] Shadrokh Sirous,[3] Elaheh Ainy,[4] and Reza Rezaei[2]

[1]Department of Civil Engineering, Imam Khomeini International University, Qazvin, IR Iran
[2]Ministry of Health and Medical Education, Tehran, IR Iran
[3]World Health Organization Representative Office, Tehran, IR Iran
[4]Safety Promotion and Injury Prevention Research Center, Shahid Beheshti University of Medical Sciences, Tehran IR Iran



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Injury, Not Accident!

- *Accident:* An unexpected occurrence, happening by chance
- *Injury:* A definable, correctable event, with specific risks for occurrence
- *A result of risk poorly managed*
- “Disease of injury” concept
- Injury can be prevented!

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Prevention control levels:

- **Primary prevention** : Modifying variables that leads to an insult , Eliminate the event
- **Secondary prevention** :Treatment and decreasing complication, Diminish effect
- **Tertiary prevention:** Rehabilitation and resolving of sequelae, Improve outcomes

General Principles

The **4 E's**:

- **E**ducation
  - bicycle and helmet safety programs
  - alcohol and drug awareness programs for high school students
- **E**nactment/Enforcement
  - Seat belt or car seat laws
- **E**ngineering
  - better-designed helmets and better occupant restraints in vehicles
- **E**conomic incentives and penalties

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Public Health Approach

- Surveillance: What is the problem?
- Risk identification: What is the cause?
- Intervention: What works?
- Implementation: How do you do it?
- Outcome measurement: Did it work?

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Effective Programs

- Community-based, multidisciplinary
- Public information and education
- Accurate, population-based data
- Unique, “homegrown” solutions
- Evaluation and measurement of effectiveness are essential!

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Trauma care system

- Definition: an organized and coordinated effort in a defined geographic area to deliver the full spectrum of care to an injured patient

- Prehospital(scene of injury and transportation)
- Acute care
- Rehabilitation services

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Trauma system components:

- Medical direction
- Prevention
- Communication
- Training
- Triage
- Prehospital care
- Transportation
- Hospital care,
- Public education,
- Rehabilitation,
- Medical evaluation

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Why to be involved in prevention programs?

- Have unique and direct experience
  - Problem identification
- Knowledge of the consequences of injury
  - Data collection
- Professional obligation
- Able to run researches and measure outcomes or protocols evaluation
  - Involvement in the intervention design process and selection of the action plan

Improve health and safety and to control health care

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1079-6061/00/4801-0025
The Journal of Trauma: Injury, Infection, and Critical Care

Vol. 48, No. 1
Printed in the U.S.A.

Effectiveness of State Trauma Systems in Reducing Injury-Related Mortality: A National Evaluation

Avery B. Nathens, MD, PhD, Gregory J. Jurkovich, MD, Frederick P. Rivara, MD, MPH, and Ronald V. Maier, MD

- Reduction in the risk of death caused by injury.
- Most evident on analysis of MVC deaths.
- Critically ill patients are cared for by those most experienced in all phases of trauma care.

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A commentary by James P. Stannard, MD, is linked to the online version of this article at jbjs.org.

The Impact of Trauma-Center Care on Mortality and Function Following Pelvic Ring and Acetabular Injuries

Saam Morshed, MD, PhD, MPH, Simon Knops, MD, Gregory J. Jurkovich, MD, Jin Wang, PhD, Ellen MacKenzie, PhD, and Frederick P. Rivara, MD, MPH

- Decreased mortality compared to non-trauma centers
- Better function in severely injured patients

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The Effect of Trauma Center Designation and Trauma Volume on Outcome in Specific Severe Injuries

Demetrios Demetriades, MD, PhD, Mathew Martin, MD, Ali Salim, MD, Peter Rhee, MD, Carlos Brown, MD, and Linda Chan, PhD

Annals of Surgery • Volume 242, Number 4, October 2005

- Decreases mortality and morbidity in specific injuries

So what do we need now?

- Integrated system
- Physicians
- Technicians
- Managers
- Injury knowledge
- Open for feedback
- Scientific approach
- Commitment of change

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ORIGINAL ARTICLE

Injury prevention education in medical schools: an international survey of medical students

A Villaveces, J A Kammeyer, H Bencevic

Injury Prevention 2005;**11**:343–347. doi: 10.1136/ip.2005.009118

- **Basic injury prevention concepts** including risk factors for injuries were not covered in **60%** of medical schools.
- Injury prevention and control concepts were less frequently taught in **Middle Eastern and African universities**

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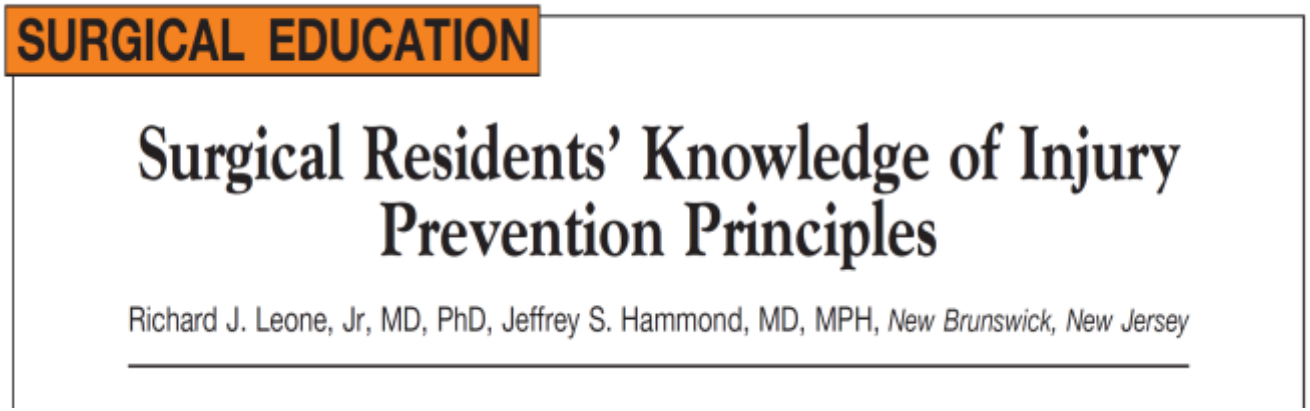
SURGICAL EDUCATION

Surgical Residents' Knowledge of Injury Prevention Principles

Richard J. Leone, Jr, MD, PhD, Jeffrey S. Hammond, MD, MPH, *New Brunswick, New Jersey*

Am J Surg 2000

- Domestic violence (60%), risk of burns (65%), and incidence of trauma deaths (82%)

- Injury prevention theory questions, components of the Injury Prevention Triangle (5%), definition of YPLL (2%), and annual cost related to injury (19%)

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Leadership in Injury prevention

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Summary

- Mortality and morbidity rates of in jury in our country are high
- Trauma centers can decrease the complications related to injuries
- Trauma surgeons must be involved more in prevention planning
- Prevention injury concept must be taught in medical schools
- The thing that we need is Prevention **Attitude**

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K N O W L E D G E

11+14+15+23+12+5+4+7+5 = 96 %

H A R D W O R K

8+1+18+4 23+15+18+11 = 98 %

A T T I T U D E

1+20+20+9+20+21+4+5 = 100 %

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GOLDEN HOUR RESCUE CHAIN

Ebrahimpur Adel MD

Head of Department OF orthopedics

Vice president of POTA

Sabbaghzadeh Irani Amir MD

Shahid Beheshti University of Medical Sciences

Taleghani Hospital

Tehran IRAN

FEBRUARY 2017

BMJ

World Health Organization

Introduction

Trauma

Leading cause of death and disability

(15 to 44 years)

Victims

Drivers

Cyclists

Pedestrians

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Each day on roads of world

Almost 3500 people die

30,000–50,000 severely injured

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Long-term Musculoskeletal Disabilities

Most because of injuries of

Extremities or ***Spine***

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Issues

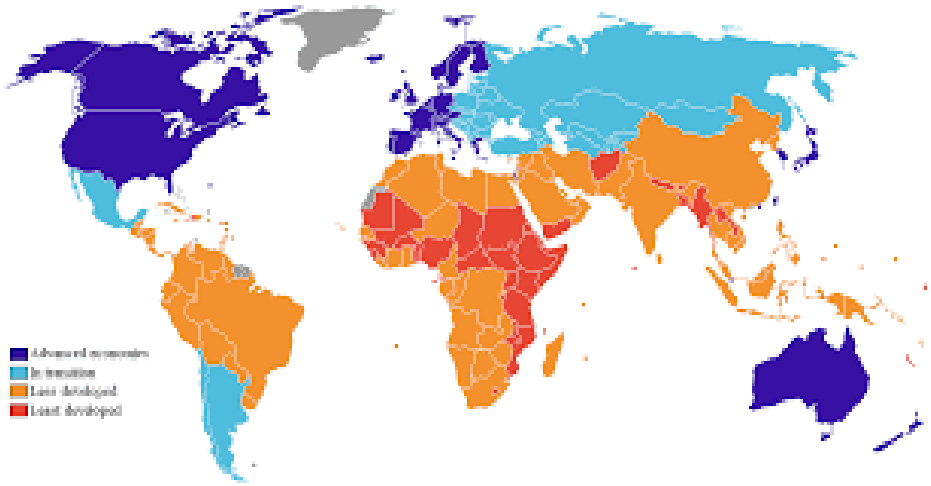
5.8 million deaths annually

90% in developing countries

Economically productive age-group

Major financial support for their families

Negative effects on return to work



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Issues

30 % of deaths at site

80 %of the remaining patients died

within an hour of injury

GOLDEN HOUR

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THE CONCEPT OF "GOLDEN HOUR"

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THE GOLDEN HOUR

Getting the **right patient**

to the **right place**

at the **right time**

Donald Trunkey

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Outcome & Survival Improves

When patient is transported to a designated **trauma centre** within **an hour** of injury

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How long it takes to move a patient to hospital???

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30-45 minute interval between the time of the crash and arrival at hospital

THE Golden Hour is Prehospital Event

Even for efficient emergency medical services

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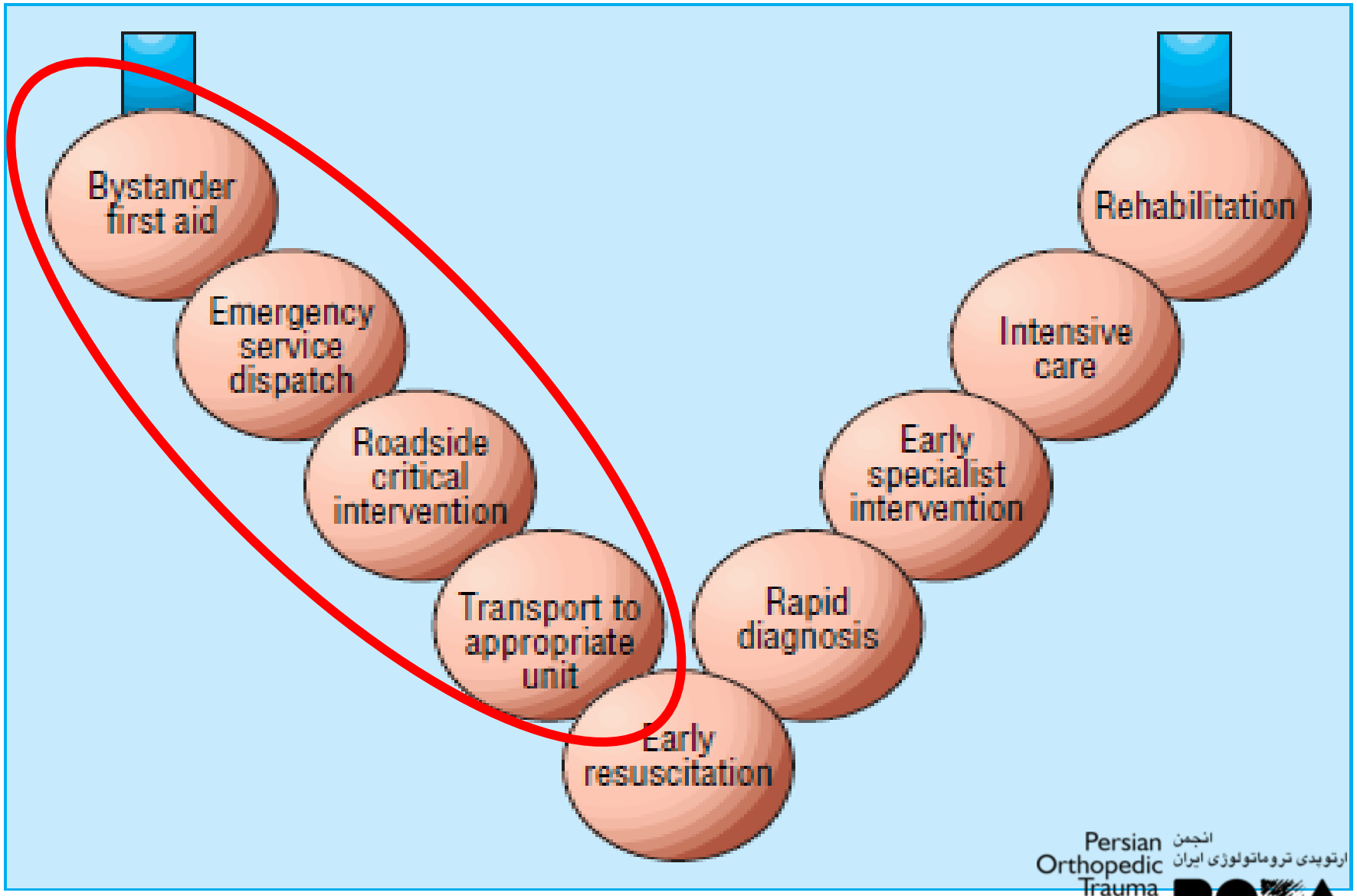
The way in which a trauma care system is organized influences **the number of deaths**

THE Prehospital phase should be viewed as the start of **Trauma Chain**

Trauma Chain



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WHO Road Safety Action Plan

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WHO Road Safety Action Plan

5 “pillars”

1. Road safety management
2. Safer roads and mobility
3. Safer vehicles
4. Safer drivers and other road users
5. Post crash response-concerning
   - crash-site care
   - transport
   - trauma care of injured

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a second is all it takes

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Objectives *Of Prehospital Emergency Care System*

1. **Prompt communication** and activation of the system

2. **Actions at the scene** of the crash by first responders

3. **Transportation** of the right patient to the right place at right time

The Pre-hospital Trauma Care Process

1. Detection
2. Reporting
3. Response
4. On-scene care
5. Care in transit
6. Transfer

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Bystander First Aid

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A road crash scene is initially uncontrolled and Chaotic

Own safety is the first priority

Telephone the emergency services

Precise location of the incident

The most important piece of information

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Step by Step

Move victims to a safe place

Jaw Thrust

ABC Principles

- Basic airway manoeuvres **Jaw Thrust**
- Control of haemorrhage by pressure

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Basic Life Support

- Airway
- Breathing
- Control bleeding
- Transportation of

The right patient to

The right place

At right time

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First Responder Care

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First Responder Care

- Motivated volunteers from community
- Fire-fighters
- Police
- Laypersons trained to provide initial first aid

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First Responder Care Responsibilities

- Getting **involved**
- **Call** for help
- Assessing the **safety** of the scene
- Assessing the **victim**
- Capable of appreciating seriousness of emergency and extent **Initial Care**

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Basic Prehospital Trauma Care

Members exposed to formal training

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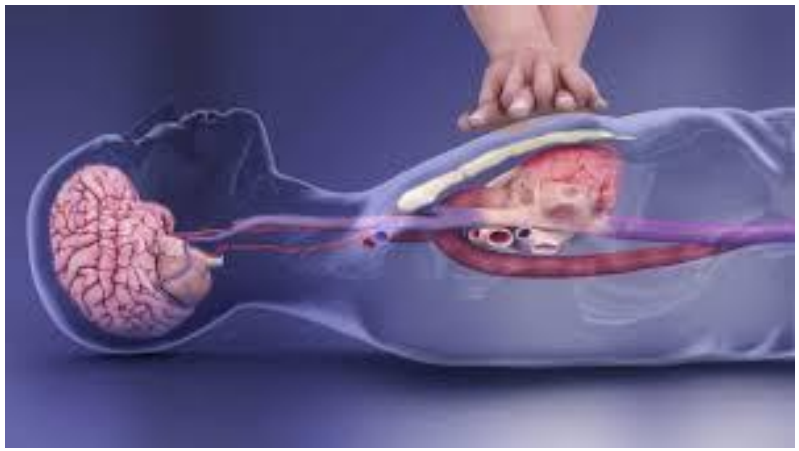
Responsibilities

Control of external **Haemorrhage**

Protection of **Spine**

Provision of

- Artificial **Respiration**
- **Circulatory** support
- **Oxygen therapy**
- **Extrication**



Advanced Prehospital Trauma Care

Highly skilled medical professionals

Paramedical staff

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Responsibilities

Endotracheal intubation

Highly invasive interventions

- Needle decompression
- Cricothyroidotomy

IV fluid therapy

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Coordination Of Physical And Medical Rescue

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Without Coordination

Slow

Frustrating

May be dangerous for both Patient & Rescuers

The Usual Pattern

Initial assessment by the medical team

who then move away

The extrication team makes space

removal of car roof and sides

The medical team can reassess

Transfer

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Patients should be “**packaged**” for transport

Hard cervical collar

Head blocks

Limb splints if required

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Appropriate Hospital for Definitive Care

- Specialties available at each of the local hospitals

- Can provide definitive care

Transport

- Small part of the total Prehospital time
- Monitoring and treatment need to continue
- Helicopter transport can be used to cover large distances

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THE GOAL

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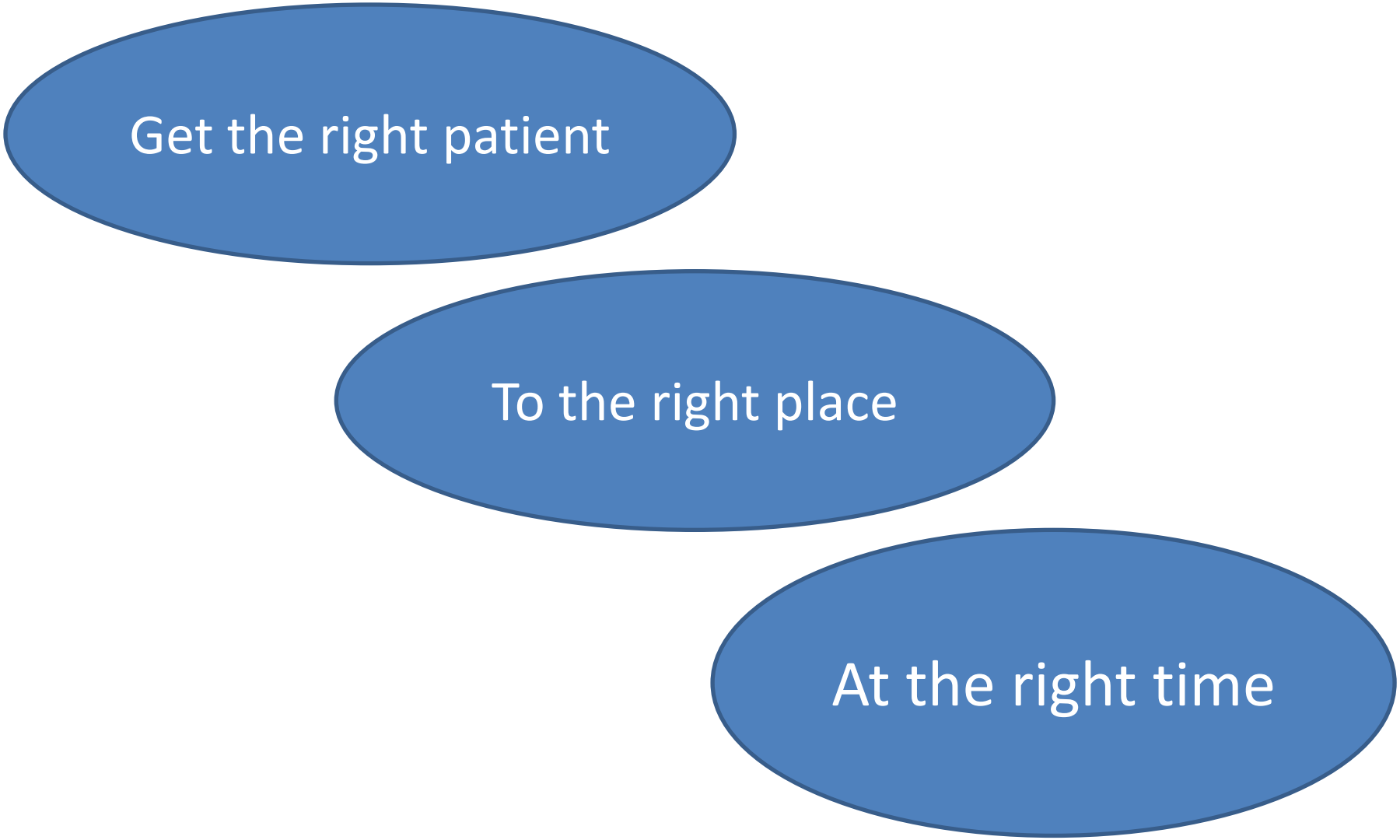

To receive the right care following trauma

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بیمارستان آتیه

Shahid Beheshti University of Medical Sciences

Impact of ATLS in Mortality Reduction

Prof. Kh Alizadeh

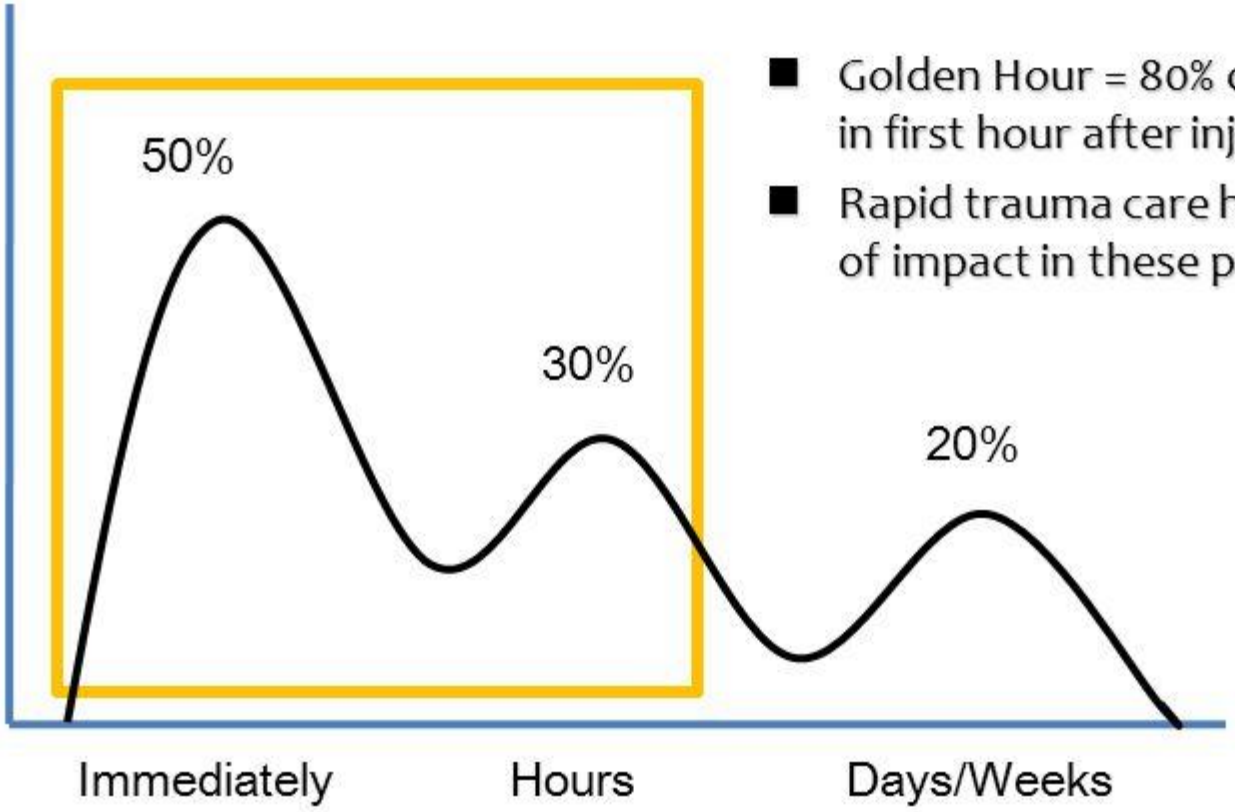
Atieh Hospital

Trimodal Trauma Mortality

- Reduce Immediate deaths with prevention
- Early ED Mx prevents early deaths-"Golden Hour"
  - ICH
  - Haemorrhagic shock
  - Haemo/Pneumothorax
- Late – sepsis/DVT/Pneumonia

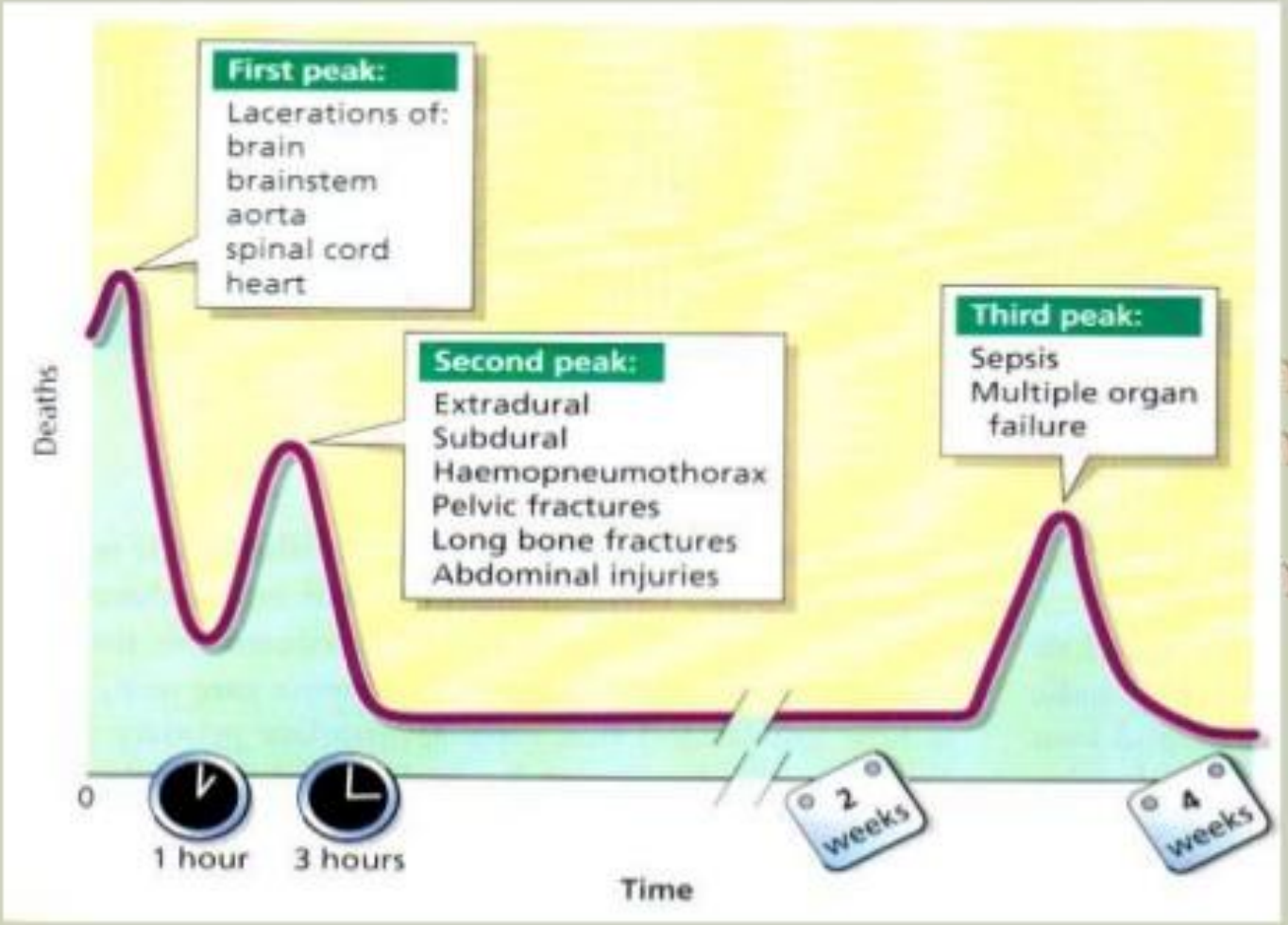
Epidemiology

Trimodal Distribution of Trauma Deaths



- Golden Hour = 80% of trauma deaths in first hour after injury
- Rapid trauma care has greatest level of impact in these patients

AIM OF MANAGEMENT



- Prevent death
- Mainly second peak of death
- GOLDEN HOUR!

ATLS™

ADVANCED TRAUMA LIFE SUPPORT

AMERICAN COLLEGE OF SURGEONS
FOUNDED IN 1913
OMNIBVS PER ARTEM
FIDEMQVE
PRODESSE

History of Trauma care Development

- Nebraska, 1976
- An Orthopedics pilot crashed his plane
- His wife died and 3 kids injured seriously
- Leading to develop of ATLS
- 1978, the first ATLS course was held
- 2011, ATLS Started in Iran.
- 2017, promulgated in more than 60 countries.

ATLS BACKGROUND

- **The ATLS Plane crash in 1976,**
- **The pilot, an orthopaedic surgeon named James Styner,**
- ***Seriously injured while his wife was killed and three of his children sustained critical injuries***

Första hjälpen

L –
Livsfarligt läge

A	B	C	D	E
AIRWAY	BREATHING	CIRCULATION	DISABILITY	EXPOSURE

Madeleine Hamarsha - VO13

NINTH EDITION

ADVANCED TRAUMA LIFE SUPPORT®

ATLS®

STUDENT COURSE MANUAL

AMERICAN COLLEGE OF SURGEONS
Inspiring Quality:
Highest Standards, Better Outcomes

ACS Committee on Trauma

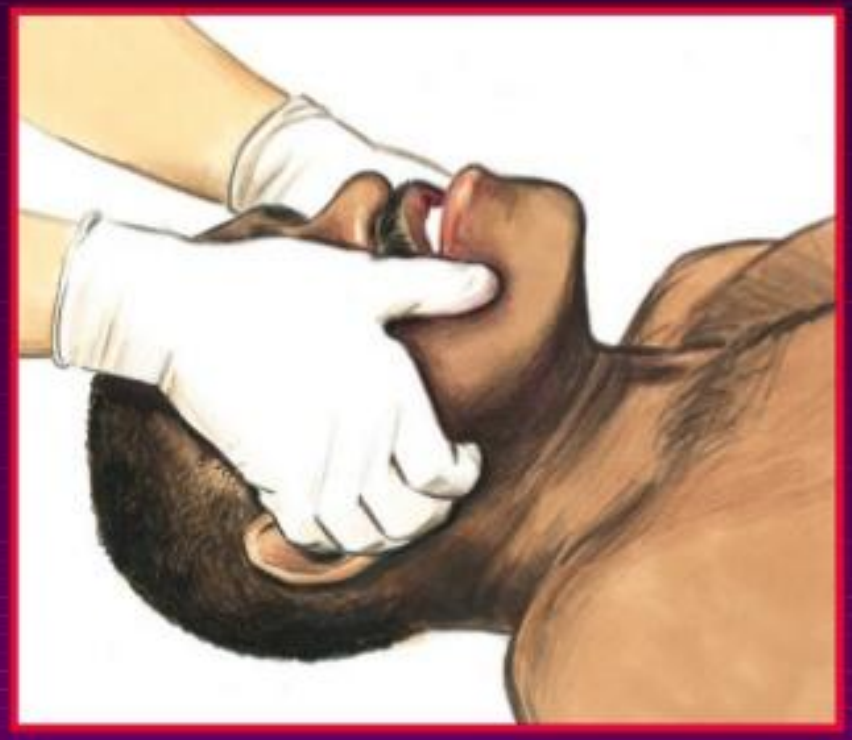
New to this Edition!
Mobile App

ATLS Skill Station

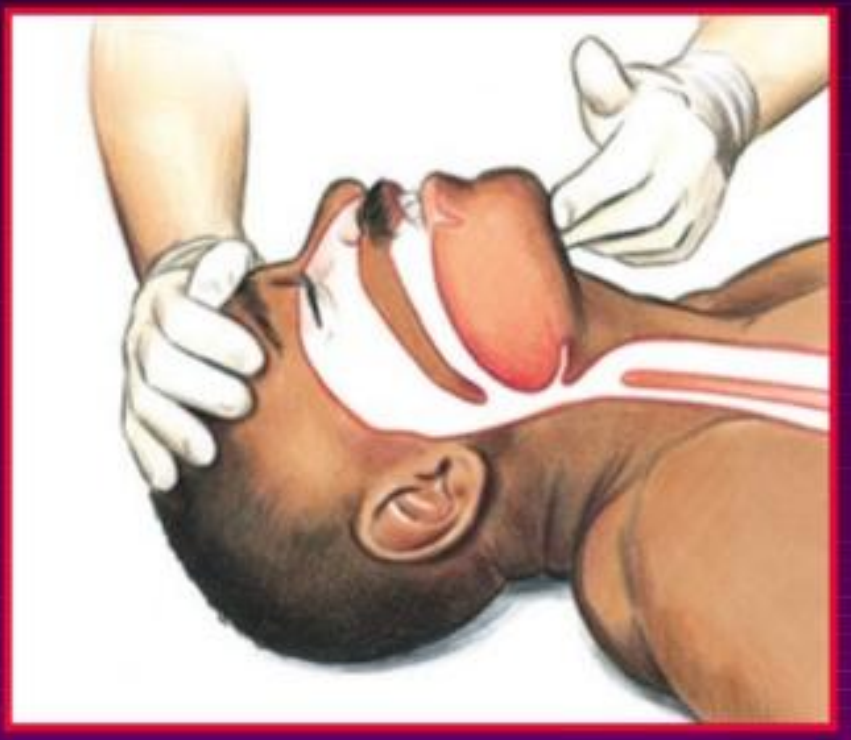
AIRWAY CONTROL

Opening the Airway

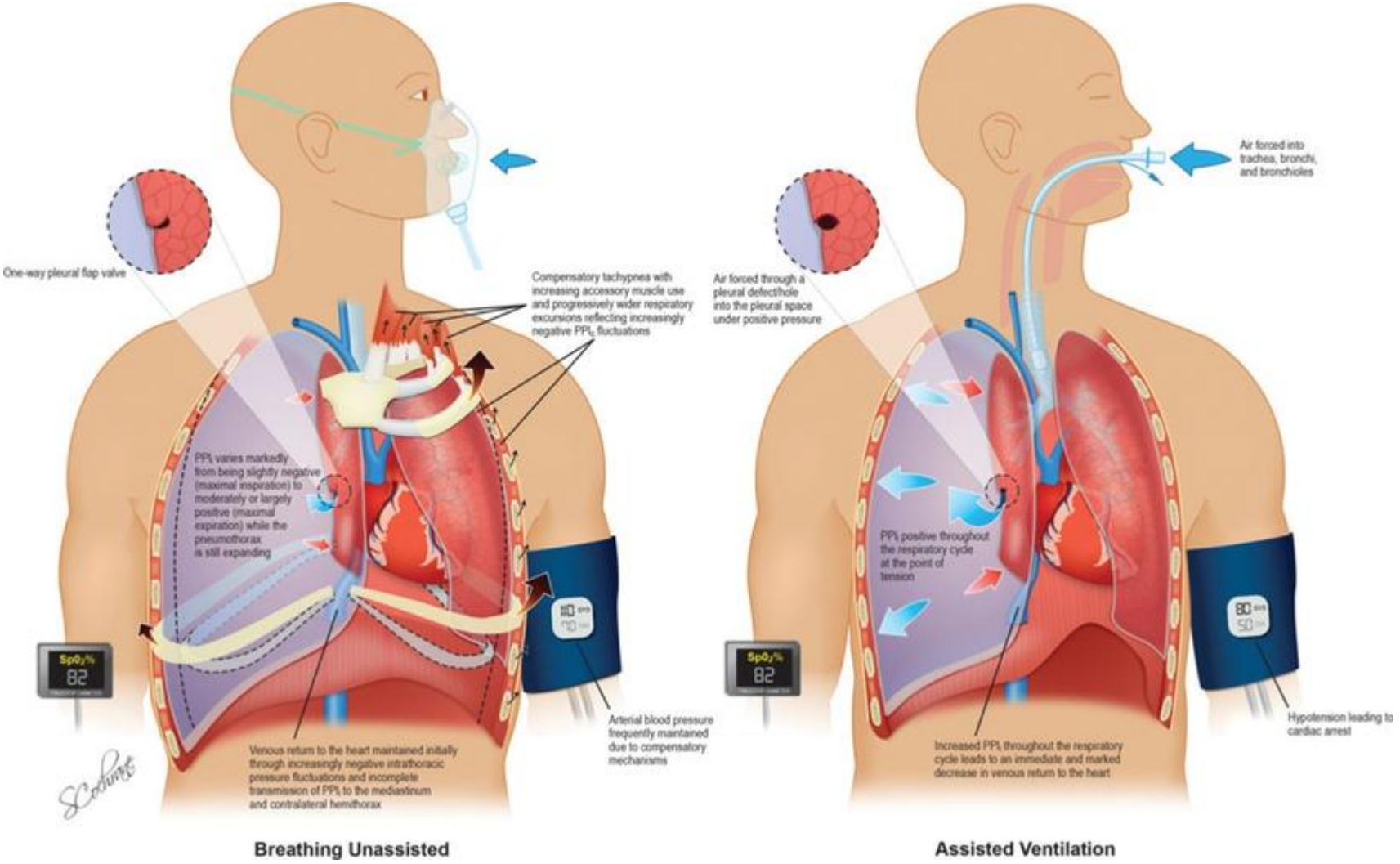
Jaw thrust



Head tilt–chin lift

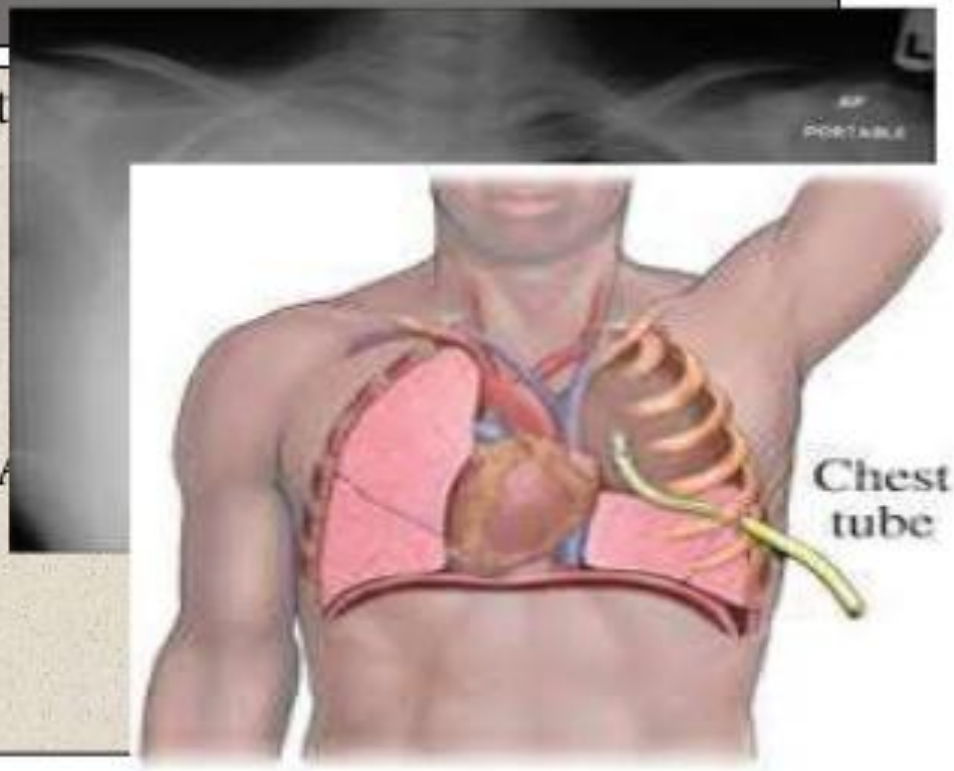


Breathing


One-way pleural flap valve
Compensatory tachypnea with increasing accessory muscle use and progressively wider respiratory excursions reflecting increasingly negative PP_L fluctuations
PP_L varies markedly from being slightly negative (maximal inspiration) to moderately or largely positive (maximal expiration) while the pneumothorax is still expanding
Venous return to the heart maintained initially through increasingly negative intrathoracic pressure fluctuations and incomplete transmission of PP_L to the mediastinum and contralateral hemithorax
Arterial blood pressure frequently maintained due to compensatory mechanisms
SpO_2% 82
Breathing Unassisted
Air forced into trachea, bronchi, and bronchioles
Air forced through a pleural defect/hole into the pleural space under positive pressure
PP_L positive throughout the respiratory cycle at the point of tension
Increased PP_L throughout the respiratory cycle leads to an immediate and marked decrease in venous return to the heart
Hypotension leading to cardiac arrest
SpO_2% 82
Assisted Ventilation

MASSIVE HEMOTHORAX

- Signs Similar To Tension Pneumot
  Percussion
- Shock
- T/T- Tube Thoracostomy
  - Thoracotomy In
    - >1500ml DRAIN IMMEDIA
    - >200ml/Hr FOR 4 HOURS
  - Contact CTVS Early.



ATLS Specifics

C – circulation (shock management)

STOP the BLEEDING

- External blood loss
- Internal blood loss

REPLACE blood loss

ATLS-SPINAL PROTECTION

Long Spinal Board

Exposure

Author unknown,
http://www.trauma.org/images/image_library/chest0044b.jpg

ESTABLISHMENT OF ATLS IN IRAN

Each year, road traffic crashes kill nearly 18,000 people in Iran, and injure or disable 300,000 more

The rate of road accidents in Iran is twenty times more than the world's average

Site Visit DEC.2010

UAE Courses

The Advanced Trauma Life Support® (ATLS®) Program is in more than 60 countries worldwide. Currently, more than half of all ATLS activity is conducted outside of the United States and Canada

The inaugural course

The inaugural course

Trauma outcome before and after establishment of ATLS in Trinidad and Tobago

- Pre ATLS period 1981-1985
- Post ATLS Period 1986-1990
- Conclusion:

Trauma mortality decreased post-ATLS (134 of 400 vs. 279 of 413) throughout the hospital, including the ICU (13.6% post-ATLS ICU mortality vs. 55.2% pre-ATLS).

PMID:

8315686 [PubMed - indexed for MEDLINE]

Educational and clinical impact of Advanced Trauma Life Support (ATLS) courses: a systematic review.

- A total of 384 articles were found in the search. Of these, 104 relevant articles were read; 23 met the selection criteria and were critically analyzed.
- Conclusio***n: It is highly recommended that ATLS courses should be taught for all doctors who are involved in the management of multiple trauma patients.***

  Ref: World J Surg. 2014 Feb;38(2):322-9
- **PMID**

8315686 [PubMed - indexed for MEDLINE]

Impact of ATLS Promulgation in IRAN

Objectives: To evaluate the effect of advance trauma life support (ATLS®) training on general surgery residents clinical reasoning skills using the national boards-style objective structured clinical examination (OSCE)

- Methods: Cross-sectional single-center study in University of Shiraz
- Results: The trauma section OSCE score was significantly higher in the ATLS® trained participants when compared to non-ATLS®(7.79 ± 0.81vs.6.90 ± 1.00; p=0.001).
- **CONCLUSION:**

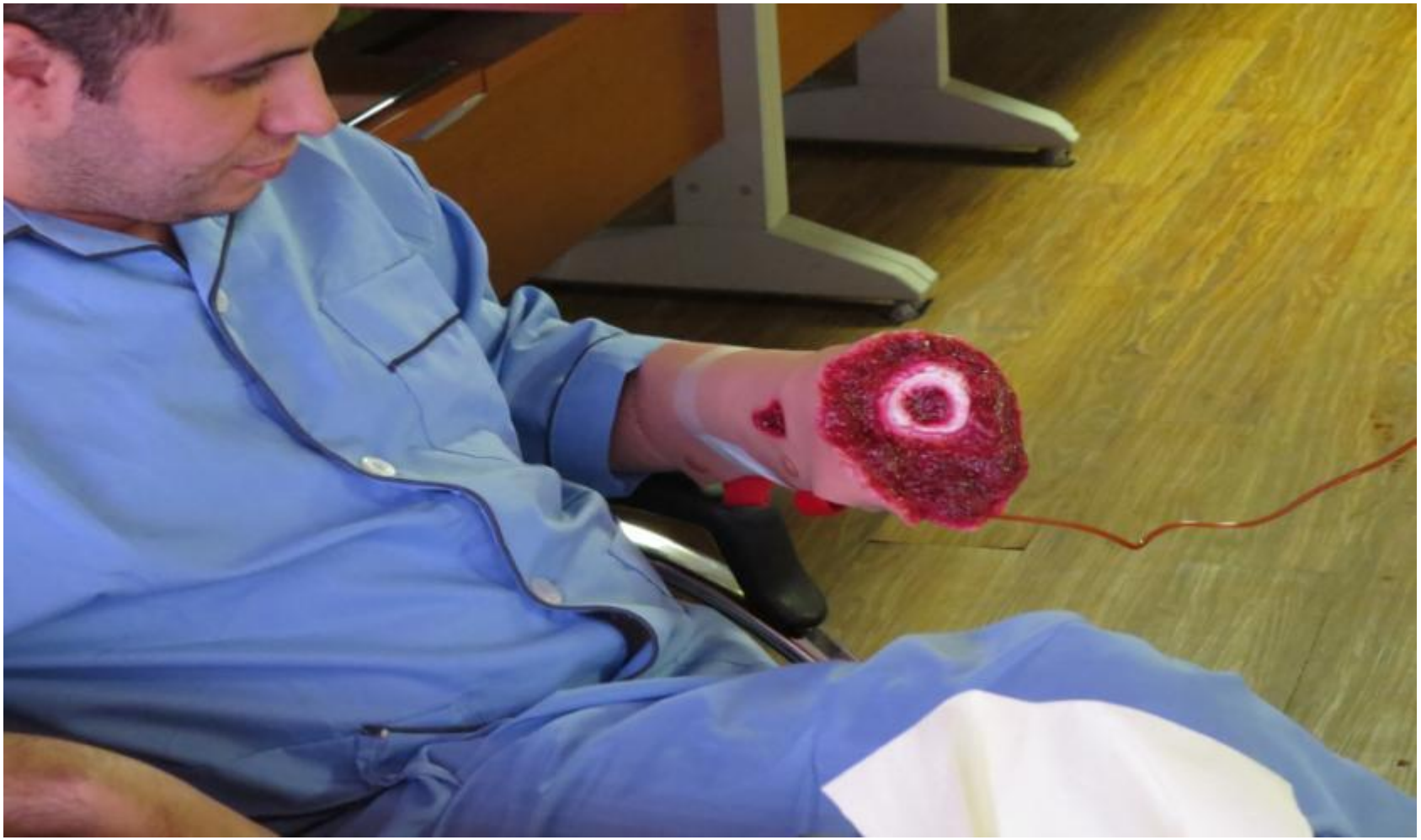
ATLS® training is associated with improved overall OSCE scores of general surgery residents completing the board examinations suggesting a positive transfer of ATLS learned skills to management of simulated surgical patients including trauma cases.

Promulgation of PHTLS Course in IRAN

September 2014

September 2014

PHTLS Course



September 2014

Rapid Extrication

September 2014

Immobilization

September 2014

Impact of PHTLS in Approach to multiple Trauma patients on scene BY EMS

Systematic Approach to Multiple Trauma involved in rolled over vehicles

Impact of PHTLS Course in Trauma Care in Trinidad and Tobago

- Pre PHTLS Period: 1991-1992
- Post PHTLS Period: 1994-1995
- Results: Mortality pre-PHTLS (15.7%) was greater than post-PHTLS (10.6%).
- Conclusion: Post-PHTLS mortality and morbidity were significantly decreased, suggesting a positive impact of the PHTLS program on trauma patient outcome.
- PMID: 9210534

Dear God , Today I Woke up ,I'm healthy I'm alive , I'm blessed , I'm apologize for all my complaining I'm truly grateful.


Thank You