

Trauma Panel: The New, the Old, and the Bloody

- Salon F; Tuesday, February 25, 2014; 4-7 pm

Trauma Panel: The New, the Old, and the Bloody

- First ever CRASH Trauma Panel
- Nontraditional (and informal) format: four 20 minute “discussion-stimulating presentations” followed by Q&A.
- All presentations are available on CRASH website
- Panelists have no conflicts of interest
- Denver Health Panelists:
 - Dr. Greg Myers
 - Dr. Matthew Roberts
 - Dr. Michael Sawyer
 - Dr. Mark Chandler-Facilitator

The director of your department approaches you and asks if you are interested in serving on a committee that is developing a Mass Casualty Incident Plan for the hospital. Your response is:

- “Of course, sounds like another opportunity to excel.”
- “Plan? What good are plans? No plan survives first contact....”
- Feign a seizure, and hope after the incident he forgets that he asked you.
- You wonder what role anesthesia providers would have in an MCI, apart from doing a bunch of trauma cases, which are just like elective cases with additional blood loss.

You are at home watching the Broncos win Superbowl XLVIII, when the broadcast is interrupted for breaking news: a gunman opened fire at a local sports bar (2 miles from your hospital). Police are on the scene as is EMS, and there are believed to be 20-30 casualties. Your actions are:

- Drive to the scene, try to lend a hand.
- Call the hospital immediately and ask to be connected to the OR to see if you are needed.
- Contact your buddy on call via cell phone and see if you are needed.
- Do nothing: we’re not a trauma hospital, thus these patients will bypass your hospital in favor of the Level I Trauma Center in your county.
- Do nothing apart from watching your cell phone: your hospital has a well-developed and rehearsed MCI plan, and you know that you will be contacted if needed.

You are called into the hospital for this MCI. You expect your role will be:

- In the OR resuscitating and providing anesthesia for trauma patients...where else am I of any use?
- In the ER, ‘cuz that is where all the casualties are, so I go there immediately and try to lend a hand.
- Likely in the OR, but as one of the hospital’s experts in airways, pain management, resuscitation, I am prepared to go wherever I am needed.

The Anesthesia Provider’s Role in the Mass Casualty Incident (MCI)

Dr. Mark H. Chandler

MCI defined

- **MCI: Mass Casualty Incident: any incident in which:**
 - emergency medical services, such as personnel and equipment, are overwhelmed by the number and/or severity of casualties.
 - AKA: multiple casualty incident, multiple casualty situation, disaster plan, emergency operations plan.
 - Examples: building collapse, train/bus collisions, terrorist incidents, natural disasters such as earthquakes, tornados, floods.

Lesson #1: Be prepared for an on rush of patients

- Patients from MCIs sometimes arrive at nearby hospitals minutes after the event, often by unconventional means
- Triage at the MCI site is highly variable depending upon EMS response
- Does this represent a new trend?

Multiple Casualty Terror Events: The Anesthesiologist's Perspective

Micha Y. Shamir, MD¹, Yoram G. Weiss, MD², Dafna Wilfberg, MD³, Yoav Mintz, MD⁴, Allan I. Bloom, MD⁵, Yuval Weiss, MD⁶, Charles L. Sprung, MD⁷, and Charles Weissman, MD⁸

From the ¹Departments of Anesthesiology and Critical Care Medicine, ²General Surgery, and ³Blotching, Hadassah-Hebrew University Medical Center, Jerusalem, Israel; ⁴Department of Anesthesiology, Perioperative Medicine and Pain Management, University of Miami, Miami, FL; ⁵University of Pennsylvania Medical School, Philadelphia, PA; and ⁶Deputy Hospital Director, Hadassah-Hebrew University Medical Center, Jerusalem, Israel

In a 28-day period 14 multiple-casualty terror events occurred in Jerusalem, including the Department of Anesthesiology and Critical Care Medicine at the city's sole Level I trauma center. The performance of emergency and critical care activities, including the emergency department, resuscitation rooms, and intensive care unit (ICU), and patient flow. A total of 1062 patients were treated in the 14 multiple-casualty terror incidents. The emergency department treated 20 victims, 103 of whom were hospitalized, and 19 underwent surgery during the incidents. Only two injuries were prehospital during the first hour, and the average time to the first surgery was

103 minutes. Fifty-two patients were admitted to the ICU, an average of 3.5 after the terror event. After a terrorist act multiple, simultaneous efforts were coordinated at the anesthesiology department, including taking part in the initial resuscitation in the emergency department, stabilizing victims in the emergency department, and caring for them in the recovery room and ICU. Therefore, anesthesiology departments are greatly impacted by such events and must plan for them to maximize the use of available personnel and to have the appropriate equipment and supplies available.

(Anesth Analg 2010;110:1730-32)



Shamir, et. al.

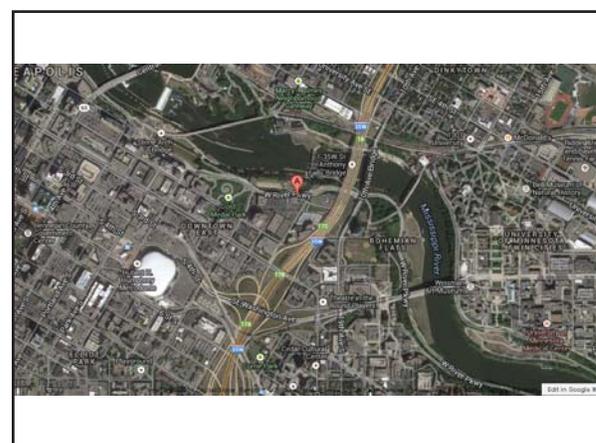
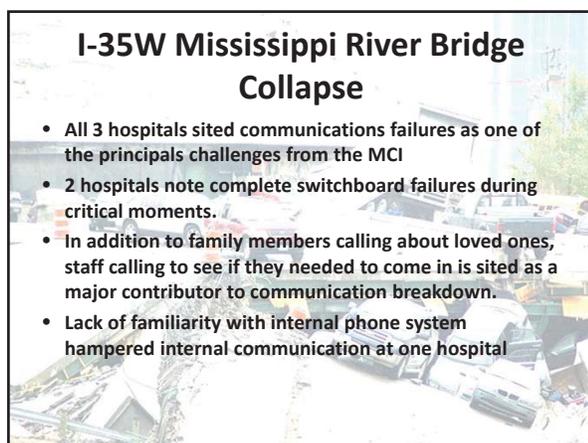
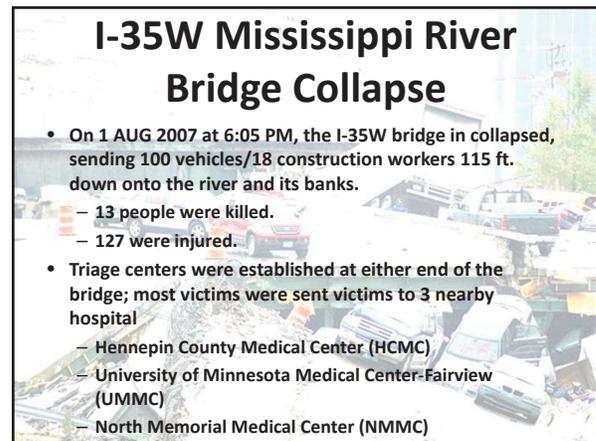
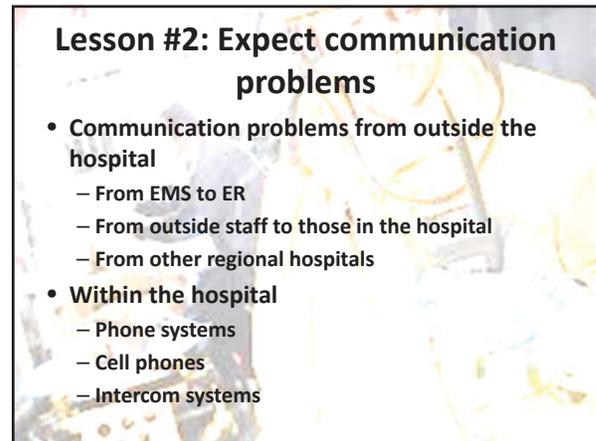
- 28 month period, 14 MCI terror events in Jerusalem
- 1062 injured people, 355 victims treated in ED, 108 hospitalized
- 58 underwent surgery in the first 8 hours
 - Average time to first surgery: 124 minutes
 - Only 2 surgeries performed in the first hour

The Game Changer: Aurora Theater experience



Aurora Theater shooting

- On July 20, 2012, a deranged gunman set off tear gas and opened fire at the audience of a midnight movie showing, killing 12 people and injuring another 70.
 - Shooting started at 12:38 AM, and lasted only until 12:45 AM
 - A policeman on the scene decided not to wait for ambulances and began evacuating patients to 7 nearby hospitals in squad cars.
- The first two patients (mother and baby, both noncritical) arrived by private vehicle at UCH at 1:01AM (16 minutes after shooting stopped)
- 23 critical patients arrived at UCH first hour
- 6 patients went straight to OR within one hour after arriving



Lesson #3: Take no comfort in
 “We’re not a trauma hospital,” or
 “I don’t do trauma...”

TRAUMA



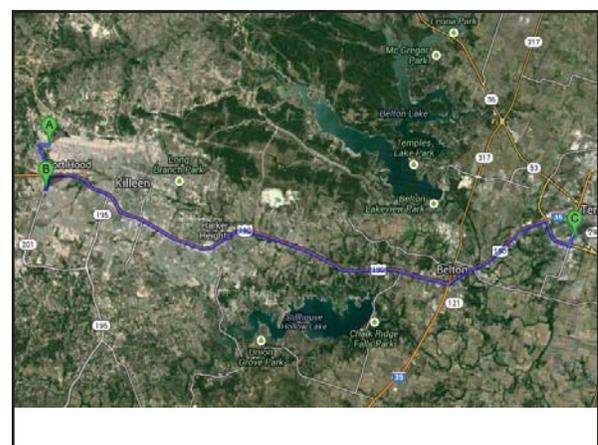
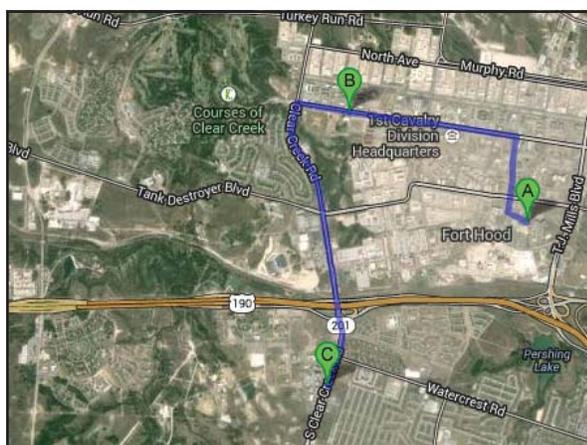
Fort Hood Massacre

- At 1:28 PM on 5 NOV 2009, a gunman opens fire on people at the Soldier Readiness Processing Center at Fort Hood, TX.
 - The shooting lasted 10 minutes, during which the shooter fired >200 rounds from a single semi-automatic pistol
 - 13 people were killed (11 on scene, 2 died enroute to local hospitals)
 - 32 people injured and transported to local hospitals

Fort Hood Massacre

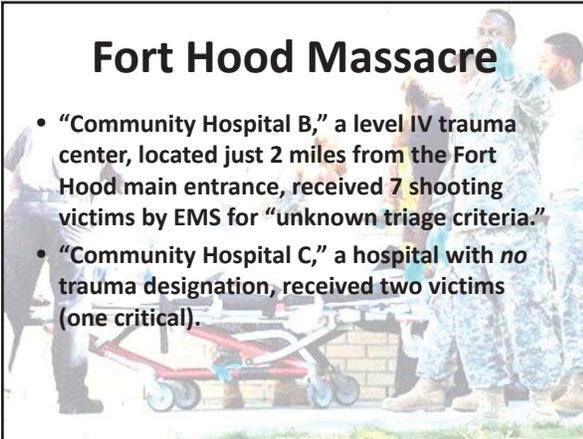
Fort Hood is one of the largest US military bases in the world, home of III Corps, the 1st Cavalry Division, and other units

- National news broadcast Scott and White’s referral phone number for families.
- Over a brief period of time >1300 calls overloaded the normal referral system.
- At the time of the MCI, civilian and military facilities could not communicate due to radio frequency incompatibility.
- Radios and the statewide web-based “EMsystem,” redundant communication systems, were not used adequately to alleviate the communication issue.



Fort Hood Massacre

- “Community Hospital B,” a level IV trauma center, located just 2 miles from the Fort Hood main entrance, received 7 shooting victims by EMS for “unknown triage criteria.”
- “Community Hospital C,” a hospital with *no* trauma designation, received two victims (one critical).



Lesson #3: Have an MCI plan, participate in its creation, and then practice that plan

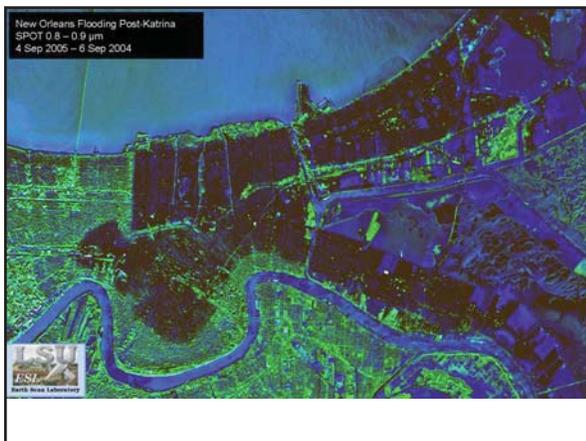


The game-changer: Katrina



The game-changer: Katrina

- 5:30 AM August 29, 2005 Hurricane Katrina slammed into southeast Louisiana.
- One of 5 deadliest hurricanes in US history:
 - 1833 deaths
 - \$81 billion in damage
 - 80% of New Orleans was flooded; floodwaters do not recede for weeks.



Memorial Hospital



Memorial Hospital

- Hospital swamped by floodwaters, lost power, lost sanitation, ran out of food as temperatures soared to 110F.
- A wholesale evacuation of the hospital was attempted:
 - 2000 patients, family members and staff were evacuated, some up/down several flights of stairs
 - Some patients died during the evacuation
 - Several patients were alleged to have received lethal cocktails of morphine/versed.
- On September 13, 2005 (16 days after the hurricane struck), mortuary workers removed 45 bodies from the hospital



JCAHO MCI requirements

- Many changes implemented in 2009, in aftermath of Hurricane Katrina
- All accredited Health Care Organizations must “conduct drills related to their emergency management plan at least twice yearly.”
 - The Hospital Command Center must be activated
 - One exercise must “simulate an influx of patients”
 - One exercise must include “an escalating event,” where the community cannot assist
 - One exercise must include “community participation”
- Exercises are based on a hospital’s “Hazard Vulnerability Analysis” (HVA)
- JCAHO does not specify how extensive these exercises must be, nor who (e.g. departments) must be involved.

SCORE	0-50%		51-60%		61-70%		71-80%		81-90%		91-100%		JUSTIFICATION
	0-25%	26-50%	0-25%	26-50%	0-25%	26-50%	0-25%	26-50%	0-25%	26-50%	0-25%	26-50%	
entrance	2	3	3	3	2	2	2	2	2	2	2	56%	How "Turnout" could handle more evacuation and practice
exit/egress	3	3	1	3	2	2	2	2	2	2	2	72%	Use more experienced employees at all exit doors for fire drills
firefight	3	2	1	3	1	1	1	2	2	2	2	56%	Probability is high (almost an annual) event but fire preparations in high-rise Cherry Creek lack high aerially but with no change in CH. See Department
food, External	2	1	3	3	3	2	2	2	2	2	2	52%	Denver normally has low winter temperatures and high summer temperatures. Summer responses include mass gatherings with high numbers of heat stroke. Need to assess the ability to treat (e.g. 2005) influx of heat stroke patients. August 2012 was the hottest month on record in Denver.
injury T-Storm/earthquake	3	1	1	1	1	1	1	1	1	1	1	33%	Disaster Preparedness used prepared
Power/Fuel	3	1	1	1	1	1	1	1	1	1	1	33%	Earthquake hazard in Colorado, but there are no fuel lines in Denver County. Burroughs are not built to withstand earthquakes
airflow	1	3	3	3	3	3	3	3	3	3	3	33%	See previous request for CC, but not other departments in high-rise for likelihood
air storm	2	2	2	2	1	1	1	2	2	2	2	37%	Probability of Cherry Creek can't breathing in fire. Critical equipment located in the basement and could be at high risk regardless of fire response.
air foundation	1	3	3	3	2	2	2	3	3	3	3	30%	

Lesson #4: Be prepared for fatigue, grisly scenes, and the need for psychiatric support.

You may be most valuable in the aftermath of an MCI

- Timing of MCI
 - Boston Marathon Bombing: 2:49 PM
 - Fort Hood Massacre: 1:28 PM
 - I-35 Bridge Collapse: 6:05 PM
- After the incident
 - Brigham and Women’s ran 4 extra plastic surgery rooms over the weekend following the Boston Marathon bombing
 - University of Colorado Hospital similarly busy days after Aurora Theater Shooting

Conduct a post-incident debriefing

- Review the incident
- Discuss and record positives and negatives
- Incorporate improvements into your institution's MCI plan
- Publish your findings!
- Anticipate fatigue, sleep deprivation and emotional distress

Lesson #5: Have a Mass Transfusion Protocol (MTP), and know how and when to activate it.

Lesson #5: Have a Mass Transfusion Protocol (MTP), and know how and when to activate it.

- Cotton BA, et. al.. Damage Control Hematology: The Impact of a Trauma Exsanguination Protocol on Survival and Blood Product Utilization *J Trauma*. 2008;64:1177-83.
- Most blood products following MCIs are needed in the immediate aftermath of the event.
- An institution's MTP must be well established, and activation must be possible by anesthesia, emergency medicine, or surgical staff.

London Bombings (7/7)

London Bombings (7/7)

- July 7, 2005, four suicide bombers detonate bombs aboard three London underground trains and a double-decker bus, killing 52 and injuring over 700 civilian.
- Royal London Hospital received 194 casualties, 17 needed surgery.
- 264 units of blood products were used in the first 15 hours
- Principal issue: surge vs. availability

Lesson #6: Be flexible, and be prepared to take on nontraditional roles

- Traditionally, anesthesia providers are most effective (and comfortable) in the OR
- Anesthesia Providers have skills that are especially useful in MCIs where high numbers of patients require triage:
 - Airway management
 - IV access
 - Pain Management
 - Emotional comfort



Egyptian Revolution, 2011



Egyptian Revolution, 2011

- Egyptian Revolution began on January 25, 2011
 - 846 people killed
 - >6400 injured
- January 28, 2011, “The Friday of Rage”
- Cairo University Hospital
 - 3012 newly injured patients
 - 339 require “urgent surgical intervention” within 6 hours of arrival

ATTACKS

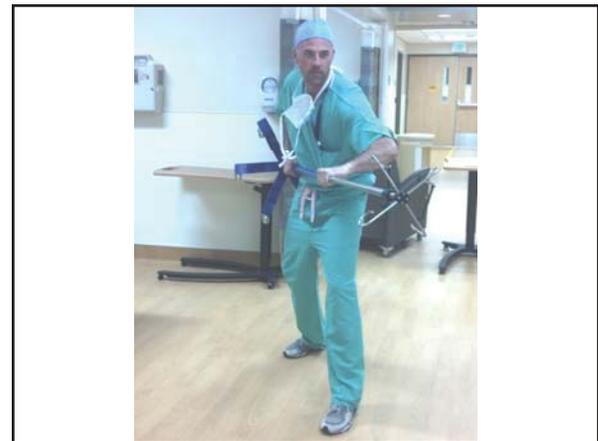
After opening of the prisons, violent criminals attacked the hospitals, intimidating both doctors and patients and forcing doctors to treat their relatives at gunpoint. Groups of relatives, porters, and physicians were organized to drive off looters, and robbers remained active until the military police were sent to guard the hospitals. The criminals were armed with knives and sticks, and the porters, relatives,

and doctors were armed with IV poles, sticks, and kitchen knives.

The 2011 Egyptian revolution began on January 25, 2011, and was lost. The decision was thus made to deploy attending physicians to facilitate the surgical care of patients requiring surgery. The decision was made to use pulse oximetry as a surrogate for arterial oxygen saturation (SpO₂) <85% on room air, or (2) Glasgow coma scale <10. Although it has been recommended that the score for sequential organ failure assessment (SOFA) should be incorporated into the triage protocol for critical care, this was not practical in this case, given the need to assess arterial blood gas and to have a venous blood sample for each patient to calculate the SOFA score. Instead, we used pulse oximetry as a surrogate for arterial oxygen tension.

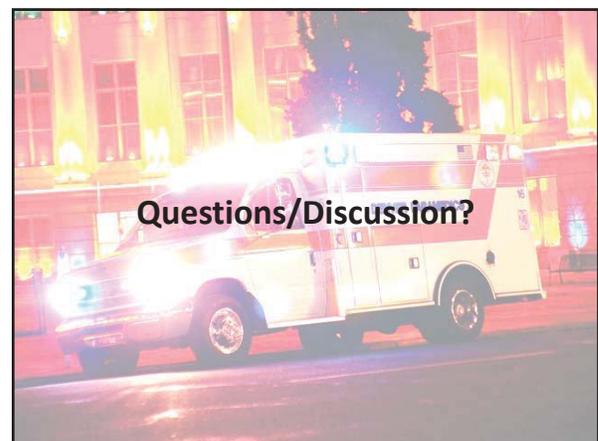
people assembled to protest, and Internet and cellular phone services were shut down by the government. Throughout the day, police fired tear gas, rubber bullets, shotgun shells, and live ammunition at protesters, and within a matter of hours, police stations were burned, the security of prisons was breached, violent criminals escaped into the streets, and the country's vast police force vanished, creating a security vacuum (Fig. 1).

During the first week of the revolution, most of the casualties were treated at the Cairo University Hospital Kasr Al-Ainy, located near Tahrir Square, the epicenter of



Summary: MCI Lessons Learned

- Lesson #1: Be prepared for an on rush of patients
- Lesson #2: Expect communication problems
- Lesson #3: Take no comfort in “We’re not a trauma hospital,” or “I don’t do trauma...”
- Lesson #4: Be prepared for grisly scenes, fatigue, and the need for psychiatric support.
- Lesson #5: Have a Mass Transfusion Protocol (MTP), and know how and when to activate it.
- Lesson #6: Be flexible, and be prepared to take on nontraditional roles.



Questions/Discussion?

Trauma Panelists

- **Dr. Greg Myers** trained at the University of Colorado and has been with Denver Health for 4 (?) years. Greg has been doing some ground-breaking work with simulation and the use of echocardiography in the management of trauma, the latter of which, if time allows, he will share with us today.
- **Dr. Matthew Roberts**, who trained in the UK, was on staff at University Hospital, and has been with us at Denver health now for 2 years. Dr. Roberts has served in both the active duty and reserve Royal Army Medical Corps, where he served two tours of Iraq, and one of Afghanistan...fittingly, he will be discussing recent innovations in the prehospital management of trauma.
- **Dr. Mike Sawyer**, who trained at Tulane and the University of Colorado, has been with Denver Health for 8 years, and has published a number of papers on the use of TEG (Thromboelastogram) and its use in the management of the Acute Coagulation of Trauma.
- **And me, Dr. Mark Chandler**. I have been with Denver Health now for 10 years, and have also served in Iraq and Afghanistan with the Colorado Army National Guard, but today I will be discussing the role of the anesthesiologist in Mass Casualty Incidents.