

## Hospital Management of a Bioterror Event

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A bioterror event, for both the hospitals and the community, will be vastly different to the standard mass casualty event. The primary occurrence will probably be silent. The origin site of spread may be obscure, and the extent of the affected area will not be well defined if the agent is contagious. No triage officer will take command in the pre-hospital phase or at the entrance to the emergency department. We may surmise that in the case of mass infection, even media reporters would be afraid and would keep their distance. It follows, therefore, that medical administrators need to switch their minds from the scenario of conventional MCE to the unique aspects of BTE management. Some of the principles of conventional or chemical MCE conduct are still relevant, but a different emphasis should be applied. In both cases the coordination of all medical system constituents is of major importance [1].

Like in any other MCE, the core problem is the overwhelming demand on limited resources; thus, the key element in handling the problem is to try to balance assets and personnel according to need. In a BTE these efforts should be lasting, and attempts should be made to overcome the medical staff's fear. Adequate early preparations and exemplary leadership during the attack will mitigate the chaos, assist in disease containment, and reduce morbidity and mortality [2].

### Pre-BTE preparations

Preparations should include writing protocols for the management of the event, instructing and training staff, purchasing certain equipment (mainly drugs and disposables), and conducting drills.

A hospital emergency committee, chaired by the medical director or chief executive officer, should direct the hospital preparations. Continuous general preparations for crisis will enhance the special efforts for BTE preparedness. Biologic terror threats should be defined and recognized in order that appropriate preparations be made. The possible causative agents of offense are: anthrax [3], plague [4], tularemia [5], smallpox [6], Ebola [7] and botulinum [8]. The protocols should be concise and simple, emphasizing major points, and divided into two parts. The first is the administrative section, comprising guidelines for running the entire medical center and specific chapters dealing with relevant medical departments and administrative wings. It should also relate

to interaction with the community. The second section should be dedicated to microbiologic aspects, including surveillance methods, diagnosis, and approach to patients affected by the offending agents. It should be stressed that the various biologic agents act differently in a warfare scenario than in the usual ecologic setting; accordingly, the presentation and disease process may also differ from what is described in the classical microbiology textbooks. The placing of relevant treatment guidelines on posters distributed at different treatment sites as well as on small pocket-size cards (lessons learnt from trauma management) will facilitate the correct response and performance during a BTE.

The availability of potential isolation facilities in the hospital should be mapped. Operational modes of air-conditioning systems and substitutes for the pneumatic delivery apparatus should be sought. Personal and environmental protection materials should be purchased, such as fluid-resistant gowns, gloves, adequate face-masks, eye-shields, and sealing materials. Diagnostic reagents, antibiotic drugs and vaccines if available should be stored in central warehouses in order to enable rapid procurement and distribution following the directive from the Ministry of Health. Different medical institutes (hospitals and clinics) should provide back-up for each other.

Full-scale drills do not seem practical for a BTE scenario, since the time scale of a BTE is much longer than in a conventional mass terror event or a chemical terror event. Rather, a drill directed by BTE experts is a preferred alternative. The participants would be the directors of associated medical departments and managers of the relevant administration divisions. To facilitate the realism of the drills, simulated medical symptomatology forms, three-dimensional models of hospitals, aerial photographs of the area of the medical facility, and other simulation devices should be used [9]. We believe that a public health system like the one in Israel, which is managed top down, carries an advantage in preparedness for crisis.

### Hospital BTE management

The appropriate functioning of a hospital is almost entirely dependent on the skillful performance of the pre-hospital medical systems. For the proper management of a mass casualty event, an efficient emergency medical system is essential. In a BTE, successful hospital management is dependent on the exchange of substantial information with community health services, and on the capacity of the primary care medicine sector. Primary care

MCE = mass casualty event

BTE = bioterror event

physicians and hospital staff should routinely monitor morbidity and provide these data to the Israel Center for Disease Control for the purpose of establishing a national infectious disease surveillance system and enabling early recognition of suspicious outbreaks. Vigilance on the part of primary care physicians to the possibility of bioterror is crucial in order to alert hospital medical staff in time. In parallel, awareness on the part of the emergency department personnel of any unusual morbidity or an exceptional cluster of diseases is of utmost importance. Emergency physicians should be alert to the possibility of a BTE, and any suspicious case should be reported immediately to the regional health authorities. Early identification of a BTE is vital for the prompt initiation of treatment to decrease mortality, provide vaccinations when available, and institute isolation measures for infection containment.

In the case of attack with contagious microorganisms, only a short window of opportunity will exist between identification of the first cases and a second wave of the population becoming ill. During this brief period it should be recognized that an attack has occurred, the organism should be identified, and treatment, vaccination (including prevention measures for the medical staff) and isolation measures implemented [10]. In the case of anthrax, which is not transmissible from person to person, isolation is not necessary and only standard precautions need be applied. Other sources of BTE infections require higher levels of isolation, such as the Biosafety level 3 standards. Certain cases will require negative pressure rooms with High Efficiency Particle Arrestor filters, but this resource is extremely limited and a compromise may have to suffice. It is desirable to cluster a large number of patients in a single department or dedicate a single hospital for them in order to facilitate isolation and treatment [10].

Since some of the staff that will be involved in such an event, e.g., infectious disease experts, internal disease physicians, pediatricians and laboratory technicians, are not well acquainted with mass events and triage, they should receive instruction and training to enable them to make the proper cognitive adjustment needed to successfully deal with this unfamiliar mass situation.

Hospitalization is required for patients needing intravenous therapy or sophisticated supportive care, and for those with severe adverse drug reactions. All other patients should be treated in the community at the outset, or referred to primary care facilities subject to their condition allowing it. Without question, the healthy but frightened population should be stopped at the community level and their entrance to hospitals avoided. Another alternative during a mass bioterror event is to use hotels as a hospital extension for patients who are not severely ill but need intravenous antibiotic treatment.

The U.S. Centers for Disease Control and Prevention [10] recommends a system differentiating four levels of laboratories, but we do not believe this is feasible in a country the size of Israel. We view hospital laboratories as triage facilities that will provide primary evaluation, minimize the rate of false positive tests, and prepare the specimens for transfer to central laboratories. These

laboratories with their higher biosafety levels have the capacity to diagnose rare infectious diseases and employ advanced diagnostic technologies, such as nucleic acid amplification and molecular fingerprinting. Postmortem examination is crucial for an early diagnosis of bioterror-associated deaths, and a high level of precaution should be practiced during autopsies of suspected BTE victims. Accordingly, postmortems should be carried out exclusively in a central forensic facility.

Usually, we recommend debriefing only at the end of a mass casualty event, but this time frame is only appropriate for short-term events. Since a bioterror event is an episode with a long duration, periodic debriefings should be conducted for the purpose of acquiring lessons and applying them immediately. The relevant lessons learnt should be conveyed to other medical centers, and feedback should be delivered to and from the community in a continuous back and forth process. At the end of the event the protocols should be updated [11].

## Conclusion

A bioterror act is a nightmare for the entire population and for the medical community in particular. An attack with a contagious microorganism is an enormous challenge for all members of the medical profession. Appropriate preparedness for both logistic and cognitive aspects will reduce the expected chaos and will assist in disease containment.

## References

1. Khan AS, Ashford DA. Ready or not – preparedness for bioterrorism. *N Engl J Med* 2001;345:287–9.
2. Shemer J, Shapira SC. Terror and medicine – the challenge. *IMAJ* 2001;3:799–802.
3. Dixon TC, Meselson M, Guillemin J, Hanna PC. Anthrax. *N Engl J Med* 1999;341:815–26.
4. Inglesby TV, Dennis DT, Henderson DA, et al. Plague as a biological weapon. *JAMA* 2000;283:2281–90.
5. Dennis DT, Inglesby TV, Henderson, et al. Tularemia as a biological weapon. *JAMA* 2001;285:2763–73.
6. Henderson DA, Inglesby TV, Bartlett JG, et al. Smallpox as a biological weapon. *JAMA* 1999;281:2127–37.
7. Jahrling PB, Geisbert TW, Dalgard DW, et al. Preliminary report: isolation of Ebola virus from monkeys imported to the USA. *Lancet* 1990;335:502–5.
8. Amon SS, Schechter R, Inglesby TV, et al. Botulinum toxin as a biological weapon. *JAMA* 2001;285:1059–70.
9. Gofrit ON, Leibovici D, Shemer J, Henig A, Shapira SC. The efficacy of integrating “smart simulated casualties” in hospital disaster drills. *Prehosp Disaster Med* 1997;12:26–30.
10. *MMWR* 2000;49:RR-4.
11. Gofrit ON, Shemer J, Leibovici D, Modan B, Shapira SC. Quarternary prevention: a new look at an old challenge. *IMAJ* 2000;2:498–500.

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