

What Do I Do?

*Automating Hospital Mass Casualty Incident
Response for Improved Outcomes*

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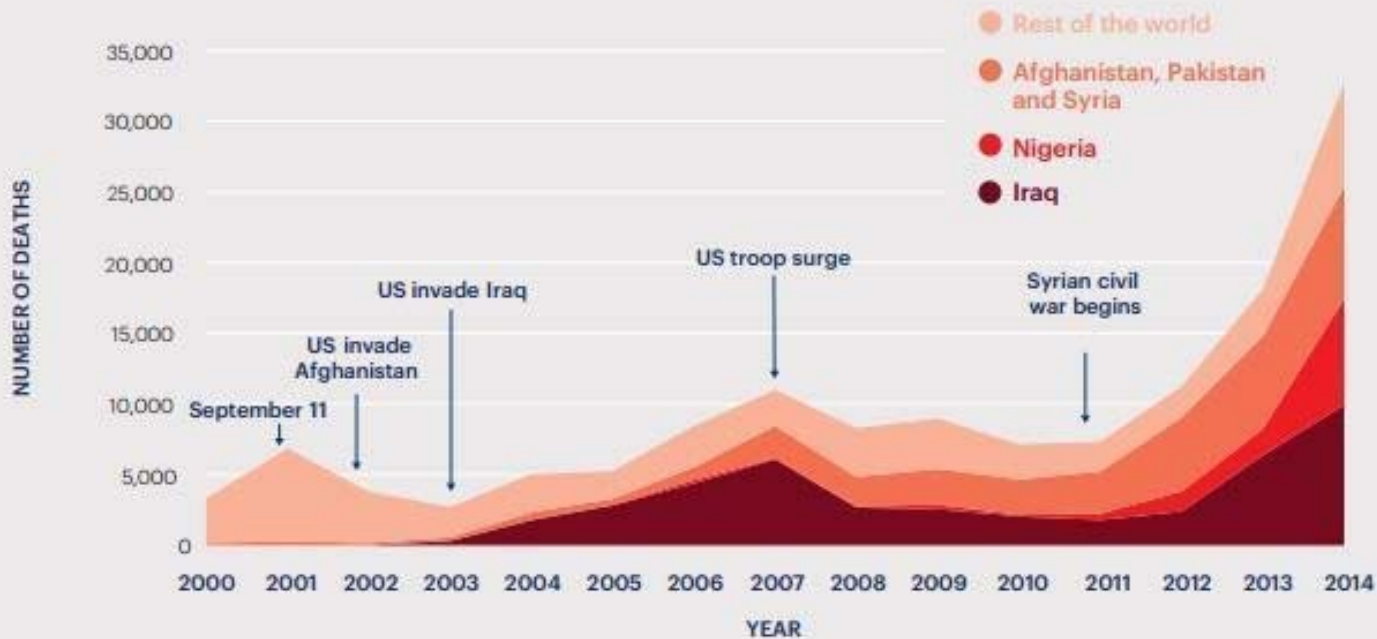
Overview

- Review of the threat landscape
- “Lessons learned”
- Describe the need for an MCI protocol
- Identify the essential elements and actions within an MCI protocol

Global Terrorism

FIGURE 1 DEATHS FROM TERRORISM, 2000-2014

Deaths from terrorism have increased dramatically over the last 15 years. The number of people who have died from terrorist activity has increased ninefold since the year 2000.

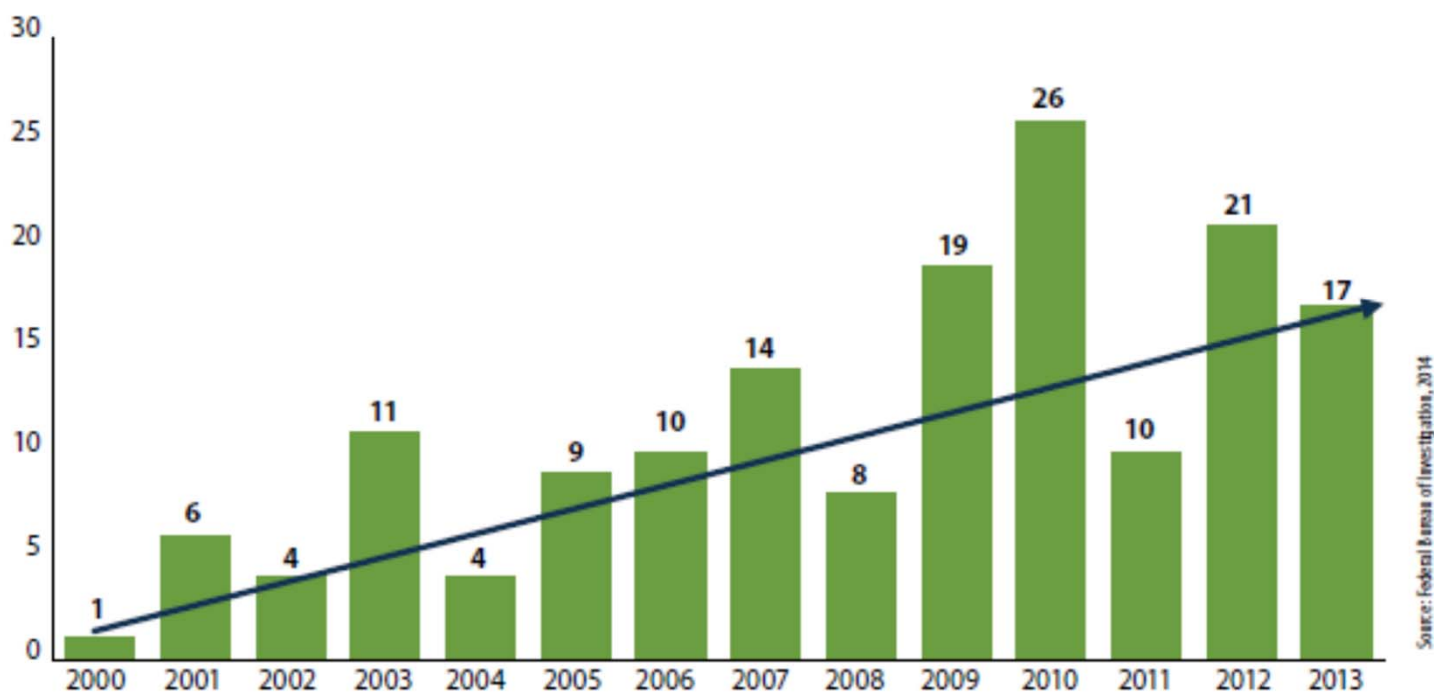


Source: Global Terrorism Index, 2015

[@MGHDisasterMed](#)

Active Shooter Events

A Study of 160 Active Shooter Incidents in the United States Between 2000 - 2013:
Incidents Annually



Source: Federal Bureau of Investigation, 2014

A Clear Need in Healthcare

- In 2015, representatives from 46 different institutions in 31 countries from all around the world participated in a survey related to MCI preparedness
- Findings concluding that 73.9 % of the centers had a written MCI protocol
- Only 47.8 % of the institutions involved in the survey conduct regular MCI trainings or exercises
 - 28% perform trainings once a year
 - 13% every two years

Source: Ben-Ishay, O., Mitaritunno, M., Catena, F., Sartelli, M., Ansaloni, L., & Kluger, Y. (2016). Mass casualty incidents - time to engage. World Journal of Emergency Surgery : WJES, 11(1), 8.

MCI Epidemiology

Historical planning for disasters has often focused on disaster “myths”

- Auf der Heide, E. The Importance of Evidence-Based Disaster Planning *Annals of Emergency Medicine* 2006 (47) 34-49



Recent Lessons

There is an ever-increasing body of knowledge accumulating that describes no-notice disaster epidemiology

- Israel, London, Madrid, Mumbai, Paris, Brussels, Aurora, Boston, Orlando, etc.

TABLE 2.1 TEN WORST ATTACKS IN OECD COUNTRIES SINCE 2015

COUNTRY	YEAR	ATTACK	DEATHS	INJURIES	RESPONSIBLE
France	2015	Paris attacks	137	368	ISIL
Turkey	2015	Ankara bombings	105	400	ISIL
Turkey	2015	Suruç bombing	33	104	Lone actor (ISIL inspired)
France	2015	Île-de-France attacks	20	22	Local group (al-Qa'ida/ISIL inspired)
France	2016	Nice truck attack	85	300	Lone actor (ISIL inspired)
Turkey	2016	Atatürk Airport attack	50	230	ISIL
United States	2016	Orlando nightclub shooting	50	53	Lone actor (ISIL inspired)
Belgium	2016	Brussels attacks	35	330	ISIL
Turkey	2016	March Ankara bombing	34	125	Kurdistan Freedom Falcons (TAK)
Turkey	2016	February Ankara bombing	30	60	Kurdistan Freedom Falcons (TAK)

Source: IEP

MCI Epidemiology: Field

- Terrorist events typically occur without warning
 - Secondary devices/incidents should be expected
 - Multi-modal and multi-site attacks are increasing
- The incident “scene” may be difficult to determine
- Many patients will immediately try to flee the area if they are able
 - Will use run or use private vehicles
 - Police or other public safety vehicles may be used

MCI Epidemiology: Field

- It may be difficult to determine when the scene is “safe”
- Preventable death is most often due to:
 - Hemorrhage (90+%)
 - Pneumothorax
 - Inadequate airway protection
- “Bystanders” will try to assist victims
 - Will try to improvise tourniquets
 - Will often try to extricate victims if able
 - May include other first response communities
- Other 911 calls will continue

MCI Epidemiology: Hospital

- Patient volumes will typically overload the closest hospital
- Walk-in patients at an area hospital may precede their official notification of an event
 - Average time from event to presentation of the first patient at the closest hospital can range from 4-18 minutes
- 50% of casualties generally arrive within a 1-hour window
 - Second 50% can present up to many hours later

Anticipate Challenges with Response

- The hospital's notification interval will be very short, if it exists at all
- Incident information will be inaccurate, incomplete, or both
- The closest hospital is likely to be overwhelmed
- Patient distribution to other facilities may be uneven
- Patients will arrive by mechanisms other than EMS
- The ED and hospital will likely be full
- Triage must be brief, but must also be repeated
- Morbidity and mortality are likely to rise when the system gets saturated

Impact of an MCI on Trauma Care

The Impact of Multiple Casualty Incidents on Clinical Outcomes.

All severely injured trauma patients (ISS > or = 12) who presented during a 12-month period to a regional trauma center were retrospectively reviewed. MCIs were defined as treating and admitting three or more trauma patients within a maximum of 3 hours. Ten percent (88/861) of all trauma patients were treated in an MCI setting.

MCI patients displayed a greater length of hospital stay, time to first surgical procedure, time to emergency laparotomy, and time spent in the emergency room ($p < 0.05$). MCI and non-MCI patients did not differ in ICU length of stay, post admission morbidity, or mortality ($p > 0.05$).

Source: Ball CG, Kirkpatrick AW, Mulloy RH, Gmora S, Findlay C, Hameed SM.
J Trauma. 2006 Nov;61(5):1036-9.

How Does Casualty Load Affect Trauma Care in Urban Bombing Incidents? A Quantitative Analysis

U.S. Level I trauma center disaster plans were translated into a computer model and challenged with simulated casualties based on 223 patients from 22 bombing incidents treated at an Israeli hospital.

The model predicted that trauma center capacity is 4.6 critical patients per hour using immediately available assets. A fully deployed disaster plan shifts the curve to the right, increasing the surge capacity to 7.1.

The model defined a quantitative relationship between an increasing casualty load and gradual degradation of the level of trauma care in multiple casualty incidents, and defined the surge capacity of the hospital trauma assets as a rate of casualty arrival rather than a number of beds.

Source: Hirshberg A, Bradford S, Granchi T, Wall M, Mattox K, Stein M
J Trauma-Inj Inf & Crit Care: 2005 Apr 58(4): 1036-9

Emergency Medicine > Emergency Medicine

Las Vegas ED Chief Recalls Sunday Night's Mass Shooting

— 'Trunks full of injured people'; 215 patients in 90 minutes

SAVE |

by [Kristina Fiore](#), Deputy Managing Editor, MedPage Today

October 04, 2017

Scott Scherr, MD, the emergency department director of Sunrise Hospital in Las Vegas, was home sleeping when his phone started buzzing repeatedly on Sunday night.

ADVERTISEMENT



Hospital Action Required Within 5-10 Minutes

- Assess available information about the incident
- Notify hospital and departmental leadership
- Establish a command structure and secure the facility
- Communicate with on-site staff about the event
- Move existing patients out of the ED
 - ED staff
 - Admitting office
 - Nursing supervisors
 - Hospitalists/internists
 - Patient transporters
- Prepare for MCI triage and patient tracking

Hospital Action Required Within 5-10 Minutes (cont.)

- Mobilize maximal number of bedside staff to conduct multiple simultaneous resuscitations
 - Emergency medicine
 - Trauma surgery
 - Surgical subspecialists
 - Anesthesia
 - Others
- Mobilize sufficient supporting personnel, materials and resources
 - Imaging (X-ray, CT, others)
 - Respiratory care
 - Blood product support
 - Lab evaluation
 - Physical carts of resuscitation supplies

MCI Planning: Conclusions

- Field response to an MCI requires detailed pre-planning and training
- Hospital response to an MCI is not just an ED or a surgical problem, it is a whole-hospital problem
- Effective response requires scripted actions and pre-specified targets of mobilization
- There is an evidence base available to guide prospective planning for MCIs

“We’ll do the best we can with what we have” is no longer good enough...

Creating an MCI Protocol: Guiding Principles

- Common challenges are anticipatable, an MCI protocol should address all of the issues above
- A true MCI plan should plan to mobilize *maximal* resources immediately and automatically
 - Should have specific numbers for resources deployed
 - Should have specific time targets

Collaborative Planning

The Emergency Department is critical, but it is only one department

- Admitting
- Anesthesiology/
perioperative services
- Blood bank
- Environmental Services
- Internal medicine
- Labs
- Materials management/ Patient
transport
- Police and security
- Pharmacy
- Psychiatry/social work
- Radiology
- Respiratory therapy
- Surgery



Marathon Bombing Response



Critical Lessons Reinforced and New Lessons Learned

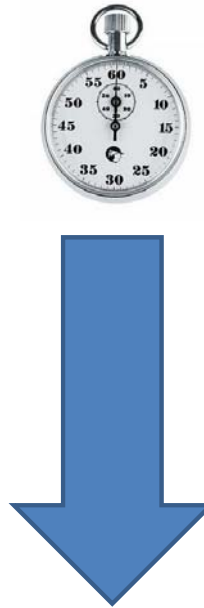


- The fundamentals of our MCI protocol were *essential* in our response
- We needed additional planning for:
 - Patient registration and EHR use
 - Creating immediate ED capacity
 - Creating capacity for minor injuries
 - ED crowd control
 - Patient tracking and connections with community tracking systems
 - Special populations

1. Expediting Patient Registration Using EHRs

Original Protocol (without EHR)

- ↓ Event recognition, Protocol activated
- ↓ Retrieve tags
- ↓ Place tags on disaster patients as they arrive
- ↓ Activate accounts or document on paper
(wait)
- ↓ Send pre-filled lab slip
- ↓ Lab orders processed using downtime procedures
(wait)
- ↓ Results called and relayed to patient's clinical team
(wait)



Revised Protocol (w/EHR)

- ↓ Event recognition, Protocol activated
- ↓ Retrieve mobile workstations
- ↓ Arriving patients using standard anonymous patient arrival process
(wait)
- ↓ Place wrist band on patient
- ↓ Submit lab orders via Epic
- ↓ Labs expedited
- ↓ Lab results available via Epic

2. Creating ED Capacity

- Immediate collaboration to move patients out of the Emergency Department in an efficient, and effective manner
 - Admitting office
 - Nursing leadership
 - Medical leadership
- Practiced communication is critical to ensure appropriate patient placement, efficient transfer, and accurate patient tracking

3. *Accommodating the Surge*

- Data shows that patients with minor injuries (green-triaged) can represent 50% or more of the patient population in an MCI
 - Minor-injured patients need less intensive monitoring
 - Reserve the ED bed spaces for higher acuity resuscitations
- Diverse planning committee can develop a Minor Injury Treatment Area
 - Supply carts to be delivered to the area to support wound repair, orthopedic care
 - RN staffing and administrative support to appropriately support the area
 - Efficient patient flow through

4. *ED Crowd Control*

- Must ensure access to ED for critical responders
 - Limit ED access for all others
- Limited resources to cover multiple entrances
- Provide external perimeter control



5. Patient Tracking and the Community

- Patients may be spread across multiple hospitals in the Region
- Hospitals and the community must create a system that re-unites patients and families as quickly as possible without violating patient privacy
 - MA system uses the Red Cross and public health

6. Unique Needs of Specific Populations

- Pediatric patients
 - Family reunification
 - Security concerns
- Non-English speakers
 - Delayed response due to immigration concerns
 - Language barriers
 - Fear of retribution against a specific ethnic group
- Suspected perpetrators
 - Evidence collection
 - Security concerns
 - Impact to staff, patients, visitors

Key Questions When Activating MCI Protocol

- Is the event a potential or confirmed MCI?
- How many patients are estimated, or known, to exist?
- Is there any possibility of hazardous substances (chemicals, radiation, biologics)?
- Are there any known, or possible, security threats to the hospital?
- What level of certainty do we have about the information currently available?

Community Planning for MCI

- Should “map out” the community to discuss:
 - All available hospitals
 - Available trauma centers (if any)
 - Typically available transport resources
- Create a common set of assumptions about MCI response
- Create a common understanding of information sharing and communications

Community Planning for MCI (cont.)

- Create a playbook for patient distribution in “the big one”
 - Recognize when community hospitals will be asked to receive critical trauma patients
 - Discuss how to address overload at the closest hospital
 - Discuss patient transfers to trauma centers

Quick Reference Resources

First Steps for ALL CMED Disaster Radio Notifications:

1. **Triage RN or Coordinator makes an announcement on the ED overhead speaker system:** "Acute Attending, Resource Nurse, Charge Coordinator, and Team Lead report to the Administrative area at Triage immediately"
2. **Coordinator pages Group with the details of the CMED radio report.** Assign staff to continue to monitor CMED traffic.
3. **Acute Attending, Resource RN, Coordinator, and Team Lead must huddle** immediately to discuss the information they know. Charge coordinator must ask the group:
 - Is MGH very likely to receive patients from this event? How *certain* are we of the information we have?
 - Will the event significantly disrupt ED operations?
 - Any security threats?

1

If MCI is very likely

(5-10+ red or 20+ total pts for MGH):

**OPEN MCI ENVELOPE AND
ACTIVATE MGH MCI PROTOCOL**

If HAZMAT event is known or likely:

**OPEN HAZMAT ENVELOPE and
PAGE MGH SAFETY OFFICER
ON CALL to speak with the ED
Triage Nurse**

Compose the EAS message, ex:

"M C I Activation. Red Line derailment. 50 plus patients to M G H. Some pedi. No Hazmat."

[@MGHDisasterMed](https://twitter.com/MGHDisasterMed)

Quick Reference Resources (cont.)

CHARGE COORDINATOR MCI Disaster Response Job Action Sheet

Immediately call 6-xxxx to send Employee Alert System Notification.

SCRIPT:

- This is your name, I am the ED Charge Coordinator.
- I want to send an EAS Message – A New Incident Notice - to Activate the MGH MCI Protocol.
- Here is the text of the EAS message:
 - "M (space) C (space) I (space) Activation. Red Level. M G H. Some Pedi. No Hazmat."
- In addition to the EAS message, please also page Stat groups with the same information.

RESOURCE NURSE MCI Disaster Response Job Action Sheet

- 1.) Assign nursing staff to assist with triage in the Ambulance Bay.
 - Discuss with Acute Attending whether to limit the ambulance entrance
 - Notify police and security and ED leadership if this is necessary
- 2.) Put on the disaster vest and maintain radio contact on Channel One

ACUTE ATTENDING MD MCI Disaster Response Job Action Sheet

- 1.) Appoint an attending physician to lead each unit below (in order):

Triage Unit Leader (conduct triage in ambulance bay)
Acute Care Unit Leader (oversee treatment of all Red pts)
Urgent Unit Leader (oversee Yellow pts, including CDU)
Minor Unit Leader (oversee Green pts in Fast Track, the ED Lobby, and auxiliary areas)

- Instruct the Triage MD and RN to place a color-coded lanyard from the disaster triage bins on each patient to reflect their triage color (red, yellow, green)

- 2.) Put on the disaster vest and maintain radio contact on Channel One

Communication

- Mass Notification Platform
 - Front line staff, onsite and able to take immediate action empowered to activate and notify
 - Leadership to guide overarching hospital operations
- Continued readiness to support an automated response
- Leveraging Hospital Incident Command (HICS)
 - Emergency Department

Training

- Tabletop exercises
 - Discuss resource allocations to the ED amidst discharges and other patient movement
- Focused drills
 - Confirm specific action items expected of each department upon notification of a protocol activation
- Full scale exercises
 - Evaluate interdepartmental coordination, including the movement of patients and resources throughout the building
- Ongoing “No Notice” exercises
 - Maintain skill sets across all shifts to ensure a well rehearsed, automated response

Discussion Based Workshops

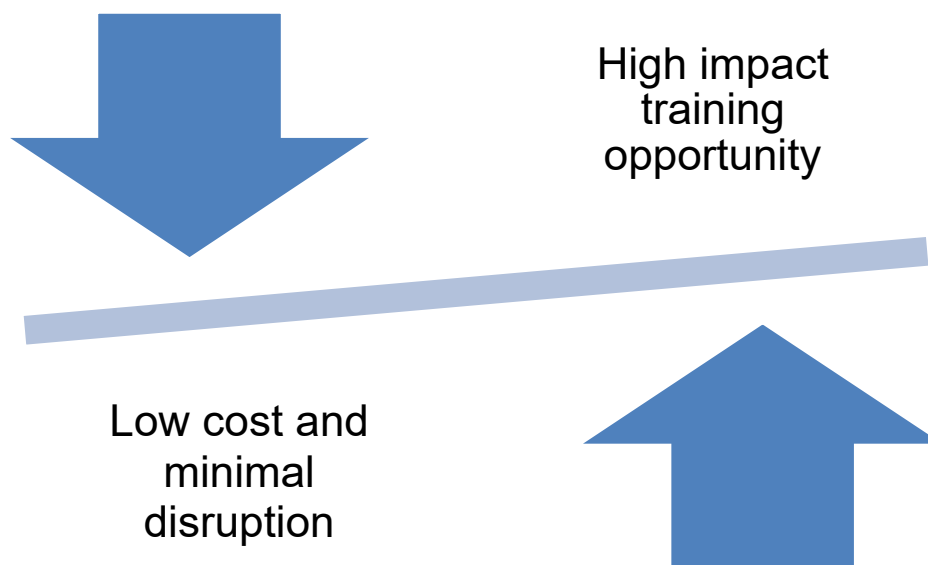
Benefits	Challenges
<p>Larger, more diverse audience</p> <p>Detailed discussion that provide context by way of theory and history</p> <p>Facilitate two way communication across role groups</p> <p>Enriched discussions during workshops streamline planning efforts by providing real time feedback</p>	<p>Does not test the feasibility of the assumptions and expectations of the protocol</p> <p>Artificial environment</p>

Full Scale Exercises

Benefits	Challenges
<p>Test protocols in a real world environment</p> <p>Help staff develop muscle memory by testing the plan in a familiar setting</p>	<p>Significant costs associates with planning</p> <p>Larger scale exercises occur at a lower frequency, disproportionately benefiting staff present for the exercises</p> <p>Risk overlooking night and weekend staff</p>

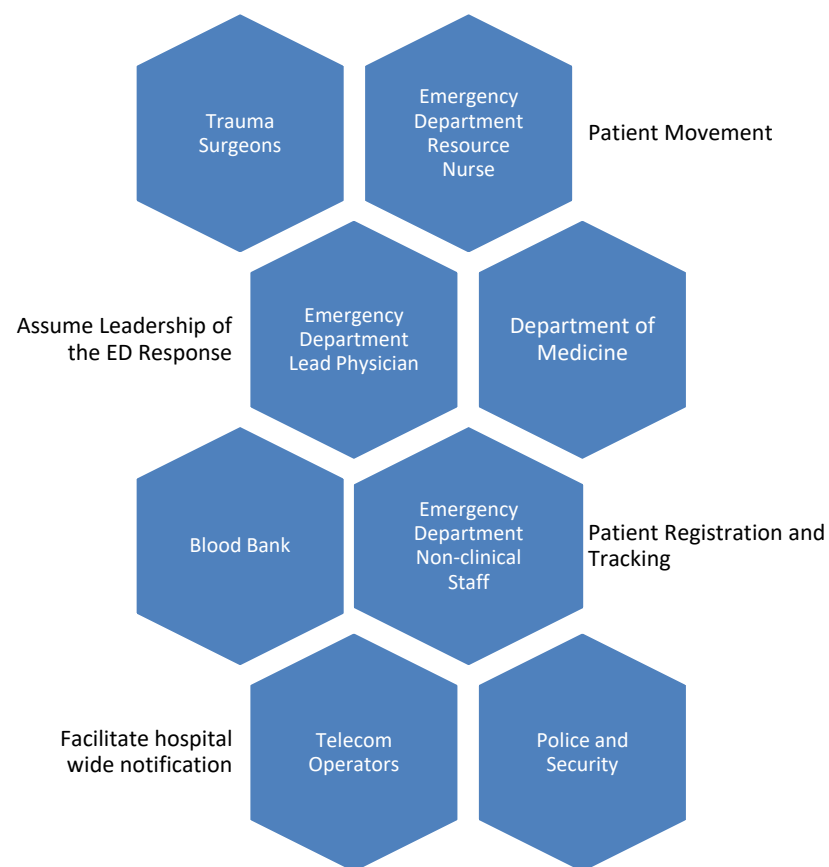
Gap Analysis

How to reach an audience comprised of diverse role groups in a streamlined manner that is easily replicated to reach varied shifts



Diversity of Initial Stakeholders

Who do you need in the first five minutes of an MCI Response?



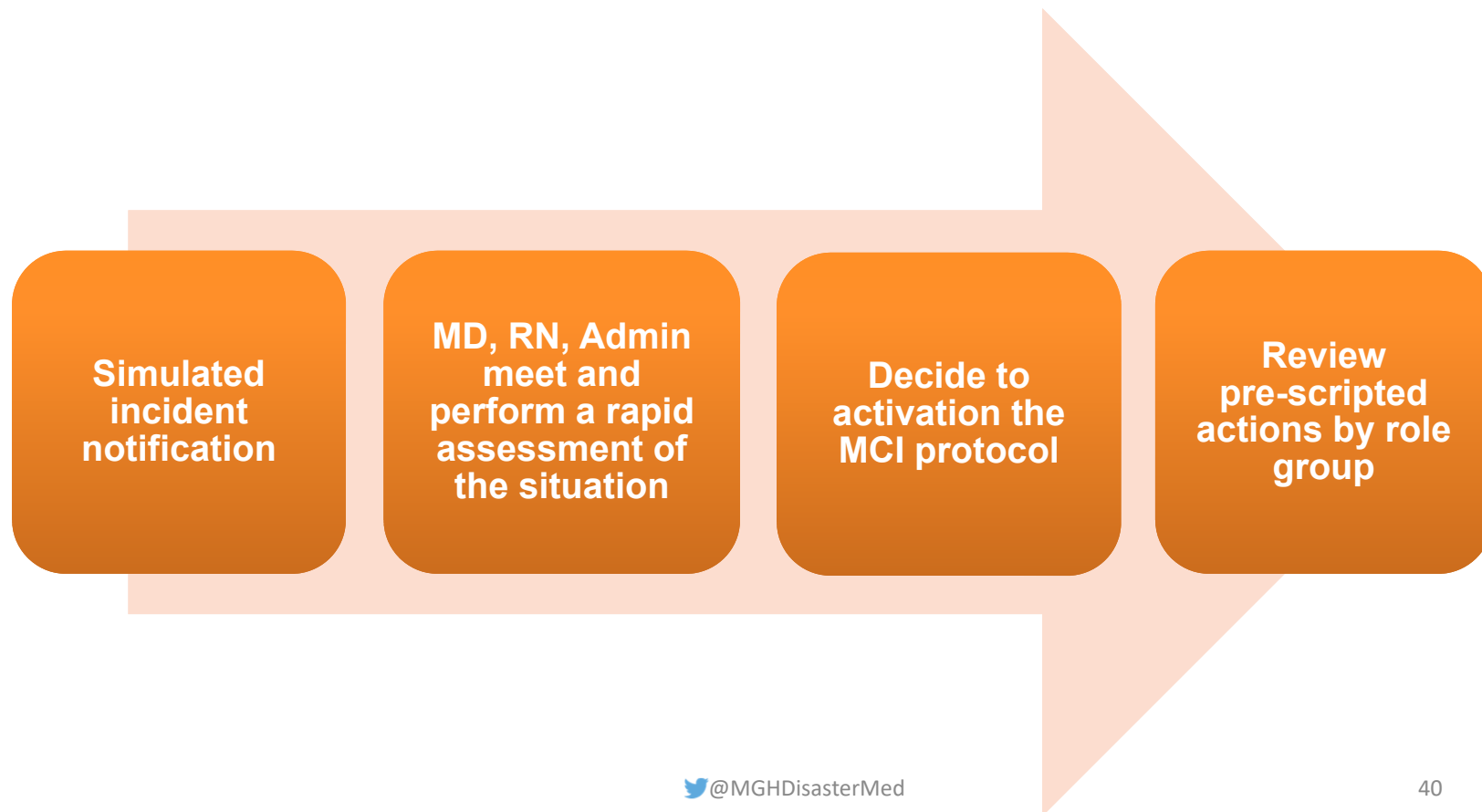
What is a No Notice Exercise?

- Low impact, 15 minute commitment training/exercise opportunity
- Maximize exposure across shifts for critical stakeholders
 - Resource RN, Lead Physician, Non-Clinical representative
- Focus on priority responsibilities within the initial moments of an event
 - Top three priorities for each role
- Increase muscle memory
- Practice in a familiar space
- Designed for the Emergency Department, but has been modified to meet the needs of any group

No Notice Exercise Logistics

Planning Component	Details
Who:	Facilitator: MGH Center for Disaster Medicine Participants: ED MD, RN, Administrative Coordinator
What:	Simulated radio notification Retrieval of Job Action Sheets Walk through priority tasks by role group
When:	Intentionally varied Different days and times to interact with staff from multiple shifts
Where:	Emergency Department

No Notice Exercise Summary



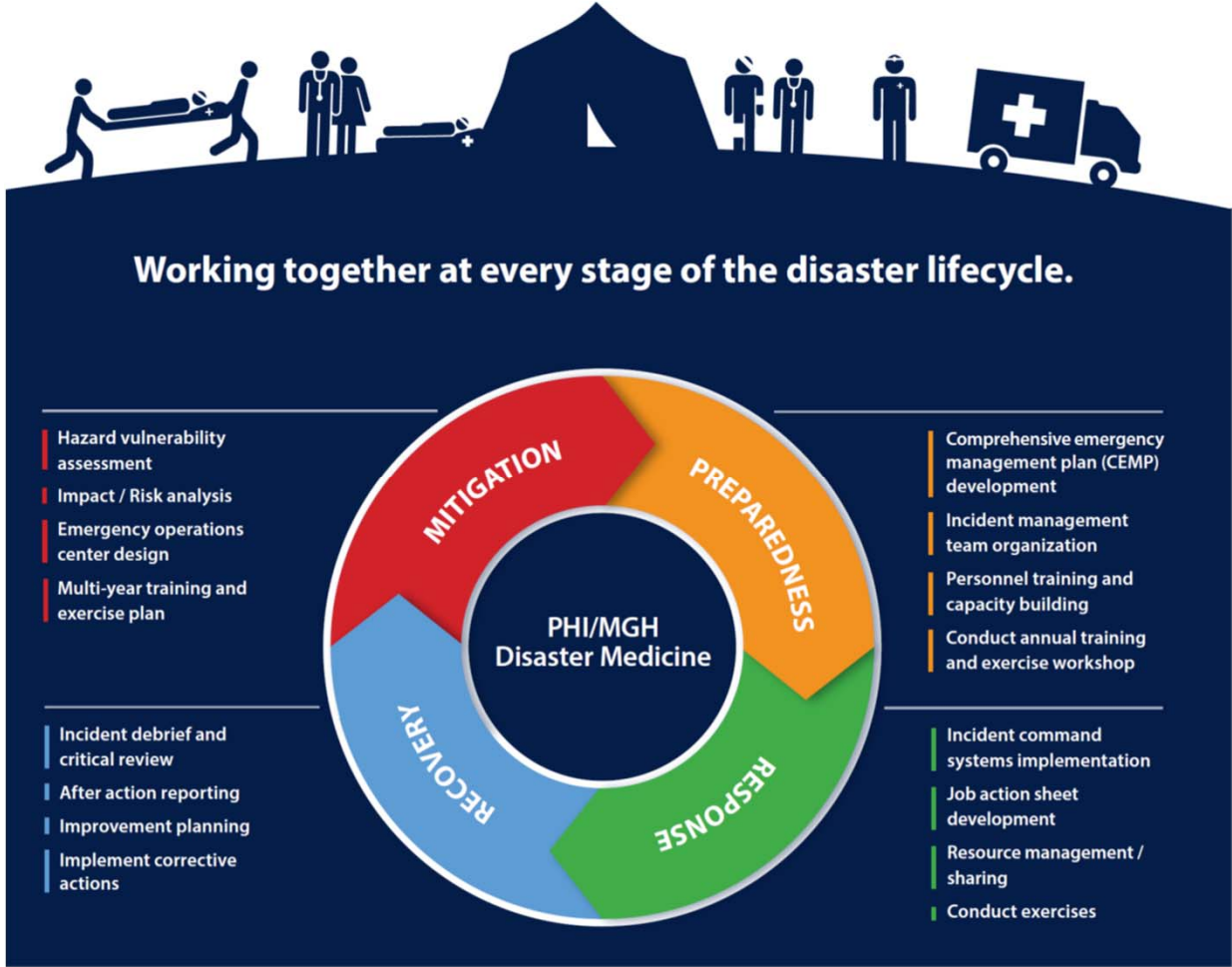
Additional Opportunities

- Leveraging planned events (ex: July 4th) to round on key areas
- 15 minute discussions of priority tasks expected of the department per the MCI Protocol
- Briefings at regular intervals to ensure staff have appropriate expectations related to interdepartmental dependencies

Ongoing Work

- Expanding No Notice Exercise format to other critical areas of the hospital
- Integrating exercises in recognition of interdependent response relationships
- Exploring the opportunity to leverage similar exercise formats beyond the MCI Protocol

Thank you



Questions

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