RESEARCH REVIEW JOURNALS
Volume-03
Issue-06
June-2018

ISSN: 2455-3085 (Online)
RESEARCH REVIEW International Journal of Multidisciplinary
www.rrjournals.com [UGC Listed Journal]

Dental Professionals and Bioterrorism

[1]Dr Jatin Gupta & [*2]Dr Kanupriya Gupta

[1]MDS- Oral Medicine and Radiology, Alwar, Rajasthan (India)
*[*2]MDS Oral Pathology, PhD Scholar & Senior Research Fellow, Faculty of Dental Sciences, BHU, Varanasi (India)*

ARTICLE DETAILS

Article History
Published Online: 12 June 2018

Keywords
Bioterrorism, preparedness, dental professionals, terror

***Corresponding Author**
Email: drkanupriya12[at]gmail.com

ABSTRACT

Terror is a Latin word which means to frighten. Terrorism usually refers to killing of innocent people by antisocial groups with the vested interest of their own. Terrorism is practiced by collecting people from different regions, religions, of different age groups, by keeping objectives like social, economic or political. Sometimes terrorists stop or discriminate their activities once they achieve their goal. Bioterrorism is the intentional use of biological agents or their products to cause harm. Sometimes such attacks might be done to create a publicity or media spectacle. It is the unlawful use of force and violence against people. Biological weapon can strike suddenly without any warning and cause hazardous effects for longer duration. The effectiveness of the attack not lies in the act itself but also in the reaction of public and Government. Delivery of the biological agents can be through letters, parcels, toys, food items, books or anything. It is easy for bioterrorist to transfer the agents through these media or environment. Biologic weapons have been used since ancient times in war and more recently by terrorists. Dentistry can contribute valuable assets, both in personnel and in facilities, to the preparation for and in the immediate response to a bioterrorist attack and its aftermath. These assets can make a significant difference in the outcome. The aim of this comprehensive review is to present a comprehensive view of the role of dental professionals in bioterrorism.

1. Introduction

Biologic weapons have been used since ancient times in war and more recently by terrorists. From the catapulting of plague corpses over city of Wales in the middle ages to the bacterial contamination of salad bars in Oregon in 1984 by Rajneesh cult, the long history of biologic weapons use underscores their current threat. In preparing for the threat of biologic weapons, health care professionals should not only be familiar with the clinical presentation and pathophysiology of the diseases they produce, but also with the historic context of their past uses.[1] Biologic weapons are unique in several ways. They are difficult to detect, relatively inexpensive and easy to reproduce. The ideal biologic warfare agent can be produced in large quantities, stable in aerosol form with the ability to be dispersed over wide areas, has no effective treatment or vaccine and is communicable from person to person. Biologic agents can spread beyond the initial delivery area and can have devastating consequences with only small amounts of agent [2]. For example the WHO estimates that an attack on a city of 500,000 with 50 kg of aerosolized Anthrax spores would result in 95,000 deaths and 125000 illnesses[3].

Following the terrorist attacks on the world trade centre and the Anthrax attacks on New York city and Washington DC there was much concern about the use of smallpox as a bioweapon. Consequently, a mass vaccination of the military and some civilians occurred. Terrorist and criminal use of biologic agents is on the rise, over 70% of substantiated cases of bioterrorism and biocrimes since 1900 occurred due to increased technological sophistication and increased resources for potential perpetrators[4,5]. Major motives for bioterrorism have changed from protesting governmental policies to retaliation or revenge, furthening nationalist or separatist objectives, apocalyptic prophecy, with the last often having mass casualities as the desired end5. Together these trends may predict for deadlier future bioterrorist attacks, especially if the groups can gain access to state biologic weapons programs or achieve technical expertise necessary to successfully aerosolize Anthrax[4].

2. Historical Perspective

Historic accounts reveal that the use of biologic agents have been part of military strategy since ancient times[6]. Early use of infectious agents in war were based on three main ideas:

1. Contamination of food or water supplies
2. Launching of potentially infective materials into enemy strongholds and
3. Dissemination of infected clothing or blankets.all were crude attempts using cadavers, dead animals, plant poisons and contaminated fabrics[6].

Two of the earliest documented instances of biologic agents use occurred in the 6th century B.C. were the wells were poisoned with rye ergot, a fungus[1]. By 1155 A.D., the contamination of drinking water became a common military tactic. During the battle of Tortona, Barbarosa contaminated the enemy wells with the bodies of his dead soldiers[7].

Modern microbiology was born in the late nineteenth century with the recognition that specific pathogens caused specific diseases. This observation along with technical advances in ability to isolate and culture specific pathogens, gave rise to the modern era of biologic warfare. During First World War

evidence suggests that Germany took advantage of these advances in creating a well developed biologic warfare programs using the agents Bacillus Anthracis (Anthrax) and Pseudomonas against livestock destined for use by the allied forces[7,8]. Japan's biologic weapons research effort began in 1930, and lasted until the end of Second world war. At least 10,000 prisoners died after experiments in which they were exposed to biologic agents such as Bacillus Anthrax, Clostridium botulinum, Clostridium perfringes, Nisseria,Shigella, Yersinia pestis, Vibrio cholera[8,9]. During 1991 Gulf War, Iraq had over 200 Weapons of Mass Destruction (WMD) with modified missiles filled with botulinum toxin,anthrax or aflatoxin [10]. On October 4,2001 about one month after the September 11 attacks on the WTC in New York and the Pentagon in Washington DC, Florida health officials announced the first case of pulmonary anthrax seen in the US in almost 25 yrs and a deliberate bioterrorism attack was suspected. By December 2001,over 2300 suspected anthrax incidents were reported[11].

3. Discussion

The CDC has categorized bioterrorism agents as given below [12, 13]:

CDC Category A

Included in Category A are pathogens with the potential for high mortality, ready dissemination or transmission from person to person, and the capacity to cause public panic. Eg. Variola virus, *Bacillus anthracis, Francisella tularensis, Yersina pestis*, Ebola virus, Marburg virus, Lassa virus, Junin (and related) viruses, Clostridium botulinum toxin.

CDC Category B

Category B includes those agents or products that are moderately easy to disseminate and can cause moderate levels of morbidity but low mortality. These include: *Coxiella burnetti, Brucella species, Burkhoideria mallei, Salmonella* species*, Shigella dysenteriae*, E. coli 0157:H7,*Vibrio cholera, Cryptosporidium parvum*, Eastern encephalitis virus, Western encephalitis virus, Venezuelan encephalitis virus, Staphylococcus enterotoxin, Epsilon enterotoxin *(Clostridium perfringens),* Ricin (castor bean).

CDC Category C

Category C lists those emerging pathogens that could possibly be used as bioweapons because of availability, relative ease of production, and the potential for high morbidity and mortality. These are: Nipah virus, Hantaviruses, Yellow fever, Tick-borne haemorrhagic fever viruses, Tick-borne encephalitis viruses, Mycobacterium tuberculosis (multidrug resistant).

4. Dentistry's Role in Bioterrorism

Dentistry can contribute valuable assets, both in personnel and in facilities, to the preparation for and in the immediate response to a bioterrorist attack and its aftermath. These assets can make a significant difference in the outcome.

Preparation before an attack

The dental profession, the public and the dental auxiliaries need to be educated regarding the medical and oral manifestations of diseases that may result from a bioterrorist attack.

Dental offices are located throughout any given community and have many of the resources that hospital facilities have: sterilization equipment, air and gas lines, suction equipment, radiology capabilities, instruments, needles. They may be called on to serve as local "minihospitals" when local hospital facilities become overwhelmed or when the concentration of patients is to be avoided, as in attacks involving contagious agents. Concentrations of patients and health care providers also may present tempting secondary targets to attackers. In some scenarios, decentralization of medical care may be the most appropriate response.

Predesignated dental offices may act as stockpiling sites for materials and supplies to be distributed in the event of an attack[14].

Assistance during an attack [14]

The assistance dentists and other dental personnel can provide during the first few days of a significant bioterrorist attack will vary according to the needs of the community and the resources available. These may run the gamut from the packaging of medications in individual doses to providing a major portion of primary medical care in a quarantined area if physicians are unavailable because they have become disabled or have died.

1. Surveillance and notification

Since there is an incubation period before the clinical manifestations of diseases that have been used as weapons in bioterrorist attacks become apparent, the initial recognition that an attack has been perpetrated may be difficult.

Because dental offices are distributed across the community, dentists can serve as an excellent surveillance resource. They can detect characteristic intraoral or cutaneous lesions if they are present and report them to public health authorities. They also may be able to detect unusual patterns of employee absences or patients' canceling or missing appointments that are not explainable by recognizable local circumstances. These occurrences may well be a harbinger of serious events about to happen.

2. Diagnosis and monitoring.

Besides assisting in the early identification of the disease or diseases introduced in a bioterrorist attack, dentists can provide individual patient diagnosis by observing the physical and behavioral signs people manifest when the nature of the attack has been determined.

Salivary and/or nasal swabs may yield important diagnostic or treatment information and can be collected by dentists for laboratory testing to determine diagnoses when necessary or to monitor treatment progress.

3. Referral

Dentists can refer suspicious cases to the appropriate specialists for confirmation, treatment or both.

4. Immunizations.

In the event that rapid inoculation or vaccination of the public is required to prevent the spread of infection by a biological agent, dentists may be recruited to assist in a mass inoculation program.

5. Medications.

If the mass population requires treatment, preventive medication or both, pharmacies' capabilities may become overpowered quickly. Dentists could be called on to prescribe and dispense chemotherapeutic or chemoprophylactic medications for the public.

6. Triage.

Appropriately trained dentists can fulfill this function, thus freeing up medical professionals to provide definitive care for the greatest number of patients.

7. Medical Care Augmentation

Because of their training and experience, many dentists may be able to augment and assist medical and surgical personnel in providing definitive treatment for victims of bioterrorism attacks and other mass disasters. The scope of services dentists may provide during these emergencies is extensive. The capabilities of individual dentists vary according to the specialty and hospital experience of the dentist. Some of the services dentists may provide include:

- Treatment of cranial and facial injuries
- Providing or assisting in administration of anesthetic
- Starting intravenous lines
- Performing appropriate surgery and suturing
- Assisting in shock management
- Assisting in stabilizing patients
- Collecting pre-antibiotic blood samples
- Taking medical histories
- Providing cardiopulmonary resuscitation.
- Decontamination and infection control.

Dentists and dental auxiliaries are well-versed in infection control procedures and can apply their knowledge in reducing the spread of infections— between patients and between patients and caregivers—in mass disasters. The decontamination of casualties, when appropriate, can be accomplished effectively by dental personnel. Dentists who have experience in practicing in a hospital setting may be especially valuable and may be particularly equipped to provide services that require a close working relationship with physicians.

After the initial attack [14]

As the community's medical systems become able to accommodate the medical needs of the public following the initial massive need for medical assistance, the roles dentists and other dental personnel play will change.

- The traditional forensic services that dentists have provided in other mass disasters will be available as needed.

- Dentists also may provide local surveillance to detect any spreading of disease beyond the original area of attack or re-emergence of infections in the original attack area.

The role of dental schools[14]

Dental schools can provide a great portion of the education of the profession that will be needed. Beyond the obvious educational programs dental schools can provide, they can be valuable assets during the initial response to a bioterrorism attack or other mass disaster.

Since most schools are associated with academic health centers, whose hospitals may be overwhelmed with demands for care, they may be used as hospital annexes. Faculty and dental students may serve both in the dental school-hospital and in the field as primary responders.

Dental schools can also be positories for pre-stocked supplies and equipment under the Strategic National Stockpile (SNS).

The role of dental auxiliaries:

Dental office auxiliary personnel can provide important assistance in the initial response to a major bioterrorism attack or in other mass disasters.

- All are familiar with administrative functions, managing medical records, handling patient flow and infection control.

- With additional training, some dental auxiliary personnel could be assigned clinical responsibilities beyond those they usually assume, provided legal and liability issues are resolved during a declared emergency.

- Clerical staff can provide an important communications link between dentists, other clinicians and the relevant state and federal agencies[14].

5. Conclusion

Bioterrorism is a threat to an India and International peace as well, to avoid its long term ill effects medical fraternity must educate both the public and policy makers about it. The need of the hour is develop biodefense mechanism by full international support and to educate the likely target populations about precautions and protective measures to be taken in such

attacks. Medical and dental practitioners, other health care personnel and their auxiliaries can play a vital role by providing valuable service to their patients and communities gaining information or updating their knowledge regarding the same. In the event of a bioterrorist attack, dentists may be called on to fulfill several functions: education, risk communication, diagnosis, surveillance and notification, treatment, distribution of medications, decontamination, sample collection and forensic dentistry. Local dental societies should develop a plan for the dental response to potential bioterrorist attacks that can be integrated into each community's mass disaster response plan. Educational programs for dentists should be developed to prepare them for providing services they may be recruited to perform in an emergency. With adequate preparation, dentistry's valuable assets in terms of personnel and facilities can help in determining that a bioterrorist attack has occurred and in responding to that attack.

References

1. Jacobs MK. The history of biologic warfare and bioterrorism. Dermatol Clin 2004; 22(3): 231-46.
2. Mobley JA. Biological warfare in the twentieth century: lessons from the past, challenges for the future.Mil Med 1995; 160(11):547-53.
3. WHO. WHO Group of Consultants: Health aspects of chemical and Biologic weapons. Geneva; 1999.p. 140-3.
4. Carus WS. Bioterrorism and biocrimes. Available at http://www.ndu.edu/centercounter.Full-Doc.pdf.oct 1,2003
5. Tusker JB. Historical trends related to Bioterrorism; an emphirical analysis. Emerg Infect Dis 1999, 5(4):498-504.
6. Wheelis M. Biological warfare before 1914. In: Geissler E, Moon JEvC, editors. Biological and toxic weapons: research, development and use from the middle ages to 1945. New York: Oxford university press; 1999.p.8-34.
7. Robertson AG. From aspirations to allegations. Biological warfare in history. Mil Med 1995;160(8):369-73.
8. Smart JK. History of chemical and Biological warfare, an American perspective. Washington DC, Borden Institute; 1997; p 9-86.
9. Christopher GW, Cieslak TJ, Pavlin JA, Eitzen EM. Biological warfare. A Historical perspective. JAMA 1997; 278(5);412-7.
10. Zilinskas RA. Iraq's Biological Weapons:The past as future? JAMA 1997:278(5) 418-24.
11. Jernigan DB, Raghunathan PL, Bell BP, Brechner R, Bresnitz EA, Butler JC et al. Investigation of Bioterrorism related Anthrax,United States,2001. Emerg Infect Dis 2002; 8(10):1019-28.
12. Centers for Disease Control and Prevention. Recognition of illness associated with the intentional release of a biologic agent. MMWR Weekly 2001; 50(41):893-7.
13. Rotz LD, Khan AS, Lillibridge SR, Ostroff SM, Hughes JM. Public health assessment of potential biological terrorism agents. Emerg Infect Dis 2002; 8(2):225-30.
14. Guay AH. Dentistry's response to bioterrorism: a report of a consensus workshop. J Am Dent Assoc 2002;133(9):1181-7.

