

Mumbai hospital review highlights challenges posed by a major terrorist attack

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Meticulous forward planning, effective casualty assessment by a senior surgeon and efficient teamwork by medical and administrative staff are essential when handling injuries sustained in major terrorist incidents.

Those are some of the key findings of a paper published in the March issue of *BJS*, the [British Journal of Surgery](#), on the 2008 Mumbai attack, which lasted more than 60 hours and resulted in nearly 300 [casualties](#) and over a hundred deaths.

The research also highlights the need for safe on-site assessment of casualties and for civilian doctors to be trained by [military personnel](#) experienced in the sort of injuries seen in [terrorist attacks](#).

"The attack, which took place in November 2008 was carried out by five pairs of terrorists who used hand grenades and modified assault rifles at a [railway station](#), café and a number of hotels" recalls Professor Ajay Bhandarwar, from the Sir Jamshetjee Jejeebhoy Group of Hospitals in Mumbai.

"We were the closest hospitals to the attack and dealt with 271 casualties, including 108 who were dead on admission. Of the remaining 163 patients, 23 were discharged after outpatient care and 140 were admitted. We carried out 194 operations on 127 patients and six people died following surgery."

The hospital group, comprising a main 1,352-bedded hospital and three

smaller hospitals, already had considerable experience of handling blast injuries, following previous blasts in 1993, 2001, 2003 and 2005.

"The 2008 attacks caused both physical and emotional damage to the people of Mumbai, but also produced unique cooperation between medical and administrative facilities, the media and non government organisations" says Professor Bhandarwar.

Co-author Associate Professor Girish Bakhshi adds: "The disaster management plan presented in our paper has been customised to the manpower and infrastructure available at the Sir Jamshetjee Jejeebhoy Group of Hospitals. However, the same basic principles can be adopted by other hospitals worldwide, and tailored to their own particular resources, so that they too are prepared to meet the challenges posed by major incidents involving mass casualties."

Key findings of the review included:

- Most patients reached hospital within 15 minutes of being injured and 91% required surgical intervention, compared with 35% in the earlier Mumbai blasts and the 2007 London bombings. The majority were taken to the main Sir Jamshetjee Jejeebhoy hospital which was closest to the attacks.
- The senior surgeon who assessed the casualties as they were brought in played a key role in selecting patients for admission and surgery, resulting in a steady flow of patients.
- The majority of the patients were aged 20 to 39 years and the dominant injury was limb trauma, seen in 117 patients. Most of the surviving patients had bullet injuries, followed by pellet injuries and a smaller number of blast injuries.
- Most of the surgical procedures were for soft tissue or orthopaedic injuries and, where possible, these were operated on

using local or regional anaesthesia.

- The surgeons also dealt with a wide spectrum of injuries including colon tears, bowel perforations, damage to the liver, spleen and kidneys and chest trauma.
- Non-governmental organisations assisted by providing extra medical supplies and the media displayed lists of patients to keep relatives up-dated and helped to mobilise blood donors.

"Managing a prolonged terrorist attack needs [teamwork](#) for efficient medical management and best outcomes" stresses Professor Bhandarwar.

"There is no doubt whatsoever that our experience of handling victims of four previous [Mumbai](#) blasts, and the development of an effective and highly detailed disaster management plan, enabled us to cope effectively with this major ongoing incident with multiple casualties."

The paper is free online at:

<http://onlinelibrary.wiley.com/doi/10.1002/bjs.7738/pdf>

It contains further details of the injuries encountered by the surgical team, together with details of the staffing levels and meticulous procedures employed by the hospital group during this major incident.

The paper also includes details of the clinical and administrative groups, which each comprised six teams with very specific roles, and the coordinating group that ensured effective communication between all the teams.

More information: Surgical response to the 2008 Mumbai terror attack. Bhandarwar et al. BJS. 99 pp368. (March 2012). [DOI: 10.1002/bjs.7738](#)

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