Managing Bio-disaster: Role of Dentist

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Summary

Over the past few decades, global events indicate that the threat of biological attack is not a myth, but a harsh reality. The medical community needs to educate both the public and policy-makers on bioterrorism and create a global consensus to reject its use for longer-term solutions. Dentists can provide their patients and communities with a valuable service by providing quality information on the potential for attacks, what to watch for, and how to respond appropriately if an attack occurs. This review provides a brief summary of biological terrorism with the role of medical fraternity in counteracting such an event, and a relevant note on alternative public health resource like dentistry in time of a crisis.

Introduction

We live in an era in which billions of people strive to foster interaction, tolerance and understanding about the more destructive forces of war, violence and political chaos that marked the beginning of the 21st century. But terrorism has continued to plague the international security scenario. The issue of international terrorism as part of ' hybrid threats ' has been discussed at length in recent security conferences held in the Russian Federation over the past three months, with answers still to be sought. Several countries are seriously concerned about several new forms of security threats that were described in combination as "hybrid threats," i.e. threats using military and non-military methods, including bioterrorism, social media radicalization, cyber attacks, fake news, color revolutions, international regime change efforts, and terrorism.[1]

Among all these threats to security, the dark horse has been bioterrorism. The use of biological agents as weapons has been prevalent throughout history to disrupt established structures, such as governments and particularly large urban populations. In addition, the problem of bioterrorism has become more critical due to the ICT (Information and Communication Technology) revolution. Researchers have characterized the next hundred years as the "century of biology." Incredibly rapid and significant developments have been made in genetic modifications in bio-molecular technology and improved bio-producing technologies. Nevertheless, being a dual-edged sword, technology will make it easier for sinister actors to resolve obstacles in the past that prevented the development of biological weapons.[2]

Owing to the increasing threat of bioterrorism, the medical fraternity will contribute valuable assets to the preparation for and in the immediate response to a bio-disaster and its aftermath, both in personnel and facilities. Within the result, these properties must make a major difference.[3] Bioterrorism redefines the reactions of the medical fraternity to disasters. Correct and substantial information provided by credible public health and physicians to the general public will do much to alleviate their fears and encourage their cooperation and involvement in constructive, organized community response efforts. Within the emergency response to a major bioterrorism attack, the dental profession can also play a major role. Bhatt et al[4] did a study to evaluate the knowledge of undergraduate and postgraduate dental students about bioterrorism. Results of the study showed that there was little knowledge among dental students about bioterrorism and its management. Although, an encouraging sign was a strong willingness to provide support in both groups during an assault.

Preparedness of Medical Fraternity and Public Health

Based on scientific calculations, the World Health Organization (WHO) estimated potential casualties following the release of 50 kg of dried anthrax powder in a city of 500,000 inhabitants by aerosolisation for 2 hours. It was calculated that there would be 95,000 deaths, with 125,000 people being disabled. The strain on medical resources would be tremendous, resulting in bed requirements for 12,500 people (10% of those with disabilities), antibiotics for 125,000 people for 60 days, and 95,000 deaths being disposed of. This would almost certainly lead to a rapid deterioration in health and civil infrastructure services. For the defense of public health against bioterrorism, improved awareness and preparedness in unexplained diseases are critical. A more sophisticated and integrated public health response is needed in the scenario of a biological threat, requiring the assessment of the outbreak by prompt methods of disease surveillance and accurate laboratory diagnosis and characterization of the biological agent enabling prevention and treatment protocols to be implemented. Preparation also needs increased public health capacity to store adequate resources, including medications, vaccines, prophylactic medicines, chemical antidotes, personal protective measures such as gloves, helmets, etc., and equipment that may be required in an incident involving bioterrorism. First responders should be qualified in disease identification, techniques for biological mass casualty hospital, methods for preventing pathogens, and decontamination. The keystones for emergency public health response should be the aggressive treatment of illnesses, isolation, quarantine, enforcement of travel restrictions on the affected individuals, safe handling of the deceased victims and public awareness of the incident. Public health systems need to be strengthened in order to achieve enhanced monitoring and epidemiological capacity to detect the emerging disease and provide the relevant information that emergency medicine professionals need to respond to a bioterrorism attack. The emerging trends in disease can be recognized by public health professionals and appropriate prevention and control strategies can be implemented. Institutions that possess, use, receive, transfer or have access to, or receive, certain selected biological agents and toxins should be tracked for the handling and storage of these substances. Dealing with chemical, microbial, radiological and nuclear threats should be “an integral part of every health care professional's teaching and learning curriculum. Then in any medical event, epidemiologists, dentists, physicians, clinical microbiologists and laboratory personnel can

always be the first active emergency responders to classify the initial cases and collaborate with medical professionals.[5]

Arguments based on the premise of low doctor-population ratio were used to initiate multiple programs in public health, especially in the areas of human resource development. According to the facts presented in the literature, India has reached a doctor-population ratio of 1:1000 of the WHO standard. The health system has shifted from "not available" to "available but not engaged" status or "available but inefficient and maldistributed."[6] Nonetheless, the question remains whether this amount is appropriate to combat a bioterrorism event and whether or not alternative health practitioners will increase the number of workers. The native demands can be large and immediate in a major bioterrorist attack. When hospitals are crowded, there may also be a need for alternative sites to provide health care, and dental offices can meet that need.

Role of Dentist in Strengthening the Disaster Response Capacity

Dentistry can contribute valuable assets to plan for and in the immediate response to a bioterrorist attack and its aftermath, both in staff and services. It is important to inform the dental community on the medical and oral manifestations of diseases arising from a bioterrorist attack. Formal plans for an associated coordinated response by dental staff should be created, incorporated into the response arrangement of each group, and practiced sporadically just in case of associate attack. Dental offices fitted with certainly valuable instrumentation will be able to act as regional auxiliary hospitals if the need arises. As part of the dental school information, educational programs that provide information on potential biological weapons should be developed along with continuing education courses.[7]

It is necessary to develop up-to-date sources of knowledge that will be quickly accessed throughout the associated attack and reference materials to be distributed for PRN use. Such simple references should be able to provide dentists with sufficient knowledge of the specific agent used in an associated attack to modify them in order to respond effectively.

Dentists are in daily contact with the general public. Armed with data and connected to science-based sources of information about agents that will be used in a terrorist act, dentists can educate their patients and may affect public knowledge as a whole. There may also be a need for advanced teaching programs for threat communication. Dental offices are located in any given community and have several of the resources available to hospital facilities: sterilization equipment, air and gas lines, suction equipment, radiology capabilities, tools and needles. They will be referred to as "mini-hospitals" when native hospital facilities are inundated or when patient concentration is to be avoided, as in attacks involving contagious agents. For materials to be distributed in the event of an attack, pre-designated dental offices could act as stockpile site.[8]

The key to triple-crown planning for a good response to a serious terrorist attack is that it is planned and checked by performing simulated attacks and creating a plan that is incorporated into the disaster response of each city.

a) Assistance during an attack

The help that dentists and other dental workers can provide during the first few days of a potential bioterrorist attack may vary depending on the community's needs and available resources. These can range from packaging medicines in individual doses to providing a significant portion of primary

medical care in a quarantined area if doctors are unavailable because they have become disabled or died.

b) Surveillance and Notification

Disease surveillance systems are critical not only to detect an outbreak initially but also to monitor the extent and spread of the outbreak and to determine when it is over. Managing a large outbreak would require gathering information from contact tracing and exposure source investigations, as well as information on critical medicine, medical equipment availability as well as managing corpses.[9]

Since there is an incubation period before the clinical manifestations of diseases used as weapons in bioterrorist attacks become evident, it may be difficult to recognize the actual perpetration of an attack. Dentists can serve as an excellent surveillance resource as they can detect and report to public health authorities characteristic intraoral or cutaneous lesions when they are present. These may also be able to detect irregular trends of the cancellation or missed appointments of staff or patients that cannot be explained by known local circumstances. Such incidents may well be a precursor to serious events that are about to occur.

c) Diagnosis and Monitoring

In addition to assisting in the early identification of the disease or disease introduced in a bioterrorist attack, dentists can provide an individual patient diagnosis by observing the physical and behavioral signs that people manifest when the nature of the attack is determined. Salivary swabs can provide important information on diagnosis or treatment and can be obtained by dentists for laboratory tests to determine diagnosis when appropriate or to track patient progress.

d) Referral

Dentists can refer suspicious cases for confirmation, treatment or both to the appropriate specialists. Immunizations, triage facilities, increased medical care, decontamination and control of infections are key arenas to work on.

The Way Forward

Bioterrorism is a topic of serious discussion. The country should target measures aimed at enhancing public health in various areas of medical specialty like dentistry, along with microbe identification, police education, as well as generic antimicrobials to beat drug resistance. Education can enhance society's power to fight 'regular' infectious disease outbreaks and mitigate the outcome of bioterrorism attacks. The ongoing exposure of the biological coercion risk is an opportunity to evaluate our collective capacities and explicitly identify weaknesses and vulnerabilities. The government's proactive measures to ensure a wider range of security measures and empower the health sector in such a case of disaster management are crucial. The number of well-equipped emergency units and the number of people with the expertise to handle is still questionable and should be addressed.

A careful analysis of the unpreparedness consequences provides a basis for change. For longer-term solutions, India's medical profession should educate each of the general public and policy makers on biological terrorism and build a global agreement that not only condemns its use but also encourages preventive and dominant measures.

Dentists will provide their patients and communities with valuable service by providing quality information about the

potential for attacks, what to look for, and how to effectively respond to an attack. Bioterrorism preparation should be added to the dental curricula to overcome the gap of knowledge and willingness. Continuing Dental Education (CDE) programs must also be focused on bioterrorism in order to improve knowledge and develop bioterrorism management skills.

Endnotes:

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5. Sharma D, Mishra A, Newaskar V and Khasgiwala A, "Bioterrorism: Law Enforcement, Public Health & Role of Oral and Maxillofacial Surgeon in Emergency Preparedness" J Maxillofac Oral Surg. 2016, v.15, n.2, pp. 137-143.

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8. See no. vi.

9. Sumeet Abrol, "Countering Bioterrorism Threat to India: Employing Global Best Practices and Technology as Force Multiplier," Indian Council of World Affairs (ICWA), 2016, v. 72, n.2, pp. 1-17.