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**The medical response to the Boston Marathon bombings: An analysis of social media
commentary and professional opinion**

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ABSTRACT

Objectives: To explore the differences in perception of the medical response to the victims of the 2013 Boston marathon bombings between lay people and healthcare professionals.

Methods: Commentary accessible and available on internet discussion websites by non-medically trained persons and in the academic literature by healthcare professionals was analysed qualitatively.

Results: Major themes were found relating to both the pre-hospital and hospital-based phases of the medical response to the disaster. Lay people focused more on pre-hospital care and the actions of specific bystanders, while healthcare professionals focused on hospital care; the importance of a disaster plan; and frequent training to the success of the response.

Conclusions: Lay people and healthcare professionals have positive but differing perceptions of the medical response to the victims of the bombings. This may have implications for future funding and implementation of disaster preparedness.

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INTRODUCTION

On April 15th 2013, two bombs exploded within 10 seconds of each other close to the finish line of the Boston Marathon. [First responders at the scene included healthcare professionals \(doctors, nurses, paramedics, and healthcare assistants\), military personnel, police, as well as bystanders. A triage facility was set up in the marathon's medical tent, and the mass casualty event procedure was set in motion, with casualties being sent to Boston's several trauma centres for definitive treatment.](#)⁽¹⁾ In total, 264 people were injured, including three deaths.⁽²⁾

Following 9/11, Boston's hospitals had recognized that they would not have been prepared to deal with such an emergency.⁽³⁾ They consulted with professionals from places where mass casualty events are a regular occurrence.⁽³⁾ While the federal government focused its disaster-preparedness efforts on bioterrorism and weapons of mass destruction, Boston chose a broader approach which “took advantage of lessons learned in Israel, Iraq, and Afghanistan” and included training in treating blast injuries.⁽³⁾

As it stands, the Department of Health and Human Services in the United States funds these efforts through the Hospital Preparedness Program (HPP), which provides “interoperable communication systems”, allowing healthcare services to share each other’s resources efficiently in an emergency.⁽⁴⁾ By January 2013, appropriations for the HPP had decreased by over 50 million dollars between 2010 and 2012, and funding for the program was cut by another 125 million in 2014.⁽⁵⁾ The HPP's funding is now the lowest it has been since 2002.⁽⁵⁾ These budget cuts not only prevent cities from improving their current emergency plans, but it also impairs their ability to train their staff to enact them.⁽⁶⁾ Despite healthcare professionals having stated the importance of continued funding, politicians and the general electorate have remained silent on the issue.⁽⁶⁾

Social media, a term encompassing Facebook, Twitter, photo-sharing sites, discussion sites, and others, have become an important source for the generation and dissemination of medical information and also information during disasters.^(7–10) The study of its role in such situations is a branch of the emerging field of crisis informatics, which has looked at the shootings at Virginia Tech, the 2007 Southern California wildfires, and the 2009 Red River floods among others.^(11–13)

The Boston marathon bombing was the subject of much discussion by lay people on popular

internet discussion sites, as well as by medical professionals in the academic literature. This study seeks to explore the perceptions of these two groups and to understand the impact that their differences may have on the future of disaster response. Whilst the epistemological and ontological perspectives of these two cohorts differ, a qualitative analysis of the differences in these perspectives can be used to add richness to the understanding of both disaster management and the possible influences of the socio-political landscape on planning for future disasters.

METHODS

A mixed methods approach to studying the phenomenology of the perception of the disaster response is recognized as a research methodology.⁽¹⁴⁾ Our approach uses triangulation of data from multiple data sources that represent primary data from 'observers' and secondary data from peer reviewed or published sources.⁽¹⁵⁾

This approach is methodologically congruent with a social constructivist perspective as it allows the research question to be explored from the social viewpoint.^(15,14,16)

Threads with comments contemporaneous to the Boston Bombings were identified on metafilter.com and reddit.com published between April 15th and May 16th 2013. These sources were chosen as sources for the lay perspectives as they are freely available and provide data similar to focus group data in which shared discussion builds upon comments of others providing a rich source of group consensus. These sources contrast to other social media sources such as Twitter or Facebook in that comments build upon threads rather than as more independent expressions of opinion generated by Twitter.⁽¹⁷⁾

Two threads containing real-time commentary were found on metafilter.com by searching for

the tag “Boston”. The first had 4437 comments and the second had 4937.^(18,19) All comments were included in the analysis.

A series of 21 relevant threads were found on reddit.com.⁽²⁰⁾ Comments were sorted using Reddit's “Best” algorithm, which is based on their rating by Reddit users. The first 200 comments in each thread were included in the analysis, as well as sub-comments to any relevant comments, for a total of approximately 4500 comments.

To identify comments and analysis from healthcare professionals including doctors, nurses, and healthcare assistants, a literature search was conducted using the term “Boston marathon” to find articles published after April 2013. This yielded 3150 results, of which 35 articles were identified that contain narrative accounts of the bombings by healthcare professionals, [with publication dates ranging from April 2013 to March 2014.](#)^(1,3,5,6,21–51)

[Comments from all sources were coded qualitatively using NVivo10 \(QRS International, Victoria, Australia\) to generate a list of themes.](#) Word clouds (wordle.net) show the frequency of each theme for each set of sources and shows an overview of all the themes mentioned. For the lay sources, each comment relevant to a particular theme was counted as a mention. For the professional sources, each article was counted as a mention, as published by a single author.

RESULTS

Looking at the themes brought up by both lay people (figure 1) and professionals (figure 2), commentary on the medical response to the bombing was almost entirely positive. The critical comments came from healthcare professionals who focused on specific areas for improvement, and this criticism was invariably preceded by praise. The commentary

organically subdivided into the two major topics of pre-hospital and hospital care, which each contained a number of major themes, [the most salient of which are discussed below](#).

[It is interesting to note users of social platforms did not comment on confidentiality or medico-legal aspects of the response in the real-time aftermath of the bombings. Users did not comment on the privacy issues or the reproduction of pictures of injured members of the public.](#)

Pre-hospital care

First responders, including Carlos Arredondo

As the events unfolded, the predominant theme in the laypeople's commentary in both discussions sites was praise for the first responders at the scene. The participation of the police, the military, emergency medical services (EMS), allied medical professionals, and bystanders was recognized. Lay commenters focused on the specific actions of bystanders rather than those of professional first responders. The "heroic" actions of Carlos Arredondo, also known as "the man with the cowboy hat", were a major theme that emerged as photographs of the events were published.^(18,52) One photo shows him running alongside a wheelchair in which a man with a bilateral amputation is sitting with Mr. Arredondo tightly holding onto the tourniquet on one of his legs. [Commenters on both Reddit and Metafilter then noticed earlier photos showing Mr. Arredondo pulling barriers to get to the casualties immediately after the explosion.](#)^(18,20)

Professional first responders

The courage displayed by professional first responders [was mentioned on the discussion sites](#). It was commented that while all of those who ran towards the scene are deserving of praise, professional first responders are trained for these situations and can rely on their reflexes

“should their instinctive courage fail”.⁽¹⁸⁾ Another lay commenter mentioned that professionals are particularly brave because they are aware of the possibility of “secondary devices designed to kill rescuers” and still go to help.⁽¹⁸⁾

Medical tent and triage

While commentary by healthcare professionals acknowledged the role that bystanders played, it focused on actions by professional services. Both laypeople and professionals noted that the medical tent designed to treat marathon runners was very close to the site of the explosion. This meant that nurses and doctors were immediately on the scene and able to provide care beyond basic life support with ready access to advanced equipment. At the Boston marathon, staff were noted to be flexible as they turned the tent into a triage unit.⁽²¹⁾

Reactions in academic literature by professionals who had been in the medical tent

highlighted the importance of training for mass casualty situations. While medical coordinators took charge of the scene, doctors mentioned being confronted with their limitations. Jangi remembers sinking “into a sensation of futility”, and remembers one of his colleagues telling him “I'm a family medicine doctor. I don't know how to care for horrific trauma”.⁽²²⁾

Speed of response

Both professionals and laypeople commented on the speed of the response, as “the initial 30 red-tagged patients were triaged, treated, and transported within 18 minutes after the explosions”.⁽²³⁾ Both groups also noted the presence of the many trauma centres in Boston, several of which were close to the site of the explosion. While these medical resources have at times been called redundant, [one doctor](#) thought that their existence contributed to the survival of many of the casualties.⁽²⁴⁾ Professionals also identified that EMS spread out the

casualties between the various hospitals, therefore avoiding the overload of any one emergency department.⁽²⁵⁾ As it was a public holiday, traffic was light, which they thought contributed to the rapid transport of patients from the scene to hospital.⁽²⁶⁾

Hospital care

The layperson/professional balance of commentary shifts from layperson for pre-hospital care to professional for hospital care, and healthcare workers have written detailed analyses of what happened in different hospitals and the lessons learnt.

Disaster response plan and training

The predominant theme mentioned almost exclusively by professionals is the existence of Boston's disaster response plan. As a result, first responders became trained in disaster response including blast-injury care, which professionals thought gave them a marked advantage in dealing with the bombings.⁽³⁾ One doctor mentions that his hospital has activated its emergency operations plan 78 times in the past nine years, and that the Emergency Preparedness Team has participated in 623 additional events that did not involve the rest of the hospital.⁽²⁷⁾ In addition, the Boston marathon has been used over the years as a "planned mass-casualty event", where all branches of the emergency and healthcare service have "taken the opportunity to practice and test the disaster-response protocols and systems".⁽²³⁾

Calm and efficiency

This level of preparedness is reflected in the descriptions of the events by hospital workers. Several professionals mention that there was a sense of calm as people stepped forward to do what was necessary: "There was no time to hesitate or question your actions. We all acted",

stated Jessica Britnell, a physician's assistant.⁽²⁸⁾ They [describe](#) screening being put in place for chemicals and radiation.⁽²¹⁾ Emergency departments were emptied and operating rooms were readied so that casualties could be wheeled straight into surgery. As victims arrived, the extraneous aspects of medical care were minimized so that all of the staff's energy could be focused on patient care.⁽²⁹⁾ Instead of documenting care on paper, doctors and nurses [report](#) writing vital information directly on the patients' chests. These were transferred to a chart after the emergency had passed.⁽³⁰⁾ In some hospitals, doctors with previous military or disaster experience mention supporting colleagues who had never seen blast injuries before.⁽³¹⁾

Communication

Whilst commentary was predominantly positive, some themes in the data indicate potential for improvement; for example, hospital staff reported that communication between the leadership team and the front-line workers was not sufficient. [According to one report in the literature](#), this led to confusion as rumours and misinformation spread.⁽³²⁾ In this hospital, the emergency plan was initiated at the management level, but the front-line staff of the hospital found out about the events through social media and the news first. Staff reportedly had difficulty “separating fact from fiction” as they prepared for the influx of trauma patients.⁽³²⁾ Some workers started gathering supplies without knowing exactly for what purpose, leading to depleted central stocks. Staff repeatedly gathered around the central desk in order to hear the latest news first-hand. The overcrowding did not resolve no matter how many times announcements were made to vacate the area.⁽³²⁾

Mobile phones

Another issue was the [rumour](#) that mobile phone networks had been shut down by law

enforcement who were worried that more bombs might be triggered through mobile networks. Laypeople interpreted this as being for the benefit of the healthcare services, with comments that key medical personnel would have “register[ed] their phones beforehand” and would still be able to make calls without having to compete for the oversubscribed network.⁽¹⁸⁾ However, hospital workers reported a breakdown in normal communication between staff members whose mobile phones were affected. In some hospitals where mobile phones are an important means of communication between staff, people report resorting to more old-fashioned methods such as using landlines and speaking face-to-face.⁽³²⁾ [Later reports confirmed that the networks had not been shut down but had ceased working due to extremely high demand.^{\(53\)}](#)

Improving disaster plan and funding

Many professionals talk about both learning from the past and improving for the future. Accounts of the events included examples of constructive criticism on an individual level, but also of a functional institutional framework for feedback and improvement. A doctor at Brigham and Women's Hospital described the process, which included immediate post-event debriefings.⁽²⁷⁾ A nurse at Massachusetts General Hospital stressed the importance of developing a disaster-preparedness plan that goes beyond the minimum standards prescribed by regulatory bodies.⁽²⁶⁾ “The practice of always looking for ways to try to improve patient care,” she said, is “one of our key responsibilities as clinicians”.⁽²⁶⁾ A doctor also considers that the amount of money allocated by the Department of Health and Human Services in the United States is insufficient for the task of preparing hospitals for disaster nation-wide, and that hospitals must “weave the threads of preparedness into their daily routine”.⁽³⁾

LIMITATIONS

This study was limited by the sources used to analyse laypeople's reactions to the event.

Other forms of social media, such as Facebook and Twitter, were not possible sources as they do not publicly archive content. Reddit and Metafilter were chosen because they attract large numbers of people, but each website has a particular demographic which may not be representative of public opinion. Additionally, neither of the sites requires users to specify their occupation, meaning that some of the commentary offered by healthcare professionals through those sites may have been analysed as coming from laypersons.

Commentary from healthcare professionals was limited to the academic literature and the themes therein may be different from what would have been expressed in real-time commentary by this group. Unfortunately, there was no publicly available archived source of real-time commentary by healthcare professionals. However, discussion websites are arguably the most similar form of social media to academic journals in their use of long-form writing and responses to what has previously been written.

The sources for layperson reactions were written in real-time, as the event was developing. The sources for the professional opinions, on the other hand, are reflective accounts published weeks to months later. While this hampers our ability to accurately compare the themes brought forth by both groups, this may also offer a representation of how different groups approach issues. The public as a whole offered real-time fact and opinion-based commentary, whereas healthcare workers sought to suggest ways to improve professionally.

DISCUSSION

Comparing the word clouds (figures 1 and 2), we can see that the public touched on fewer themes than the experts. This may be because they lack the familiarity with the topic that

would allow them to analyse it in depth. Public comments relate almost exclusively to pre-hospital care, while the experts mention both pre-hospital and in-hospital care. This may be explained by the fact that pre-hospital care can be seen happening live on the news, while hospital care happens behind closed doors.

In the months after the bombings, many of the professional accounts of the event emphasized the importance of teamwork and training to the success of the response. Most recognized that this was made possible by the drills that they had gone through as a team. One doctor worries that healthcare professionals in other cities and politicians everywhere may not understand the importance of this training: they “may erroneously conclude that it doesn't matter if emergency departments are crowded and if disaster plans and rigorous drills are lacking, because their hospitals' medical staff will simply rise to the occasion”.⁽³⁾

A matter that is raised only by healthcare professionals is the importance of continuing funding from the government to support these plans. Boston's healthcare professionals share the apprehension that while disaster preparedness is paid attention to immediately after an event, it is easily forgotten about when mass media and the public consciousness move on. While Boston may have been well prepared for a mass casualty event, this is likely not to be the case in most major cities. A successful response such as the one following the Boston marathon should illustrate that disaster preparedness is not just “nice to have”, it is crucial.⁽⁵⁴⁾

This study has shown that laypeople's and medical professionals' commentary on the medical response to the Boston marathon bombings differed markedly. Whereas the professionals focused on disaster planning, training, and communication, lay discussion focused on Carlos Arredondo (figures 1 and 2). While laypeople did acknowledge and praise

healthcare professionals, it is interesting to consider whether this focus on a fellow layman's heroic actions might reflect an unconscious undervaluation of the role that trained medical professionals played in the emergency medical response. If so, disaster preparedness programs may benefit from an effort to publicize their actions and victories, keeping them in the public eye.

Figure 1 - Word cloud of the themes brought forth by laypeople on Metafilter and Reddit.

The font size reflects the number of times that the theme was mentioned.

Figure 2 - Word cloud of the themes brought forth by healthcare professionals. The font size reflects the number of times that the theme was mentioned.

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