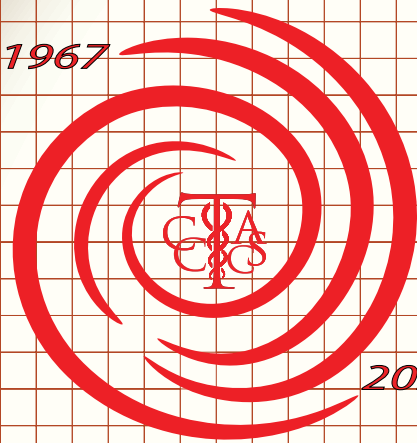


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2024

MATTOX VEGAS TCCACS™

Continuing 57 Years of Educational Excellence

Medical Disaster Response

 **2024**

April 14, 2024

Las Vegas

www.trauma-criticalcare.com



MEDICAL DISASTER RESPONSE 2024

Medical Disaster
Response



April 13, 2025
Caesars Palace
Las Vegas

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MARK
YOUR
CALENDAR
TODAY!

April 13, 2025

SUN	MON	TUE	WED	THUR	FRI	SAT
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CAESARS PALACE
LAS VEGAS

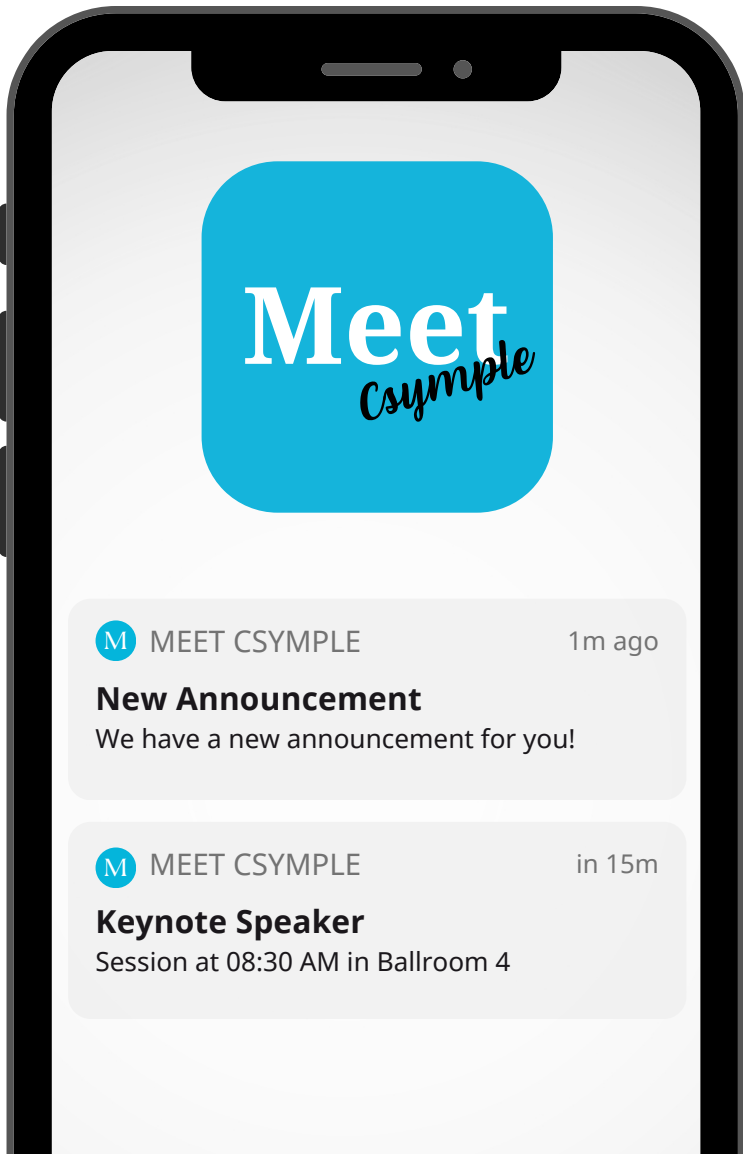
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CME FORMS:

Follow this convenient link to access the Trauma 2024 System, which allows you to sign and complete required CME FORMS, as well as download your CME Certificate.



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CONTINUING MEDICAL EDUCATION CREDIT INFORMATION

Accreditation

The American College of Surgeons is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

AMA PRA Category 1 Credits™

The American College of Surgeons designates this live activity for a maximum of 8.5 *AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Of the *AMA PRA Category 1 Credits™* listed above, a maximum of **8.5** hours meet the requirements for **Surgical Critical Care**.*

Of the *AMA PRA Category 1 Credits™* listed above, a maximum of **8.5** hours meet the requirements for **Trauma**.*

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he content of this activity may meet certain mandates of regulatory bodies. Please note that ACS has not and does not verify the content for such mandates with any regulatory body. Individual physicians are responsible for verifying the content satisfies such requirements.



Blended Surgical Education and Training for Life

Successful completion of this CME activity, which includes participation in the evaluation component, enables the learner to earn credit toward the CME of the American Board of Surgery's Continuous Certification program.

PROGRAM OBJECTIVES

1. Develop strategies to meet challenges of triage, limited resources, ethical and moral risks, and coordinating multiple agencies in MCI situations
2. Modify individual situation MCI and disaster responses based on data from past responses
3. Discuss specific clinical response, including managing limited blood supplies, trauma bay violence, vehicular terrorist attacks, and the border health crisis
4. Discuss ways to address the disconnect between institutional administrators and "in the trench" responders in MASCAL situations
5. Discuss medical response and motorsport medicine

DISCLOSURE INFORMATION

<p>Ineligible Company: The ACCME defines an “ineligible company” as any entity producing, marketing, re-selling, or distributing health care goods or services used on or consumed by patients. Providers of clinical services directly to patients are NOT included in this definition.</p>
<p>Financial Relationships: Relationships in which the individual benefits by receiving a salary, royalty, intellectual property rights, consulting fee, honoraria, ownership interest (e.g., stocks, stock options or other ownership interest, excluding diversified mutual funds), or other financial benefit. Financial benefits are usually associated with roles such as employment, management position, independent contractor (including contracted research), consulting, speaking and teaching, membership on advisory committees or review panels, board membership, and other activities from which remuneration is received, or expected.</p>
<p>Conflict of Interest: Circumstances create a conflict of interest when an individual has an opportunity to affect CME content about products or services of an ineligible company with which he/she has a financial relationship.</p>

The ACCME also requires that ACS manage any reported conflict and eliminate the potential for bias during the educational activity. Any conflicts noted below have been managed to our satisfaction. The disclosure information is intended to identify any commercial relationships and allow learners to form their own judgments. However, if you perceive a bias during the educational activity, please report it on the evaluation.

Speakers / Moderators / Discussants / Authors	Nothing to Disclose	Disclosure		
		Company	Role	Received
Jayson Aydelotte	No			
Carlos Brown	No			
Jay J. Doucet	Yes	Wolters Kluwer (Up to Date)	Author	Royalties
Alexander Eastman	No			
Tanya Egodage	No			
Jennifer Gurney	No			
R. David Hardin	No			
James Kempema	No			
Matthew Martin	No			
Kenneth Mattox	No			
Jigarkumar A. Patel	No			
Michael A. Samotowka	No			
Martin Schreiber	Yes	Haemonetics	Consultant & Research PI	Financial Compensation
		CSL Behring	Consultant & Research PI	Financial Compensation
		Tricol	Consultant	Financial Compensation
Jeffrey Skubic	No			
Jason L. Turner	No			
Sydney Vail	No			
Alison Wilson	No			
Kenneth L. Wilson	No			

Program Committee	Nothing to Disclose	Disclosure		
		Company	Role	Received
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Mary Allen	No			
Jayson Aydelotte	No			
Carlos V.R. Brown	No			
Alexander L. Eastman	No			
Matthew J. Martin	No			
Jeffrey L. Skubic	No			
Alison Wilson	No			

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SUNDAY MORNING

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LUNCHEON SESSION

Palace Ballroom 1-2, Palace Tower, Emperors Level

Formula 1 - A "Crash" course in Medical Response and Motorsports Medicine

SUNDAY AFTERNOON

Palace Ballroom 1-2, Palace Tower, Emperors Level

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"Fixing" the Disconnect Between Hospital Administrators and "Boots on the Ground"

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Late Breaking News

MATTOX VEGAS TCCACS™ 2024
PROGRAM AT A GLANCE
SUNDAY, APRIL 14, 2024

Time	Activity	Location
7:00	Registration Opens	Roman Ballroom, Office Palace Tower 3 rd Floor, Promenade Level
7:00 – 8:30	Continental Breakfast Served in Exhibit Hall	Emperors Ballroom Palace Tower 4 th Floor, Emperor Level
7:45 – 9:50	SESSION 1 BEEN THERE, DONE THAT; BUILDING ON PAST EXPERIENCES Moderator: Alexander L. Eastman	Palace Ballrooms 1-2 Palace Tower 4 th Floor, Emperor Level
	TITLE	SPEAKER
7:45 – 7:55	Setting the Stage: Review/Preview 2024	Kenneth L. Mattox
7:55 – 8:15	Chaos in Kabul: The Kabul Evacuation Airport Bombing Attack	R. David Hardin, Jr.
8:15 – 8:35	Meeting the Challenges of the Escalating Health Crisis on the Border	Alexander L. Eastman
8:35 – 8:50	Vehicular Terror Attacks: The Texas Bus Stop Massacre	Jeffrey J. Skubic
8:50 – 9:10	First Do No Harm - Volunteers in Ukraine	Michael A. Samotowka
9:10 – 9:30	Mega-Disaster - A Retrospective: What “Went Right;” What “Went Wrong.” Did Lessons Learned Impact Future Responses?	Kenneth L. Mattox
9:30 – 9:50	PANEL DISCUSSION	
9:50 – 10:15	Break & Visit Exhibits	Emperors Ballroom Emperors Level – 4 th Floor
10:15 – 12:00	SESSION 2 AUDIENCE INTERACTIVE SESSION Ethical, Moral, and Legal Risks in Disaster and MCI Care Co-Moderators: Tanya Egodage & Matthew J. Martin	Palace Ballrooms 1-2 Palace Tower 4 th Floor, Emperor Level
	SESSION 3 LUNCHEON SESSION Moderator: Carlos V.R. Brown	Palace Ballrooms 1-2 Palace Tower 4 th Floor, Emperor Level
	TITLE	SPEAKER
12:00 – 1:30	Formula 1 - A “Crash” course in Medical Response and Motorsports Medicine	James Kempema

1:30 – 3:00	<p align="center">SESSION 4</p> <p align="center">REALITY CHECK! ENGAGING THE C-SUITE</p> <p align="center">“Fixing” the Disconnect Between Hospital Administrators and “Boots on the Ground”</p> <p align="center">Moderator: Jayson Aydelotte</p> <ul style="list-style-type: none"> • Creating C-Suite Buy-in For Emergency Management • How to Create a MASCAL Plan that Works! • Triage Officer: Who to, and Who Not to Choose, and Why • Culture of Movement: How to Create an Environment that Safely Moves Patients Around Your Hospital and Maximizes Your Effectiveness • The Culture of Movement: Mastering the Vertical Evacuation • Purging Units: How to Move Patients OUT of the ED and ICU • What Now? How to Get Patients OUT of the Hospital • When the EMR Fails! 	<p>Palace Ballrooms 1-2 Palace Tower 4th Floor, Emperor Level</p>
3:30 – 4:00	Break & Visit Exhibits	Emperors Ballroom 4th Floor, Emperor Level
4:00 – 6:00	<p align="center">SESSION 5</p> <p align="center">BEYOND TRIAGE & RESUSCITATION</p> <p align="center">Moderator: Jeffrey J. Skubic</p>	<p>Palace Ballrooms 1-2 Palace Tower 4th Floor, Emperor Level</p>
	TITLE	SPEAKER
4:00 – 4:15	Running on Empty: Resuscitative Adjuncts and Alternative Products when Blood Supplies are Limited	Martin A. Schreiber
4:15 – 4:30	Violence in the Trauma Bay and ED	Jay A. Doucet
4:30 – 4:45	Whole Blood and Walking Blood Banks in the Civilian Setting	Jennifer A. Gurney
4:45 – 5:00	No CT Scan? No Problem! Managing Injured Patients with Limited Radiology Support	Kenneth L. Wilson
5:00 – 5:15	Preparing for MASCAL at a Level III - Challenges, Tips, and Tricks	Jason L. Turner
5:15 – 5:30	Who’s in Charge? Coordinating Multiple Agencies in MASCAL	Alison Wilson
5:30 – 6:00	PANEL DISCUSSION	

GENERAL COURSE INFORMATION

Medical Disaster Response 2024 is a one-day course focusing on clinical realities of medical disaster response, not logistics, organizational charts, and the like, while providing practical information that trauma care providers can take home and implement to improve institutional disaster response plans. Information presented is physician/nurse/hospital care oriented and emphasizes that the trauma center, whether a Level 1, 2, 3 or 4, is the foundation of the disaster medical response system.

CONFERENCE REGISTRATION

Registration opens on Sunday, April 14th at 7:00 a.m. The Medical Disaster Response registration desk is in the Palace Tower, 3rd floor, Promenade Level, immediately outside the Roman Ballroom.

GENERAL SESSIONS

All general sessions are held in the **Palace Ballrooms 1-2 on the 4th floor of the Palace Tower**. You must have a *MEDICAL DISASTER RESPONSE* badge to enter the General Session. The General Session begins at 7:45 a.m.

CONTINENTAL BREAKFAST

Continental breakfast will be served in the **Exhibit Hall, the Emperors Ballroom**. Take the escalator or elevator down one level to the Exhibit Hall. Hours for continental breakfast are from 7:00 - 8:30 a.m., Sunday, April 14th. Morning and afternoon breaks will also be held in the **Emperors Ballroom**.

LUNCH SESSION

The luncheon session will be held in Palace Ballroom 1-2, where the General Sessions are. The session is moderated by Doctor Carlos Brown, and Dr. James Kempema will present, *“Formula 1 – “Crash” Course in Medical Response and Motorsports Medicine.”*

BADGES

Your badge must be worn at all times to be admitted to all sessions. If your badge is lost, a replacement is required, and the fee is \$20.00. Your badge serves as your "admission ticket" to the General Sessions, Exhibit Hall, and Luncheon Session. **YOUR BADGE HAS YOUR ID NUMBER ON THE BOTTOM RIGHT. YOU WILL NEED THIS NUMBER TO SUBMIT YOUR CME DOCUMENTATION and access your certificate.**


CLAIMING YOUR CME CREDITS

This is done online, optimally done during the conference. We have provided complimentary Wi-Fi in the convention general session and Exhibit Hall, as well as in your Caesars Palace hotel room. Instructions for accessing CME Claiming site while at the conference:

1. Go to Wi-Fi list on your phone, laptop, etc.
2. Click on our SSID (network name), which is **MattoxTCCACS2024**
3. Then, it will prompt you to put in the password, which is **Tccacs!!**
4. Then, it will take you to the internet
5. Next go to Conference URL to CLAIM CME: www.lvtraumacme.com

**ATTENDANCE VERIFICATION, MOC EXAM, & CME CERTIFICATES
TRAUMA, CRITICAL CARE, ACUTE CARE SURGERY 2024
APRIL 15-17, 2024**

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**MEDICAL DISASTER RESPONSE
TRAUMA, CRITICAL CARE & ACUTE CARE SURGERY**

Log in to Verification of Attendance System

WHICH CONFERENCE DID YOU ATTEND?

Medical Disaster Response
 Trauma & Critical Care

-Choose year-

Badge Number:

Last Name:

SUBMIT

Your USER ID is the ID NUMBER PRINTED ON THE LOWER CORNER OF YOUR BADGE, OPPOSITE THE BARCODE. TAKE A MOMENT NOW TO INPUT YOUR BADGE NUMBER IN THE BLANK ABOVE, AND/OR NOTE IT IN YOUR TELEPHONE OR OTHER ELECTRONIC DEVICE.

CME Instructions

You must submit the steps below in the order listed. The link in the next step will be available upon submitting the prior step. You can access any of the steps as many times as you wish.

Step #	Description	Completed?
1	Fill Out Verification of Attendance Form (VOA)	<input checked="" type="checkbox"/>
2	Course Evaluation You may SUBMIT this form multiple times.	<input checked="" type="checkbox"/>
3	Download CME Certificate (not yet available - must complete VOA form and course evaluation first)	<input checked="" type="checkbox"/>

LOG OUT

STEP 1: ACCESS CONFERENCE URL TO CLAIM CME

- Go to the Wi-Fi list on your phone, laptop, etc.
- Click on our SSID (network name), which is **MattoxTCCACS2024**
- Then, it will prompt you to put in the password, which is **Tccacs!!**
- Then, it will take you to the Internet.
- Next go to Conference dashboard to claim CME: www.lvtraumacme.com

STEP 2: VERIFICATION OF ATTENDANCE

- FREE WI-FI provided in the General Session and your hotel rooms to facilitate your completing your required forms immediately, during the conference
- You may save and submit this form multiple times
- Once you complete and submit your Verification of Attendance (VOA) Form, you may complete the course evaluation (Step 3) REQUIRED

STEP 3: COURSE EVALUATION

- Course evaluation form must be completed for your certificate to be downloaded (Step 4).
- You may complete the forms in stages, following each session (advised), or at the completion of the course

STEP 4: DOWNLOAD CME

- **PLEASE ENSURE YOU SAVE A COPY FOR YOUR RECORDS**
- If you note any errors on your certificates, contact Mary Allen IMMEDIATELY at REDSTART@AOL.COM or Telephone: 713.798.4557

The Verification of Attendance system for submitting requests for CME credit is available via any device connected to the Internet. Should the Wi-Fi network in the meeting room seem slow because of high usage, you may use your data plan's wireless connection or access the system at another time.



www.lvtraumacme.com

SCAN THE ABOVE QR CODE TO GO TO THE TCCAS 2024 SYSTEM, WHICH ALLOWS YOU TO SIGN IN TO ACCESS REQUIRED CME FORMS, AS WELL AS DOWNLOAD YOUR CME CERTIFICATE.

ALSO, SUBMIT YOUR QUESTIONS TO THE SESSION MODERATORS VIA THIS SYSTEM

2024

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MEDICAL DISASTER RESPONSE

April 14, 2024

CAESARS PALACE - LEVEL 3 - POMPEIAN BALLROOM
LAS VEGAS, NV



EXHIBIT DIRECTORY

1. PolyNovo North America
2. American Association for the Surgery of Trauma
3. Elsevier
4. Beeken Biomedical



ENTRANCE

SESSION 1

BEEN THERE, DONE THAT; BUILDING ON PAST EXPERIENCES

Moderator: Alexander L. Eastman

Sunday, April 14, 2024

7:45 – 9:50 AM

Palace Ballrooms 1-2

Palace Tower

Emperors Level – 4th Floor

- | | |
|---------------------|---|
| 7:45 – 7:55 | Setting the Stage: Review/Preview 2024
Kenneth L. Mattox, MD, FACS, MAMSE |
| 7:55 – 8:15 | Chaos in Kabul: The Kabul Evacuation Airport Bombing Attack
R. David Hardin, Jr. MD, FACS, COL, MC |
| 8:15 – 8:35 | Meeting the Challenges of the Escalating Health Crisis on the Border
Alexander L. Eastman, MD, MPH, FACS, FAEMS |
| 8:35 – 8:50 | Vehicular Terror Attacks: The Texas Bus Stop Massacre
Jeffrey J. Skubic, DO, MSc, FACS |
| 8:50 – 9:10 | First Do No Harm - Volunteers in Ukraine
Michael A. Samotowka, MD, FACS, FCCM, FCCP |
| 9:10 – 9:30 | Mega-Disaster - A Retrospective: What “Went Right;” What “Went Wrong.” Did Lessons Learned Impact Future Responses?
Kenneth L. Mattox, MD, FACS, MAMSE |
| 9:30 – 9:50 | Panel Discussion |
| 9:50 – 10:15 | Break & Visit Exhibits
Emperors Ballroom, Palace Tower
Emperors Level – 4th Floor |

DISASTER MEDICAL RESPONSE – REVIEW/PREVIEW 2024

Kenneth L Mattox, MD, FACS, MAMSE

Course Director
Distinguished Service Professor
Michael E. DeBakey Department of Surgery
Special Advisor to the President and CEO
Baylor College of Medicine
Houston, TX

This is the 16th year the Mattox Vegas Trauma Group (TCCACS) has offered this course on Medical Disaster Response in conjunction with Mattox Vegas Trauma, Critical Care & Acute Care Surgery. In that almost all the world's disasters involved the trauma team from the local trauma center, it was logical, in 2008, to develop this course. Disasters, often sudden and catastrophic, now seem to be epidemic, though always unexpected and frightening. Numerous courses and books focus on regional and hospital disaster committees, their organization and administration; creating shelters, property recovery, various drills and communications, and obtaining certification for taking such courses. When victims of any "disaster" are met by the ambulance crews, the emergency center staff, or the in-hospital services, the immediate challenges seem to be different than presented in the typical disaster courses. This course was structured to share with the hands-on staff at the scene of the disaster, during the first responder transportation, in the triage area, in the emergency center, and in the OR/ICU of the hospital - the lessons learned by those at the center of managing acute patients in an mci/disaster.

Disasters are not identical, so a reproducible "turnkey" practice guideline to apply to all disasters is not possible. A "disaster" might be a ½ mile wide/20 mile long(on the ground) long Level 3 tornado, with extensive building, car, road, and electrical line damage (as occurred during the 3rd week of January 2023,) but without a single injury requiring hospital transport, as occurred in Houston, Texas. So, while government will correctly classify such an occurrence as a disaster, medical personnel would not be called upon to respond. On the other hand, a single VIP patient in the EC and hospital can cause such disruption that it might be classified as a major disaster. Regardless, medical personnel must be prepared to react and provide quality & immediate service in both situations and all in between, Past Medical Disaster Response attendees have asked us to continue to focus on the MEDICAL RESPONSE aspects of disaster and MCI situations.

The Disaster Program organizers and Program Committee meticulously collect information on "disasters" occurring around the world and in which hospitals and clinicians were directly involved. In addition, they collate those management and clinical challenges that doctors, nurses, and hospitals encounter. These data, as well as requests from the previous years' attendees regarding important presentations, make up the disaster program.

What this course is NOT. This is not a course to teach you techniques in search and rescue and creating shelters. It is not a course for creating shelters. It is not a course on how to create a disaster drill with fake blood, simulated broken bones, and fake mentally ill patients, along with personnel in colored vests. Each of these frequently used drill tactics is of best value when conducted in coordination with other

responder groups. In true disaster situations, very rarely is the individual/team on duty the same who participated in the mock drill and incident command. This is NOT meant to lead the reader to conclude that these drills are not helpful, but this course has a different focus - for the learner to benefit from real life experience and crisis management.

There are some ESSENTIALS for you to navigate this course:

1. Your badge is your “ticket” to enter general sessions, the luncheon session, and the Exhibit Hall, where breakfast and all breaks take place. It is also essential to claim your CME certificate. So, RECORD YOUR BADGE NUMBER. Take a picture with your phone.
2. Wi-Fi is complimentary in the General Session and your hotel room, allowing ready access to claiming your CME. See step-by-step instructions in your syllabus book.
3. You will access the **conference dashboard** via www.lvtramacme.com to:
 - a. Document your attendance (required)
 - b. Send questions directly to the moderator
 - c. Complete your Verification of Attendance (required)
 - d. Complete the course evaluation (required)
 - e. Claim your CME and Download your certificate
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CHAOS IN KABUL: THE KABUL EVACUATION AIRPORT BOMBING ATTACK

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Over a two-week period in August 2021, the United States Air Force performed the largest humanitarian airlift in human history (Operation Allies Refuge). Simultaneously, the United States and its allied partners completed the military departure of all forces from Afghanistan. In the backdrop of this exodus, additional military medical assets arrived to augment the existing medical footprint at the Hamid Karzai International Airport (HKIA). The rapid assimilation of these smaller disparate teams into a single integrated multinational medical task force proved to be invaluable. These resilient teams were able to successfully provide the healthcare and trauma support system for nearly 130 Afghan refugees and supporting servicemembers.

Anticipating the final withdrawal of US troops in Afghanistan, the Taliban launched a spring offensive in May 2021. To meet an agreed upon withdrawal date set for August 31st, the US and its NATO allied partners began shutting down bases throughout the country. By July, the final American base in Afghanistan was located within the capital city of Kabul at HKIA. On August 6th, the Taliban seized its first provincial capital in southwest Afghanistan. In the following days, many more provinces and cities rapidly fell to the Taliban. By August 15th, the Taliban had completely encircled Kabul and began entering the city overnight. The Afghan president fled the country, and the central government of Afghanistan collapsed.

The following day, fearing reprisals from the Taliban, thousands of Afghans fled to the safety of the last remaining NATO presence at HKIA. By the morning of August 16th, all air operations were temporarily shut down at HKIA due to the influx of thousands of civilians seeking military protection in and around the airfield. Order was regained through assistance of newly arrived troops from the 24th MEU (1/8 Marines), CENTCOM SPMAGTF (2/1 Marines) and the 82nd Airborne Division (1/82). During the two-week non-combatant evacuation operation (NEO), military flights departed HKIA approximately once every 34 minutes. A single military C-17 aircraft evacuated a record 823 Afghan citizens during the earliest days of the NEO.

Under the threat of terrorist attacks, military personnel continuously worked the entry control points at HKIA. Medics provided care for victims of Taliban violence. Due to high temperatures and crowded conditions, multiple casualties were treated for dehydration, heat exhaustion, and crush injuries. All patients requiring significant medical care were transferred to the NATO Role II-Extended (Role II-E) for stabilization and medical evacuation. As the crowds surged, infants and small children were passed to Marines standing along the protective walls to avoid being crushed to death. Several dozen infants and children were kept at the Role II-E until they could be reunited with caregivers and evacuated.

Approximately 1700 hours on August 26th, a single ISIS-K terrorist infiltrated the crowd and detonated a suicide vest at the Abbey Gate, killing at least 183 people, including 13 American servicemembers. An estimated 200 people were wounded by the attack. Tactical Combat Casualty Care (TCCC) and LTOWB resuscitation was initiated near the point of injury with rapid evacuation of both military and civilian victims to the Role II-E as well as the 82nd Airborne Role II Forward Resuscitative Surgical Detachment (FRSD). The Role II-E received 63 casualties. The Role II FRSD received 9 casualties. Surgical teams performed 13 cases, including thoracotomies, laparotomies, external fixation of fractures, fasciotomies and peripheral vascular interventions. Multiple patients were initially managed non-operatively and expeditiously evacuated for intracranial, spinal, orthopedic and maxillofacial injuries. Ninety-three units of blood products were administered. A robust walking blood bank capability ensured additional units were available if required. During the ongoing mass casualty event, an Afghan baby was delivered.

Within minutes of the explosion, the first of 3 US Air Force C-17s carrying aeromedical evacuation (AE) crews and Critical Care Air Transport Teams (CCATT) were launched from Ramstein Air Base, Germany, and Al Udeid Air Base, Qatar. Within 15 hours, 32 US and Afghan casualties had been evacuated from HKIA in the largest single day aeromedical evacuation in US Air Force history. Patients were evacuated to Landstuhl Regional Medical Center (LRMC) and facilities in Qatar. All surviving patients were eventually transferred to Walter Reed National Military Medical Center.

Following the MASCAL, medical staff reset equipment, re-sterilized surgical sets, replenished blood stores and prepared for possible follow-on terror attacks. Fortunately, no additional significant casualties occurred. In the remaining three days, military medical assets departed in planned phases; this allowed for surgical coverage and aeromedical evacuation of remaining servicemembers until all troops departed. On the evening of August 30th, the last US servicemembers safely departed HKIA.

LESSONS LEARNED FROM HKIA

In potential MASCAL planning, medical planners must clearly demonstrate that the medical response should be appropriately proportionate to the threat plus the number of people impacted. Providers must be clear with commanders/administrators to buy down on risk. Knowing all military personnel had to leave the country in the next several days, it was imperative for medical planners to communicate with their non-medical superiors the continued need for a large trauma surgical footprint at HKIA. This was done well. The sustained and augmented surgical footprint was eventually required and the planning paid off.

Due to logistical constraints, one of the US Army surgical teams arrived with minimal equipment, other than what they hand carried off the aircraft. Fortunately, other surgical teams were able to donate equipment and that team was able to find additional medical supplies in shipping containers full of surplus medical equipment. During the MASCAL, the 82nd Role II (274th FRSD) successfully functioned using equipment they expeditiously acquired.

During the initial days of the evacuation, multiple international surgical teams were set up in multiple separate locations. The Norwegian and US NATO Role II-E leadership opened the hospital to all surgical teams. Good relationships between international surgical teams were forged through cooperation during prior deployments and international training events. During the MASCAL, one critically injured US Marine was simultaneously cared for by a UK anesthesiologist, US Army trauma surgeon, UK orthopedic surgeon, Norwegian scrub tech, and US Air Force trauma surgeon. The “non-doctrinal” flat organizational structure amongst multiple Services and nationalities worked remarkably well.

By 2021, the United States had been at war for nearly 20 years; however, the operational tempo of combat casualty care had significantly decreased from the volume seen in Afghanistan and Iraq several years before. Many medics, providers, and Servicemembers had no prior deployment prior to HKIA. Active mentorship by senior veteran providers and medics occurred throughout the deployment. Pre-deployment training, MASCAL planning, and adherence to Joint Trauma System Tactical Combat Casualty Care (TCCC) and Clinical Practice Guidelines paid off. A retrospective Department of Defense review of the trauma care provided at HKIA stated there were zero preventable deaths.

During the evacuation, thousands of Afghan citizens had to leave their belongings behind. Vehicles and baggage began littering the streets throughout HKIA. In the overnight hours prior to the MASCAL, senior medical leadership used bulldozers to keep corridors leading to the Role IIs open for casualty flow. The triage space immediately outside the hospital was kept clear. It is ESSENTIAL to understand that time is life. Whether that time is being used to ligate a bleeding mesenteric artery during surgery or driving through a cleared street, the clock is ticking.

Successful management of casualties requires doing the small, seemingly clinically insignificant things well. The efficient movement and transfer of casualties are essential. Use down time to your advantage. Rehearse to the point of failure and repeat. Assume breakdowns at every level and plan accordingly. Utilize a PACE plan (Primary, Alternative, Contingency, Extremis). Stay switched on—if your intuition tells you something, do it. Rehearse down to the last detail. Bottlenecks in care should be anticipated and worked through. Examples include knowing lock combinations and vehicle key locations. The additive sum of these factors improves time to definitive hemorrhage control which saves lives. Free throws and layups win games.

At the Role IIs, medics were paired with trauma providers in the triage area. The rapid assessment of casualties combined with the continued performance of critical TCCC and whole blood administration worked well. During the initial surge of casualties, full trauma bays, ORs, and packed hallways required providers and medics to maintain mobility as they worked on casualties in the triage area. When medics are integrated with surgical teams during training, it encourages the medics to think like surgeons and teaches surgeons to think like medics. In a military setting, surgical assets may be near the point of injury, where the roles of both surgeons and medics overlap. Anticipating loss of power or infrastructure, civilian institutions should train similarly. The 82nd Role II performed all surgical procedures without the use of surgical suction, electrocautery, OR tables, or surgical lighting.

The initial MASCAL surgical volume outnumbered the available number of surgical tables. Despite doubling the OR capacity by utilizing litter stands, some ATLS and surgical procedures were performed in suboptimal locations. One US Army surgeon cared for a critically injured Marine while the patient was lying on a NATO litter in the hallway. The patient had received multiple fragmentation injuries to the face and torso. Due to airway compromise from an open mandibular fracture and facial injuries, a surgical cricothyroidotomy was performed. Subclavian access was placed for rapid whole blood transfusion. Bilateral tube thoracostomies were performed revealing a massive right hemothorax. Shortly after, the patient went into cardiac arrest. A resuscitative thoracotomy was performed with open cardiac massage. After two units of whole blood, ROSC were obtained, an extended clamshell thoracotomy was performed. Right sided pulmonary tractotomies were performed. ALL of these procedures were performed on the floor with a surgeon, CRNA, and medic. The patient survived and returned to active-duty status. Pre-packed surgical and anesthesia rucksacks containing enough equipment for a single surgical case allow for

surgical mobility and damage control surgery, despite the location. In this case, the concept of the “OR” was not a location, but a mindset.

Throughout the MASCAL, surgical teams were updated by medical leadership. Understanding the big picture outside the OR may help surgeons make vital decisions during MASCALs regarding patient re-triage. During a MASCAL, these considerations include the number of remaining patients requiring urgent surgical intervention, available units of blood products, the ongoing tactical/scene situation, and expected arrival times of aeromedical evacuation aircraft. In one case, a surgical patient required 55 units of blood products due to significant truncal and junctional vascular injuries. Intermittent aortic cross clamping occurred multiple times during the case. Surgical decision making was aided when the incident commander updated the surgeon stating, “Don’t stop, keep going, we have plenty of blood left.” The patient survived.

Walking blood banks provided fresh, warm whole blood to some MASCAL patients; however, most patients received cold stored whole blood. Patients suffering coagulopathic bleeding improved significantly when given fresh, warm whole blood versus cold stored whole blood. Activation of a walking blood bank quickly replenished HKIA blood supplies. Topical hemostatic agents including Combat Gauze, Everest, and Tachosil were utilized. The use of topical hemostatic agents for blast injured patients with multiple fragmentation wounds may decrease the number of blood products in resource limited settings. As LTOWB administration in civilian trauma centers and pre-hospital settings becomes the norm, the utilization of walking blood banks should be considered and planned for future civilian mass casualty scenarios where a banked blood resupply is inadequate or unavailable. Following the MASCAL, activated walking blood banks ensured blood was available for potential additional casualties. A total of 86 units of blood were available for use immediately following the MASCAL.

Once all casualties were evacuated from HKIA, surgeons utilized official and commercially available mobile platforms (WhatsApp and Signal) to communicate with their peers in Germany. The 9.5-hour flight allowed for the operative planning and coordination of care for all 33 patients transferred to Landstuhl Regional Medical Center (LRMC). Emergency credentialing was approved allowing German surgical subspecialists to assist in care. Upon notification of the MASCAL, an Air Force pediatric surgeon and pediatric critical care physician voluntarily travelled through the night from the UK to arrive in time to receive patients at LRMC. Surgeons at LRMC performed 65 cases in the first 48 hours.

For most, the deployment was short. The mass casualty event only lasted 15 hours. Despite this, some two years later, reflecting upon the event remains painful. We tend to remember our losses much more vividly than our wins. Many of the providers, nurses, medics, and patients have developed lasting friendships and a mutual support network that remains today. Take care of your team. When you find yourself in a similar MASCAL feeling inadequate for the task, understand the choices you made long before the event placed you there. A commander once told me, “Every decision you have ever made in your life has led you to this point tonight. You’re the right person.” Get in the fight and stay in it until it’s over. During these times, team members experience a purpose in their profession unlike anything prior; despite developing an aversion to the experience, they will paradoxically spend the rest of their life desiring the opportunity to be in that position again.



Marine Corps Staff Sgt. Darin T. Hoover, 31, of Salt Lake City, Utah.

Marine Corps Sgt. Johanny Rosariopichardo, 25, of Lawrence, Mass.

Marine Corps Sgt. Nicole L. Gee, 23, of Sacramento, Calif.

Marine Corps Cpl. Hunter Lopez, 22, of Indio, Calif.

Marine Corps Cpl. Daegan W. Page, 23, of Omaha, Neb.

Marine Corps Cpl. Humberto A. Sanchez, 22, of Logansport, Ind..

Marine Corps Lance Cpl. David L. Espinoza, 20, of Rio Bravo, Texas.

Marine Corps Lance Cpl. Jared M. Schmitz, 20, of St. Charles, Mo.

Marine Corps Lance Cpl. Rylee J. McCollum, 20, of Jackson, Wyo.

Marine Corps Lance Cpl. Dylan R. Merola, 20, of Rancho Cucamonga, Calif.

Marine Corps Lance Cpl. Kareem M. Nikoui, 20, of Norco, Calif.

Navy Hospitalman Maxton W. Soviak, 22, of Berlin Heights, Ohio.

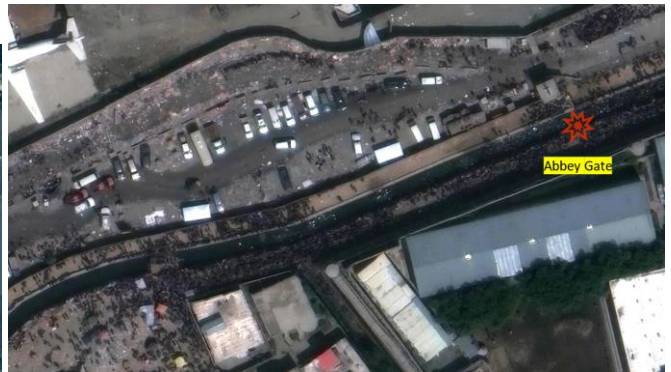
Army Staff Sgt. Ryan C. Knauss, 23, of Corryton, Tenn.

TABLE 1. Summary Table of the Abbey Gate Surgical Patients Cared for by NATO and US Forces

Patient Demographics and Receiving Location	Injuries	HKIA Operative Management	Disposition
Marine, Male (Army Forward Surgical Team)	Small bowel, extremities	Exploratory laparotomy, multiple small bowel resections with discontinuity, temporary abdominal closure	Serial washouts and abdominal closure. Survived to return to active duty
Afghan, Male (Army Forward Surgical Team)	Hepatic, renal, inferior vena cava, extremities	Exploratory laparotomy, transdiaphragmatic pericardial window, hemostasis of liver injury, right nephrectomy, supraceliac aortic cross clamp, repair of multiple IVC injuries, temporary abdominal closure, bilateral tube thoracostomies	Expired in Germany
Afghan, Male (pediatric) (Army Forward Surgical Team)	Colon, duodenal, hepatic	Exploratory laparotomy, lysis of adhesions, right hemicolectomy with discontinuity, duodenal repair	Serial washouts and abdominal closure. Survived to discharge in United States
Marine, Male (NATO Hospital)	Pulmonary, extremities	cricothyroidotomy, resuscitative clamshell thoracotomy with cardiac massage, aortic cross-clamping, pulmonary tractotomies, and exploratory laparotomy	Serial washouts and chest closure. Survived to discharge in the United States
Afghan, Male (NATO Hospital)	Popliteal artery, extremities	Shunting of popliteal artery injury, fasciotomy	Definitive reconstruction of popliteal artery with saphenous vein. Survived with limb function
Marine, Male (NATO Hospital)	Mesenteric, junctional femoral artery and vein, pulmonary, extremity	Exploratory laparotomy, small and large bowel resections, fasciotomies, shunting of femoral artery	Required brief ECMO support in the United States for pulmonary embolism. Survived but required right upper and left lower extremity amputations
Afghan, Female (pediatric) (NATO Hospital)	Hepatic, retroperitoneal	Exploratory laparotomy, complex hepatorrhaphy, Zone I and II retroperitoneal explorations, abdominal packing	Serial washouts and abdominal closure, neck exploration and removal of retained foreign bodies. Survived to discharge in the United States
Afghan, Female (pediatric) (NATO Hospital)	Small bowel, large bowel, mesenteric, retroperitoneal, open femur	Exploratory laparotomy, small bowel and low anterior resections with discontinuity, ligation of bleeding mesenteric vessel, abdominal packing, right femur external fixation	Serial washouts and abdominal closure. Femur fixation. Survived to discharge in United States
Marine, Male (NATO Hospital)	Cardiac tamponade, proximal aortic injury	Clamshell thoracotomy	Expired in HKIA operating room
Marine, Male (NATO Hospital)	Penetrating injuries	Resuscitative thoracotomy	Expired in HKIA trauma bay
Marine, Male (NATO Hospital)	Penetrating injuries	Resuscitative thoracotomy	Expired in HKIA trauma bay
Afghan, Male (pediatric) (NATO Hospital)	Penetrating injuries to abdomen and upper extremity	Exploratory laparotomy (negative). Debridement and washout of wounds and external fixation of distal open antebrachial fracture	Evacuated in stable condition to Children's Hospital in Germany.



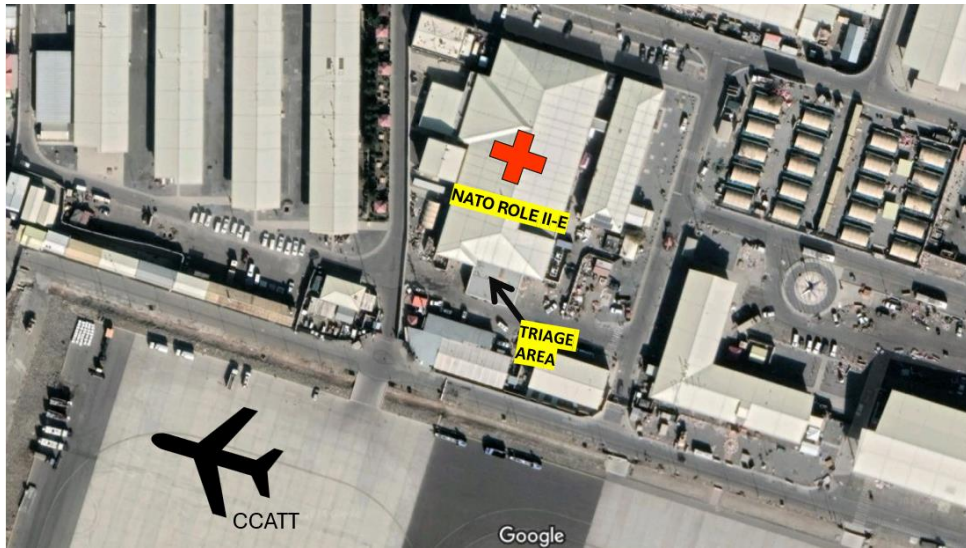
Abbey Gate immediate post-blast (DoD via AP)



Abbey Gate (NYT)



Abbey Gate prior to the attack (NYT)



Google Maps

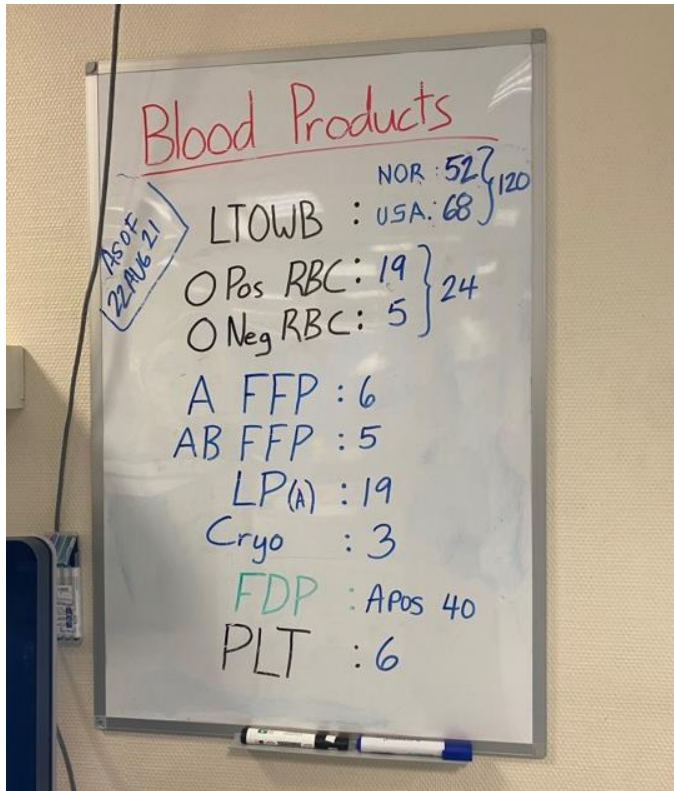


NATO Role II-E Trauma Bay



82nd Role II Field Sterilization





Top Picture-82nd Role II (274th FRSD) during MASCAL; Bottom Picture-Blood products were accurately displayed and updated at all times, which improves surgical re-triage decision making

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MANAGING AN ESCALATING SITUATION AT THE SOUTHERN BORDER

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Too much of southwest border (SWB) policy is governed by rhetoric and ridicule rather than a measured, purposeful approach at modernizing our Nation’s immigration system to meet the needs of national and economic security. Because the United States is dependent on migrant labor from an economic standpoint, as well as what Ronald Reagan described as our status as “...the beacon on the hill” for so many, managing migration flows will always be of a challenge. Since May 2023, an unprecedented hemispheric migration surge has presented a myriad of challenges at the SWB. Each day, during these surges, more than 10,000 migrants can be encountered between port of entry, and more than 1,000 present each day seeking asylum at the ports of entry. A robust health system at the SWB is essential to ensure both the health security and the public health integrity of border and interior communities alike.

MANAGING AN UNPRECEDENTED SURGE

In a similar fashion to trauma centers and healthcare systems, a surge in demand for care requires space first. Because of the migration surge, DHS and CBP have been forced to expand our holding capacity to ensure space to “process” migrants who have been apprehended making unlawful entry into the United States. To provide a sense of scale, during a prior surge in mid-2020, CBPs holding capacity was around 10,000 persons. This capacity has now been increased to the point where holding 20,000 persons in custody each day is uncomfortable but not unusual. The migration surge has forced the use of novel strategies to ensure migrant safety and for this capacity expansion. The extensive use of soft-sided facilities allows DHS to expand holding capacity without building a more expensive, permanent facility. These facilities include wrap around service contracts that provide sanitation, food, and medical services necessary to ensure appropriate conditions for migrants in custody and frontline personnel. Higher numbers of migrant encounters require deliberate and coordinated actions to ensure individuals in CBP custody are held in safe and sanitary conditions and unaccompanied children or other vulnerable populations are appropriately cared for until they are transferred out of CBP custody. Figure 1 shows representative images of a typical soft-sided CBP holding facility.

Figure 1. DHS CBP Typical Soft-Sided Holding Facility

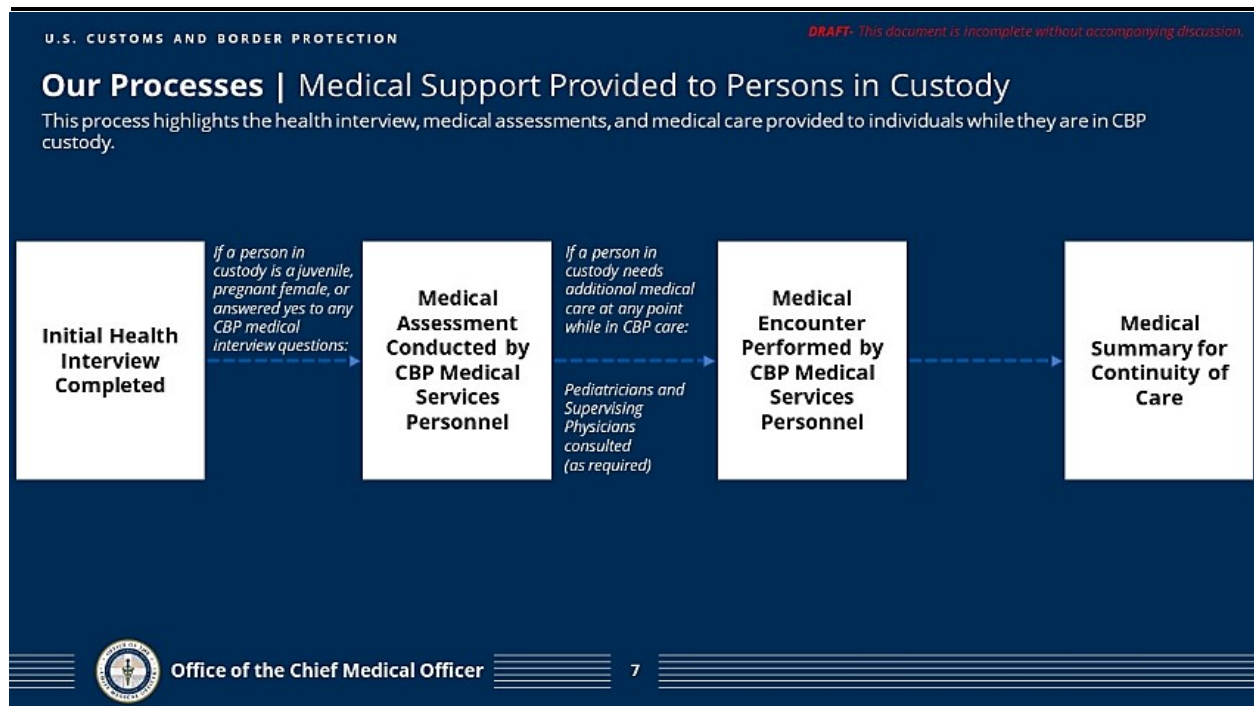


Courtesy, AP News.

CBPS BORDER HEALTH SYSTEM

The medical portion of CBP’s mission is complex, and the rapid fluctuations in the volume, demographics, and location of arriving migrants have required constant adaptation to evolving medical requirements. The BHS consists of 94 medical units across 82 CBP facilities situated in strategic areas across the 1,954 miles of the SWB. These facilities are located in all four SWB states and have been placed in a strategic fashion to ensure maximum coverage of migrant flow volumes. Figure 2 shows the strategy utilized by the Border Health System to ensure a rapid, efficient health screening for migrants taken into custody.

Figure 2. The DHS CBP Border Health System Approach



Although recently renamed the CBP BHS, the foundations of this system have been in place since the unfortunate deaths of three children in 2018. This caused the Department of Homeland Security to deploy experts to assist both U.S. Customs and Border Protection (CBP) and U.S. Immigration and Customs Enforcement (ICE) with health/medical/public health issues. As directed by then Secretary Nielsen, priorities for care remain currently to:

- 1) Eliminate preventable deaths related to the migration crisis along the SWB;
- 2) Ensure the integrity of our bio-surveillance system with regards to protecting the United States from an intentional attack or the unintentional risk from an infectious or communicable disease; and
- 3) Provide the best possible, humanitarian medical care to those in U.S. Government custody along the SWB – the right care, to the right person at the right place/time.

Despite challenges, our goals remain the same.

A DEATH IN CUSTODY: 2023

Many healthcare systems learn hard lessons from less-than-optimal outcomes – the CBP BHS is no exception. In response to the death of Anadith Reyes in May 2023, significant improvements had to be made to ensure that the BHS was adapting and evolving to an ever-changing landscape on the SWB. Critical improvements included:

- Enhanced collaboration and communication to expedite processing and transfer of those with elevated in custody medical risk
- Improved medical services contract management and operations
- Enhanced medical monitoring while in CBP custody
- Improved clinical documentation through more rigorous, detailed, and automatic record keeping
- Enhanced / relocated isolation unit operations to soft-sided facilities with greater resources

DEFINING ELEVATED IN-CUSTODY MEDICAL RISK (ECMR)

CBPs Border Health System fills a unique part of the CBP mission, as there is no analogous healthcare system worldwide. CBP is a law-enforcement agency without dedicated detention capacity. Facilities are designed, as they have been since its inception, for short-term holding alone. For example, compare a similar state or local law enforcement agency. There simply isn't one that has an embedded healthcare system as a part of their temporary detention of those accused. However, because of the unique nature of migration, the prevalence of families and the incredible challenges most migrants endure en route to the United States, this system is an essential part of both border security and national security.

One critical and recent project involved identifying and defining the conditions that place an individual at elevated in-custody medical risk (ECMR). Part of responding to any disaster or crisis involves the standardization of responses to ensure minimum variability. The ECMR definition is now standardized across all the detention or custodial occupancies in the Department of Homeland Security. ECMR is used to ensure that those migrants at ECMR are not detained any longer than necessary to ensure they are not a threat to the United States. Additionally, those at highest ECMR are enrolled in enhanced medical monitoring during their time in custody at CBP facilities.

A CRITICAL UPDATE: ELECTRONIC HEALTH RECORDS

Documentation of care is a critical function of any healthcare system. Yet the BHS until relatively recently, was operated as a federation of contracted medical units, not a true healthcare system. Originally designed by USBP agents to solve a problem at the time and to simply document the care provided in CBP facilities, the growth of the CBP Border Health System is threatening to outpace the functionality of the EHR. Future efforts to continue to modernize the DHS CBP BHS will likely require conversion of this record to one that is modernized, includes updated decision support and can communicate with receiving hospitals and health departments around the United States.

CONCLUSION

Healthcare system operations are challenging in the best of situations. When faced with an unprecedented surge of migrants intending to cross the United States southwest border, DHS and CBP were forced to adapt a Border Health System to ensure the wellbeing of those in our custody and to ensure the continued integrity of healthcare systems and the public health infrastructure not only along the SWB but also the interior of the United States.

VEHICULAR TERROR ATTACKS: THE TEXAS BUS STOP MASSACRE

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Brownsville is a city located in the southernmost part of Texas. It is situated on the Gulf of Mexico, near the border with Mexico. Here are some key points about Brownsville:

1. **Location:** Brownsville is in Cameron County, Texas, and it is part of the Rio Grande Valley region. It is located at the southern tip of Texas, across the border from the Mexican city of Matamoros, Tamaulipas.
2. **Population:** 16th largest Texan city
 - a. Brownsville, TX – 183,000 people
 - b. Matamoros, MX – 750,000 people (adjacent sister city)
3. **Economy:** Brownsville's economy is diverse, with sectors such as international trade, agriculture, manufacturing, and healthcare playing significant roles. The city's proximity to the border contributes to its importance in cross-border trade and commerce.
4. **Border Crossing:** The Brownsville – Matamoros International Bridge connects Brownsville to Matamoros, Tamaulipas, Mexico, facilitating trade and travel between the United States and Mexico.
5. **Education:** Brownsville is home to the University of Texas Rio Grande Valley, which has a campus in the city. The university plays a crucial role in higher education in our region.
6. **Culture and Events:** The city has a rich cultural heritage with influences from Mexican, American, and other cultures. It hosts various cultural events, festivals, and celebrations throughout the year including Sombrero Fest.
7. **Natural Beauty:** Brownsville is close to the Gulf of Mexico and offers access to beautiful beaches and natural areas. The region has a warm climate, making outdoor activities popular.
8. **Space Industry:** Brownsville gained attention in recent years due to the presence of SpaceX's Boca Chica launch site, located nearby. SpaceX conducts tests and launches of its Starship rocket from this site.
9. **Energy Industry:** NextDecade announced in June, 2023 that they will be constructing an \$18.4B liquefied nitrogen gas plant at the Port of Brownsville.

HISTORY

Originally inhabited by indigenous tribes such as Coahuiltecan and Karankawas, the region was first discovered by Europeans in 1519. Jose de Escandon brought the first European settler families to the region in 1746. At that time, the primary settlement was named San Juan de los Esteros and Congregacion del Refugio, later named "Matamoros." Initially controlled by Spain, until Mexico's Independence in 1821, the entire region became part of disputed territory between the US and Mexico after the Texas revolution in 1821 and then the annexation of Texas to the USA in 1845. Brownsville was started as a Mexican war outpost during these battles, eventually becoming a city of its own. During the civil war, Brownsville became a "backdoor to the confederacy" since products (such as cotton) could be taken across to Mexico and shipped out from there avoiding Union blockades of Confederate port cities. Eventually Brownsville became connected to the rest of the USA via the railroad allowing Brownsville to continue growing as a part of the US economy. Today the city has a population of 183,000 and is worth \$7.5 Billion, quadrupling its wealth in the past 15 years. SpaceX/Starbase lie just outside the city of Brownsville, where rockets are currently being launched from an area called "Boca Chica". The city continues to grow with a planned \$18 Billion energy project for the Port of Brownsville on the horizon.

TRAUMA SYSTEM

The Rio Grande Valley is made up of the most Southern four counties of Texas – Cameron, Hidalgo, Starr, and Willacy. These four counties make up segment 'V' of the local Texas Regional Advisory Council (TRAC-V). The system of trauma regionalization was mandated by Texas in 1992. TRAC-V has been operational since 1993.²

The 22 RAC's of Texas are designed to oversee regional care of Trauma, Cardiac, Stroke and Neonatology. These specialties have a large amount of high acuity patients, many times requiring transport within or even outside of the region. RAC's are designed to distribute power among the various providers involved in caring for these patients including physicians, nurses, administrators and emergency medical service providers (EMS). The governing body consists of a board led by a chair and with various positions reserved for both hospital systems personnel alongside EMS providers. TRAC-V plays a critical role in raising awareness and educating EMS providers in our region by funding an annual symposium on South Padre Island as well as multiple courses throughout the year.

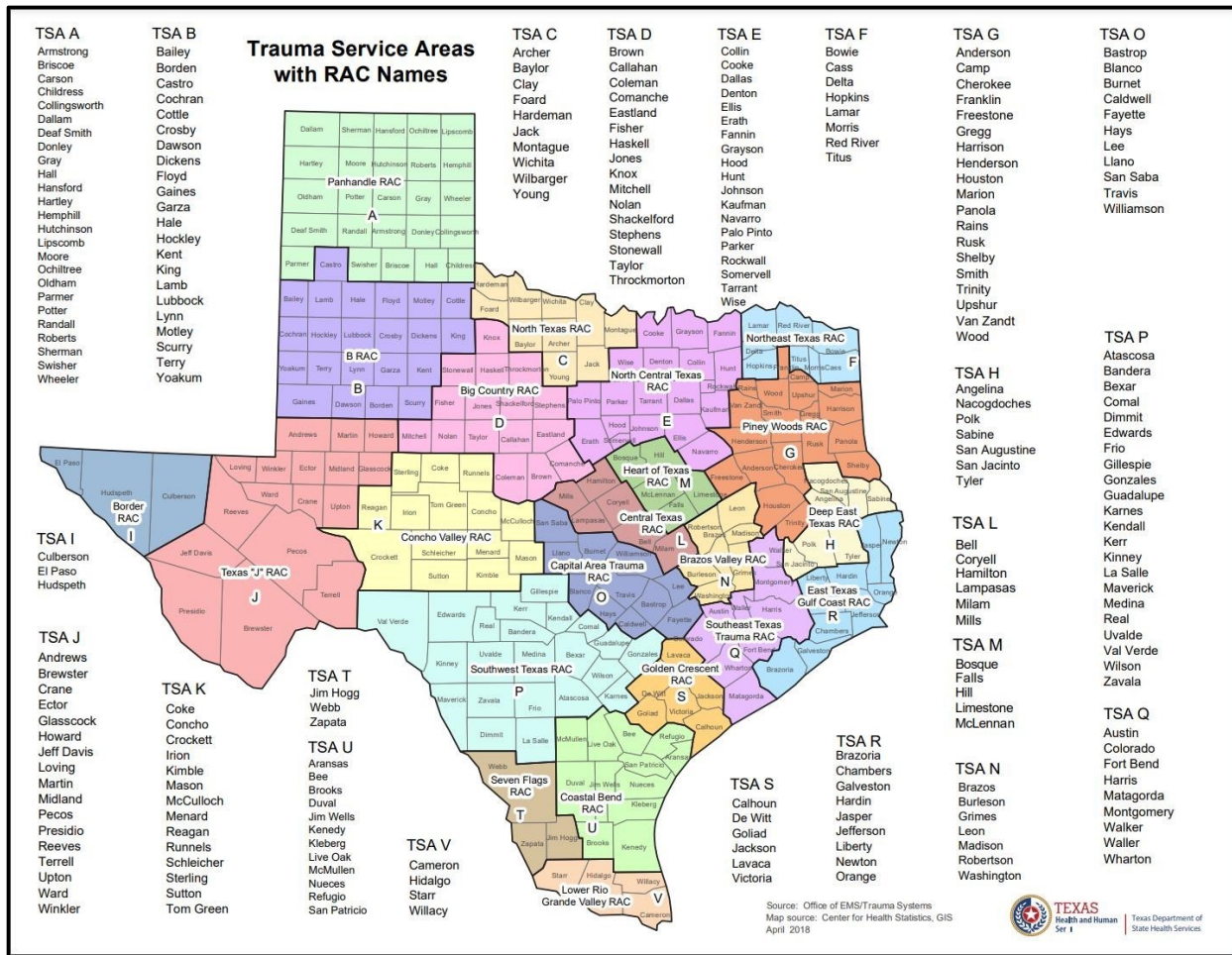


Figure 1. Trauma Service Areas with RAC Names

LOCAL EMS

The primary provider for 911 EMS calls in the city of Brownsville is Brownsville Fire Department (BFD). BFD covers an area of 250 square miles including 3 international Bridges as well as the port of Brownsville. They provide structural firefighting, airport rescue firefighting, haz-mat response, dive rescue recover response, 911 and non-emergency ambulance services and fire prevention. They have an annual operating budget of \$21,000,000 dollars and 206 full-time unit formed personnel (primarily dual certified firefighter/paramedics) working out of 9 fire stations.



BFD has a mobile medical unit which can care for up to 16 patients at a scene; it was used often during the COVID-19 pandemic and especially during spring break week on South Padre Island. They also possess a mass casualty trailer that can treat up to 50 trauma patients. BFD is backed up by neighboring EMS of Los Fresnos and Port Isabel through mutual agreements. There is rotor support out of the mid-valley (Weslaco) via an Air Methods EC-130 helicopter.

TRAUMA CENTERS

The RGV contains 12 trauma centers including levels 1-4. Within the city of Brownsville exist two Level 3 trauma centers (Valley Baptist Medical Center – Brownsville (VBMC-B) and Valley Regional Medical Center (VRMC)), backed up by a Level 2 trauma center (Valley Baptist Medical Center – Harlingen (VMBC-H) 30 minutes away and two level 1 trauma centers (McAllen Medical Center and DHR Health) one hour away.

The region has experienced a ramp-up in trauma capabilities in recent years. There are now two general surgery residencies, an emergency medicine residency, a surgical critical care fellowship as well as ECMO capabilities, all developed within the last decade.



Figure 2. Level 1-4 Trauma Centers

THE EVENT

On Sunday, May 07, 2023, a 34 year old male with a history of charges for driving while intoxicated, ran a red light at the corner of Minnesota Ave. and Houston Ave. in Brownsville, Texas, shortly before 0830 while driving a grey range rover. At 0829, a “command page” went out to all Emergency personnel in the region. Report was that there was a major accident involving automobile vs. pedestrian with victims. Initially, law enforcement controlled the scene. Initial EMS on scene recognized the gravity of the situation and called for backup and rotor support immediately. The first arriving EMS officer on the scene became the incident commander. Shortly after, a Lieutenant showed up and took control as incident commander. The Healthcare coalition (HPP) and TRAC-V were notified to allow for large scale coordination. EMS began transporting the majority of patients to the two level 3 trauma centers within Brownsville, with a select few being taken directly to the level 2 trauma center in Harlingen. Two were later transferred from level 3 centers to a level 2 trauma center. 18 total persons were hit by the SUV. Seven died at the scene, with another dying later in hospital for a total death toll of 8 persons. 10 additional persons were injured.

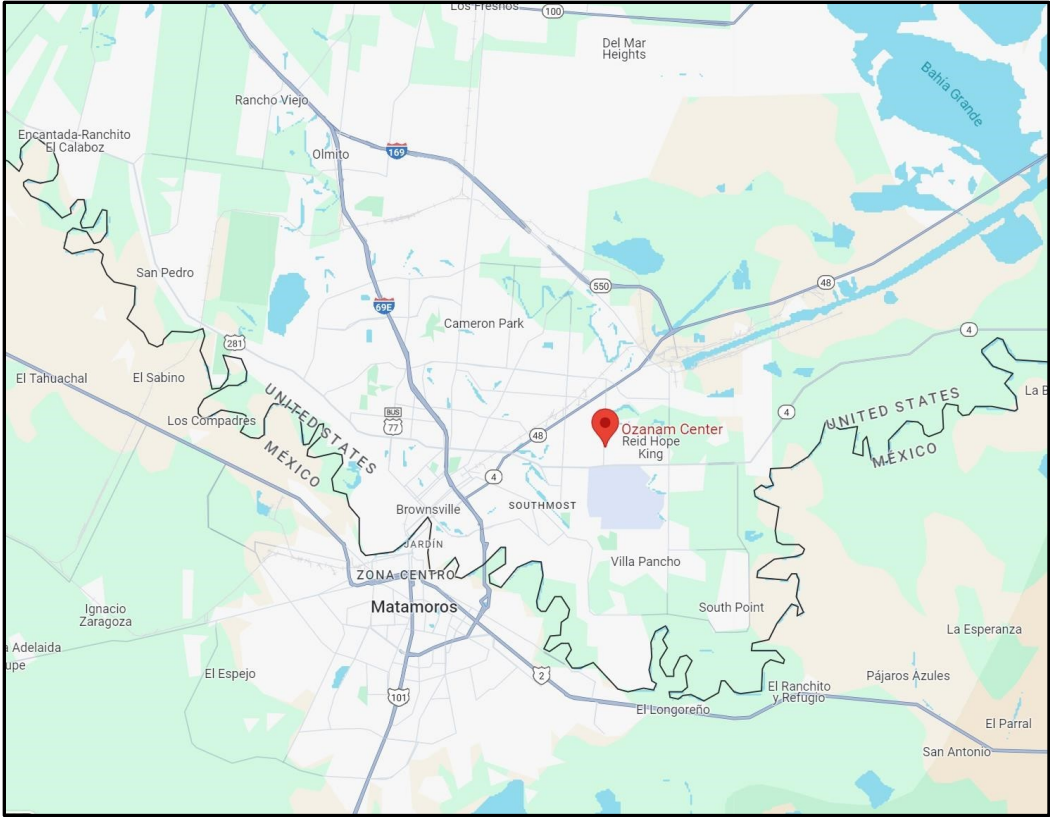


Figure 3. Location map of Ozanam Center



Figure 4. Scene investigation

SEQUENCE OF EVENTS

0829	Dispatch receives report of a MVC involving grey range rover near Ozanam center
0830	3 Units dispatched to an auto versus pedestrian x3
0831	1 of the arriving engines requested back up
0832	Dispatch now reports 15 injured patients at the scene
	2 more units are requested by on scene engine
	First unit arrived to the scene Another medical unit dispatched
0835	Dispatch is advised to notify the local hospitals that they have multiple trauma patients
	Additional unit dispatched to location
	Medical unit reports 10 critical patients at location and multiple dead on scene
	Assistant chief requested Los Fresnos EMS for mutual aid
0836	More units dispatched to location
0837	2nd unit arrived to the scene
	Requests traffic control
0838	3rd unit arrives at location
	Assumes incident command
0839	Request output page for command staff
	4th unit arrives at location
	Port Isabel EMS mutual aid requested
	Rotor support requested
0842 – 0847	7 more units arrive at location
0849	1st patient transferred to VBMC-B
0853 – 0857	2 units transport to VRMC 1 unit transport to VBMC-B
0858	1st patient arrives to VBMC-B
0903	VBMC-H advised that they would be receiving trauma patients
0905	2nd patient arrives to VBMC-B
0907	0907
0909	1st patient arrives to VRMC

0911	Transporting two patients to VBMC-H including last ground patient transport
0922	Rotor lands at scene
0934	Obtunded male tries to steal a border patrol unit at the location which causes a border patrol response
0936	Walking wounded that had initially left scene now returns requesting assistance
0938	Rotor leaves scene transporting patient to VBMC-H
0947	Transporting walking wounded to VRMC

Table I. Sequence of Events

PATIENT LIST

Injuries	Destination	Survival
SAH, L Clavicle Fx	VRMC (III)	YES
LLE Amputation, Open book Pelvic Fx, L5 Fx	VRMC (III) → VBMC-H (II)	YES
SDH, SAH, R Clavicle Fx	VRMC (III)	YES
Scalp laceration	VRMC (III)	YES
R arm ecchymosis	VRMC (III)	YES
B/l femur Fx, Open L Tib/fib Fx, Unstable pelvic Fx	VRMC (III) → VBMC-H (II)	YES
Open skull fx, ICH w/ midline shift and herniation, facial Fx	VBMC-B (III)	NO
SAH, basilar skull Fx, C1 Fx, Spleen IV	VBMC-B (III)	YES
L1 TP Fx	VBMC-H (II)	YES
T5-L4 Fx, Pelvic Fx, L acetabulum Fx, R Elbow Fx, R Toe Fx	VBMC-H (II)	YES
C1/2 ligament injury, L ft/ankle fx	VBMC-H (II)	YES
R knee edema, Neck pain	VBMC-H (II)	YES
Open R Ft Fx, L open femur Fx, L Patella Fx	VBMC-H (II)	YES

Table II. Patient List

DISCUSSION

How does a trauma system along the US-Mexico border respond when an SUV suddenly plows into a crowd of migrants at a bus stop? It was only by working expediently that EMS workers were able to transport the survivors to nearby hospitals and save the majority of them. In hindsight, it was very fortuitous that the incident occurred on a Sunday – there were many EMS units available, as there was a paucity of incidents compared to a normal work day. Without the well trained EMS personnel, more people would have died. One of the migrants at the scene was to be an EMS / firefighter in Venezuela, and he applied a make shift tourniquet to one of the victims, successfully stopping the bleeding!

An important lesson to learn is that with the influx of many additional people to an area (in this example, in the form of migrants), mass casualty incidents can occur anytime, anywhere, not just during their crossing into Texas. These migrants were casually waiting at a bus stop on a pleasant spring morning and still did not escape harm. Debriefing the case at the regional level with the RAC and HPP was very beneficial for all involved parties. All involved parties need to be notified early! When you have a MCI, you may suddenly find yourself short-staffed when it comes to specialists. Many times they provide on call coverage of multiple local hospitals. It is very likely that an MCI will exhaust your supply of on call specialists. Some variation of redundancy is necessary to try to accommodate for this possibility. On the plus side, zero patients required transport outside the Rio Grande Valley. Until the recent upscale of trauma resources in the region, any major trauma victims were transported out of the region to San Antonio, 250 miles away. Interestingly, it appears the COVID-19 pandemic acted as a catalyst for growth of healthcare capabilities in the region.

Another commonly overlooked resource is mental support for the survivors and EMS workers who were at the scene. When they do recover, other than group therapy, 1:1 sessions with a psych provider can be immensely helpful. BFD started peer support groups and had their chaplain provide sessions, and Homeland security provided counselors from day one

Finally, we learned that an MCI is not over in a single day. It begins at the time of incident and persists for many months. Things like ongoing investigations, mental support for PTSD, and so forth can continue to occupy one's time and mental space for a long time.

FIRST DO NO HARM: THE WAR IN UKRAINE

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In February 2022, the unprovoked but expected invasion of Ukraine by Russian forces led to a massive humanitarian tragedy. Previously, in the Budapest agreement, Ukraine agreed to voluntarily surrender all its nuclear arsenal (Ukraine has the third largest in the world) in return for guaranteed security of its internationally recognized borders.

Historically, this was the 24th assault on Ukraine by Russia. After signing the Budapest Accords, Ukraine focused its resources on building up civilian infrastructure and developing a free market economy with a target of joining the European Union and possibly NATO (North Atlantic Treaty Organization). This focus and lack of military spending left the country vulnerable to an invasion by outside forces, particularly Russia.

After the invasion, NATO and WHO (World Health Organization) with the assistance of several NGOs (non-governmental organization) tried to address the medical crisis using principles learned from previous conflicts, for example Iraq, Afghanistan, and so on, but this response has had mixed results. What worked in these previous wars does not necessarily apply to the war in Ukraine. Unlike those previous conflicts, Ukraine lacks air superiority in the battlefield, and this results in prolonged evacuation times, and lack of adequate supplies and trained personnel. Organized safe evacuation resources and coordination of care between overwhelmed military hospitals and civilian hospitals and a medical education system still rooted in old Soviet Union policy, have led to significant morbidity and mortality.

TOURNIQUETS

The proper application of tourniquets and length of time they are left in place has led to significant increase in preventable limb loss and rhabdomyolysis with subsequent renal failure. Some estimates suggest that 30% or more of applied tourniquets were not necessary. The concept of applying tourniquets as high up on an extremity as possible has resulted in unnecessary muscle necrosis. The CAT-7 remains the gold standard for quality of tourniquets, but with limited resources, Ukraine has had to rely on multiple other sources. There are several reports of tourniquets breaking during application. This seems to be especially the case with cheaper Chinese models. Since they break more frequently, it is jokingly said that these tourniquets have saved more lives than the higher quality tourniquets. The transport time from field to hospital could be 24 or more hours, and there are inadequate numbers of medics to watch and care for all the injured soldiers, so “release tourniquet and check for ongoing bleeding at 1-2 hours after initial application” is limited.

A universal training program for all medics using best practice management guidelines is being started now, two years since the war began.

EDUCATION

Prior to February 2022, Ukraine trained more physicians from Asia and Africa than any other European countries. Ukrainian medical education was still deeply rooted in the old Soviet Union system. A lack of appreciation of the value of nurses and therapists still existed. Trauma surgeons and critical care as recognized disciplines did not exist. Many of the surgeons sent to the front-line hospitals were general surgeons with no formal trauma training or gynecologist, urologists, otolaryngologists, or other subspecialists. There was no formal pre-deployment training program in trauma.

The healthcare system as it was set up did not offer any opportunity for patient follow up or feedback to frontline surgeons to improve the care being given. Communication between hospitals, especially military to civilian, is inadequate. There is no one person or board that directs all healthcare. The Ministry of Health runs in parallel with the Ministry of Defence; coordination of programs is limited. Over 50 well-meaning NGO's have stepped in to help, but there is no coordination of training programs, and there is wide variability in the quality of the training.

MedGlobal was the first NGO to place trauma surgeons in red zones of conflict and continues to run training programs that parallel ASSET and ATLS.

The David Nott Foundation also runs training programs and assisted in the translation into Ukrainian of several trauma care books and videos for YouTube.

Acceptance of training is also an issue. Students have said, "I know what you are teaching me is correct, but I still have to do what my commander tells me to do." Available medications, surgical instruments, antibiotics, limited access, and ability to deliver medication have dampened good patient care. Providing surgeons with working high quality surgical instruments have been challenging. There is no formal system for front line surgeons to go up the chain of command to obtain the exact resources they need. We failed to dedicate enough time and attention to building the logistics for coordinated care.

Bureaucracy on both sides, the United States and Ukrainian, remains a problem. Reportedly, over 20 million dollars appropriated in the USA 2023 budget for medical assistance to Ukraine remains untouched. There is over reliance on volunteers to aid.

Antibiotic use and abuse is a major problem. Initially WHO guidelines were followed, but it is not unheard of to see patients who received eight different antibiotics in a weeks' time. Part of the problem is what antibiotics are being donated to Ukraine and no hospital wide infectious control team at each facility.

The Ministry of Health now has a separate department for multidrug resistant pseudomonas, and Acinetobacter infections are a growing concern. This problem arose partly from the philosophy that in antibiotic use, "more is better". Currently, the use of ceftriaxone has been stopped due to resistance.

MEGA-DISASTER - A RETROSPECTIVE: WHAT "WENT RIGHT;" WHAT "WENT WRONG." DID LESSONS LEARNED IMPACT FUTURE RESPONSES?

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A mega-disaster is defined as an unexpected natural or man-made catastrophe of exceptional magnitude and/or causing unusually severe or unprecedented damage. Many books and guidelines for disaster planning build on analysis of mega-disasters. However, most disasters in the United States have NOT been mega-disasters. Further, in most mega-disasters, there may be relatively few victims surviving to be transported to a hospital for treatment, as occurred on 9/11, Hurricane Katrina, and others. Even the Sandy Hook school shooting is not considered a mega disaster **from a medical response standpoint**, in that only two victims survived to be transported/treated for medical care. For our purposes, medical disaster response, the definition is expanded to include hospitals receiving an overwhelming number of casualties beyond the ability to evaluate and treat.

Hospitals tend to plan for small and mega disasters in a similar manner, and it is important to learn from the similarity and differences. All disasters, large or small, are disruptive to the routine running of a hospital.

This talk focuses on some major principles of medical disaster response built on lessons learned

- Importance of pre-planning – a **working** disaster response plan that is **developed by all stake holders**
- Importance of hospital resources/infrastructure. "Fix" what prior disasters have revealed "ain't working"
 - To the extent that it can be afforded, invest in
 - new technology and processes
 - Structural modifications/additions that proved inadequate in the past
- When possible, stockpile critical supplies and/or have supply chains in place
- Communication
 - reliable in-hospital communications systems that can function independent of the availability of electricity
 - Inside hospital – all members of response team
 - Physicians and nurses
 - Staff

- C-Suite
 - With all involved groups/agencies
 - Press
- Triage – Who? Where
- Managing hospital personnel – Who leads in each area?
 - Pre-assigned roles of responsibility
 - Pre-planned call-in
- Managing unexpected numbers of patients (when hospital beds are already occupied)
 - ER
 - OR
 - ICU
- Safety of hospital personnel
- Crowd control
 - Medical and hospital personnel
 - Families
 - Others
- Developing an effective central command center
- Planning for potential outages/loss, i.e., power, EMR
- Patient tracking and ID

Key lesson Learned on what NOT to do: Do not over-prepare beyond the best estimated needs.

Remember the Rule of 10s exists for most disaster in the US:

- In mega-disasters, only 10% of those directly involved in the disaster survive the initial event
- Among the 10% initially surviving, only 10% have a medical condition significant enough to seek medical attention
- Among the 10% seeking medical attention, only 10% will require major intervention

Another major lesson is understanding the multiple levels of patient illness or injury:

- Dead and dying patients (futility)
- Severely wounded, but with survivable injuries
- Walking wounded - need only minor medical attention (can be rendered in any local first aid station, and do not need to be in a hospital emergency room)

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SESSION 2

**AUDIENCE INTERACTIVE SESSION – Ethical, Moral, and Legal Risks in
Disaster and MCI Care**

Co-Moderators: Matthew J. Martin & Tanya Egodage

Sunday, April 14, 2024

10:15 – 12:00 NN

Palace Ballrooms 1-2

Palace Tower

Emperors Level – 4th Floor

ETHICAL, MORAL AND LEGAL RISKS IN DISASTER AND MASS CASUALTY EVENTS

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INTRODUCTION

A mass casualty (MASCAL) event is one that exceeds the available resources at a facility or healthcare system. It generally requires a paradigm shift from individual ethics to population ethics, meaning that providers must transition from offering the highest standard of care to each individual patient, to providing the greatest benefit for the community at large. Creating a framework for management of these ensures for fewer failures in disaster response. The American College of Surgeons (ACS) acknowledges that surgeons often play an important role in disaster response and encourages all surgeons “to obtain an appropriate level of education and training in the unique principles and practice of disaster and mass casualty management, and to serve as role models in this field.”¹

When hospitals experience a “surge” in volume or a disaster scenario, standards of care may change. Generally, providers function with conventional standards of care (SOC), in which optimal care and resources are provided to the individual patient. Contingency standards are those in which care to the individual patient is adjusted, but remains equivalent. Crisis standards of care require major adjustment of care. The Institute of Medicine has published on Crisis Standards of Care.² Under this jurisdiction, there is a change in fundamental healthcare operations and levels of care provided to patients. It occurs over a sustained period of time, is made necessary by an either pervasive or catastrophic event, and generally acknowledged formally by a governmental entity.³

In preparation for a MASCAL scenario, it is imperative to consider ethical principles. Usually, physician decision-making is led by three tenets: ethical, moral, and legal ideologies. These are defined below.⁴

1. **Ethics:** Values and reasoning that direct an individual’s behavior in his or her activities, particularly used in reference to professional conduct. In the 1979 textbook entitled Principles of Biomedical Ethics, Beauchamp and Childress defined the four guiding principles of medical ethics: autonomy, beneficence, non-maleficence and justice.

2. **Morals:** Standards of behaviors and beliefs concerning what is and is not acceptable, particularly used in reference to personal conduct. Morals are often based upon an authority, such as the Bible.
3. **Standard of care (legal):** The care which an ordinary, prudent professional with the same training and experience in good standing in a same or similar community would practice under the same or similar conditions. An “average” standard does not apply because in that case at least half of any group of practitioners would not qualify.
4. **Standard of care (medical):** Appropriate treatment based on scientific evidence or widely accepted guidelines and collaboration between medical and/or psychological professionals involved in the treatment of a given condition. Note that pro bono (free) or emergency bystander care (i.e., “good Samaritan care”) is not exempt from these requirements.

Furthermore, medical ethics are governed by four principles: beneficence; non-maleficence; autonomy; and justice.⁵

1. **Autonomy:** All persons have intrinsic and unconditional worth, and therefore, should have the power to make rational decisions and moral choices, and each should be allowed to exercise his or her capacity for self-determination.
2. **Beneficence:** The obligation of the physician to act for the benefit of the patient.
3. **Justice:** Fair, equitable, and appropriate treatment of persons
4. **Non-maleficence:** Obligation of a physician not to harm the patient

The primary ethical principle in normal medical encounters is Autonomy. However, in mass casualty or disaster scenarios the principles of Beneficence and Justice become of foremost concern. Despite multiple reviews, publications, and training courses available to prepare for a MASCAL, a minority of physicians and healthcare providers are abreast of these. Furthermore, ethical, moral, and legal questions arise despite optimal preparation. In this review, we describe several MASCAL scenarios and quandaries associated with them in attempts to curb potential future misadventures.⁶

Scenario 1: Personal Risk/Responsibility

Although we have neared the completion of the Coronavirus-19 (COVID-19) pandemic, review of the last several years has raised discussion that may guide future policy and plans. Hospitals and healthcare systems are fraught with the repercussions of the pandemic, including staffing and supply chain shortages. Healthcare providers were faced with challenging decisions, and, although the majority chose to participate fully during the pandemic, many felt the burden of moral distress in caring for patients.

Several questions arose during the pandemic. To what extent does the physician duty to treat outweigh that individual’s autonomy. Additional caveats include elderly physicians, those with comorbidities, or with ailing family members. Overwhelmingly, physicians chose to rise to the occasion and contribute in times of need. However, specific scenarios warrant further discussion. Several professional organizations created management recommendations for professional conduct during the pandemic. The American Medical Association published in its Code of Ethics that physicians are obliged to provide urgent medical care during disasters, “even in the face of greater than usual risks to the physicians’ safety, health, or life.” The American Heart Association (AHA) recommended that medical personnel should NOT delay chest compressions nor defibrillation in order to don appropriate personal protective equipment (PPE), regardless of the COVID-19 status of the patient. Physicians, however, are a finite resource, and care for future patients is commensurate on the protection of physician well-being. This bodes the question, how does one balance the ideas of beneficence and non-maleficence to the patient with physician autonomy

and safety? Although guidelines specific for each scenario are difficult to create and enforce, one must consider preservation of healthcare providers as a limited resource in contrast to patient well-being. Interestingly, the ACS does not comment on the obligation to report for duty, particularly if it puts the life of the surgeon at risk.

Scenario 2: Obligations of healthcare providers to risk personal injury/illness

The increasing number of mass shootings necessitate an increased need for field hemorrhage control, as evidenced by the ACS “Stop the Bleed” campaign. Surgeons are well-equipped to provide care and hemorrhage control, whether in the hospital or in the field. To what end does professional obligation warrant intervention? The conflict between patient autonomy and provider well-being became particularly evident during the 2017 MASCAL shooting in Las Vegas, during which time medical personnel were present as members of the audience. Basic life support tenets require one to ensure scene safety prior to administering medical intervention. For the case in which shooting terminates but a perpetrator has not been secured, should surgeons and providers commence medical treatment, as advised by several professional societies, or is personal safety paramount? This applies to any active shooter scenario. Several national organizations hold varying opinions. The Federal Emergency Management Agency (FEMA) allows for physicians to conduct a personal risk assessment at the time of inquiry. The Joint Commission advocates for personal survival. The Department of Homeland Security (DHS) and the American Medical Association (AMA) advocate for a patient-first strategy, and American College of Emergency Physicians (ACEP) as well as the American Association for Emergency Medicine (AAEM) make no recommendations. Suffice it to say this is a point of personal imperative, and one in which algorithms have not been developed to balance the safety of medical personnel with patient beneficence.

Scenario 3: Cyber-attacks as a novel disaster scenario

Medical care has become increasingly dependent on technology, with hospital systems worldwide utilizing electronic record databases. These vast networks of hard-wired and wireless technology leaves facilities vulnerable to exposure. Cybersecurity has become such a national risk that a National Cybersecurity Strategy was released in early 2023.⁸ Despite encryption, data security, and management, health systems remain a target for bad actors who wish to capitalize from access to protected health information, resulting in substantial financial costs and personal loss. These agents are at times well-funded and may be supported by foreign governments. The average expense incurred per cyberattack approximates \$11 million for a hospital system, with a total annual expenditure of \$25 billion, nationally.⁷ Breach of cybersecurity by malicious software may cripple a healthcare facility, debilitating an organization’s technical infrastructure and prevent the entity from accessing its own data. These breaches may disrupt time-sensitive care and routine hospital function for weeks to months. In 2022 alone, 707 infractions were noted in healthcare, with an estimated 52 million patient files compromised. A cyberattack as recent as November of 2023 resulted in rerouting of ambulances to different hospitals.⁸

In the past, cyber attacks have required hospitals to halt certain operations and divert care to surrounding facilities or systems. Prevention of widespread collapse of infrastructure requires integration of private and public sector agents. Health systems must adequately maintain backup hardware systems, with ability to resume partial function as able. Cybersecurity incident response plans should be implemented to ensure healthcare facilities are able to manage ransomware attacks.

Preparation requires the following:

1. Hazards vulnerability analysis
2. Plan for continuity of operations
3. Incident command team operations

Hazards vulnerability analysis should include critical operations and technology. These include pharmacy, radiology, laboratory and pathology services, as well as blood bank, critical care areas, infant and child areas, and nutrition services. Establishing pathways to ensure accurate ordering and dosing of medications with attention to drug interactions, communication of test results, and movement of patients must be discussed, with preparation to minimize and accommodate disruption of services. Outside hospitals may or also suffer from compromised infrastructure, and contingencies made if so.⁹

Facilities must instate a continuity of operations system ensuring function during lack of availability to electronic systems. These include a paper charting and ordering system, with alternate mechanisms to print patient records and tags, an emphasis on warm handoffs and ability to transfer patients within a facility. Access to critical laboratory and radiology testing and reporting is imperative as well, specifically as it relates to critical pathology such as stroke or trauma. Use of personal devices may be required to communicate with healthcare providers and ancillary staff members, although communication may also include two-way systems. Organizations should consider adequate staffing models, with or without the use of outside contractors. Leaders should consider rescheduling or canceling elective surgical procedures, although adequate communication between patients and the facility should be managed appropriately. Additionally, frequent unit huddles and leadership rounds can maintain communication amongst staff. It is imperative that facilities establish regional communication with contingency plans for transfer of patients who are appropriate to transfer. Furthermore, any breach potential of function must be communicated with medical device providers to ensure the integrity of said devices.⁹

As with other crises, an incident command team can address the actual technological breach in an appropriate manner. This team must also communicate with internal and external audiences, as well as regional facilities. Local law enforcement and cybersecurity vendors should be contacted. Cyberattacks require initial restriction of electronic transfers, with gradual restoration of credentials for necessary staff members. This must be conducted in such a way to attempt to identify the transgressing party by preserving relevant logs and data. Generally, all didactic training activities are terminated during this time, and trainees maintained for clinical function.

Given the profound implications of a cyberattack, healthcare entities are bound by federal, state, and local reporting requirements. Legal involvement may assist in maneuvering breaches of data protection and reporting. Hospitals may be found negligent in the event of failure to maintain appropriate safeguards or contingency plans. Reporting to the Cybersecurity and Infrastructure Security Agency (CISA) is required within 72 hours of occurrence of the incident. “Substantial” breaches requiring reporting include the following:⁸

- Unauthorized access to your system
- Denial of Service (DOS) attacks that last more than 12 hours
- Malicious code on your systems, including variants if known
- Targeted and repeated scans against services on your systems
- Repeated attempts to gain unauthorized access to your system
- Email or mobile messages associated with phishing attempts or successes

Ransomware against critical infrastructure, including variant and ransom details, if known.

Scenario 4: Transfusion restrictions and “futility” in medical disaster response

A contemporary resurgence of blood transfusion for those in hemorrhagic shock has resulted in increased demands for blood donation and maintained blood products as scarce resources. In times of crises, this already precious resource becomes even more scarce, requiring rationing. This was somewhat apparent during the COVID-19 pandemic, and shortages must be considered during a disaster or MASCAL. In fact, the American Red Cross declared its first ever blood crisis in early 2022. With critical shortages, transfusion limits should be considered, especially in the event of a MASCAL. Irrespective of a disaster, researchers in the civilian setting advocate for massive transfusion limits, although the military literature seems to support higher transfusion limits. Authors also suggest the integration of additional clinical parameters in the assessment of transfusion limits. In essence, providing efficient and timely blood transfusions results in life-saving intervention. Unfortunately, in the setting of a disaster, one must triage patients in concordance with population ethics. Which triage criteria warrant transfusion? Certainly those considered expectant or moribund would be excluded. Does injury pattern matter? Is a salvageable extremity or junctional injury more or less amenable for transfusion than a central injury? Furthermore, as it pertains to triage, do physicians/ surgeons or government officials warrant increased resources over others? Is advanced age considered a contraindication for transfusion and does this same standard apply to clinicians and government officials? Military literature may support increased transfusion limits given the generally young and healthy cohort of those included in their reviews. In the event of a MASCAL, in which we are unable to quantify pre-existing comorbidity status, how does one assess survival?

In addition to transfusion, consideration of additional aggressive interventions warrants discussion. Specifically, what role does resuscitative thoracotomy (RT) plan in a MASCAL. In routine care, RT has been recommended for use in penetrating trauma patients who arrest within 15 minutes of presentation to the hospital, and rarely in blunt trauma patients. RT may additionally be considered for educational purposes or in the event of organ procurement. In times of disaster, however, surgeon and physical resources remain critical. Recommendations outlined in the Joint Trauma System Clinical Practice Guideline reject the use of RT during a multiple or mass casualty event, in attempts to preserve these resources. The case for RT use in MASCAL is perhaps negligible, but one could consider specific scenarios in which a patient may benefit, including a young patient with a singular penetrating wound to the chest who appears to be in periarrest, or a patient with exsanguinating extremity or junctional hemorrhage who also remains in periarrest. If RT is undertaken in the multiple or mass casualty setting there should be a clear and rapid determination of potential survivability with immediate termination of efforts if ROSC is not achieved. There should also be a strict limitation on the use of blood products in these patients, again with immediate termination of transfusion unless rapid return of a perfusing rhythm is obtained and the patient is felt to have survivable injuries. In any event, the decision to perform RT should not be taken lightly, and performing this under disaster conditions may lead to demise of other salvageable patients. In any event, the decision to perform RT should not be taken lightly, and performing this under disaster conditions may lead to demise of other salvageable patients.

Scenario 5: Palliative care vs euthanasia

Among the difficulties of a MASCAL scenario is the management of unsalvageable or expectant patients. In addition to those expectant from the results of acute injury, several vulnerable populations may fall within the scope of symptomatic treatment. These include patients with pre-existing hospice or palliative care requirements, patients previously dependent on the healthcare system (ventilator-dependent, ECMO), prior life-threatening or terminal conditions, and those with advanced disease housed in long-term facilities. Management of this vulnerable group falls secondary to the management of salvageable patients, however, these individuals should ideally be cohorted to an alternate area of care and, resources permitting, be provided therapies for symptom relief.

Palliation offers the ability to manage expectant patients humanely, while offering comfort and maintaining resources for others' survival. While some consider palliation a luxury during a MASCAL, others argue that it is a necessity. To account for this group, a MASCAL plan should consider an alternate care area in which palliation may occur. Success is dependent on availability of personnel and additional resources including medications. Often, providers may exercise skills outside of their general area of expertise, but should have some knowledge of analgesics and anxiolytic dosing and titration. Pain and shortness of breath are two of the most likely symptoms requiring intervention. Efforts to provide palliation have been described in several prior events, including Hurricane Katrina and the earthquake affecting Haiti. In Haiti, proponents of palliative care advocated for cohorting of patients and administration of analgesics, and that not doing so would cause undue suffering. Dissidents argued that this would expend valuable resources.¹⁰

In Hurricane Katrina, providers with knowledge of analgesics and anxiolytics were assigned to a group of expectant patients. Retrospective review of this care brought to light several questions. In fact, whistleblowers identified possible cases of homicide rather than palliation. Clinicians were charged with homicide in an historic precedent. Prosecutors argued that supratherapeutic doses of analgesics or anxiolytics were utilized in providing euthanasia to patients, resulting in their deaths. Although the charges were expunged, this highlighted an important conversation about the limits of practice within a MASCAL.¹¹ Palliation in this, and any circumstance is appropriate insofar that it provides comfort, but does not hasten death. What those providers considered appropriate management came to be viewed as euthanasia by reviewers. The idea of criminalization of physician decisions during a MASCAL will inevitably result in reluctance of participation, and may have dire results. However, patient protections must continue despite altered standards of care, and prosecution may ensue if malpractice is suspected.

Scenario 6: Post-event Actions and Wellness

In the midst of COVID-19, healthcare workers were championed as heroes. However, this is a misnomer, forgetting the struggles that workers endure and continue to endure. Rates of physician burnout vary widely in the literature, ranging up to 80%. Unfortunately, there is no singular definition of "burnout," and no accepted screening mechanism. Perhaps a better characterization is moral distress, which can ensue after any one of the following situations:¹²

- Circumstances which contradict one's moral beliefs and expectations
- Having to make decisions that affect the survival of others or where all options will lead to a negative outcome
- An act of commission (performing something that goes against one's beliefs)
- An act of omission (failing to do something in line with one's beliefs)
- Witnessing or learning about such an act
- Experiencing betrayal by trusted others

A review presented at the AAST in 2017 by leaders experienced with mass casualty events noted significant physical and emotional stress that came from caring for patients during crisis scenarios. In instances in which the hospital staff were separated from their families and unable to return home, care providers faced additional stressors. The need to maintain a fresh team to assume clinical duties meant forcing staff to sleep, eat, and rest even when they may be motivated to keep working. This fact held true for team leaders, including the panelists themselves, who found it difficult but necessary to designate and adhere to personal time limits and to delegate leadership responsibilities to others. Finally, ensuring the health and safety of personnel meant starting infectious disease testing and prophylaxis as necessary as

needle sticks and exposure to blood and body fluids were ubiquitous. The group encouraged early psychological counseling for all staff who participated in caring for patients during the MCI.¹³

The Substance Abuse and Mental Health Services Administration (SAMHSA), which is run through the Department of Health and Human Services (HHS), provides resources to survivors and healthcare professionals. They provide an around-the-clock technical assistance center. The website offers support for responders dealing with disasters and includes, but is not limited to, techniques about sleep hygiene, eating habits, avoidance of substance use, and encouragement of physical activity, humor, and spiritual practice. Mindfulness techniques are also available. Compassion fatigue is also discussed. Guidance is provided on how and when to return to work. An application available to healthcare workers is available on their website with guidance on when to seek further professional assistance.¹⁴

Tips for Disaster Responders: PREVENTING AND MANAGING STRESS



Leaders should encourage rest and recovery amongst healthcare providers, and offer resources to maintain the health and well-being of their staff.

CONCLUSIONS

Mass casualty scenarios are fraught with ethical, moral, and medicolegal questions. When weighing decisions, physicians must consider population ethics and the general tenets of medical ethics. Discussions between physicians and review of prior data will serve to strengthen decision-making if these situations arise.

REFERENCES

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5. Varkey B. Principles of Clinical Ethics and Their Application to Practice. *Med Princ Pract.* 2021;30(1):17-28. doi: 10.1159/000509119. Epub 2020 Jun 4. PMID: 32498071; PMCID: PMC7923912.

SESSION 3

LUNCHEON SESSION

Moderator: Carlos V.R. Brown

Sunday, April 14, 2024

12:00 – 1:30 PM

Palace Ballrooms 1-2

Palace Tower

Emperors Level – 4th Floor

***“Formula 1 - A “Crash” course in Medical Response
and Motorsports Medicine”***

James Kempema, MD, FACEP

FIA Medical Delegate / Formula 1

Medical Response Physician

Medical Director Travis County EMS / STAR Flight

Affiliate Faculty, Department of Surgery and Perioperative Care

Director, Emergency Medical Services Education

The University of Texas at Austin

Dell Medical School

Austin, TX

SESSION 4

REALITY CHECK! ENGAGING THE C-SUITE

Moderator: Jayson Aydelotte

Sunday, April 14, 2024

1:30 – 3:00 PM

Palace Ballrooms 1-2

Palace Tower

Emperors Level – 4th Floor

1:30 – 3:00

“Fixing” the Disconnect Between Hospital Administrators and “Boots on the Ground”

Interactive Audience Participation Session

- **Creating C-Suite Buy-in For Emergency Management**
- **How to Create a MASCAL Plan that Works!**
- **Triage Officer: Who to, and Who NOT, to Choose and Why**
- **Culture of Movement: How to create an environment that safely moves patients around your hospital and maximizes your effectiveness**
- **The Culture of Movement: Mastering the Vertical Evacuation**
- **Purging Units: How to Move Patients OUT of the ED and ICU**
- **What Now? How to Get Patients OUT of the Hospital**
- **When the EMR Fails!**

3:30 – 4:00

Break & Visit Exhibits

Emperors Ballroom, Palace Tower

Emperors Level – 4th Floor

CREATING C-SUITE BUY-IN FOR EMERGENCY MANAGEMENT

Elizabeth Garrasi, MS, CHEP, CEDP

Enterprise Director
Emergency Management and Business Continuity
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Healthcare emergency management programs are essential to hospital operations. While several programs saw renewed interest from the C-suite throughout the COVID-19 pandemic, too many remain undervalued and under resourced. Hospital emergency managers must continually demonstrate the relevancy of emergency management to secure funding for mitigation and preparedness initiatives such as equipment and training. This is challenging as emergency management is typically a non-revenue generating department. To overcome this barrier, emergency managers must build relationships with the key stakeholders, compile and present data effectively, and create opportunities for engagement.

Relationship-building with senior leadership is necessary for a successful emergency management program. The Joint Commission requires senior leadership engagement and oversight of hospital emergency management programs (*Joint Commission EM 10.01.01 EP 1, EM 17.01.01 EP 2*). Scheduling quarterly review meetings with the CEO and/or senior leadership report outs are both recommended best practices. The review meetings with the CEO or designated senior executive should provide an overview of current initiatives, program accomplishments, and any ongoing after-action improvements; however, the majority of the meetings should be spent listening. Learning what's important to senior leadership, what they worry about, and any organizational gaps they identify allows emergency management to find ways to better integrate the program into hospital operations. These meetings also enable the emergency manager to understand their audience and how they use data to make decisions.

Hospital emergency managers must dedicate some of their time to researching best practices, current events, and trends in the field. Compiling data on emergency incidents hospitals have experienced, such as bomb threats, violent intruders, and evacuations, is critical to developing justifications for program expenditures. Presenting not only the number of hospitals that have recently experienced significant emergencies or disasters, but also the lessons learned, helps senior leaders better visualize how similar situations would play out within their own hospitals.

Create opportunities for senior leaders to become involved, and personally invite them to participate. Executives have limited time, so the emergency manager must offer opportunities that add value for the leaders. Teach them something, give them something new to think about, or provide an alternate angle for them to consider. These engagement opportunities could be a training, exercise, simulation, or the annual hazard vulnerability assessment. Whatever the event, ensure they walk away with new information they didn't have before. Often these types of events can help plant a seed the emergency manager can continue to build upon.

Finally, if funding is received for a particular initiative, showcase the progress. Track and trend metrics that prove the positive impact the financial support has had on preventing or preparing for disaster. This is a critical step in the cycle where emergency managers can provide a clear report of the value, added and the executives can see the different funding has made.

5. For the Clinical People on the Panel: What key elements does the C-suite/Administrative leadership need to understand about MCI hospital response? What are their misconceptions?

6. For the Administrators: What do the clinical people need to know that they don't understand and admin MCI response?

HOW TO CREATE A MASCAL PLAN THAT WORKS!

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BACKGROUND AND CONSIDERATIONS

Most Mass Casualty Plans are enormous documents that cover way too much material, i.e., hundreds of pages in a binder. In a real MASCAL situation, a nurse in the emergency department, an anesthesiologist in the OR, or an intensivist in the ICU needs only to know what they are supposed to do and what they are responsible for locally on their unit. Sifting through a huge document is potentially harmful. Moreover, most of the plans weren't created by the end user or even involved them in developing the plan.

IDENTIFYING THE ACTUAL NEEDS OF THE HOSPITAL

The entire hospital needs a complete plan, no doubt about it. But the functional needs of the workers on the ground, including those in administration, need to have what is *pertinent to them* only. The most useful plan is one that the end user can reasonably read in a short amount of time and has limited action items that make sense and are doable in a stressful situation. One or two pages only! The coalescence of all these plans can exist in a binder somewhere in the bowels of the hospital on the safety officer or Trauma Medical Director's shelf. But the functional plans should only reflect the needs and actions of the individual units where they lie.

For example, the plan in the emergency department would be hanging on the wall in a big red folder, and inside are two pages: one with a map of the ED outlining where the triage area is and where the major movement will occur (trauma bays 1, 2, 3 as the emergent areas, 4-12 as Immediate, etc.;;) the other a set of descriptors, expectations, and tasks that the reader could comprehend and carry out. For example, "Emergency Department: You are acting as the main treatment area for the seriously injured casualties. LEADERSHIP: The Triage OFFICER is the Trauma Surgery Attending on-call until relieved by the Trauma Medical Director or her/his surrogate. The Triage Officer will direct all movement of patients into and out of the Emergency Department, nursing leadership is the charge nurse of the Emergency Department until relieved by the ED Nurse Manager or his/her surrogate. 2) COMMUNICATION: All communication inside the Emergency Department is done eye-to-eye. Communication outside the ED will be done with handheld radios. Go to the ambulance bay; there will be a security officer with radios. Get the one marked EMERGENCY DEPARTMENT, and tune to channel 3. And on it will go for another maximum 15 items. See attached sheet for our 7th floor's plan.

COLLABORATING THE PLAN

One of the biggest problems in coming up with a good, *functional* Mass Casualty Plan is getting buy-in from all the parties involved: clinical, administrative, and support services. *Most* hospital Mass Casualty Plans, including the mock training episodes, are developed essentially in a clinical or administrative vacuum. When the other side sees the plan, the typical response is something along the lines of, “who the hell came up with this nonsense!?” It’s imperative that whoever is going to own the plan must take *active* strides to involve the other two main players. Experience says they are more than welcoming to the idea.

Organizing a Functional Planning Group

Once the players have been contacted it’s time to organize an activity that is both efficient with everyone’s time *and* can actually produce a workable product. One way to do this is to organize a series of “retreats.” Nothing fancy, but two separate afternoons dedicated to 1) Introducing the topic to each separate clinical, administrative, and support area (Acute Care Floors, C-suite players, and Security/Traffic control, for example) 2) Presenting them your initial ideas of how things should flow in their areas 3) Getting their input on the same.

Then, the owner has some work to do. Document the collaborative plan from your notes. Send these to the respective areas. After this work is done, set another “retreat.” This time, your time expectation is about half of what the original time commitment was. At this meeting, the expectation is they have read your work, and at this time, each of you go over fine points to change the plans as you both see fit. Note, it’s pretty common for small details to have been overlooked at the first meeting and in the documentation process. This is the chance to make it all work well. Edit the documents right there together. At the end of this meeting, you now have a functional document.

MASTERING DEVELOPING A PLAN WORKSHEET

As the panel moves through the discussion of this topic, reflect on your institution, your unit, your resources and your knowledge to formulate answers or questions to take home to develop or learn about your hospital’s plan. Key concepts and questions are included here, TAKE NOTES(!), and bring them back to your home institution.

CREATING A MASCAL PLAN THAT WORKS
1. What are the major considerations for Developing the Mass Casualty Plan for the surgeons in the hospital?

2. What other medical specialties are involved in this planning process? Who is/are their leadership?

3. What are the major considerations for the C-Suite/Administrative leadership for Developing a Plan?

4. is the Administrative leader for Developing the Plan (who owns this?) Chief Medical Officer? Chief Nursing Officer? Chief Operating Officer? President/CEO?

5. For the Clinical People on the Panel: What does the C-suite/Administrative leadership need to know about Developing a Plan that they don't understand?

6. For the Administrators: What do the clinical people need to know that they don't understand in creating an effective MASCAL plan?

Attachment: Our 7th Floor's Actual Plan

THERE IS CURRENTLY AN INCIDENT IN PROGRESS THAT IS EXPECTED TO PRODUCE A SIGNIFICANT INCREASE IN PATIENT VOLUME AT DSMC- UT. READ THIS ENTIRE DOCUMENT FOR INSTRUCTIONS ON HOW YOUR UNIT IS TO PROCEED.

Your unit will be the secondary receiving area for delayed (Green) level patients.

- Initiate your call-in plan immediately.
- **DO NOT USE ANY ELEVATORS FOR PERSONAL USE. ALL STAFF MUST USE STAIRS ONLY.**
 - Elevators are reserved for PATIENT & SUPPLY MOVEMENT ONLY, effective immediately.
- 7th Floor WILL HAVE THE ONLY RED EMERGENCY RADIO FOR ALL DELAYED AREAS (INC. 7th/6th/5th/4th FLOORS).

The **Medical Leadership** for your area is

- **Internal Medicine Resident on call** until a more qualified Family Practice MD becomes available

Your workforce is

- Nursing and clinical assistant staff for your unit

Department Specific Information

- 7 NORTH will be moving ALL of their patients to 7 SOUTH. ALL ROOMS ON 7 SOUTH WILL NOW BE OCCUPIED BY 2 PATIENTS.
- You will be receiving patients into your hallway areas on cots or another patient movement device. (See Appendix B) These patients will be treated in the hallway until a care plan is formulated by the Medical Leader and the nurse responsible for the patient.
- Once a patient care plan is made for a patient in a hallway bed, the patient will be moved to an available room on 7 NORTH. Each room on 7 NORTH will also hold 2 patients.
- 7 SOUTH will also be moving their hallway patients into rooms on 7 NORTH at the discretion of the Medical Leader for your unit.

Normal Flow Procedure

- A **patient/injury list** will be kept by the Medical Leader for your unit
- The Primary Triage Officer for their designee will come to your unit to discuss patient movement, treatment, and priority for the OR
- When the 7th floor has filled all but 2 beds, the Medical Leader will contact the House Supervisor via the **Red Emergency Radio** located on the 7th floor
- All hallway patients will remain there until space in a room becomes available, the patient is moved to another care area (i.e. OR/ICU), or the patient is moved to another facility

Emergencies

- If a case arises that places a patient's life or limb in danger, IMMEDIATELY contact the Medical Leader for your unit. The Medical Leader will then contact the Primary Triage Officer using the **Red Emergency Radio** located on the 7th floor.

Documentation

- **CEASE ALL DOCUMENTATION IN COMPASS**
- Each patient’s care will be documented ON PAPER in pre-printed packets that should arrive with each patient to your floor. **Every patient should have a packet**
- When each patient arrives, place the numbered bracelet found in the front of the packet on the patient
- Extra downtime patient care packets for your floor can be found at each team station

Supplies/Resources

- Contact the DSMC- UT Incident Command Center DIRECTLY using The Clinical Disaster Status Report for any supply requests. They will address any needs that may arise that have not been previously noted.
- DO NOT MAKE ANY REQUESTS DIRECTLY TO SPD/CSP PERSONNEL.

7th CHARGE NURSE	Time	Initial
Read this entire Document.		
Complete Clinical Disaster Status Report. (Appendix A)		
Submit Clinical Disaster Status Report to Incident Command Center and pick up radio.		
Initiate Call-In Plan.		
Place direction signs near staff elevators and public elevators.		
Contact internal medicine resident on call. Direct them to come to your unit.		
Evacuate ALL rooms on 7 NORTH and move patients to 7 SOUTH.		
If indicated, contact Medical Leader for your unit when your floor is nearing capacity.		

TRIAGE OFFICER: WHO TO, AND WHO NOT, TO CHOOSE TO BE YOUR TRIAGE OFFICER AND WHY.

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BACKGROUND AND CONSIDERATIONS

The Triage Officer is the point person and lead clinical decision making agent in any Mass Casualty Incident (MCI). In usual circumstances, triage is performed by an experienced nurse in the emergency department and usually involves radio communication with Emergency Medical Service providers on the scene or in transport. But MCI's present unique sets of challenges that might require a different approach to triage, mostly centered around patient transport to the hospital, unique personnel challenges, and other triage needs throughout the hospital.

The Triage area is the focal point of the MCI. It is the place where all incoming patients are sorted into groups. While it might seem like a foregone conclusion in your hospital, it needs to be planned with several considerations that might be less obvious: single point of entry, under cover, close to the action, and potentially need a different traffic pattern for both EMS as well as the POV's that bring patients to the facility.

Casualty Transport

Many of the MCI's around the world, certainly in the United States, in the past 30 years are marked by a common patient transport theme that *doesn't* include any EMS vehicles or personnel. The vast majority of the severely injured are brought by POV, police, or carried in by bystanders. There is no call-ahead. There is no time to sort out which patient goes in which room. The vast majority of the triage is done at the door (in the Triage Area). Because this is so different than normal operations in your Emergency Department, it requires a different method of triage and usually a different Triage Officer.

Personnel Challenges

Most busy trauma centers run pretty lean from a personnel perspective. In an MCI, this is exaggerated to the extreme. The parceling out of nurses and techs in rooms becomes a full time job. There's very little (read: No) time to devote to manning a radio and performing *usual* triage methods. Glass half full: the patient's aren't coming to the hospital that way anyhow.

In addition to personnel shortages, two other unique personnel phenomena exist in an MCI:

1. The doctor and APP clinical workforce will need to be sorted along with the patients. Who is and how many are responsible for which trauma bays and which patients needs to be well thought out and sorted in an organized way.
2. The *very real* notion that certain care providers (surgeons, EM physicians, residents, APP's) exist on a spectrum of experience, competence, and confidence requires those groups to be sorted within that spectrum. *Not* addressing this up front as part of the planning process (in identifying the right Triage Officer) is not fitting with the reality of the situation and does not *put the odds ever in your favor*.

This is not in the normal operational function of the usual Triage Officer (nurse). Experience dictates using this person to triage these clinical providers is not functional or efficient for a variety of reasons, not the least of which is doctors hate getting bossed around by nurses. You're going to need to get another person...a doctor to be the Triage Officer.

Other Triage Needs of the Hospital

While most of the Triaging attention is focused on the Emergency Department, the reality will shortly become, as is the case outside of an MCI, *throughput out of the ED*. Essentially this will be three main areas: the delayed area, the OR, and the ICU.

The delayed area is pretty easy. There will be lots of beds, and this area will rarely run out of space or people.

The ICU is a bit more difficult. There are only so many beds with ventilators you can fit in your hospital. This needs to be triaged, both out of the ED (mostly isolated head injuries on the ventilator) and out of the OR (damage control cases, which are nearly all of them). This is a three-minute kind of process from decision to moving. The concept of using a House Supervisor/Bed Coordinator for this function is not doable. This needs to be run by a single person familiar with the ED, the ICU, and the OR.

The OR is the single greatest rate-limiting step of any MCI. Because of this and the limited number of OR's in your hospital, who *needs* to go the the OR *when* becomes a real issue. You can't really leave this up to each individual surgeon; they all think they and their patients are the most important thing on earth. Someone familiar with injuries and surgery timing needs to sort this out.

The best person for this job is the trauma surgeon. They are familiar with every area that needs sorting and have the clinical gravitas to command respect in all of them. Using different people to do this job (one for the ED, one for the ICU, and one for the OR) can lead to massive communication failures and is actually unnecessary. The normal ebb and flow of the event lends itself to the person out front in the triage area being able to tackle the sorting of all three just fine.

MASTERING IDENTIFYING A TRIAGE OFFICER

As the panel moves through the discussion of this topic, reflect on your institution, your unit, your resources, and your knowledge to formulate answers or questions; to take home to develop or learn about your hospital's plan. Key concepts and questions are included here. TAKE NOTES(!), and bring them back to your home institution.

4. Who is the Administrative leader for Identifying a Triage Officer (who owns this?) Chief Medical Officer? Chief Nursing Officer? Chief Operating Officer? President/CEO?
5. For the Clinical People on the Panel: What does the C-suite/Administrative leadership need to know about Identifying a Triage Officer that they don't understand?
6. v For the Administrators: What do the clinical people need to know that they don't understand?

CULTURE OF MOVEMENT: HOW TO CREATE AN ENVIRONMENT THAT SAFELY MOVES PATIENTS AROUND YOUR HOSPITAL AND MAXIMIZES YOUR EFFECTIVENESS

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BACKGROUND AND CONSIDERATIONS

The way patients move around the hospital in normal day-to-day operations CANNOT be the way patients move during an MCI. During an MCI, patients need to move into the ED to the delayed area and out of the ER to the OR/ICU, and all these movements need to be coordinated by a single person with nothing but opening room in the ER as the main outcome measure of success. This is going to require three main areas of change from normal operations: 1) A single point of contact in the Triage Officer and 2) Providing a real-time assessment of bed availability and 3) Changing the normal concept of nurse readiness and safety.

TRIAGE OFFICER AS THE FOCAL POINT PERSON FOR MOVEMENT

Normal patient movement requires several unnecessary steps to get a patient from point A to point B. A bedside nurse calls the charge nurse, who calls the bed coordinator, who calls the receiving charge nurse, who then calls the bed coordinator back, who then calls the originating charge nurse back, and, then, lets the bedside nurse know they are ready upstairs and then the sending bedside nurse calls the receiving bedside nurse for report. In reality, the only requirement (providing there is actual space at the receiving location) is that the nurse downstairs pops the breaks and rolls to where they need to go. This is such a huge change in behavior that it requires massive buy-in from the hospital leadership. The best person to make these decisions is the Triage Officer.

REAL-TIME BED AVAILABILITY ASSESSMENT

Because this is a one-person decision matrix, the availability of beds throughout the hospital in key locations (ICU/OR) needs to be communicated in real time. The best way to do this is in a planning session to outline exactly how many beds are available at any given moment and articulate what that looks like to the Triage Officer. This is best done by keeping a list of numbers of beds available, and as they get filled, the Triage Officer just checks them off. Pencil and paper have worked very well, but there are other modern methods available.

CHANGING THE CONCEPTS OF SAFETY

Normally, safety is wrapped in the common concepts of bed and nurse availability. Nurse availability is further wrapped into the concept of staffing ratios. In a MCI, most of the latter two go out the window. IF the hospital is full and more patients are coming NO MATTER WHAT, then bed space is the only real measure of availability. Nurses will have to staff patients in beds in a manner that they may not be used to. The overall goal of movement is to see patients then free the area for more patients, in the Emergency Department, to facilitate the biggest bang for the buck, which is normal ATLS: chest tubes, control the airway, stop external bleeding. You must practice this philosophy, and the C suite has to facilitate this mentality (and its practice) for success.

MASTERING IDENTIFYING A TRIAGE OFFICER

As the panel moves through the discussion of this topic, reflect on your institution, your unit, your resources and your knowledge to formulate answers or questions to take home to develop or learn about your hospital's plan. Key concepts and questions are included here, TAKE NOTES(!), and bring them back to your home institution.

Culture of Movement: How to create an environment that safely moves patients around your hospital and maximizes your effectiveness

1. What are the major considerations for changing your culture of movement for the surgeons in the hospital?
2. What other medical specialties are involved in this process? Who is/are their leadership?
3. Who is the Administrative leader for Changing Your Culture of Movement (who owns this?) Chief Medical Officer? Chief Nursing Officer? Chief Operating Officer? President/CEO?

4. Who is the Administrative leader for Identifying a Triage Officer (who owns this?) Chief Medical Officer? Chief Nursing Officer? Chief Operating Officer? President/CEO?
5. For the Clinical People on the Panel: What does the C-suite/Administrative leadership need to know about Changing Your Culture of Movement that they don't understand?
6. For the Administrators: What do the clinical people need to know that they don't understand?

THE CULTURE OF MOVEMENT: MASTERING THE VERTICAL EVACUATION

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Morgantown, WV

BACKGROUND AND CONSIDERATIONS

Patients are moved throughout all parts of the hospital all hours of the day and night, so it is often assumed that in an emergency, hospitals and healthcare professionals would be natural to this task. However, one only needs to reflect upon the impact of Hurricane Sandy on hospitals of NYC or Tropical Storm Allison on the Texas Medical Center to realize this task is really quite complex. This challenge comes in different stages, and each stage presents its own set of challenges that will also be unique, based on the individual hospital. In this segment of the panel, the identification of when, why, how, and to where will patients be moved will be explored.

DEFINING THE SCOPE OF PROBLEM

Delineating if the reason for evacuation of patients is simply a unit or more widespread is critical. If the entire hospital is disabled and will be for an extended period, then full evacuation may be required. Next it must be determined if the crisis is limited to the hospital or is it the entire region, as that will influence available resources. It will be imperative to have knowledge of what systems are working in the hospital to optimize the movement of patients.

IDENTIFYING AND TRIAGING PATIENTS FOR EVACUATION

While it is easy to say that those who can be discharged have orders written and presume they leave, it is not nearly that straightforward. If the hospital is disabled, then assistance down floors is needed, and appropriate medications, supplies and instructions are needed. Even in ambulatory patients, this will be a challenge in the dark and/or without elevators. If the region has been hit with a natural disaster, there may not be a possibility of family to retrieve the patients, and though discharged, the patients are still the hospital's responsibility.

The more pressing issue is the very critically ill. Consider which patients are the most complex or are in need of the most resources. Likewise, which patients require medications, supplies, or equipment that is the most limited. These patients are the ones that earlier evacuation can maximally free up other resources. Each institution will need to define who does the evaluation and prioritization. Consideration to prioritize between different units will be needed as well.

RESOURCES FOR EVACUATION

The team lead must have working knowledge of what systems are still functional, the destination of the patients, is there a midpoint staging area, how will patients be assessed, what medical assets will travel with each patient, who is available to help move the patients, what equipment is needed to accompany the patients, and what movement equipment does the hospital have? Specialty equipment to assist with vertical movement is available and can make the task much less labor intensive. Additionally, where the patients are going must be predetermined; there must be adequate beds, oxygen, ventilators, medications, etc., to provide the on-going care. Special consideration for having a mobile crash cart at all stages of the move in case of patient decompensation.

PACKING AND MOVING THE CRITICALLY ILL PATIENT

Each institution will need to pre-determine who oversees the packaging and moving of ICU patient. Will this be a physician, APP, experienced charge nurse, or other? If moving vertically, it is important the patient is secured adequately, as is all critical equipment and medications. Movement down stairwells can be very unforgiving. For each stair flight, there should be a designated provider to monitor vitals and the patient and another individual monitoring the team and team movement. The number of people to actually move the patient will be dependent on the equipment being used. Certain types of equipment, such as the MedSled, are made so that only 2 individuals are needed for that task.



REASSESSMENT OF THE PATIENT AND FINAL DESTINATION

Whether it is at a staging area or final destination, the patient will need constant reassessment to see how the movement is tolerated, adjustments to medications, (particularly pain medications), re-evaluation of tubes, lines and drains, and documentation. The roles and responsibilities need to be identified and assigned. Though the patient's primary nurse seems to be the natural fit, it needs to be remembered that no equipment, supplies, medications, or nutrition are in standard locations, so aides or runners may be needed. Next steps and availability of all the above are critical. How long it is anticipated that the unit will be "rehomed", what type of location is this, and sustainability of that location should also be considered.

CONFIRMING IDENTITY, MEDICAL ISSUES, TRACKING LOCATION

In any evacuation and movement of patients, confirmation of the patient identity, medications, medical problems, and ultimate location are paramount to patient safety. Though this is obvious in non-emergent times, in a disaster, this is easily overlooked or prioritized lower. Systems for tracking patients exist in multiple forms. Providers and leaders should know what their institution has available.

IDENTIFYING LOCAL PLANS, NEED FOR PLAN DEVELOPMENT, OR DISSEMINATION OF KNOWLEDGE

Reflect on your institution, your unit, your resources, and your knowledge, formulate answers or questions to take home to develop or learn about your hospital’s plan. Key concepts and questions are included here.

1. As the medical director or team leader, how will you know what resources within the hospital are functional?
2. Who and how many people will be available to help move your patients? How do you identify them? What are their roles in the move? Where else are they expected to be? What is their training?
3. Who would be in charge of determining prioritization in the evacuation? Attending? Charge Nurse? APP? How will key medical problems be noted? How much medications or supplies need to accompany the patient? What can the patient do without?
4. How would you get patients out? What equipment, if any, do you have for vertical evacuations? Have people used it before? Who supervises the “packaging” of the patient and supplies? Where are you going and for how long? What is the equipment and supply status of the destination location? Who will stay with the patient? Will a physician reassess the patient along the way? Who supervises the movement down the stairs? What additional resources do you have if a patient decompensates along the way? How do you get additional help?
5. What type of identification and tracking tools does your hospital have? How will medical knowledge/issues be communicated? How will families be notified? Who is tracking all the patients and destinations?

MASTERING MOVING THROUGHOUT THE HOSPITAL AND THE VERTICAL EVACUATION WORKSHEET

As the panel moves through the discussion of this topic, reflect on your institution, your unit, your resources and your knowledge to formulate answers or questions to take home to develop or learn about your hospital’s plan. Key concepts and questions are included here, TAKE NOTES(!), and bring them back to your home institution.

MASTERING MOVING THROUGHOUT THE HOSPITAL AND THE VERTICAL EVACUATION WORKSHEET
1. What are the major considerations for the surgeons in the hospital for Vertical Evacuation of the hospital, especially ICU areas?

2. What other providers (nurses, respiratory, etc) are involved in this planning process? Who is/are their leadership?
3. What are the major considerations for the C-Suite/Administrative leadership for moving patients and vertical evacuations?
4. Who is the administrative leader for developing a patient movement/evacuation plan (who owns this?) Chief Medical Officer? Chief Nursing Officer? Chief Operating Officer? President/CEO?
5. For the Clinical People on the Panel: What does the C-suite/Administrative leadership need to know about Patient Movement and evacuation, especially vertical evacuation of ICU patients that they don't understand?

6. For the Administrators: What do the clinical people need to know that they don't understand?

PURGING UNITS: HOW TO MOVE PATIENTS OUT OF THE ED AND ICU

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BACKGROUND AND CONSIDERATIONS

When a mass casualty event happens, a lot of room will need to be accommodated in the ED, and it is estimated 10% of the patients will need ICU care which will provide the bed estimate for that area. This section will provide some discussion regarding options and key concepts for making this space. One of the first considerations is how quickly are casualties arriving. If the event is evolving quickly and numerous casualties are arriving in close sequence, alternate care areas of new patients with minimal movement of others may be needed.

MAKING SPACE IN THE ER

Immediate space must be made in the trauma bays and higher acuity beds. One of the most effective strategies is to take all admitted patients to the floors that are expecting them. Though in ideal circumstances a formal report via standard methods is utilized, in this situation, a verbal hand off at the bedside in that unit is warranted. If the room is not ready, it should be acceptable in this circumstance to move the patient to the hall of the floor accepting the patient. Knowledge of this and acceptance of this practice should be discussed and approved by leadership far in advance to minimize push back when this does happen.

For patients who have not yet been admitted, condensing those patients by acuity and cohorting in a particular part of the ED or alternative site may be fruitful. For patients who do not have a true emergent need, consideration could be given to discharging the patient with clinic follow up. Consideration of either keeping patients in current areas and moving the mass cal patients into a specific cohort area may be faster and more effective way to do this. Both are viable options but time should be spent planning this decision now so when the incident occurs, people are knowledgeable as to who and what to mobilize. This will be completely dependent on the local setting, hospital geography, usual staffing, and location of resources as well as training.

MAKING SPACE IN THE ICU

Getting the highest acuity patients to the actual ICU where trauma patients are standardly cared for should be one of the greatest priorities. To do this, a plan to rapidly gain capacity is required. One of the first steps is to hold all elective surgeries that were planned to be admitted post op to the ICU. At the same time, identification of all patients who are step down status but still in an ICU bed should be

performed. If there are not immediately available step down beds on units, consider moving those patients to another physical location. A consideration may be to cohort them in a pre-op area, as this will have monitors and nurses, and elective surgeries will have been cancelled. While doing this, the patients in the SICU or trauma ICU could be evaluated and lower ICU acuity patients could be moved to empty beds in other units, i.e. a sepsis patient could go to a MICU bed. This will match patient acuity, needs, and pathophysiology with nursing and respiratory care that are well trained to handle this. Again, it should be the expectation that care is facilitated by giving a verbal report at the bedside, rather than the cumbersome methods standardly used.

Another option is to admit all the new patients to the pre-operative or postoperative areas so they are cohorted together. The proximity to the OR may be an advantage, and those spaces may be faster and easier to clear of pre-existing patients, particularly the pre-operative area. Members of the trauma team could then be stationed in the area to oversee and re-evaluate all these patients. The challenge in this plan may be the training and familiarity of the nursing staff to care for them. Though they may feel “uncomfortable,” many pre/post unit nurses have ICU training or experience. Also, during the COVID pandemic, many of these areas were converted to ICUs, so processes may be in place to quickly ramp up the execution. By the time the patient reaches the ICU, the patient will most likely have been enrolled into the EMR, and that may be the standard mode for orders and medications. If those areas did serve as an ICU, consider re-activating the unit names in your EMR so that the mapping for the ancillary services such as pharmacy and radiology can be done extremely quickly. If the standard nursing staff is really not comfortable with these patients, consider supplementing them with your rapid response team or stat/acuity nurses. Most of these individuals have substantial critical care experiences and are used to working in a multitude of units.

PREPLANNING YOUR STRATEGY

It cannot be emphasized enough that pre-planning and evaluation of your local resources, hospital geography, alternate care sites, nursing staff, and training are imperative for any plan to work. As you think through the options here are some general considerations.

1. What is your hospital geography? Are the ICUs close together to make overflow easier and faster? Do you already have a mixed med/surg ICU, or do you have specific units? Are the ICUs close to the OR?
2. Does your Pre-Op or PACU already care for ICU boarders? If so, then the ramp up may be quite straightforward.
3. Was your Pre-Op and PACU used as an ICU during COVID? If so, which nurses staffed that area? Would they be feasible to use in this case? What is their trauma training? Do they need a refresher? Pull out your COVID “Lessons Learned”
4. Should you use these areas to cohort new admissions from the Mass Casualty event or should you use these to decompress your usual ICU?
5. What other space is close to the ER that could be utilized to move less acute ER patients who are still in process for being evaluated? Does it have monitors and physical beds already? Is there a nursing staff assigned to that area? What is its normal use and how quickly could it be emptied? Have they seen the MassCal paper patient packets, or do they know how to use downtime forms? How will pharmacy know where these patients will be?
6. As most MassCal drills include the initial influx of patients, how well has the plan been developed to move patients through the ED? What does that flow look like? Have you ever drilled that to ensure there are enough beds, monitors, oxygen tanks, transporters?

7. What is the process for handing patients off between the units? It is important that the ability to give bedside verbal report has been discussed and will be acceptable. Planning to use the standard process “just do it faster” will not work. The pace of a MassCal will be too fast.

SUMMARY

Identifying alternate care areas will be important to moving pre-existing patients or absorbing new patients. Considerations of proximity, staffing, and standard equipment are all extremely important for both the ICU and ER patients. An assessment of your individual hospital, staffing, and current disaster plans is imperative to be sure you are ready.

MASTERING PURGING PATIENTS: HOW TO MOVE PATIENTS OUT OF THE ED AND ICU WORKSHEET

As the panel moves through the discussion of this topic, reflect on your institution, your unit, your resources and your knowledge to formulate answers or questions to take home to develop or learn about your hospital’s plan. Key concepts and questions are included here, TAKE NOTES(!), and bring them back to your home institution.

PURGING UNITS: How to Move Patients Out of the ED and ICU
1. What are the major considerations for the surgeons moving patients out of ED and ICU
2. What other medical specialties are involved in this process? Who is/are their leadership?
3. What are the major considerations for the C-Suite/Administrative leadership?

4. Who is the Administrative leader for Identifying (and addressing) obstacles to the process? Triage Officer (who owns this?) Chief Medical Officer? Chief Nursing Officer? Chief Operating Officer? President/CEO?
5. For the Clinical People on the Panel: What does the C-suite/Administrative leadership need to know about this process that they don't understand?
6. For the Administrators: What do the clinical people need to know that they don't understand about this process?

WHAT NOW? HOW TO GET PATIENTS OUT OF THE HOSPITAL

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BACKGROUND AND CONSIDERATIONS

When individuals discuss managing patient surges or the team participates in table top exercises, it is often stated that, “we will discharge all floor patients who can be discharged” in an effort to make patient beds available for new admits resulting from the mass casualty event. Unfortunately, the planning usually stops at that statement. Additionally, the reality of doing this is not part of disaster drills or table tops. The vision tends to be that the physician writes the order, and, then, like a magic trick, the patient is discharged and gone from the facility. Anyone who deals with hospital throughput on a daily basis knows that this is completely unrealistic. This section is to prompt discussion and thoughts as to how this could be done, or if this is even feasible.

Scenario 1

The hospital has become disabled due to internal water and power failure. Your team is in charge of getting floor and step down patients out of the hospital. There are 419 patients currently admitted. With the power out, the Wi-Fi is non-functional, and, therefore, the EMR is down. The benefit of this scenario is the tempo can be methodical and steady as long as you have a pre-existing plan. What is your plan?

Who can just be discharged? The best source of information regarding this may be the charge nurses from each floor. The things that must be considered are not only medically ready, but are the support services already in place for the patient to be discharged. Leaving this solely to the physician team to identify medically ready will most likely fail. Issues such as having the appropriate supplies for dressings, DME, home oxygen, etc., will already have to be in place. Having knowledge of who already had been planned for discharge that specific day is a good place to start. Depending on the situation that caused the hospital to be disabled, such as is the region in the middle of a natural disaster, will also dictate if the patient will actually be able to be picked up, even if medically ready.

Identifying an alternate care site: Prior to COVID, many health systems had not considered having to care for patients beyond their walls. Hopefully, this has already been identified and known. If not, selecting an alternate site to provide care will be critical. Considerations include ensuring access to adequate electric outlets, open, accessible space, bathroom facilities, ability to store/serve food, access to refrigeration for medications, areas clean enough for medication preparation, and, finally, anticipated

dwell time. Other considerations include cohorting patients by the hospital unit or some alternative way, maintaining or changing nursing assignments, and ensuring medication safety.

Transportation to the alternate site: This will also depend on local resources. For patients who may be more ambulatory, community assets such as buses may be used. However, consideration must be given to differentiate those patients who could negotiate a few steps versus those that would need a handicap or lift access onto bus. Organizing multiple EMS crews to help transport the higher acuity patient will also need thought out and pre-planned.

Tracking Patients: A plan needs to be in place to track all discharged patients including who, where they were discharged to, who they were discharged with, and any follow up needs. For patients moved to the alternate care site, it will be critical to continue to track vital signs, assessments, medications, and other basic care functions. It must be tracked who is moved, when they were moved, and when they arrived. Who will do this and how it will be done must be planned for, and it should be anticipated that the EMR will not be functional.

Scenario 2

There has been a mass casualty event. 100 patients are expected. Statistics say approximately 10% of those will need ICU care. The rest may need floor or stepdown beds. The charge is to discharge all patients who are able to be to make room for new admissions. The challenge is the tempo and short time period over which this will need to occur. Naturally, the first step is to have each floor submit room numbers of patients already scheduled to be discharged to families and those scheduled to be discharged to facilities. After the numbers of these patients are gathered, further assessment of who is medically appropriate for discharge can be undertaken. A more feasible avenue may be to cancel any elective surgery same day admissions that are not yet behind the line and put a temporary hold on transfers into the facility. In fact, these options will open beds more quickly than awaiting discharges. To proceed with freeing beds via inpatient discharges, consider the issues below.

1. For the patients being discharged to facilities, it will be important to determine if EMS will be available to transport the patients. They may be completely engaged in the mass casualty event.
2. For the patients being discharged with family, will family be able to arrive within the time period needed to discharge the patient and prepare the room for a new admission.
3. If discharged patients awaiting transport (family or EMS) are to be moved to a "holding area" or "discharge lounge," who will actually help explain the discharge instructions to family and distribute medications? What medical supervision will be in this area? Where will this area be? Are there medical considerations such as oxygen needs, infection control issues, or other issues that need considered?
4. What is the acuity of these patients vs the acuity of the new admissions from the mass casualty event?
5. It may be faster, easier, and more effective to use an alternate care site with different staffing to house all the new admissions from the event. The acuity may be lower and the process easier. Is that an alternative approach?

SUMMARY

Scenario 2 is the most commonly talked about of the patient movements, though it is done so superficially. It will save time in the actual event if these issues are addressed and key decisions such as discharging patients vs admitting new patients to alternative sites are the most feasible.

4. Who is the Administrative leader for Identifying (and addressing) through-put issues in hospital mass call response? Triage Officer (who owns this?) Chief Medical Officer? Chief Nursing Officer? Chief Operating Officer? President/CEO?

5. For the Clinical People on the Panel: What does the C-suite/Administrative leadership need to know about this process that they don't understand?

6. For the Administrators: What do the clinical people need to know that they don't understand about this process?

WHEN THE EMR FAILS!!

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BACKGROUND AND CONSIDERATIONS

As technology continues to evolve and electronic interfaces connect most of our methods for communication and patient care, healthcare systems become increasingly reliant on the electronic medical record. The investment in these systems sets almost a mentality of “too big to fail” for the leadership and administrative personnel. Given the reliance on the ability to run reports and evaluate data (even if the data is clinically inaccurate) creates a belief that no other system can work. One could venture to say that all clinical people have experienced multiple situations where the EMR did not function well for the clinical setting. No more is this true than in fast paced situations, such as the trauma bay. Many will attest the cumbersome nature of the EMR when attempting to care for an unstable full trauma team activation that arrived with a short ETA. Often, challenges with patient electronic “arrival” and then the pace in which events occur require more individuals to document or the need to continue to do on paper and retroactively fill in the EMR. Despite the clinical challenges, the EMR is here to stay. When preparing for a disaster or mass casualty event, considerable thought and planning is required.

MANAGING THE PATIENT SURGE IN MASS CASUALTY EVENTS

This is most likely the situation that has been considered most frequently. The rapid arrival of many patients will overwhelm the ability to rapidly register, treat, and document in the standard way. Mass casualty packets that come equipped with triage tags, paper order sheets, and documentation are most likely in your facility. The “plan” most likely involves bringing those packets out and using them during the event. When engaging in your planning, consider asking about the location and number of these packets. Be sure key clinical people have working knowledge of the contents. Be sure to include pharmacy and radiology, as this would be a different workflow for them as well. Hopefully these packets are stored in the ED and not off site. Depending on the number of packets available, plans may need to be made regarding what group of patients the packets are primarily used on. For example, if there are 50 packets, but 125 patients, perhaps only the red and yellow patients who have a very time sensitive need should be managed in this way. Ensure that for these patients, you are able to activate the blood bank, type and cross blood products, access medications, order imaging, and admit to the hospital or OR. A decision regarding what point to transition the patient into the EMR should also be discussed. All these transitions between hospital locations and patient identification sets an opportunity for errors and these potential

pitfalls should be evaluated in advance. Additionally, it will be important the floors, ICUs, OR, and anesthesia are familiar with the contents and are able to make the system work using the paper system.

WHEN HOSPITAL DISASTER CAUSES EMR TO FAIL

The failure of the EMR itself is a disaster for systems. Depending on the cause, this may be a short- or long-term challenge. For management and concepts regarding when the system is subjected to ransomware, the reader is referred to Dr. Matt Martin's talks and syllabus on this topic. However, there are other considerations to plan for, even if this is not the situation. Consider the following scenario: it is the middle of a weekday and the OR and ER are in full peak activity. All web-based applications are shut down and inaccessible, including your EMR. Is there a plan to deal with this and do key leaders in each area know the plan. As a surgical leader, if you do not know the plan, chances are good that others do not either. Consider the following as you work through developing your local plan.

1. In the immediate moment, can urgent issues be handled? Specifically, can the OR continue to operate, or should further cases be held? How integrated is the anesthesia record? Can the OR and anesthesia access required medications? Can case carts and equipment be made available? What safety checks and systems are hampered by the web not being available?
2. Are your phones all web based? If so, consider alternate means of communication early, especially to critical hospital areas. Most institutions have invested in handheld radios, but who can activate the use of those? How early will your institution decide to do that? Who will get these, and are there enough for key areas? Have clinical people used these, and are they familiar with the procedures to do so?
3. For the individual patient care areas, do paper flowsheets and History/Physical/Progress notes exist, or have they been purged? What quantity is available? How are paper "down time" sheets acquired? Can they be used for all orders; i.e., blood products, medications, imaging, nursing orders? How are these orders processed?
4. For inpatients already in the hospital, how will the orders that are currently in the EMR be continued? How would a nurse be able to know, confirm, and access pre-existing orders, medications, etc.?
5. How will lab results be reported? Does this add a significant time lag? Is there a plan to only process certain labs during this time or from certain units? What if the failure is predicted to occur for days?
6. How will imaging be processed and performed? How will images be viewed? How will reports be generated? How will critical results be communicated? Are certain orders put on hold to help focus the workforce on the critical items, knowing that a significant increase in time to perform, process, and complete these will occur.
7. How does all the documentation get merged back into the EMR when the system is corrected?

SUMMARY

Failure of the EMR may simply be because patients are arriving too quickly for the EMR to keep up. This initial step has often been considered and disaster packets available in the ED. The challenge occurs as patients surge out of the ED, and, commonly, these packets are completely unfamiliar to other areas. In the middle of a critical surge is not optimal for those providers to have their first experience with the package. Ensuring critical patient care areas have knowledge of these packets is important. However, perhaps even more critical is when the system actually fails and is not available. Though it is commonly denied that this could happen, it is a real possibility and whether that is due to failure of internet, electric,

or ransomware is inconsequential. Knowledge of how to activate a secondary process to keep critical areas and information intact is important. Each leader should be aware of what systems would be at risk and how to initiate the steps to mitigate the impact.

MASTERING THE EMR FAILED WORKSHEET

As the panel moves through the discussion of this topic, reflect on your institution, your unit, your resources, and your knowledge to formulate answers or questions to take home to develop or learn about your hospital’s plan. Key concepts and questions are included here, TAKE NOTES(!), and bring them back to your home institution.

When EMR Fails
1. What are the major considerations for failure of the EMR, especially ICU areas for the surgeons in the hospital?
2. What other medical specialties and providers (nurses, respiratory, etc) are involved in this planning process? Who is/are their leadership?
3. What are the major considerations for the C-Suite/Administrative leadership for dealing and responding to failure of the EMR?

4. Who is the administrative leader for contingency plans for when the EMR or web fails (who owns this?) Chief Medical Officer? Chief Nursing Officer? Chief Operating Officer? President/CEO?

5. For the Clinical People on the Panel: What does the C-suite/Administrative leadership need to know about the critical clinical systems and patient care that they don't understand?

6. For the Administrators: What do the clinical people need to know that they don't understand?

SESSION 5

BEYOND TRIAGE & RESUSCITATION

Moderator: Jeffrey J. Skubic

Sunday, April 14, 2024

4:00 – 6:00 PM

Palace Ballrooms 1-2

Palace Tower

Emperors Level – 4th Floor

- | | |
|--------------------|--|
| 4:00 – 4:15 | Running on Empty: Resuscitative Adjuncts and Alternative Products when Blood Supplies are Limited
Martin A. Schreiber, MD, FACS, FCCM |
| 4:15 – 4:30 | Violence in the Trauma Bay and ED
Jay J. Doucet, MD, FACS |
| 4:30 – 4:45 | Whole Blood and Walking Blood Banks in the Civilian Setting
Jennifer M. Gurney, MD, FACS |
| 4:45 – 5:00 | No CT Scan? No Problem! Managing Injured Patients with Limited Radiology Support
Kenneth L. Wilson, MD, FACS |
| 5:00 – 5:15 | Preparing for MASCAL at a Level II - Challenges, Tips, and Tricks
Jason L. Turner, MD, FACS |
| 5:15 – 5:30 | Who's in Charge? Coordinating Multiple Agencies in MASCAL
Alison Wilson, MD, FACS |
| 5:30 – 6:00 | Panel Discussion |

RESUSCITATIVE ADJUNCTS AND ALTERNATIVE PRODUCTS WHEN BLOOD SUPPLIES ARE LIMITED

Martin A. Schreiber, MD, FACS, FCCM

Professor and Chief
Division of Trauma, Critical Care &
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Portland, OR

There are several scenarios where blood product availability may be limited. Due to the short half-life of platelets, most rural hospitals don't have them available, and the amount of red blood cell and plasma products may also be limited with one massive transfusion depleting the blood bank. It is estimated that during the COVID pandemic, there was an almost 20% decline in available donors across the United States, severely limiting blood product availability. A survey performed across 51 US institutions revealed that 92% experienced a red blood cell shortage, and 84% experienced shortages of platelets.¹ (Figure 1) Far forward battlefield scenarios requiring prolonged field care also require innovative blood product replacement strategies. While blood conservations strategies can partially mitigate these challenges, alternatives and adjuncts that limit the need for blood products are strongly needed. This talk will focus on factor concentrates, lyophilized plasma, tranexamic acid, and novel platelet solutions.

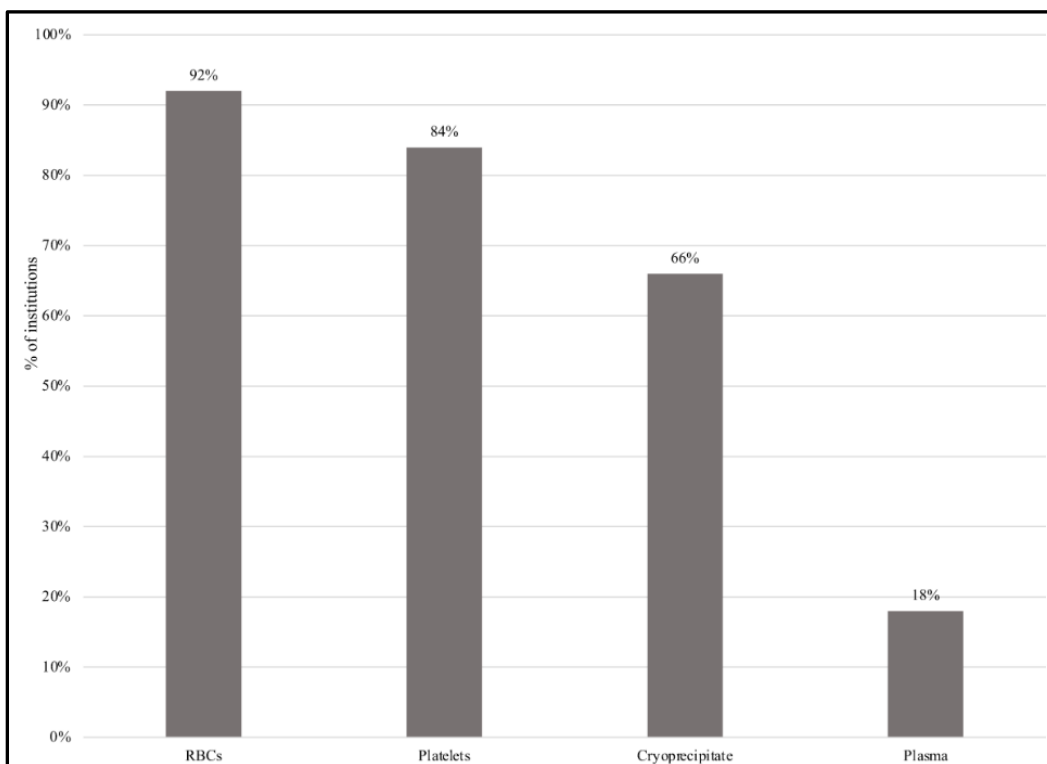


Figure 1. Percentage of institutions that have experienced a particular blood product shortage since March 2020.

Prothrombin complex concentrate (PCC) is FDA approved for urgent reversal of coumadin in bleeding patients and those who require emergency procedures. It is a concentrate made from the plasma of thousands of people and it contains a balance of vitamin K dependent coagulation factors, as well as anti-coagulant proteins, to include Proteins C and S, and anti-thrombin III. A typical dose is 25-50 units/kg, and it has also been used to reverse the direct thrombin inhibitors and anti-Xa inhibitors. In a prospective randomized trial comparing PCC to plasma in bleeding patients and patients needing emergent procedures, 70% of patients receiving PCC achieved a normalized INR within 1 hour, while only 60% of patients in the plasma group had achieved a normal INR at 12 hours.² Although PCC is approved only in patients on coumadin, it has also been used in the general trauma population. Zeeshan performed a 2-year propensity score matched retrospective analysis of TQIP in 486 trauma patients, half of whom received plasma alone and the other half received plasma and PCC.³ This study revealed a reduction in RBC and plasma use, as well a reduction in hospital mortality, acute kidney injury rates, and acute respiratory distress syndrome rates without increases in deep vein thrombosis or pulmonary embolus in patients receiving PCC.

Fibrinogen concentrate is a lyophilized powder stored at room temperature. It is rapidly reconstituted in water at a concentration of around 1 gram in 50 ml, which is very similar to the amount of fibrinogen found in cryoprecipitate pools. For comparison, plasma contains about 2.5 grams of fibrinogen in 1 liter. Fibrinogen concentrate is inactivated by pasteurization, and additional purification removes antigens and antibodies, decreasing the risk of adverse reactions. The RETIC trial was a single center randomized trial comparing 15ml/kg of plasma to 50mg/kg of fibrinogen concentrate in trauma patients with abnormal ROTEMs.⁴ Following treatment, the ROTEM was repeated, and patients were redosed within their treatment arm. If the ROTEM still did not correct, crossover salvage occurred. The trial was stopped early because the plasma group required more frequent dosing and salvage. Coagulopathy was much more likely to be corrected after 1 or 2 doses of fibrinogen concentrate, compared to plasma.

Ditillo et al. did a 2-year retrospective review of the Trauma Quality Improvement Project evaluating trauma patients who received 4 or more units of RBCs.⁵ The authors compared patients who received cryoprecipitate to those who did not. On multivariable logistic regression analysis, both 24-hour and in-hospital mortality were lower in patients who received cryoprecipitate.

There is a longstanding practice in parts of Europe of using factor concentrates like PCC and fibrinogen concentrate in place of blood products, utilizing ROTEM variables as a guide for administration. Schochl, et. al., published their experience of using the FIBTEM maximum clot firmness to guide fibrinogen and platelet administration and the EXTEM clotting time to guide PCC administration.⁶ Utilizing this technique, the majority of patients were successfully treated with RBCs, fibrinogen concentrate, and PCC, and many less required plasma and platelets. (Figure 2)

	Total administered until arrival at ICU		Total administered during 24 hours after admission to the ER	
	Number of patients treated	Dose	Number of patients treated	Dose
Fibrinogen concentrate (g)	123	6 (4, 9)	128	7 (5, 11)
PCC (U)	83	1800 (1650, 3100)	101	2400 (1800, 3600)
FFP (U)	6	10 (7, 10)	12	10 (9.75, 11.25)
PC (U)	22	2 (1, 2)	29	2 (2, 3)
RBC (U)	125	6 (4, 10)	131	10 (6, 13)

Figure 2. Number of trauma patients requiring Fibrinogen concentrate, PCC, plasma, platelets and RBCs guided by ROTEM on arrival to ICU and at 24 hours after admission.

In this retrospective review, patients treated primarily with concentrates achieved an observed mortality lower than predicted by standardized scoring systems.

Dried plasma is another possible strategy that can be utilized to make plasma available in austere conditions or if supplies are exhausted in the hospital setting. Lyophilized plasma was utilized by the US military as a primary resuscitation product during WWII.⁶ (Figure 3) The product was a multi-donor product, and donors were not screened for infectious diseases. It was common for recipients to develop hepatitis, so lyophilized plasma has not been used in the US since WWII. In general, dried plasma is logistically superior to other plasma products because it can be stored in powder form at room temperature for over 1 year. German lyoplas is a single donor product requiring blood type compatibility. It can be stored for up to 15 months. The product is used routinely in Germany and has been given to hundreds of thousands of recipients with a complication rate similar to standard plasma.



Figure 3. Lyophilized Plasma Used by the US Military in WWII.

A single unit of the French Flyp comes from up to 11 donors. This product is pathogen reduced to avoid infectious risks, and it can be stored up to 24 months. It is used on IRB protocol by US special forces combat medics in austere conditions. It has been transfused to thousands of patients without adverse events. Garrigue et al. performed an open label randomized trial comparing 4 units of FFP to 4 units of FLYP in trauma patients with trauma induced coagulopathy.⁷ They found that FLYP could be transfused earlier than FFP and resulted in a higher fibrinogen concentration than FFP 45 minutes after randomization. Dried plasma products are being utilized around the world, including in Africa and the Middle East. Several companies in the US are producing these dried plasma products, but none have an FDA indication yet.

Tranexamic acid is being used with increasing frequency as an adjunct to blood products in bleeding patients. The STAAMP trial was a prospective, randomized, multicenter trial that enrolled 927 hypotensive trauma patients.⁸ Patients were randomized to 1 gram of TXA in the field versus placebo. After arrival to the hospital, patients were further randomized to no additional TXA, 1 gram over 8 hours or a 1 gram bolus and a 1 gram infusion. Multivariate analysis revealed a survival advantage in patients who received TXA less than or equal to 1 hour after injury and in patients with a systolic blood pressure < 70mmHg. There was no difference in blood product requirement, and patients receiving TXA did not have increased complications rates including thromboembolic complications.

The most problematic blood component in rural and austere conditions is platelets. Platelets are stored at room temperature with a shelf-life of 5 days. They are not available in most rural hospitals, and their availability rapidly becomes limited during shortages. Novel solutions for platelet products that can be stored for prolonged periods are being developed. Thrombosomes are freeze dried group O platelets. They are stable for 3 years at room temperature, and they are pooled from up to 10 donors. They are heat treated for viral infections and cultured prior to use for bacteria. They are rehydrated in 100cc of sterile

water, and there are ongoing studies in human subjects. Theoretical benefits of thrombosomes include they can be stockpiled in large quantities, pooled donors reduce variability, and the platelets are fully activated when reconstituted. Since they are reconstituted as needed, there should be minimal to no waste.

Platelet extracellular vesicles (PEVs) are particles secreted from platelets. They express surface receptors to include procoagulant GPIIb/IIIa, tissue factor, and P-selectin. (Figure 4)

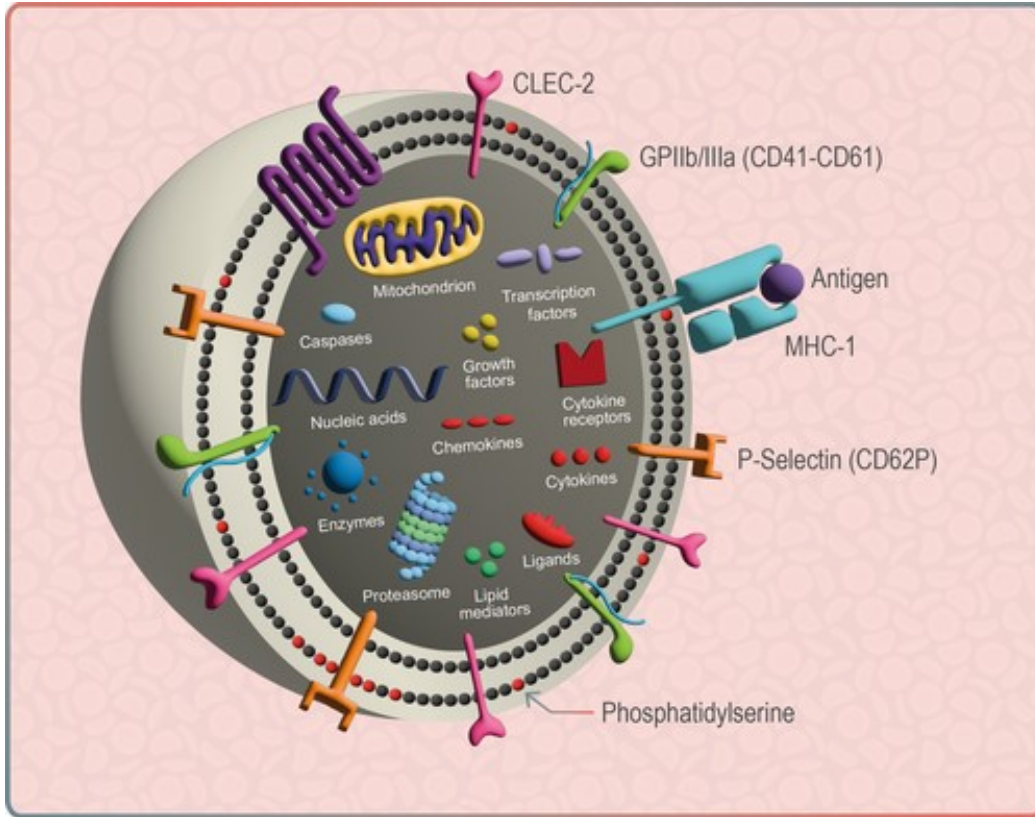


Figure 4. Diagram showing receptors expressed on the surface of platelet extracellular vesicles

PEVs range in size from 10-1000nm, and they have a prolonged shelf-life in a broad range of temperatures. They are rehydrated in 10cc of sterile water. PEVs have shown improved survival in rat models of hemorrhagic shock.⁹

CONCLUSION

Many novel solutions are being developed to mitigate blood shortages and to provide equivalent hemostasis and resuscitation when standard blood products are not available. For the most part, these solutions involve powdered products that can be stored at room temperature for over a year. The ultimate solution may be the equivalent of whole blood on the shelf that simply needs to be reconstituted. Based on the current level of technology, the most limiting factor is the development of an oxygen carrier, because a practical replacement for red blood cells has not been found to date.

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VIOLENCE IN THE TRAUMA BAY AND ED

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OBJECTIVES

- Understand scale of violence in hospitals
- What is the nature of the threat?
- Why your trauma bay is at risk?
- Learn how to plan and prepare for violence events
- Prevention and Advocacy

HEALTHCARE WORKPLACE VIOLENCE

- 73% Nonfatal workplace injuries are in **Healthcare**
 - 50% *Healthcare* workers report verbal & physical violence
 - Most assaults on HCWs are not reported and not investigated
- Healthcare
 - 2021: 18.3% of GDP (\$4,300,000,000,000)
 - Hospitals directly employ 6,350,000
- Healthcare Workplace Violence:
 - \$500 Million Annual Healthcare Costs
 - Over \$230 Million Staff Turnover
- In a 2022 American College of Emergency Physicians survey of E.R. doctors, 55 percent said they had been physically assaulted, almost all by patients, with a third of those resulting in injuries. Eighty-five percent had been seriously threatened by patients. The risks can be even higher for E.R. nurses.
- A recent study indicates that in the last two years, 44% of nurses reported being subject to physical violence, and 68% reported verbal abuse.¹ In a survey of physicians published last year, 23% reported being personally attacked on social media.² These threats on social media can end up manifesting in physical violence, such as when an angry patient shot two doctors, a receptionist, and a visitor in Tulsa, Oklahoma.³ In California, we have seen nurses, physicians, and other HCWs suffering serious assaults, including a nurse stabbed in L.A. in September,⁴ a doctor and two nurses stabbed in LA in June⁵, in addition to many assaults on healthcare workers in prior years.

- Violence against health care providers is the third-leading cause of serious workplace injuries in the industry⁶, generating at least \$540 million a year in workers compensation costs, according to Liberty Mutual Holding Co. Inc.'s 2020 Workplace Safety Index.⁷ A Centers for Disease Control and Prevention report from 2018 found 73% of those injured in workplace violence were health care workers.⁸
- The number of assaults on health care workers has increased during the pandemic.⁹
- **Only 14% of hospitals require all staff to be trained in workplace violence prevention.**
- The perpetrators of violence most commonly included patients (75%), followed by visitors (9%), or outside individuals (6%). Threats and verbal assaults were most common (41%). 29% of events included a physical assault. Among the events where injury occurred, the injured commonly included security personnel (57%) or other hospital workers (38%).

In the past 8 years

- at least 4 FACS surgeons have been murdered by patients, a 5th died as a result of intimate partner violence


Aggression has 2 Biologically Distinctive Modes

- **Affective Violence, or**
- **Predatory (Targeted) Violence**
- Affective Violence:
 - Emotional, reactive, impulsive
 - Sudden
 - Quick
 - Resolve quickly
 - De-escalation teams, training
 - Most common in healthcare
 - Hospitals response teams
- Predatory (Targeted) Violence:
 - Individual target
 - Perpetrator plans
 - Intent
 - No somatic warning
 - Sudden
 - Inexplicable
 - HIGH risk
 - Less Frequent
 - Weapons detection
 - Law enforcement

Example: Surgery Resident punched by trauma patient in trauma bay.

SURGICAL PERSPECTIVE

A Lasting Impact

Sophie H. Chung, MD 

Example: Surgeon stalked by former patient at work and at residence, threatening her.



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SESSION PS335. Surgeon Safety: When a Patient Becomes a Threat Add to My Playlist

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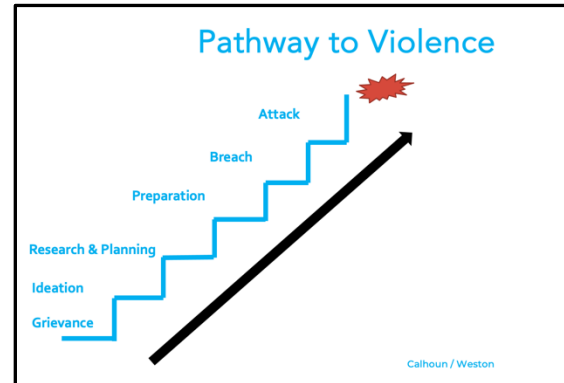
- Threat: perceived possibility of harm - OR - statement of intention to cause harm

Threat Assessment

- Threat or risk assessment is the process of assessing risks to a particular target, group of individuals, or individual, and designing and implementing intervention and management strategies to reduce that risk or threat

Threat Mitigation

- Developing plans to mitigate threat of violence posed by a person(s):
 - Violence prevention
 - Strategic, tactical, logistical
 - Stalking
 - Cyberstalking
 - Assault
 - Murder
 - Incident Shootings
 - Mass shooter events



Healthcare Workplace Violence is made up of Affective and Targeted Violence

- Application of Threat Assessment and Management Science
- Lessons learned from Military
 - Threat to life causes profound life changes
- General risk of occurrence adds to burden of Burnout
 - Occurrence leads to acute stress and PTSD
- Risk is to all Healthcare workers
 - Surgeons may be at increased risk of Targeted Violence
 - Surgeons should take security steps to Mitigate Risk
- **Violence will be more likely to occur in the workplace:**
 - Without policies
 - Without a proper training program
 - With management who ignore behaviors of concern
 - Tolerate bullying type behavior
 - Failure to note, and or report, behavioral or appearance change
 - Have inadequate security measures and procedures
 - Who do not practice fair and consistent disciplinary procedures
 - Lack of training, and or no Threat Management Team

Armed Hospital Security?

- Hand cuffs are the most common type of weapon available to be carried and used by hospital security staff (96%), followed by batons (56%), pepper spray products (52%), hand guns (52%), TASERS® (47%) and K9 units (12%).
- Among hospitals with a particular type of weapon, documented training in weapons use was required in approximately 90% of the hospitals for nearly all types of weapons.

- TASERS® are associated with a 41% lower risk of physical assault among hospitals with TASERS® available for security personnel to carry and use compared to those without TASERS®.
- Decision to arm security guards in hospital is a tough one, expensive, may affect culture and needs study and training,

Metal detectors – especially at ED entrances?

- At my hospital – UCSD Medical Center, a level 1 trauma center with an annual emergency department census of about 45,000 visits a year, we added a walk-through low-profile magnetometer to the emergency entrance of the central San Diego campus in 2022.
- Before the metal detector, over 8 weeks, 511 psychiatric patients were screened by security, and they confiscated 15 weapons.
- In the 8 weeks the metal detectors appeared, 13,149 people were screened, and 194 weapons were confiscated. The change in average weapons confiscated per day grew from a mean of 0.26 to 3.46 (P<0.001); the patient censuses were similar during both 8-week periods.

ADVOCACY

- Federal bill: HR2584/S.2768 **Safety From Violence for Healthcare Employees Act or the SAVE Act**
- States: Currently 38 states have laws increasing penalties for assaults on certain healthcare workers.
- AL, AK, AR, AZ, CO, CT, DE, FL, GA, HI, ID, IN, IL, IA, KS, LA, MS, MO, NE, NV, NM, NY, NC, OH, OK, OR, PA, RI, SD, TN, TX, UT, VT, VA, WA, WV, and WI have laws that establish or increase penalties for assault of healthcare workers.
- California – AB977: example of difficulties in getting state legislators to recognize disruption of health system by violence.

118TH CONGRESS 1ST SESSION	H. R. 2584
To protect hospital personnel from violence, and for other purposes.	
IN THE HOUSE OF REPRESENTATIVES	
APRIL 13, 2023	
Mr. BUCSHON (for himself and Ms. DEAN of Pennsylvania) introduced the following bill; which was referred to the Committee on the Judiciary	
A BILL	
To protect hospital personnel from violence, and for other purposes.	

CALL TO ACTION

- Have you conducted a unit violence prevention walkthrough?
- Are your unit staff trained in violence prevention?
- Are your unit staff trained in de-escalation?
- Are your unit staff trained in active shooter response?
- Should your hospital have a next generation metal detector?
- Do staff know who/how to report concerns?
- Is your trauma bay safe?
 - No patient access to possible weapons?
 - Restricted access?
 - Panic buttons?
 - Escape routes?
 - “Buddy system” for all workers?



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WHOLE BLOOD AND WALKING BLOOD BANKS IN THE CIVILIAN SETTING

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WHOLE BLOOD PEARLS

1. Patients bleed whole blood → they should be resuscitated with whole blood!
2. Whole blood is superior to component therapy for hemostatic resuscitation of a trauma patient because it improves survival.
3. Whole blood can be type specific or Group O.
4. The only whole blood that is currently used for civilian trauma resuscitation is Group O Low Titer Whole Blood (LTOWB).
5. For resource/personnel constrained environments, LTOWB simplifies the resuscitation, making it more efficient and effective.
6. Walking Blood Banks use fresh whole blood from a prescreened donor (the donor is the walking blood bank) to transfuse to a bleeding patient.
7. Walking Blood Banks have been used in the military during times of war and conflict for over 100 years.
8. Patients bleed whole blood – the faster whole blood is returned to a patient, the better the chance of survival.
9. Large volumes of clear fluids/crystalloid are detrimental for a bleeding patient. In 2024 no one should be resuscitating a bleeding patient with crystalloid. *Salt water is great for cooking pasta but is terrible for bleeding!*
10. Developing civilian Walking Blood Banks will save lives and can mitigate risk from large MASCAL events and blood shortages.

Hemorrhage continues to be the leading cause of death from potentially survivable injury in both military and civilian trauma. It is well established that rapid transfusion is a life-saving intervention for a bleeding patient. Studies demonstrate the value of whole blood in trauma patients; however, whole blood transfusion should be the therapy of choice for any rapidly bleeding patient - no matter what the etiology of the hemorrhage. Hemorrhage of whole blood should be treated with whole blood....or a resuscitation strategy that recapitulates whole blood.

Two things are paramount to saving the life of a rapidly bleeding patient: hemorrhage control and appropriate resuscitation. The quicker both can be accomplished, the higher the chance of survival. Over the last two decades, there has been a paradigm shift in resuscitation strategies. It is understood that almost as important as 'what' is given is 'when' it is given.

Transfusion practices in the military have helped shaped current civilian practices. The current best practice management can be summarized by the following statement by Dr. LB Robertson 1916 in the British Medical Journal: *“The indications for blood transfusion are based on the fact that transfused blood is the best substitute for blood lost in acute hemorrhages.”* An understanding of transfusion practices in the enduring military conflicts demonstrates not only how transfusion management has come full circle but also elucidates how war is often the source of advancement and innovation in medicine. This progress is fueled by the intense and concentrated patient experience combined with the resultant national impetus to improve battlefield outcomes; it yields great medical and surgical achievements.

WHY WHOLE BLOOD?

Blood Failure → physiology dictates the need for whole blood

The term ‘blood failure’ refers to the physiologic consequences of untreated hemorrhage. Severe injury with resultant hemorrhage results in failure of oxygen delivery by blood (a quantitative deficiency), leading to accumulation of oxygen debt and a cascade of events driven by cellular hypoxia and metabolic failure (quantitative and qualitative deficiencies in blood function). Endotheliopathy develops within 30 minutes of hemorrhage-induced hypoperfusion. It is characterized by release of tissue plasminogen activator (tPA) with activation of fibrinolysis, as well as loss of the endothelial glycocalyx and the associated dysfunction of the endothelial permeability, as well as the coagulation cascade and the immune system.

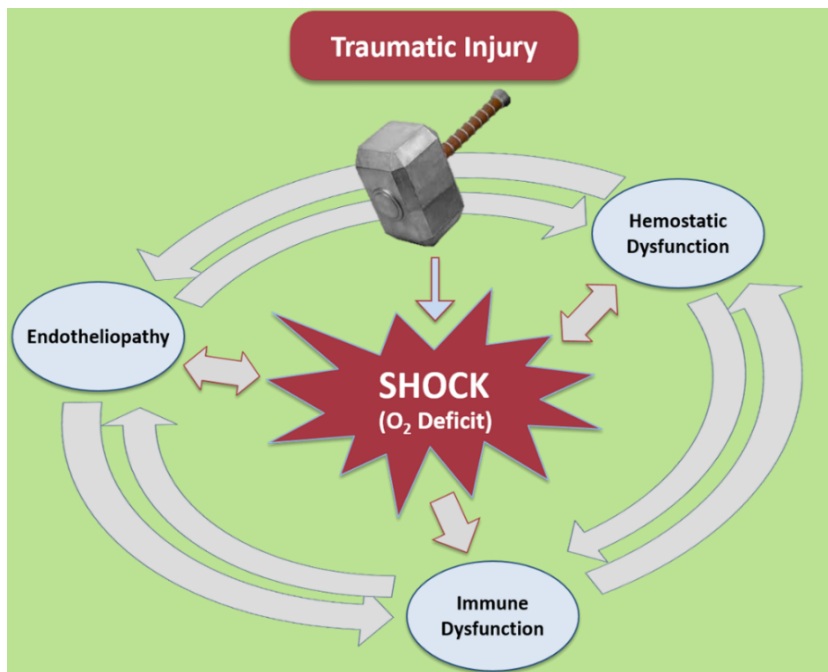


Figure 1. Trauma Induced Blood Failure

Management of blood failure requires hemorrhage control and restoration of hematologic homeostasis. At present, warm whole blood is the best therapy that mitigates the coagulopathy, acidosis, and hypothermia that results in blood failure. Several physiology aberrations result from hemorrhage, which can complicate the management. There are novel medications currently being investigated to decrease hemorrhage-induced oxygen debt and subsequent blood failure. Targeted therapeutics are being examined to correct abnormalities in platelets, red blood cells, and the coagulation system.

Additionally, during hemorrhage, the combination of blood loss and the movement of interstitial fluid into the vascular space results in hemodilution, which is subsequently exacerbated by the loss of endothelial barrier function, and, thus, amplifying coagulopathy and platelet dysfunction. Lactic acidosis is exacerbated by the loss of red blood cell mass and the reduced buffering capacity of blood. Red cells also provide the bulk of clot mass and contribute to blood viscosity; as they are depleted in hemorrhage, coagulopathy bleeding worsens, resulting in the downward spiral of blood failure complex. This combined loss of both homeostasis and hemostasis is secondary to a quantitative loss of whole blood and not just depletion of a single component. Therefore, implicit in the pathophysiology of blood failure is also the

management strategy: lost organ function must be replaced, and severe blood loss must be treated with blood transfusion. Indeed, hemostatic resuscitation and the treatment of blood failure can be thought of as the core organizing principle of trauma resuscitation.

Whole Blood Definitions

Whole Blood (WB)

- Blood that has not been fractionated into its components.
- It can be fresh, cold stored, type-specific, whole, or low-titer Group O.

Cold Stored Low Titer Group O Whole Blood (CS-LTOWB)

- CS-LTOWB is an FDA-approved product that is unfractionated blood collected from a donor with 'low' IgM and 'low' IgG anti-A and anti-B titers.
- 'Low Titer' does not have a standard definition.
- The military uses titers $< 1/256$ and civilian centers that have started transfusion LTOWB use from $< 1/50$ to $< 1/256$.

Warm Fresh Whole Blood (WFWB)

- Blood obtained from a WBB.
- The blood must be screened with rapid point of injury tests, (not FDA-approved).
- WFWB can be type-specific (TS-FWB) or warm fresh low-titer Group O whole blood (WBB-LTOWB).
- LTOWB from a WBB is much more pragmatic the emergency setting.

Walking Blood Bank (WBB)

- A process that is planned, trained, and rehearsed for the collection of warm fresh whole blood from screened (ideally prescreened) donors for transfusion in an emergency situation. Whole blood from a WBB is not an FDA approved product. Screening occurs with:
 - 1) a questionnaire and
 - 2) point of care testing; the point of care tests are currently not FDA-approved in the US.

WBBs are commonly implemented in the deployed military environments.

HISTORY OF TRANSFUSION IN THE MILITARY

War and major military conflicts are often the source of advancement and innovation in medical care secondary to the concentrated patient experience and the national impetus to limit battlefield morbidity and mortality. In every military conflict since the US Civil War, blood transfusion has been paramount. Unfortunately, many of the lessons learned were forgotten, and forgotten more than once. Interestingly, and driven by elegant, non-human physiologic experiments, advances in resuscitation toward the end of the last century advocated for crystalloid resuscitation of the interstitial space. Based on these sophisticated laboratory investigations, balanced salt solutions were promoted for the treatment of shock and the treatment of hemorrhage diverged from blood resuscitation, despite the lack of clinical outcomes data. Consequently, there was a paradigm shift toward crystalloid resuscitation with the addition of component therapy in a serial fashion starting with RBC transfusion. This contradicted not only what has been historically known since the Civil War, seen repeatedly during the wars of the 20th century, but also what, retrospectively, is somewhat obvious (if not encumbered by the physiologic investigations advocating for the resuscitation of the interstitial space): treat bleeding with blood products.



Figure 2. GI blood donors in line before receiving building, 2d Medical Laboratory, Fifth U.S. Army, Carinola area, Italy, May 1944. www.history.amedd.army.mil



Figure 3. Canadian blood transfusion unit. On the right is Dr. Norman Bethune. www.cbr.ubc.ca

By the end of World War I, blood transfusion was widely used at the American Expeditionary Force hospitals that had academic surgical consultants; up to 50 units per day were transfused. It is estimated that in 1918, over 10,000 whole blood transfusions were performed; however, no conclusive records exist documenting clinical outcomes. The British military and the Royal Army Medical Corps embraced blood transfusion therapy with more enthusiasm than the US military, and the British entered World War II with a transfusion capability, while the US, unfortunately, did not.

In the time between WWI and WWII, a Canadian surgeon, Norman Bethune, conceived the idea of a centralized blood transfusion service base and set up mobile blood banks delivering transfusion capability to the front line during the Spanish Civil War. This was an organized

WBB. The rapid expansion of his mobile blood bank resulted in hundreds of liters of blood being transfused monthly, and during increased military operations, 100 transfusions could be given daily from Bethune's WBB. Bethune recognized the value of prompt transfusion of the exsanguinating patient, brought whole blood lines to battle for the first time, and conducted organized prehospital blood transfusions. This is noteworthy, given that many trauma systems in 2024 cannot currently implement prehospital whole blood transfusion!

That men do not learn very much from the lessons of history is the most important of all the lessons that history has to teach.

Aldous Huxley

In addition to revealing the value of blood far forward, Bethune demonstrated the value, utility, and logistical reality of systematic collection and distribution of blood on a large scale for transfusion to the front lines. He clearly demonstrated that soldiers could be trained to organize expeditious transfusion of the exsanguinating casualty. The importance of timely intervention and transfusion, the "golden hour of opportunity", was

recognized prior to the Second World War.

When the United States entered World War II, blood banking and transfusion capability were not part of the initial medical plan. The British, however, continued to work on transfusion capabilities in the interwar period and entered WWII with a functioning transfusion system. Despite the US observing and documenting advances and the improved outcomes with blood transfusions during WWI, blood transfusion was considered too problematic to institute at the start of WWII. Initially during the war, most of the blood transfused was fresh whole blood collected at Field Blood Banks. Group O blood was given to all blood types.

It was not until 1944 that blood programs were systematically and logistically supported. In 1944, the demand for blood products greatly outweighed the supply capacity of the Field Hospitals, and whole blood started being sent from the United States; up to 62,000 units of whole blood in a month (March, 1945) were sent to support the European and Pacific theaters. Overall, during World War II, the military built an excellent military and civilian national blood program. The American Red Cross collected more than 13 million pints of whole blood. Unfortunately, like after WWI, the military-civilian national blood program was not sustained; however, the US did retain a rudimentary civilian blood system.

"The only mistake in life is the lesson not learned."

—ALBERT EINSTEIN

Prior to the US entering the Korean War, the military did not sustain the whole blood capability that had been implemented in both WWI and WWII; therefore, the US entered the Korean War without a military blood program. After approximately seventy days of combat operations, the first blood from the US arrived, along with the first surgical hospital. There were immense logistical challenges during the Korean War secondary to long supply lines, and given the short storage time for whole blood, there was a large amount of blood wastage. This hindrance to transfusion capability drove the research innovation to develop and field plastic blood bags and techniques for longer RBC storage.

Surgical hospitals in Vietnam used walking blood banks for fresh whole blood if more than 6-8 units of blood transfusion were anticipated. Additionally, in a 6-year period, starting in 1965, approximately 1.3 million units of whole blood were sent to Vietnam, and approximately 600,000 units were used to treat 330,000 US and some allied casualties. During the time of the Vietnam War (1955-75), there was a huge paradigm shift, starting in the early 1970s, in resuscitation strategies that were not driven by clinical impetus. The advent of whole blood fractionation was economically advantageous, and there were logistical benefits in terms of longer storage for blood products. Additionally, the possibility of treating several patients from a single unit of whole blood was appealing for a variety of reasons. There was enthusiasm for better resource utilization and wider applicability of each unit of blood, as well as the decreased risk of blood borne infection and transfusion reactions. Fractionation of blood to produce four component products from each unit of whole blood was considered advantageous given the economic gain and increased storage capability, as well as the increased number of patients that could be treated per unit of blood. Subsequently, there was a move away from clinical value of whole blood. During this time, there were no prospective comparisons between the efficacies of transfusion with whole blood compared to component therapy.

Despite the use of whole blood, component therapy, and walking blood banks for fresh whole blood in the Vietnam Theater, this practice and previous blood utilization practices in previous wars were abandoned for crystalloid resuscitation followed by RBCs. The aggressive approach to crystalloid resuscitation was seamlessly adopted without evidence demonstrating beneficial outcomes. Towards the end of the Vietnam War, large volume crystalloid resuscitation was used regularly in the resuscitation of combat casualties. This strategy of resuscitating the interstitial space described by Carrico and Shires resulted in the overuse of crystalloid, which, in turn, resulted in severe interstitial edema. The term, “Da Nang lung,” was used to describe the pulmonary edema that resulted from use of massive crystalloid resuscitation.



For the three decades following the Vietnam War, crystalloid and, then, RBCs, if the patient remained hypotensive, were used for the resuscitation of patients in hemorrhagic shock. Crystalloid use was promulgated in the surgical literature, in addition to the first 8 editions of the Advanced Trauma Life Support Manual. This practice of

Figure 4. Korean War and Vietnam War

using salt water to replace blood loss from hemorrhage did not seem to be questioned in the medical literature, which is curious, given the lack of outcomes studies comparing the two resuscitation strategies. Supporting the enthusiastic trend of crystalloid resuscitation were studies done supporting mortality benefits for “supranormal” hemodynamic parameters. Resuscitation was aimed at reaching optimal (“supranormal”) goals of oxygen delivery by modifying cardiac output by large volume resuscitation. Resuscitation was initiated with crystalloid products and included transfusion if crystalloid did not achieve evidence of improved cardiac parameters and oxygen delivery or if the hemoglobin decreased significantly. Resulting from this resuscitation strategy, complications such as ARDS, abdominal compartment syndrome, and multiple organ dysfunction syndrome became more prevalent. It took decades to reassess this resuscitation approach and start to move ‘back to the future’. The data that emerged from the wars in Iraq and Afghanistan demonstrated that this longstanding and widely adopted strategy was potentially deleterious to trauma patients.

HISTORY OF LOW TITER GROUP O WHOLE BLOOD

Low Titer Group O Whole Blood (LTOWB) has over a century of proven efficacy and safety. With the recent (and rapid) re-adoption of LTOWB into clinical practices, there are occasional questions about using “new” transfusion strategies when studies, such as PROMPT and PROPPR demonstrated superior clinical outcomes with a hemostatic (or balanced) resuscitation strategy. It helps to remind those who are slow to adopt LTOWB into transfusion protocols because of concerns of risk of new strategies that LTOWB was used starting in WWI. During WWII, when the U.S. was using a plasma-based resuscitation and the readoption of a whole blood transfusion strategy was slow, Dr. Edward Churchill forced change in the system by reaching out to *The New York Times* to aggressively pursue the use of whole blood.



Figure 5. New York Times article regarding the live-blood banks.

A publication from the U.S. Armed Services Blood Program is the first to account for the amount of LTOWB transfused during WWII and the Vietnam War. The publication of the use of LTOWB without transfusion reaction continued to demonstrate the safety of LTOWB. Despite what was learned (and relearned) during the conflicts in Iraq and Afghanistan, the trauma community had to relearn the lessons of transfusion history once again.

The rationale for using LTOWB early in the resuscitation of massively bleeding patients was adopted by the AABB (American Association of Blood Banks) in 2018. The AABB is the professional society for transfusion medicine that develops practice standards and provides accreditation for all aspects of transfusion medicine. The change came to fruition after evidence-based rationale supporting LTOWB was submitted to the AABB from 217 international experts in the fields of transfusion and resuscitation from 24 countries. The standards published in April 2018 indicated that it is permissible to use LTOWB for recipients of known or unknown ABO types and that the definition of 'low titer' would be made locally by each transfusion service. The AABB endorsed those benefits of LTOWB for hemorrhagic shock from safety, efficacy, and logistical standpoints. LTOWB has been rapidly adopted (again) into civilian practices with an exponential increase in institutions using LTOWB and publications supporting its use from a logistical feasibility standpoint and because it improves clinical outcomes.

Recent studies have also demonstrated the efficacy and feasibility of using LTOWB for obstetrical hemorrhage. In a recent prospective observational study of 34 obstetrical patients with placenta accreta, 16 received LTOWB and 18 received component therapy. The total transfusion volume was less in the LTOWB group (2.6L) compared to the component therapy cohort (4.7L) which demonstrated a 44% relative reduction in total blood transfusion volume. Trauma patients should not be the only ones afforded the benefits of a whole blood resuscitation strategy.

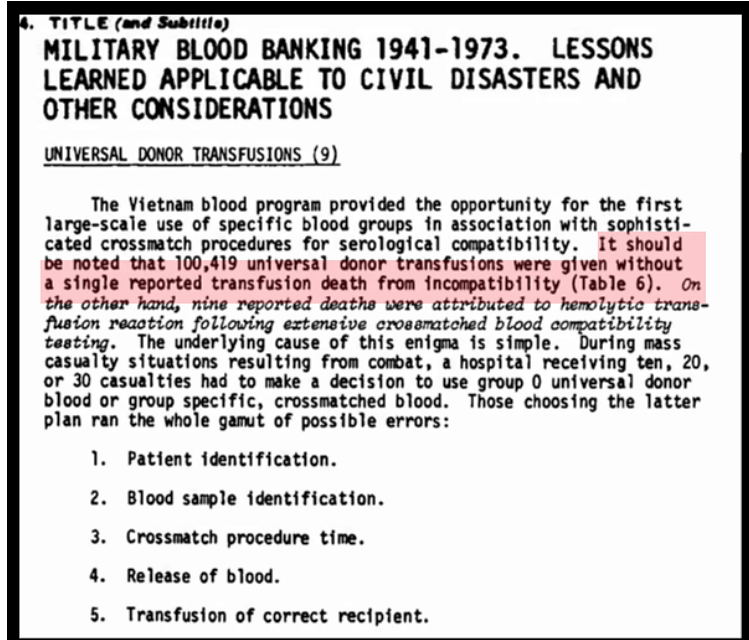


Figure 6. Published article from the U.S. Armed Services Blood Program publication.

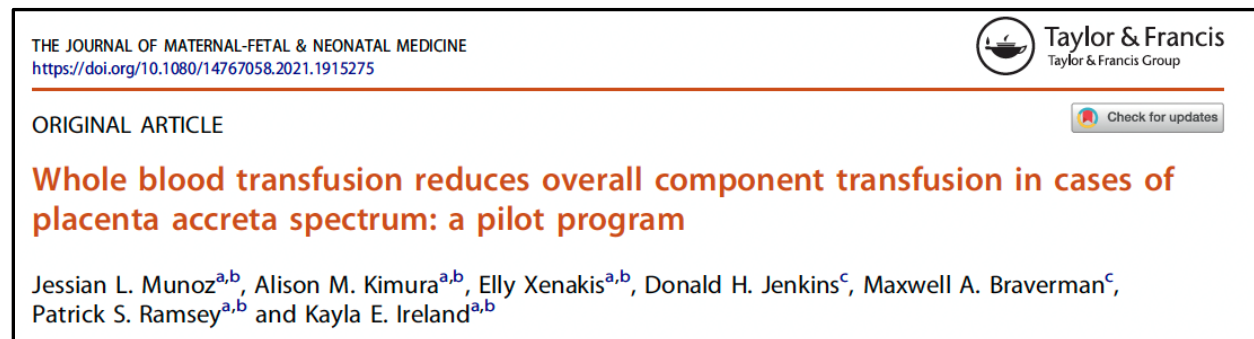


Figure 7. Article published on Taylor & Francis Group

TRAUMA, OBSTETRICAL AND PEDIATRIC STUDIES THAT DEMONSTRATE CLINICAL BENEFITS OF LTOWB

Study	Outcome	Mean % Less Blood Transfused	Mean Reduced Vol Blood Transfused	Mean Reduced Vol/kg Transfused
Adult Trauma Studies				
Williams, (n=350) Retrospective	2-fold increase 28-day survival	53%, (post ED) (P=0.033)		
Brill, (N=1,377) Retrospective	1.5 fold increase 30 day survival	7%, (post ED) (P<0.001)		
Hazelton, (N=1,623) Prospective	2-fold reduction In-hosp mortality	No difference Only Recorded Units		
Hanna (N=8,494) Retrospective	1.2 fold reduction 24 hr mortality	No Difference Only Recorded Units		
Braverman (N=214) Retrospective/Propensity	Reduced death in ED (0 vs 11%)		400ml less in ED	
Mahilko, (N=384) Prospective-Unpublished	2-fold reduction 24-hour mortality	40%, (72hrs) (P<0.001)	2.5 Liters	32ml/kg
Obstetric Studies				
Munoz, (N=36) Obstetric, Prospective	44% less blood transfused	44% (p=0.03)	2.1 Liter	30ml/kg (70kg)
Pediatric Studies				
Gaines, (N=80) Peds, Retrospective	2-fold reduction 28-day mortality	18% (p=0.06)	333 ml	11 ml/kg
Annand, (N=405) Peds, Retrospective	Mortality diff not significant	26% (P<0.001)	630 ml	14ml/kg
Manno, (N=109) Ped CT surgery, RCT	40% less blood loss	40% (No statistics)	352 ml	22ml/kg

Table I. Trauma, Obstetrical and Pediatrics Studies that demonstrate clinical benefits of LTOWB.

THE IMPETUS FOR CIVILIAN WALKING BLOOD BANKS

In addition to what is being transfused, the timing of transfusion is critical. Many advances in trauma and critical care emphasize that the more expeditious the intervention, the more efficacious the therapy. Well-understood, early interventions that result in improved treatment effects when administered in a timely fashion are antibiotics in sepsis, time to neurosurgical intervention for extra-axial traumatic hemorrhage, time to tourniquet placement for extremity hemorrhage, time to intervention for stroke therapy, time to revascularization in myocardial infarctions, and time to hemostatic transfusion in hemorrhage. Time is critical, and while it seems obvious that hemorrhaging patients die quickly, urgency for transfusion is not always appreciated; minutes matter when it comes to hemorrhagic shock.

During the COVID Pandemic, blood shortages became a reality in urban centers. However, blood shortages, and especially the lack of platelets are common, especially in rural areas. In the case of a prolonged pandemic, there could be an even greater situation of degraded stocks and disrupted supply chains, and blood banks could be depleted without ability for resupply. The blood supply is susceptible to not meeting needs either because of decreased supply or increased demand given that blood banks are optimized for maximum efficiency. While efficiency is desirable during routine practice, it is not optimized

for a prolonged surge, and there are multiple points of potential failures. The possibility for cascading effects of supply chain failures during a crisis could be catastrophic and result in large numbers of death for otherwise survivable injuries or medical diseases.

WBBs are viable options to build redundancy and resilience in the blood supply. Utilization of the WBB and leveraging the extensive military experience with WBBs would bridge the period until the interruption of the supply chain is resolved and FDA approved products could be available. It is critical for national preparedness that national and regional WBB plans get developed. San Antonio has been able to develop a WBB with the LTOWB donors used for the well-known 'Brothers in Arms' Program. The creation of a civilian WBB could be lifesaving for patients if there were a MASCAL event. Currently, US hospitals and blood banks institute campaigns to collect blood on demand to meet the need for blood products during shortages by often appealing to repeat donors. This current system could be formalized into the development of WBBs available to respond during times of increased need for blood.

SUMMARY

Early in the recent wars in Iraq and Afghanistan, whole blood was utilized in US Military operations, primarily by forward-deployed teams that were equipped with a limited supply of packed red blood cells. Whole blood transfusion during this period was driven by necessity rather than clinical indication. Over time, through both focused empiricism and investigations of comparative efficacy that demonstrated improved survival with whole blood, battlefield hospitals began using whole blood, not just when components were unavailable, but because of the clinical superiority of whole blood. Both LTOWB and FWB from WBBs save lives and are superior to component therapy. National preparedness requires a resilient blood supply and the ability to have WBBs incorporated into contingencies. The WBBs must become a viable option when FDA approved blood products required to save lives are not immediately available. WBBs can be trained, but they need to be rehearsed as well. Having whole blood widely available will decrease death from potentially survivable injuries.

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NO CT SCAN, NO PROBLEM! MANAGING INJURED PATIENTS WITH LIMITED RADIOLOGY SUPPORT

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Trauma patient evaluation is challenging, especially when making a determination for the operating room. The initial physical examination is frequently unreliable in identifying patients with blunt trauma who are at high risk for having serious intra-abdominal injuries. The determination of how to proceed with multiple injuries presenting simultaneously across the chest, abdomen and pelvis can be perplexing and lead to indecisiveness. The advent of the “pan scan” CT imaging in many institutions serves as the ultimate decision making tool for acute trauma. Missed injuries remain a significant concern, and CT imaging can elucidate unexpected findings in the chest, abdomen, or pelvis. The reliance on technology, specifically CT imaging, has blurred the lines between missed injuries and delayed injuries that were actually identified in the correct sequence after the most threatening injuries have been assessed and addressed. Does the upfront CT scan need to identify nonactionable injuries? The utility of computed tomography (CT) in clinical practice is incredibly useful, but the disproportionate utilization of the pan scan to assure accurate diagnoses has diminished clinical acumen, and the over reliance of CT imaging decision creates delays in addressing serious injuries that can be readily identified by following clinical algorithms and paying attention. In the presence of hypotension, further evaluation and resuscitation should take place in the operating room.

The diagnosis of intra-abdominal injury after blunt trauma remains a challenge. A combination of clinical examination and ancillary diagnostic tests, such as computed tomography (CT) of the abdomen and, focused abdominal ultrasonography (FAST) for free intraperitoneal fluid, should be utilized. However, abdominal CT is an expensive, time-consuming investigation, frequently occurring during the precious golden hour of trauma resuscitation. Inappropriate CT use may delay important interventions or investigations, while scanning insignificant injuries and delaying interventions for more serious injuries that could lead to disastrous consequences.

Missed injuries, delayed diagnosis (DD), have been called the “nemesis” of the trauma surgeon. Based on the findings of multiple studies, the “pan scan” seems to be an effective and highly sensitive way of evaluating trauma patients for intracranial, cervical spine, chest, abdomen, and pelvic injuries that have the potential to significantly impact morbidity and mortality. Reliance of physical examination and clinical suspicion alone to guide the selected use of radiographic imaging has been revealed to be less reliable than the use of physical examination alone. In a well-organized study of 26,264 patients, 90 patients had DD, with an incidence of 0.34%. Injuries included 16 bowel/mesentery, 12 thoracic/lumbar spine, 11 pelvic, 8 spleen, 6 diaphragm, 5 clavicle, 4 scapula, 4 cervical spine, 4 intracranial, 4 sternum, 3 maxillofacial, 3 liver, 2 heart/aorta, 2 vascular, 2 urethra/bladder, 2 pneumothorax, and 2 pancreas/common bile duct. One death occurred in DD patients, and there were 6 prolonged intensive care unit stays and 19 operative interventions. It is impossible to never miss an injury, but several of the injuries discussed as being missed in the study would have been present with hypotension or peritonitis. Delayed identification does not equate to being missed. Arguably, CT imaging is not the study for a bowel

injury, and a high index of suspicion would have led to identification of the bowel injuries earlier. The bowel injuries were all bowel perforations that presented on tertiary examination within 5 days after injury. Perhaps a more complete and earlier tertiary examination makes the injury delayed and not missed. An appropriately timed CT scan or an expeditious movement to the operating room avoids the sequelae of a missed injury. Classically, diaphragmatic ruptures are diagnosed on a plain film showing herniation of abdominal contents into the thoracic cavity without the need for CT imaging. Bowel injuries still remain the most commonly missed torso diagnosis and begs the question that if the clinical examination or clinical concern is great enough, should the CT scan be relied upon and the next progression is an immediate diagnostic laparoscopy or celiotomy.

The CT scan provides an objective evaluation, but the assessment of the abdomen in blunt trauma still remains a challenge. The accuracy in predicting intra-abdominal injuries in equivocal cases is considered poor (i.e. adjacent free air). The presence or absence of clinical indicators and their association with serious intra-abdominal injury can be used to determine the probability of serious injuries with or without the aid of CT imaging. A base deficit of greater than -3 mEq/L and major chest injuries, for instance, have a high predictive power, followed by hypotension on arrival to the hospital, the presence of a pelvic fracture and a history of hypotension in the field. A CT scan cannot be relied upon or be a comforting adjunct without accurate clinical guides to assist in clinical decision making. An application of one clinical prediction rule can give a sensitivity of 93.8% and specificity of 25.5%, but the application of an additional decision making guideline is highly sensitive (92.5%) and specific (100.0%). CT scan reliance without a skilled decision maker leads to over utilization and a lack of surgical execution.

The determination for expeditious movement to the operating room is more likely to occur in penetrating trauma, and for many years, gunshot wounds (GSW) meant a mandatory laparotomy. The selective non-operative management (SNOM) of abdominal GSWs is gradually gaining worldwide acceptance. Helical CT, traditionally thought to have limited usefulness in penetrating trauma, is now shown to determine with reasonable accuracy bullet trajectories and their proximity to vital structures. The results of the abdominal CT serve to add information to the findings of the clinical examination. Although CT is not the principal determinant of the need for surgery, it increases or lowers the threshold for non-operative management of abdominal gunshot wounds. In non-operatively managed patients, the development of abdominal signs or evidence of on-going bleeding is an indication for laparotomy. Those that undergo delayed laparotomy have similar lengths of hospital stay to those that undergo immediate laparotomy. The CT scan avoids nontherapeutic laparotomies, but in an academic environment or austere environment, where observation is not feasible, the clinical presentation or subsequent clinical deterioration obviates an operation without CT scan imaging.

No greater example of where pontification cannot lead to treatment paralysis is in an austere environment. Damage control resuscitation and damage control surgery for injured patients are impractical in an austere environment. The salvage rates for forward-deployed surgeons exceeded 90% during the height of the conflicts in both Iraq and Afghanistan, respectively. Life-saving interventions took place remotely, away from hardened facilities where a CT scan could not be housed or maintained. The injury patterns required minimal radiographic assessments beyond ultrasonography (FAST). Mechanisms of blunt, burn, and penetrating injuries appeared simultaneously with multiple injured patients with injuries above and below the diaphragm. It was impractical and impossible to perform CT imaging. Serious injuries were addressed during damage control surgery, and other interventions could take place in a delayed fashion, which could include CT imaging. This did not equate to missing injuries, but utilizing limited technology and clinical practice guidelines (clinical support tools) to avoid death from exsanguination. A better way to practice is to reset toward avoiding exsanguination and that the reliance

of CT technology becomes an appropriately timed adjunct and not relied upon to make the most serious of diagnoses.

Rule	Description
Grieshop et al ²² (applicable to patients with a Glasgow Coma Scale score > 10)	Abnormal physical examination; or 1 or more of the following risk factors: Chest injury (any Abbreviated Injury Score grade) Gross hematuria
Mackersie et al ²¹ Presence of 1 or more of the following:	Arterial base deficit > 3 mmol/L Major chest injury (multiple fractured ribs, fractured sternum, flail chest, fractured scapula, crushed chest) Hypotension (systolic blood pressure < 90 mm Hg) Pelvic fracture

Table I. Clinical Prediction Rules for the Use of Abdominal Computed Tomography in Trauma

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PREPARING FOR MASS CASUALTY AT A LEVEL 3 CENTER – CHALLENGES, TIPS AND TRICKS

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In the United States, there are approximately 2,000 trauma centers: 213 Level I, 313 Level II, 470 Level III, and 916 Level IV or V centers.¹ The strategic geographic placement of the Level 1 and 2 centers creates access issues for rural patients. Ninety-seven percent of the Country's land mass is rural and accounts for 19.3% of the total population.⁴ Only 24% of patients living in rural communities have timely (golden hour) access to level 1 or 2 trauma centers.^{2,3} These disparities leave us with two paramount goals that must be accomplished in the rural mass casualty incidents: 1- do the greatest good for the greatest number of patients, 2- get patients to the correct place in the correct time.

As required by the American College of Surgeons and JHACO, most hospitals have a disaster plan in place. The reality is that these plans are usually a policy-oriented document that is infrequently revised or visited. A 20-page policy drafted by administration is not the effective working document needed in times of crisis. It is imperative that rural (and urban) surgeons are acutely aware of their hospitals Mass Casualty Plan, or lack thereof.

SCENARIO

You are the on-call general surgeon at a 120 bed Level 3 hospital. Police, Fire and EMS are alerted for a 6 vehicle crash on the nearby interstate. One of the vehicles involved is a school bus that sustained a rollover with confirmed entrapment.

You have 6 Operating rooms that are currently all in use. The 25 bed Emergency room is boarding 10 patients. The only surgical subspecialties immediately available at your facility today are orthopedics, OB/GYN and urology. The blood bank has 8 units of PRBC, 10 units of FFP and 1 unit of platelets.

The closest Level 1 trauma center is 1 hr 25 min by ground or 17 min by air. There are two Level 2 trauma centers 35 min away.

REAL LIFE CHALLENGES (IF IT HAPPENED TODAY)

1. There is no working Mass Casualty Plan in place. Or if there is, it is not readily available to the key stakeholders.
2. The Mass Casualty Policy is 20 pages long and nobody has seen it before. Non-Clinical personnel are assigned to roles they are uncomfortable with.
3. "Pagers" were removed from the hospital 4 years ago and the operator does not have a system in place to easily notify clinical staff and physicians to report en-bloc.

4. The Mass Casualty Packets (triage tags and paper medical records) have been moved since the last Emergency Room renovation.
5. All the main operating rooms are running with elective cases.
6. There is no working agreement with the two nearby Level 2 trauma centers for Mass Casualty Incidents- no contact person is assigned at either hospital.
7. EMS is bringing every patient, regardless of triage color, to the overburdened ER.
8. Families and Media are congesting the hospital campus, restricting traffic for essential personnel.
9. The local paid and volunteer ambulance services are consumed with patient transport from the scene. There is no immediately available commercial transport ambulance available from the sole provider in the community.
10. There is no extra ER physician available to respond and triage at the scene. EMS is triaging all patients which will likely lead under/over triage and delivery to the wrong destination.
11. Hospital incident command is setup as planned, but with poor communication to the most critical areas (Emergency Room, Operating Room).

TIPS AND TRICKS TO HELP AVOID THE CHALLENGES

1. GET INVOLVED. All surgeons should be familiar with the Mass Casualty Plan at their institution. If there is not an implementable plan in place, revise it. Demand that the plan is practiced, community wide, on a semi- annual basis.
2. Who reports and where? The plan must include specific detail about what essential personnel are to be called and where they are responsible for reporting. Not everyone should flood the Emergency Room. In a Level 3 hospital, an "All Call" list for physicians is appropriate for a Mass Casualty Incident. There are obvious roles for pediatrics, internal medicine, OB/GYN, Ortho and other actively involved specialties. Psychiatry and oncology should be assigned to those with bereavement from lost loved ones. Nursing leadership should keep an updated list of their staff on each floor to submit to the operator for call-back.
3. As part of practicing the Mass Casualty Plan, everyone should become familiar with the MC Packets and know where they are located. There should always be redundancy in the system and overestimate the number of packets needed. For the walking-wounded or green color triage patients, the destination will be different than the yellow or red colored patients. Likely the yellow/red will report to the ER for evaluation whereas the walking wounded, and green patients will go to a location such as the hospital cafeteria. The packets should be readily available at the designated place (cafeteria) and not rely on someone to deliver them in the moment.
4. Avoid over/under triage from the scene by having a physician report directly to the scene.
5. Once you join the Mass Casualty Planning Committee, be a liaison to go visit with surrounding hospitals and make necessary contacts. Review each other's Mass Casualty plan and see where reciprocal assistance is an option. Exchange direct phone line numbers to the ER, blood bank, OR and cell phone numbers of Trauma/ER Directors.
6. Meet with paid and volunteer EMS companies from not just your county, but also all surrounding counties. It will be necessary to pull EMS crews from surrounding counties as mutual aid to assist with transport- both scene and inter-hospital. Plan to stage available ambulances near the hospital for transport to higher level of care. Pre-alert all surrounding air crews of the situation to be on standby or have a plan to stage at a local airfield.

7. Have a plan with security to go on lockdown with implementation of the Mass Casualty Plan. This should also include traffic into the hospital parking lot. Regular hospital visitors should be asked to evacuate to free up parking and space.
8. All operating and procedural rooms should be put on immediate hold when the Mass Casualty announcement is made. Once the current cases finish, all rooms should be immediately turned over and equipped with trauma instruments on standby.
9. All portable x-ray and ultrasound devices (from ICU and radiology) should be brought to the ER and immediately available for trauma CXR/PXR and FAST exams.
10. As ancillary staff arrive, have designated “runners” assigned to the OR, ER, blood bank and materials department.
11. Designate staging areas for the different levels of triage- walking wounded, green, yellow, red, morgue. Know what personnel will staff each area and where these locations will be.
12. Know where patients will flow after initial evaluation in the ER. If they are taken to CT scan, where next? Ideally, they are taken to a holding area for ongoing reevaluation and decision making that is not back to the ER. It is imperative that their nurse is in constant contact with the charge nurse or medical command of that unit about new results and changes in patient condition.
13. It is highly recommended that surgeons involved in Mass Casualty planning take (at a minimum) the FEMA ICS 100/200 classes online for a better understanding of incident command structure and function

In preparation for this talk, I reached out to Dr. Sandra Boenig to get advice from her first-hand experience. She is the sole general surgeon in Uvalde, Texas, that cared for the children and teachers following the school mass shooting on May 24, 2022. Her experience and recommendations for community hospital preparedness are outlined below and published with her permission. I have included her email as an inspiration to everyone reading it- we need to be prepared.

Dr. Turner,

Uvalde is a small, rural town of about 17K people. We are a level 3 trauma center and keep little blood on hand. I am on the only general surgeon here. We are close to the border of Mexico and have had several bailouts, so our hospital had set up an emergency response call system to alert all physicians in case of an emergency just a few weeks before this happened. On the morning of the shooting, we all started receiving calls of a mass shooting and told to be prepared to come in. About 45 minutes prior to arrival of the injured, we were instructed to report to the ED. Almost everyone came, even the radiation oncologist. I trained at a level one trauma center at Brooke Army Medical Center in Ft Sam Houston, TX. I was in the army during the Afghanistan conflict and took care of the wounded firsthand during my deployment to Afghanistan and also at Landstuhl, Germany and at BAMC. I was familiar with high velocity rifle wounds. I immediately starting to organize everyone in the ED to get tourniquets, IVF, blood, chest tubes, thoracotomy trays, etc. to have available on hand. When the kids first started arriving, 2 were being actively coded. Me and the ER physician ran the trauma codes and did a pericardial window on a child who was shot multiple times in the chest. There was no blood around the heart. I then had to move on to the next child because it was pretty obvious at that point that this child was probably dead at the scene. The other child was shot in the head with a non-survivable head injury. He was never actually brought into the ED but placed in a temporary morgue that was set up. The remaining kids all had high velocity wounds to

multiple extremities and chest. Some had tourniquets placed in the field. The chest wounds required chest tubes. These kids and one adult had been in that school for almost an hour before finally being extricated so they had survived the "golden hour" and had survivable wounds. One teacher that was shot multiple times in the chest died enroute to the hospital. All the kids were stabilized and sent out via helicopter to several waiting hospitals in San Antonio. We were told that there would be a second round of injured kids, but they never arrived because they were all declared dead at the scene.

From a medical standpoint, I think the in-house hospital action was appropriate. We have a hospital rule that NO cases will be started if a situation like this arises again. EMS needs more extensive training on handling this type of trauma – "Scoop and run".

A few more thoughts....

- Have a way for your hospital to get a hold of key personnel quickly to get them enroute. This includes anesthesia for intubations.
- Hold all elective cases in the OR and stop all CT scans to free up the ct. Get all portable x rays to ED for films. Have every available sonosite/US for FAST exams.
- Set up trauma rooms with an RN and a runner. The runner should know what the common needs are - chest tubes, pleur evac, 11 blade, thoracotomy tray, suture to tie in a chest tube, central line kits, etc. personnel also need to know how to set up a pleuravac and place it on suction. Have plenty of gloves and disposable gowns.
- Have a plan for helicopter traffic. We have one helipad but had our local airport be a holding area.
- Get ready for personnel not used to seeing these wounds have issues with ptsd and grief.
- Best thing is to have mass casualty training but that's pretty difficult in reality. At least talk about it during med staff meetings.

Best,

Sandra Boenig

SUMMARY

Most general surgeons have a false sense of security about their facilities preparedness for mass casualty incidents. Most of the plans are written as hospital policies to fulfil the requirements of governing agencies but are not practical when needed for true practice guidelines. As a whole, we should be more involved in the planning and simulation of these situations to give patients the best care we can on the worst day of their life.

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WHO IS IN CHARGE?

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Director, WVU Critical Care & Trauma Inst.
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When disaster strikes, we all want help, but we want helpful help. No matter what the tempo of the event is, when efforts are not coordinated, this can actually become very inefficient and potentially detrimental. Each disaster is different. Each location is different. The purpose of this syllabus is to prompt the reader to anticipate disasters in the local area, local response teams/agencies and how best to coordinate efforts so when the unthinkable becomes reality, the efforts compliment each other and are additive.

NATURE AND SCOPE OF THE DISASTER

One of the key determinants of how many and what type of agencies will be involved will be dictated by the nature and scope of the disaster causing the multiple casualties. If the event is due to a natural disaster over a region, then it needs to be anticipated that the event will be prolonged, shortages of supplies will persist, and multiple hospitals may be involved/impacted or disabled. Issues to be considered and planned for ahead of time are how to reduce the waste of supplies, as resupply may be difficult for the area. Disposable materials will need to be conserved. Planning for food, water, medications, and supplies will be critical. Additionally, it may not be possible for shift relief to get to the hospital, and those in the hospital at the time may have concerns about their own families and homes. The tempo of arrival of the casualties may be spaced out over a longer period of time. As with all natural disasters, it should be anticipated that the region is “on its own” for the first 24 to 72 hours, so agencies involved are likely to be ones already having associations with the hospital. This can facilitate communication and coordination since key personnel are known to leadership. In the sub-acute time period, the nature and scope of disaster will determine the number and intensity of outside agencies that become involved. The governor has the authority to request assistance from the state national guard through the state adjutant general. If approved by congress, a state can have a compact with another state to allow use of an outside state’s guard as well. In cases when the President has declared a disaster, the President can activate the Guard. The scope and duties of the Guard will remain under the leadership and approval of the officers and leadership of the Guard. The Guard does have medically trained personnel who are verified and have documented credentials and competencies. Therefore, this group is a possible supplement to the medical staff, should additional staff be needed. Coordination by the commanding officer, hospital leadership, and clearly defined roles would be needed. Additional agencies, such as the Red Cross and FEMA, will arrive later, and their roles should be primarily external to the hospital clinical care, though they can assist with supplies, especially of food and water. It is critical that the hospital remain functional as a clinical treatment area and not serve as a shelter. This is the area in which interface with agencies such as Red Cross and FEMA are most beneficial. A non-clinical group of hospital individuals can help connect and coordinate family members of patients with these agencies. It will be paramount that the clinical staff stay focused on delivering the clinical care with representation and communication to non-clinical hospital leadership as to their needs and capacity. In all cases and response agencies, it is critical that coordination of efforts and communication are essential to successful collaboration.^{1,2,3}

Events such as mass shootings, explosions, and terrorist types of events add different dynamics. In these cases, the influx of casualties will be rapid, but the ability to obtain resources and the surrounding community infrastructure will still be intact, though more complicated to navigate. As the hospital response to these situations has already been extremely well covered in this course, this summary will not address that. It is critical that each hospital has a well-developed plan that has been practiced routinely and clinical staff are educated as to their responsibilities. The additional factors not usually discussed are the interactions with multiple law enforcement agencies that may be involved and the impact on hospital flow. The FBI may become involved in situations that include terrorism, cyberterrorism, civil rights, and other major crimes. The FBI does not supervise or have authority over local law enforcement, but rather usually pools resources and investigative findings. US Marshals, the US oldest and most versatile of the agencies, has large focus being on apprehension of fugitives, sex offenders, and recovery of missing children, amongst other tasks. Homeland Security uses its resources to gather and act on intelligence to intercept and prevent acts of terrorism and other threats to protect the federal infrastructure. Each of these agencies may be involved, depending on the criminal situation that the area is experiencing.^{4,5}

No matter which situation one is dealing with, there are some key principles that should be kept in mind to help optimize the clinical care.^{6,7,8,9}

1. Utilize your practiced disaster plan. Activate early. You can always de-escalate, but catching up is hard to do.
2. Have a pre-determined individual who will be the point of contact to relay the clinical needs to incident command.
3. Have a seasoned clinical individual (who that is will be based on local individuals) who will provide the “big picture” over sight of the clinical events, flow, and needs. All clinical people and areas should be reporting to that person so he/she can coordinate and prioritize needs and requests.
4. Control the patient flow. Patients should move in one direction. Have a plan for staging areas between steps. For example, a patient is evaluated in the shock room/trauma bay then goes to CT. Though in normal times, the patient would return to that room, in a mascal, they cannot. Use a close by alternate holding area that can accommodate monitors, etc., and stage providers there to attend to those needs.
5. If law enforcement or federal agencies need a presence at the hospital, ensure their command center is cohorted with hospital incident command to best coordinate efforts and share information. A lot of IT and electronic resources will need to be in this area. The location will need to be large to accommodate the teams.
6. Secure the hospital. This should happen without clinician involvement, but be aware if it is not. Depending on the event and threat, it is possible for the hospital or EMS to be a target. Control the traffic, traffic flow, and access to ER and hospital. Incident Command can coordinate with local or federal law enforcement if needed to do this. In a less ominous, but similarly disruptive event, a challenge is controlling/preventing the inflow of family, friends, and media into the hospital, as this will congest halls and disrupt/slow clinical care.
7. Dealing with the media will need to be a priority for leadership. Have a set area to have frequent, scheduled updates. If you are the lead physician or surgeon, be sure to set time to participate when needed. This will decrease rumors and allows you to control the message. Avoid interacting with reporters on a one off or individual basis.

8. Have a designated family reunification area away from the media location, with trained, dedicated personnel. Basing a chaplain or grief counselor in this area will also be helpful.
9. If the event is prolonged, be prepared to manage volunteers. The physicians and surgeons should not be doing this directly but do need to be involved with defining work areas, qualifications, and credentialing, and have clinical oversight and authority.
10. If multiple support agencies are involved, i.e., Red Cross, local shelters, etc., the hospital incident command should regularly meet with them to help track needs and coordinate efforts to minimize duplications. Each of these agencies will have its own leadership and communication structure as well as different strengths and assets.
11. Expect an outpouring of community support, especially if the event is prolonged. Have a dedicated administrative person to communicate the hospital needs and schedule efforts. Donations of things such as food, etc., can help support staff, and scheduling these to arrive on different days and times will be more meaningful and provide the community support over a longer period. Consider getting suggested items from hospital staff. Many organizations and individuals are looking for ideas. If there are no suggestions, they may “fill in” with less than useful items.

SUMMARY

Each disaster is different, resulting in multiple and varied responses. It will be important to be connected to incident command and maintain control of the clinical care. Frequent, direct communication with hospital incident command is mandatory to prioritize issues, acquire resources and adapt to the situation that will be ever changing. Knowing the hospital leadership who will be involved with hospital incident command and building those relationships ahead of time will pay dividends. Maintain control of your hospital, prioritize the clinical care and needs, and avoid getting bogged down in other areas that a non-clinical person could do. Working with leadership and emergency management ahead of time to think through the most likely threats and events will better prepare you and your team to deal with the many issues that will arise.

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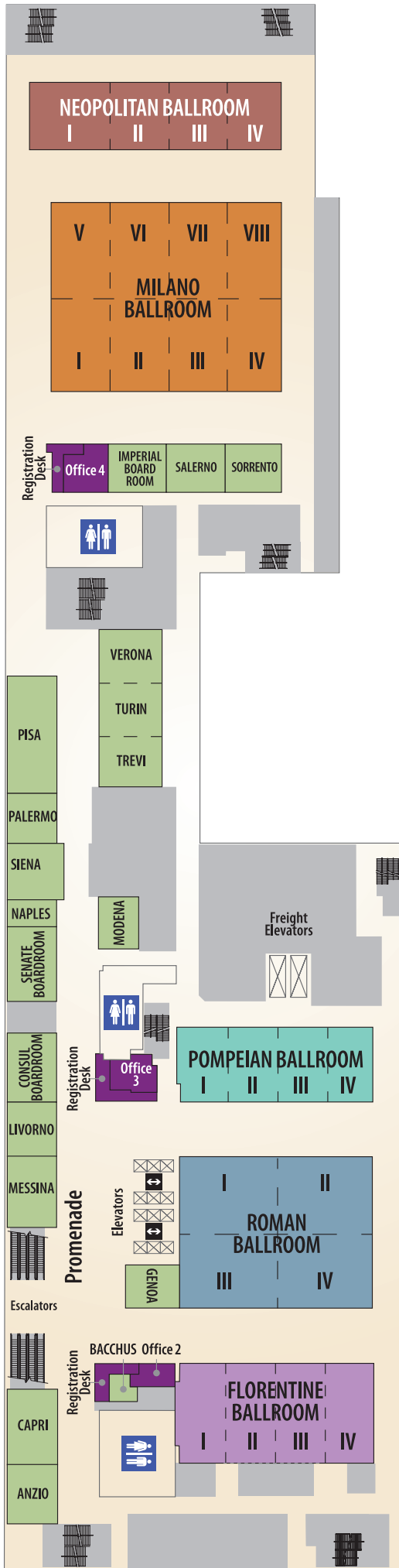
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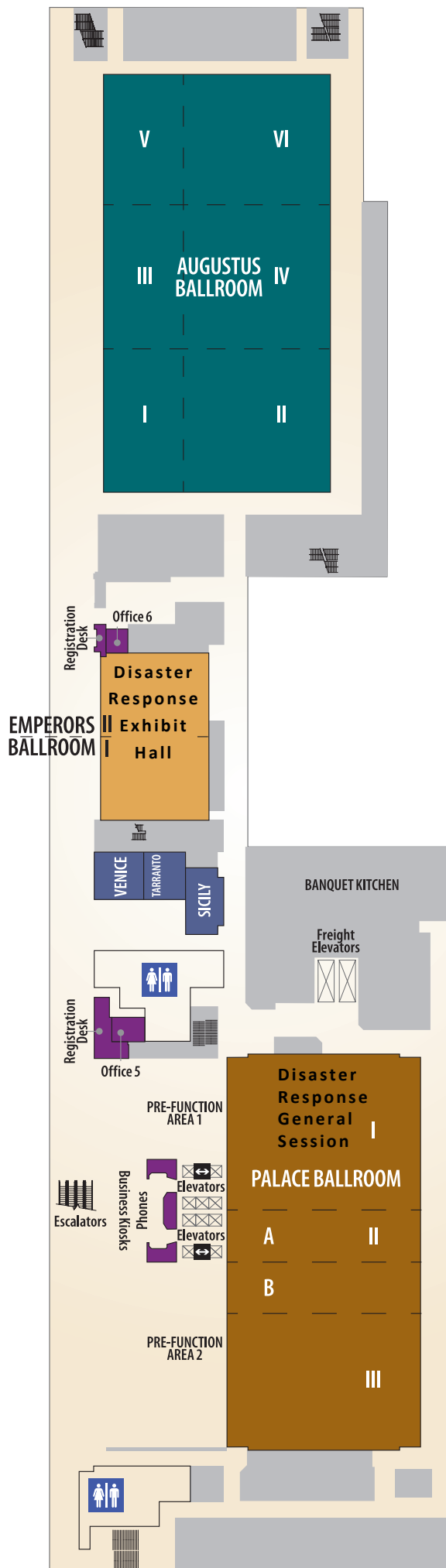
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CAESARS PALACE CONVENTION AREA MAP

PROMENADE LEVEL



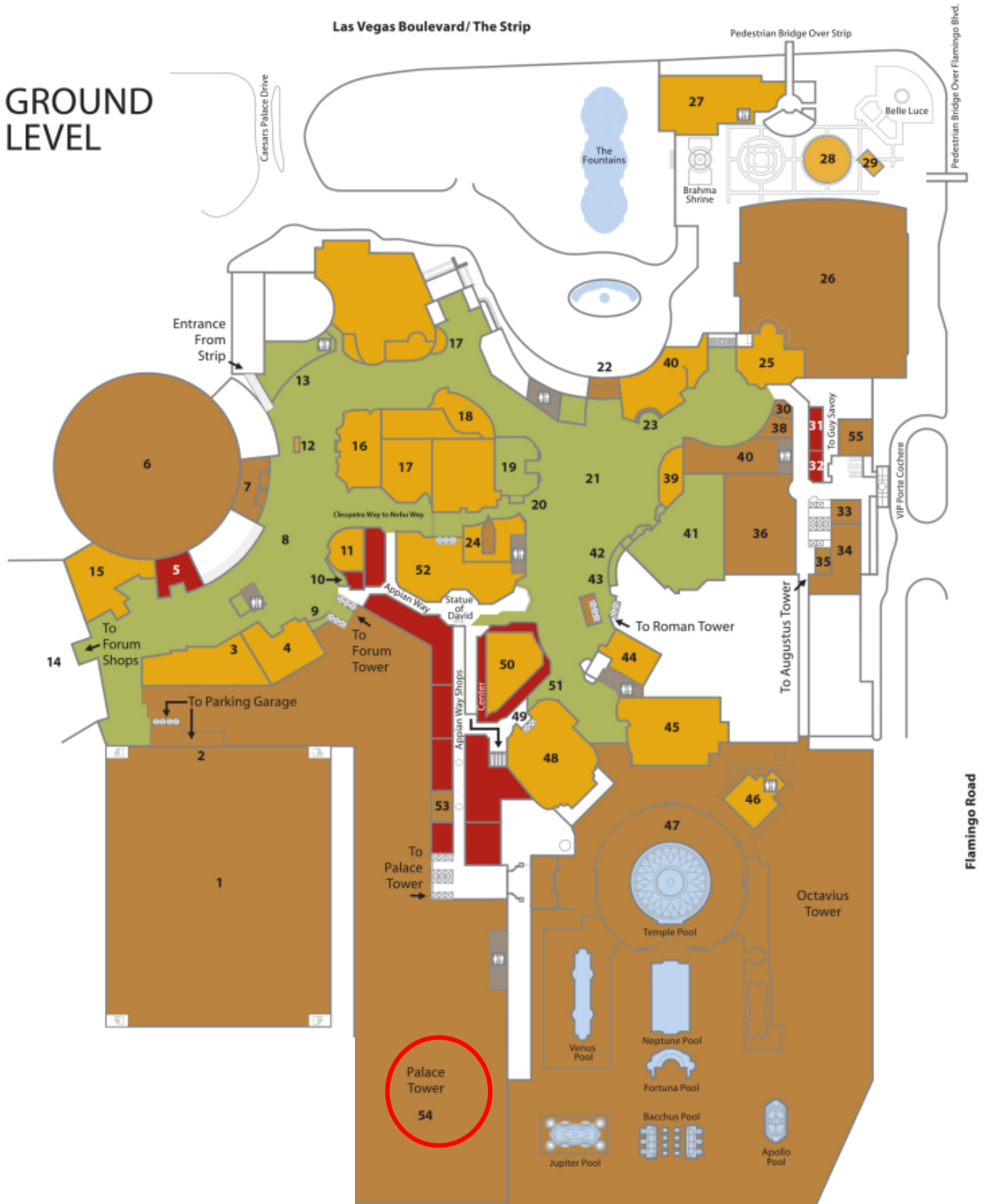
EMPERORS LEVEL



CAESARS PALACE

Property Map

GROUND LEVEL



MEDICAL DISASTER RESPONSE 2024

Medical Disaster
Response



April 13, 2025
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April 13, 2025

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