Introducing challenges and opportunities for resilient performance of hospital incident management: A case study of Hurricane Harvey.

INTRODUCTION

Escalating threats from natural and man-made disasters

Growing global economic losses due to natural disasters (UNDRR, 2019)
- 300 billion USD
- 14 billion USD
- 1985
- 2017

Deepwater Horizon disaster (NOAA, 2011; Lee, Cross-Connor, & Luo, 2018)

- Oil well blowout and resultant explosion in a drilling rig in 2010
- Tremendous oil spill that lasted for 87 days
- A total cost of 145 billion USD accounted for oil spill recovery, settlement, and liabilities

Coronavirus Disease 2019 (COVID-19)

- Global impacts *(as of May 6, 2020)*
  - Total confirmed cases: 3,688,635
  - Total deaths: 258,085
- Increasing impacts in the US *(as of April 6, 2020)*
  - Total confirmed cases: 1,239,848
  - Total deaths: 72,381
  - Expected maximum deaths: 100,000 to 240,000*

Knowledge of resilient performance in hospital incident management is markedly limited due to natural disasters.

BACKGROUND

Persistent Challenges to Disaster Management (Perry & Lindell, 2003; Perry, 2007)

- Sudden onset of emergency events
- Situations changing constantly and unexpectedly
- Consequence growing larger and more complicated
- Accompanying risks to the public and responders

Internal challenges (within response organizations)
- Relying Limited resources (e.g., staff, supplies)
- Dealing with inaccurate or incomplete information
- Making high-stake decisions under time pressure
- Modifying pre-established plans continuously

Rise of Resilience in Disaster Management

- Definition of resilience: "A system’s ability to adjust its performance to expected and unexpected situations" (Bous, Comfort, & Deming, 2011; Hollnagel, 2011).
- Two safety views to capture opportunities and challenges of resilience of a system (Klein, 2014)

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<thead>
<tr>
<th>Safety-I</th>
<th>Safety-II</th>
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<tr>
<td>Definition of safety</td>
<td>Absence of undesired events</td>
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<tr>
<td>Focus</td>
<td>What went wrong</td>
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<td>Attitude towards rules and procedures</td>
<td>Compliance</td>
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<td>Approach</td>
<td>Find-and-fix</td>
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<th>Aspect</th>
<th>Opportunities</th>
<th>Challenges</th>
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<td>Organizational structure, and functions, and individual roles</td>
<td>Establishing multiple incident command centers</td>
<td>Excess endeavors to coordinate multiple centers</td>
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<td>Communication and situational awareness</td>
<td>Availability of various formal and informal communication channels</td>
<td>Needs for a hospital-wide notification system</td>
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<td>Operating plans and protocols</td>
<td>Skipping administrative procedures for urgent requests (e.g., paperwork)</td>
<td>Difficulty of following a formal planning process (e.g., the NIMS)</td>
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<td>Human and physical resources (staff, space, and supplies)</td>
<td>Accepting funding from private and non-government organizations</td>
<td>Too specific requirements for reimbursement from federal funding</td>
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<td>Lessons learned from incidents</td>
<td>Maintaining the CMS patient reporting protocol</td>
<td>Increased fatigue and anxiety of hospital staff</td>
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<td>Leadership and high-level decision making</td>
<td>Mobilizing back-up supplies and equipment to sustain hospital operations</td>
<td>Issues with the ad-hoc use of spatial resources (e.g., helipad, sleeping space)</td>
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<td>Regular inspections and drills for disaster preparedness</td>
<td>Hazards from back-up equipment (e.g., emergency generator) and limited stock of supplies (e.g., fuel)</td>
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STUDY AIM

- To identify opportunities and challenges of resilient performance in a hospital’s response to Hurricane Harvey by adopting Safety-I and Safety-II viewpoints.

METHOD

Semi-structured Interview

- Participants: 6 hospital incident personnel of a large regional hospital that responded to Harvey
- Data Analysis: A thematic analysis (Braun & Clarke, 2006)

FINDINGS

Opportunities and Challenges of resilient performance of the hospital

- Noticeable events during Harvey
  - Patient health and safety
  - Stabilization of hospital operations
  - Maintaining hospital structural integrity
- Goals of the hospital
  - Patient health and safety
  - Stabilization of hospital operations
  - Maintaining hospital structural integrity

DISCUSSION & CONCLUSION

- Recurrent issues with hospitals’ coping with disasters
  - Major issues: Surge capacity, loss of electricity, and staff shortage
  - Reactive attitude: lack of proactive and coordinative efforts for possible disaster scenarios
- Safety-I and Safety-II viewpoints were employed to identify challenges and opportunities for resilient performance of hospital incident management
  - Advantages and disadvantages of adaptations and improvisations (e.g., two incident command centers)
  - Technical incompatibility to be resolved
  - Future studies for interoperability between emergency management computer software and electronic health record (EHR) systems

We confirmed that chronic challenges to hospital disaster planning and management should be addressed.

The opportunities identified in our case study need to be incorporated into hospital disaster preparedness programs in order to make hospitals and healthcare systems more resilient in large-scale disaster events.