

Lessons From the 2013 Boston Marathon: Incorporating Residents Into Institutional Emergency Plans

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When 2 pressure-cooker bombs exploded during the 2013 Boston Marathon, first responders and hospitals across the city coordinated a swift and effective response, caring for 264 patients across 26 local hospitals.¹ Residents from the Boston Combined Residency Program were staffing 3 of these hospitals, whereas others were watching or running the marathon. Shortly after the bombings, overwhelmed by call volumes, cellular service went down across Boston.

Our program was challenged by hampered communication with residents. Beyond difficulties with communication, the residents' role in the disaster response was unclear. Well-intentioned residents wanted to help out, but didn't know how, which added a layer of confusion that is common in disaster scenarios. Would residents be expected to provide surge staffing, and who would make that determination? Would all residents participate or just the most experienced?

Later in the week, a citywide manhunt led to "shelter in place" orders, with all civilians mandated to remain inside while law enforcement worked to locate the bombing suspects. With this development, a new set of questions arose. What was the best way to find a balance between patient safety and residents'

personal safety? Could trainees be asked to work beyond scheduled shifts? Should trainees be asked to commute to work during the shelter in place order?

From these events, our program determined that it was essential to have a trainee-specific emergency preparedness plan (EPP), not only to clarify expectations and communication plans in the event of an emergency, but also because residents provide a significant proportion of hospitals' direct patient care and thereby increase hospital throughput and capacity.

BACKGROUND

Our experience parallels that of other hospitals where rapid, widespread coordination was needed during emergencies despite limited resources. Examples include the evacuations during Hurricane Sandy² and Hurricane Katrina.³

Because residents play integral roles in hospital operations at academic institutions, incorporating residents into EPPs is imperative for a successful response. Although more than 80% of hospitals train nurses and attending physicians for terrorism-related events, only 49% train residents. Furthermore, most residency programs do not train house staff in terrorism preparedness.^{4,5} Recent literature



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has highlighted the importance of incorporating emergency preparedness curricula into residency training, but has lacked emphasis on integrating residency emergency preparedness efforts with institutional communication, personnel management, and resource allocation systems.^{6–10}

PLAN DEVELOPMENT

With the goal of establishing a resident EPP in our large pediatric training program, we first wanted to understand the existing institutional EPPs at Boston Children's Hospital (BCH) and Boston Medical Center (BMC), the 2 main hospitals where our residents work. To do this, we met with the emergency management groups at both hospitals. Both hospitals used internal emergency management groups and neither hospital included residents in their plan. Instead, resident staffing during emergencies was managed ad hoc by the chief resident without formalized interfaces between the chief residents and emergency management.

After understanding the institutional EPPs at BCH and BMC, the authors developed the following objectives for the new resident EPP. In times of disruption to hospital operations (eg, weather emergencies, mass casualties, threats to hospital safety, or otherwise limited communication or staffing), the EPP will help to: (1) facilitate rapid, closed-loop, redundant communication with residents that is tiered and operational even in communication-limited scenarios; (2) establish the whereabouts and safety of residents; (3) ensure adequate resident staffing so that routine hospital operations and patient safety can be maintained; and (4) create a process by which greater resident staffing can be activated and deployed to clinical care settings as needed.

We established ground rules that outlined key principles of the EPP that residents would follow regardless of location, rotation, or circumstance. These included: (1) be safe: prioritize personal safety and standard operating procedures above all else; (2) if you're working, keep working; (3) if you're at home, communicate with the in-house resident on your clinical team whether you can safely commute to your next scheduled shift; (4) the chief resident on-call is in charge; they act as liaison between institutional emergency management, attending physicians, and resident teams; and (5) if no communication is possible, show up at your next scheduled shift.

A major challenge for our program was communication to ~150 residents across multiple hospitals. Thus, it was important that communication be redundant, streamlined, and bidirectional.

For outgoing messaging, we chose a trio of communication tools, including pagers, e-mail, and an encrypted text messaging application that all residents installed on their personal cell phones. This combination ensured reliability with paging, ease of access with e-mail, and notification when off duty with a text message to residents' personal phones. For each modality, we created distribution lists such that the chief resident on call could rapidly and efficiently distribute notifications.

For incoming messaging, a phone tree system was developed with each in-house resident in the hospital responsible for accounting for his or her clinical team. Residents could communicate with their in-house resident using phone, pager, text, or e-mail, but primarily relied on an online shareable spreadsheet that residents could update remotely and simultaneously. This spreadsheet allowed residents to check on one another and the hospital status in

real time. The chief resident on call could quickly assess the availability and condition of the entire residency by reviewing the spreadsheet and identify staffing needs or missing residents.

PLAN IMPLEMENTATION

With the assistance of the BCH emergency management group, we introduced and simulated our EPP at a residency-wide retreat by using a tabletop exercise. The exercise used multiple simulated emergencies, with residents rotating through different clinical roles (eg, ICU resident, resident at home) in an informal, low-stress environment. The objectives for the tabletop exercise were to ensure that residents were familiar with EPP notifications, understood the communication structure and tools, and understood their roles and the ground rules in the event of EPP activation.

After the tabletop exercise and rollout of the EPP, we administered an anonymous survey to residents. The 67 responses demonstrated that residents understood the EPP notifications, their role during EPP activation, and the communication tools they would use. After implementation, 65 (97%) residents felt more prepared for emergencies and 66 (99%) felt the EPP met residents' and chief residents' needs. Constructive feedback focused on the need for repeated trainings over time. Other feedback highlighted improved understanding of residents' professional role in emergencies, a greater sense of belonging within hospital systems as a result of their inclusion in institutional EPPs, and the benefit of being able to confirm their peers' safety in the event of an emergency.

In the first 9 months, the resident EPP was used more than a dozen times in response to winter storms, an enterovirus outbreak, Ebola

preparations, electronic medical record downtime, and an active shooter in a nearby adult hospital.

Additionally, the chief residents were integrated into the emergency management groups at both institutions. This formalization allowed chief residents to better anticipate staffing disruptions. It also enabled consistent messaging from hospital and residency leaders as events unfolded regarding resident responsibilities, expectations, and resources. Our early experiences demonstrated that chief residents, given real-time updates about hospital planning, were able to be more strategic in their decision-making, better prepare residents for their roles, and provide valuable feedback to hospital leadership during times of crisis.

The integration of trainees into institutional emergency plans is not only feasible, but is essential to patient care. Although events like the Boston Marathon bombing are rare, the EPP that was subsequently developed is broadly applicable to improve operations during weather emergencies, infectious disease outbreaks, and events that limit travel, communication, or staffing, which occur annually.

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ABBREVIATIONS

BCH: Boston Children's Hospital
BMC: Boston Medical Center
EPP: emergency preparedness plan

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