6/15/2018

Sideline Emergency Management

Benjamin Oshlag, MD, CAQSM
Assistant Professor of Emergency Medicine
Assistant Professor of Sports Medicine
Columbia University Medical Center

NewYork-Presbyterian

Columbia University
Department of Orthopedic Surgery
College of Physicians & Surgeons

Disclosures

Nothing to disclose

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Goals

Review important sideline emergencies and initial management

Discuss differences in emergent vs urgent vs routine situations

Understand indications for emergent treatment, transport, or work-up

Learn what you can do to help on the field/sideline

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Case #1

27 year old male

Professional basketball player

No known medical history

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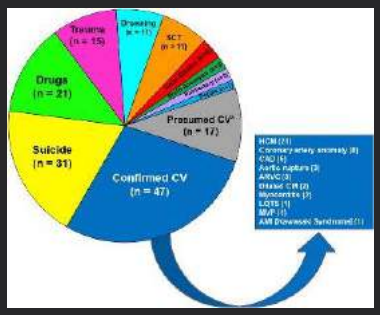
Sudden Cardiac Death

Incidence

- **Highest risk in black male college basketball athletes**
- **Causes**
  - HCM, ARV, anomalous coronary arteries
- **Importance of screening?**



Characteristic	Increased Risk Group	Decreased Risk Group
Overall	1 in 53,703 athlete-years[14]	
Gender	Males: 1 in 37,790	Females: 1 in 121,593
Race	Black: 1 in 21,491	White: 1 in 68,354 Hispanic: 1 in 56,254
Sports	Men's Basketball: 1 in 8,978 Men's Soccer: 1 in 23,689 Men's Football: 1 in 35,951	N/A

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What Went Wrong?

- **AED arrives at 22 seconds, left on floor, 4+ minutes prior to portable monitor application**
- **Prone, no attempt to roll over or assess ABCs**
- **No determination of cardiac arrythmia/arrest**
- **No CPR or defibrillation**
- **Taken off life support 2 days later**
- **Cause of death: sudden cardiac death**
- **Wrongful death suit filed by family this month:**

"Despite this undeniable dire situation, no life-saving measures were attempted, no CPR was initiated and no defibrillator was used."

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ACLS and BLS only work if they are used

ABCs

1. Check responsiveness
2. Check for breathing and pulse (5 to 10 seconds)
3. If no pulse, START CPR
4. Apply AED and follow commands

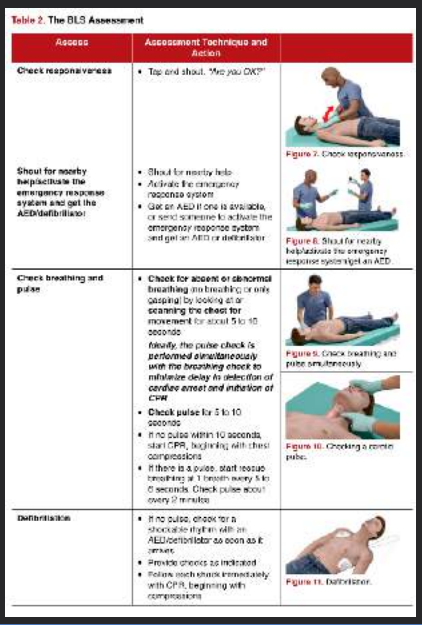
Table 2. The BLS Assessment

Assess	Assessment Technique and Action	
Check responsiveness	• Tap and shout, "Are you OK?"	Figure 7. Check responsiveness.
Shout for nearby help/activate the emergency response system and get the AED/defibrillator	• Shout for nearby help • Activate the emergency response system • Get an AED if one is available, or send someone to activate the emergency response system and get an AED or defibrillator	Figure 8. Shout for nearby help/activate the emergency response system/get an AED.
Check breathing and pulse	• Check for absent or abnormal breathing (no breathing or only gasping) by looking at or scanning the chest for movement for about 5 to 10 seconds *Ideally, the pulse check is performed simultaneously with the breathing check to minimize delay in detection of cardiac arrest and initiation of CPR* • Check pulse for 5 to 10 seconds • If no pulse within 10 seconds, start CPR, beginning with chest compressions • If there is a pulse, start rescue breathing at 1 breath every 5 to 6 seconds. Check pulse about every 2 minutes	Figure 9. Check breathing and pulse simultaneously. Figure 10. Checking a carotid pulse.
Defibrillation	• If no pulse, check for a shockable rhythm with an AED/defibrillator as soon as it arrives • Provide shocks as indicated • Follow each shock immediately with CPR, beginning with compressions	Figure 11. Defibrillation.

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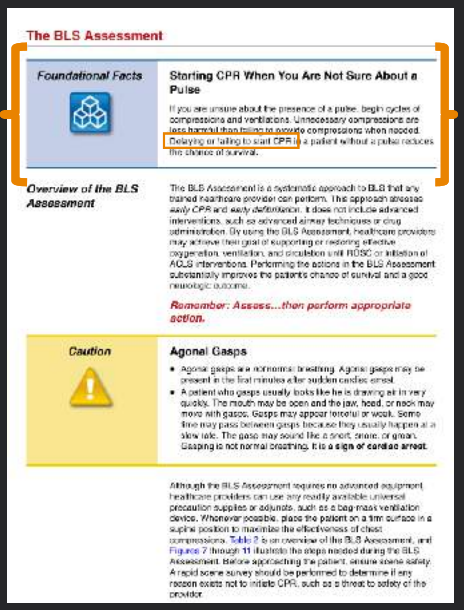
- Early CPR and early defibrillation save lives
- Compression-only CPR is a viable alternative until more significant intervention available
- When in doubt, unlikely to cause harm with CPR
- Skills and instincts fade without regular practice/simulation

DO SOMETHING!


The BLS Assessment

Foundational Facts

Starting CPR When You Are Not Sure About a Pulse

If you are unsure about the presence of a pulse, begin cycles of compressions and ventilations. Unnecessary compressions are less harmful than failing to provide compressions when needed. Delaying or failing to start CPR in a patient without a pulse reduces the chance of survival.

Overview of the BLS Assessment

The BLS Assessment is a systematic approach to BLS that any trained healthcare provider can perform. The approach stresses *early CPR* and *early defibrillation*. It does not include advanced interventions, such as advanced airway techniques or drug administration. By using the BLS Assessment, healthcare providers may achieve their goal of supporting or restoring effective oxygenation, ventilation, and circulation until ROSC or initiation of ACLS interventions. Performing the actions in the BLS Assessment substantially improves the patient's chance of survival and a good neurologic outcome.

Remember: Assess...then perform appropriate action.

Caution

Agonal Gasps

- Agonal gasps are a common breathing. Agonal gasps may be present in the first minutes after sudden cardiac arrest.
- A patient who gasps usually looks like he is drawing air in very quickly. The mouth may be open and the jaw, head, or neck may move with gasps. Gasps may appear forceful or weak. Some time may pass between gasps because they usually happen at a slow rate. The gasps may sound like a snort, snore, or groan. Gasping is not normal breathing. It is a **sign of cardiac arrest**.

Although the BLS Assessment requires no advanced equipment, healthcare providers can use any readily available universal precaution supplies or adjuncts, such as a bag-mask ventilation device. Whenever possible, place the patient on a firm surface in a supine position to maximize the effectiveness of chest compressions. Table 2 is an overview of the BLS Assessment, and Figures 7 through 11 illustrate the steps needed during the BLS Assessment. Before approaching the patient, ensure scene safety. A rapid scene survey should be performed to determine if any reason exists not to initiate CPR, such as a threat to safety of the provider.

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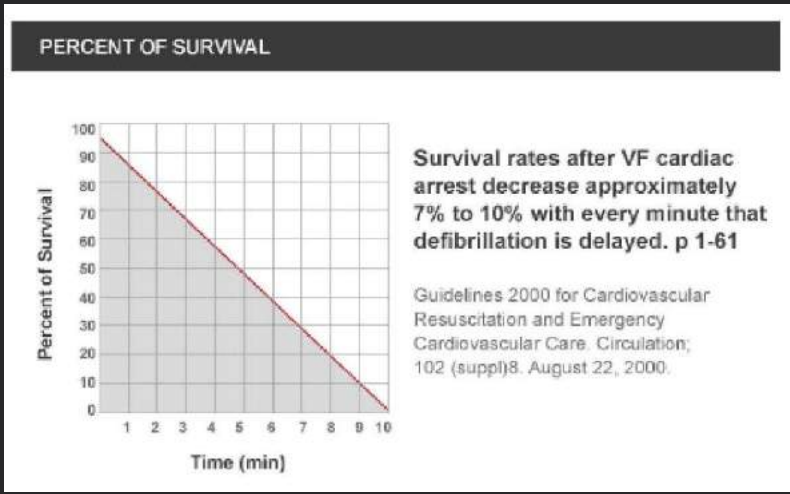
Early Defibrillation



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Early Defibrillation


The New England Journal of Medicine

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VOLUME 343 OCTOBER 26, 2000 NUMBER 17

OUTCOMES OF RAPID DEFIBRILLATION BY SECURITY OFFICERS AFTER CARDIAC ARREST IN CASINOS

TERENCE D. VALENZUELA, M.D., M.P.H., DENISE J. ROE, DR.P.H., GRAHAM NICHOL, M.D., M.P.H., LANI L. CLARK, B.S., DANIEL W. SPAITE, M.D., AND RICHARD G. HARDMAN, B.S.

ABSTRACT

Background The use of automated external defibrillators by persons other than paramedics and emergency medical technicians is advocated by the American Heart Association and other organizations. However, there are few data on the outcomes when the devices are used by nonmedical personnel for out-of-hospital cardiac arrest.

Methods We studied a prospective series of cases of sudden cardiac arrest in casinos. Casino security officers were instructed in the use of automated external defibrillators. The locations where the defibrillators were stored in the casinos were chosen to make possible a target interval of three minutes or less from collapse to the first defibrillation. Our protocol called for a defibrillation first (if feasible), followed by manual cardiopulmonary resuscitation. The primary outcome was survival to discharge from the hospital.

Results Automated external defibrillators were used in 105 patients whose initial cardiac rhythm was ventricular fibrillation. Fifty-six of the patients (53 percent) survived to discharge from the hospital. Among the 90 patients whose collapse was witnessed (86 percent), the clinically relevant time intervals were a mean (±SD) of 3.5±2.9 minutes from collapse to attachment

OUT-OF-HOSPITAL cardiac arrest is a major cause of death in the United States.[1,2] Studies of cardiac arrest in the nation's largest cities have shown dismal rates of survival to hospital discharge (less than 5 percent for cases of ventricular fibrillation in which the collapse is witnessed).[3,4] By contrast, some mid-sized urban areas with excellent emergency medical systems have achieved survival rates of 15 to 35 percent.[5,6] The majority of cases of out-of-hospital cardiac arrest arise from ventricular fibrillation.[7,8] Survival after out-of-hospital cardiac arrest due to ventricular fibrillation is determined primarily by the length of time from the onset of ventricular fibrillation to electrical defibrillation.[9] Therefore, early in the 1990s, the American Heart Association initiated a program to ensure public access to defibrillation and reduce the delay between collapse and electrical defibrillation.[10] The keys to reducing the interval from collapse to defibrillation are increasing the availability of automated external defibrillators and increasing the number of people trained to use them. We conducted a prospective, observational study of cardiac arrest in casinos to determine

Results Automated external defibrillators were used in 105 patients whose initial cardiac rhythm was ventricular fibrillation. Fifty-six of the patients (53 percent) survived to discharge from the hospital. Among the 90 patients whose collapse was witnessed (86 percent), the clinically relevant time intervals were a mean (±SD) of 3.5±2.9 minutes from collapse to attachment of the defibrillator, 4.4±2.9 minutes from collapse to the delivery of the first defibrillation shock, and 9.8±4.3 minutes from collapse to the arrival of the paramedics. The survival rate was 74 percent for those who received their first defibrillation no later than three minutes after a witnessed collapse and 49 percent for those who received their first defibrillation after more than three minutes.

Conclusions Rapid defibrillation by nonmedical personnel using an automated external defibrillator can improve survival after out-of-hospital cardiac arrest due to ventricular fibrillation. Intervals of no more than three minutes from collapse to defibrillation are necessary to achieve the highest survival rates. (N Engl J Med 2000;343:1206-9.)

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Bystander CPR

Contents lists available at ScienceDirect

American Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/ajem

Original Contribution

Timely bystander CPR improves outcomes despite longer EMS times

Gwan Jin Park [a], Kyoung Jun Song [a,*], Sang Do Shin [a], Kyung Won Lee [d], Ki Ok Ahn [b], Eui Jung Lee [a], Ki Jeong Hong [c], Young Sun Ro [b]

[a] Department of Emergency Medicine, Seoul National University College of Medicine and Hospital, Seoul, Republic of Korea
[b] Laboratory of Emergency Medical Services, Seoul National University Hospital Biomedical Research Institute, Seoul, Republic of Korea
[c] Department of Emergency Medicine, Seoul National University Bonmae Medical Center, Seoul, Republic of Korea
[d] Inje University Seoul Paik Hospital, Department of Emergency Medicine, Republic of Korea

ARTICLE INFO

Article history:
Received 1 December 2016
Received in revised form 14 February 2017
Accepted 15 February 2017

Keywords:
Cardiac arrest
Bystander cardiopulmonary resuscitation
Outcomes
Emergency medical services

ABSTRACT

Objectives: This study aimed to determine the impact of bystander CPR on clinical outcomes in patients with increasing response time from collapse to EMS response.
Methods: A population-based observational study was conducted in patients with witnessed out-of-hospital cardiac arrest (OHCA) of presumed cardiac etiology from 2012 to 2014. The time interval from collapse to CPR by EMS providers was categorized into quartile groups: fastest group (<4 min), fast group (4 to <8 min), late group (8 to <15 min), and latest group (15 to <30 min). The primary outcome was hospital discharge and the secondary outcome was survival with good neurological outcome. Multivariable logistic regression analysis was performed to evaluate the interaction between bystander CPR and the time interval from collapse to CPR by EMS providers.
Results: A total of 15,354 OHCAs were analyzed. Bystander CPR was performed in 8591 (56.0%). Survival to hospital discharge occurred in 1632 (10.6%) and favorable neurological outcome in 996 (6.5%). In an interaction model of bystander CPR, compared to the fastest group, adjusted odds ratios (AORs) (95% CIs) for survival to discharge were 0.89 (0.66–1.20) in the fast group, 0.76 (0.57–1.02) in the late group, and 0.52 (0.37–0.73) in the latest group. For favorable neurological outcome, AORs were 1.12 (0.77–1.62) in the fast group, 0.90 (0.62–1.30) in the late group, 0.59 (0.38–0.91) in the latest group.
Conclusion: The survival from OHCA decreases as the ambulance response time increases. The increase in mortality and worsening neurologic outcomes appear to be mitigated in those patients who receive bystander CPR.

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Cardiac Arrest

Summary:

EARLY DEFIBRILLATION AND EARLY CPR SAVE LIVES!

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Case #2

19 year old male

College baseball pitcher

No know past medical history

Struck in chest with batted ball, becomes unresponsive

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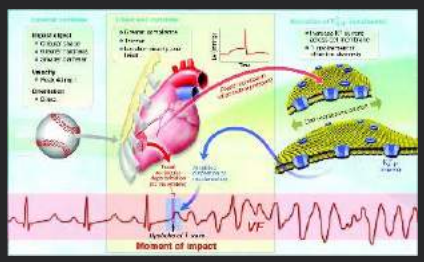
Commotio Cordis

Structurally normal heart

Arrhythmia induced by mechanical force (baseball, lacrosse ball, hockey puck)

- **Preventable?**
- **+/- Precordial thump?**



Clinical Profile and Spectrum of Commotio Cordis

Barry J. Maron, MD
Thomas E. Gohman, BA
Susan B. Kyle, PhD
N. A. Mark Estes III, MD
Mark S. Link, MD

SUDDEN AND UNEXPECTED DEATHS of young individuals are highly visible and emotionally charged events.[1,3] These deaths are frequently the consequence of unsuspected congenital cardiovascular diseases[3-6] in trained athletes. However, organized sports are subject to another risk for sudden death (ie, blunt, nonpenetrating, and usually innocent-appearing chest blows, *commotio cordis*).[7-12] However, the spectrum of commotio cordis is diverse, and the risks considerably more pervasive. In this study we characterize more completely the evolving and heterogeneous clinical profile of chest blows causing sudden death.

METHODS

Context Although blunt, nonpenetrating chest blows causing sudden cardiac death (commotio cordis) are often associated with competitive sports, dangers implicit in such blows can extend into many other life activities.

Objective To describe the comprehensive spectrum of commotio cordis events.

Design and Setting Analysis of confirmed cases from the general community assembled in the US Commotio Cordis Registry occurring up to September 1, 2001.

Main Outcome Measure Commotio cordis event.

Results Of 128 confirmed cases, 122 (95%) were in males and the mean (SD) age was 13.6 (8.2) years (median, 14 years; range, 3 months to 45 years); only 28 (22%) cases were aged 18 years or older. Commotio cordis events occurred most commonly during organized sporting events (79 [62%]), such as baseball, but 49 (38%) occurred as part of daily routine and recreational activities. Fatal blows were inflicted with a wide range of velocities but often occurred inadvertently and under circumstances not usually associated with risk for sudden death in informal settings near the home or playground. Twenty-two (28%) participants were wearing commercially available chest barriers, including 7 in whom the projectile made direct contact with protective padding (baseball catchers and lacrosse/hockey goalies), and 2 in whom the projectile was a baseball specifically designed to reduce risk. Only 21 (16%) individuals survived their event, with particularly prompt cardiopulmonary resuscitation/defibrillation (most commonly reversing ventricular fibrillation) the only identifiable factor associated with a favorable outcome.

Conclusions The expanded spectrum of commotio cordis illustrates the potential dangers implicit in striking the chest, regardless of the intent or force of the blow. These findings also suggest that the safety of young athletes will be enhanced by developing more effective preventive strategies (such as chest wall barriers) to achieve protection from ventricular fibrillation following precordial blows.

JAMA. 2002;287:1142-1146 www.jama.com

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Cardiac Arrest

Summary:

EARLY DEFIBRILLATION AND EARLY CPR SAVE LIVES!

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Case #3

48 year old male

Recreational triathlete

No know past medical history

Finished Half Ironman 2 hours prior to presentation

Comes to medical tent after vomiting, has nausea, weakness

Appears pale and sweaty

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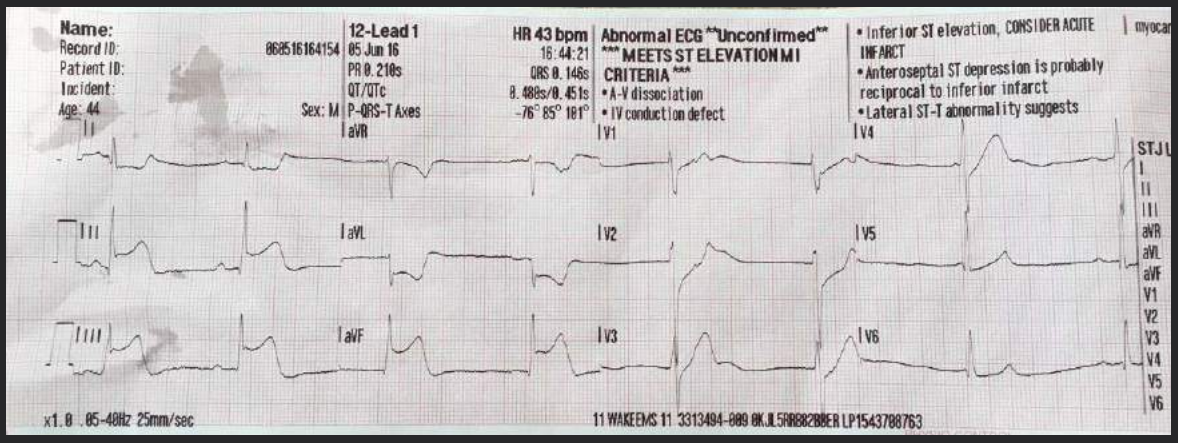
Case #2 EKG



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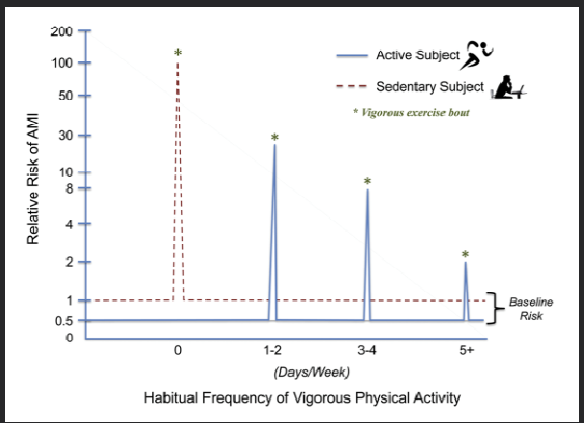
Acute Coronary Syndrome

Risk of death during exercise

Have suspicion even in healthy adults during and immediately after periods of intense exercise

ACS does not always cause chest pain: consider with unusual shortness of breath, nausea/vomiting, abdominal, back, or shoulder pain



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What Else Needs to go to the ER?

What does the Emergency Department provide?

- **Rapid assessment and evaluation for serious illness or injury**
- **Resuscitation and stabilization of unstable patients**
- **Access to specialists for emergent consultations and treatments**
- **Admission to the hospital**

Not all "Emergencies" are equal

ED Triage HW
Chief Complaint Pt states "I need my toenail clipped before I go to my program." Pt reports toenails are too long. States she also needs a cream for her itchy ankle

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What Else Needs to go to the ER?

- **Cardiac**
- **Respiratory**
- **Head, neck, and face injuries**
- **Abdominal trauma**
- **Extremity Injuries**
- **Environmental Illness/Injury**

5:30 Presenting complaint: Mother states: A double A (AA) battery from one of his toys is missing. We looked all over the house for it and cannot find it. He has been coughing for a few days and it seems like he has been coughing more since this morning when the battery vanished. Acuity: ESI 3.
5:39 Acuity: ESI 3

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Acute Respiratory/Airway Emergencies

A & B of ABCs

- **Upper Respiratory Issues**
  - Mouth
  - Throat
- **Lower Respiratory Issues**
  - Lungs
- **Traumatic vs. Medical**
  - Fractures and contusions
  - Allergic Reactions
  - Reactive Airway Disease

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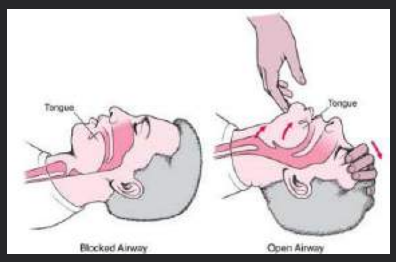
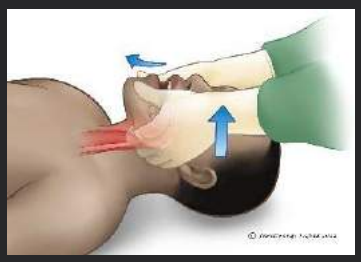
Emergency Airway Management

Keep it Simple

- **Oxygen into lungs**
- **Positioning**
  - Head Tilt/Chin Lift
  - Jaw Thrust
- **Oxygenation**
  - Supplemental O2
  - Bag-Valve-Mask





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Emergency Airway Management

Most important airway skill is being able to ventilate

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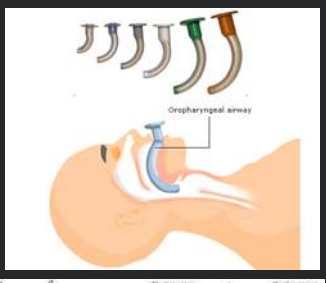
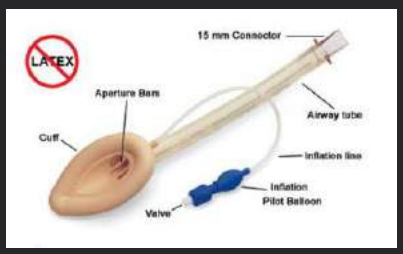
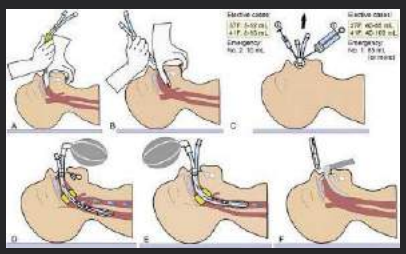
Emergency Airway Management

Airway Adjuncts

- **NPA**
- **OPA**
- **LMA**
- **Combitube**







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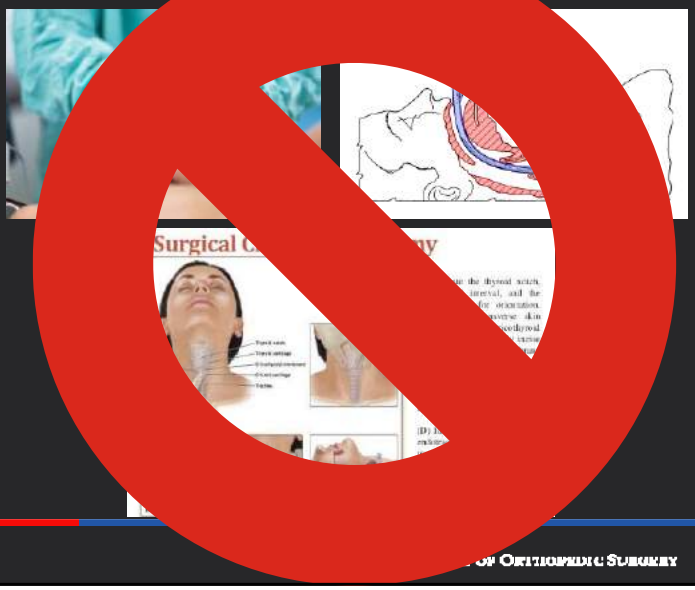
Emergency Airway Manage

Things not to do on the sideline

- **Endotracheal intubation**
- **Crichothyroidotomy**
- **MacGyver-y things with pocket knives, ballpoint pens, coffee straws, etc**



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What Else Needs to go to the ER?

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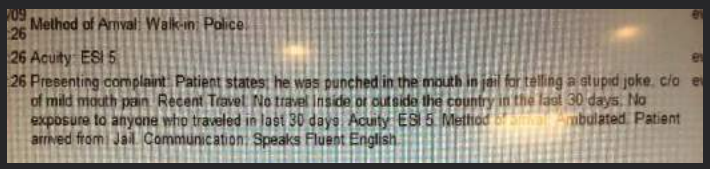

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Head and Neck Trauma

What are we worried about?

- Head
  - "Clinically important traumatic brain injury"
  - Canadian Head CT Rule, NEXUS II, New Orleans Criteria, PECARN
- Neck
  - "Clinically important cervical spine injury"
  - Canadian C-Spine Rule, NEXUS Criteria

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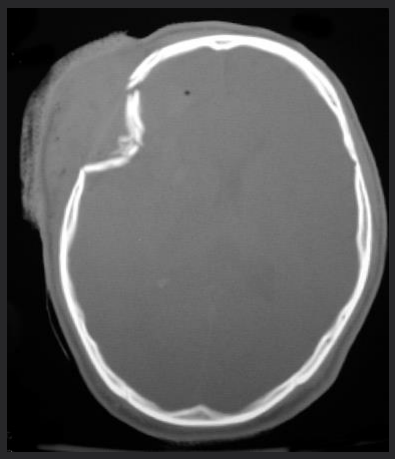
Head Injuries

- Rule out **badness**
  - CT scans sensitive for fractures, bleeds, herniation
  - Not much else
- Limited/no utility in CT if low suspicion for serious pathology
  - Must weigh risk/potential benefit
- Who do we need to worry about?
- Who do we NOT need to worry about?



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