Bio Terrorism

... Time to wake up!!!!

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ABSTRACT:

Terrorism refers to the use or threat of force or violence against people or property. Bioterrorism is the term used for terroristic activities in which biological substances are used to cause harm to other people. Bioterrorism is a combination of biological warfare and terrorism and due to particular events bioterrorism has received lot of attention recently. A bioterrorist attack releases viruses, bacteria, or other germs to cause illness or death. These biological agents are typically found in nature. But they can sometimes be made more harmful by increasing their ability to cause or spread disease, or to resist medical treatment. This review will enlighten the potential role of various health sciences, in particular we; dentists, in combating bioterrorism.

Key words: *terrorism, bioterrorism, biological agents, disease, dentists.*

INTRODUCTION

"Terror" comes from the Latin verb *terrere* meaning "to frighten".[1] Terrorist attacks vary in methods, implementation, and threat level, but a particularly worrying form is bioterrorism.

According to the Centres of Disease Control and Prevention, bioterrorism is defined as "*the deliberate release of viruses, bacteria, or other germs (agents) used to cause illness or death in people, animals, or plants*".[2]

Bioterrorism is a form of terrorism which involves the deliberate introduction of biological agents into an environment or community for the purpose of causing widespread disease and panic. Like other acts of terrorism, bioterrorism is meant to create chaos and undermine morale, and it can be performed by a single individual, a terrorist organization, or even a state actor who wishes to use terrorist tactics to advance political goals. As human knowledge of disease has expanded, the risk of bioterrorism has radically increased, especially since several unstable nations have reserves of biological agents which could potentially be appropriated and used by terrorist groups. A bioterrorist attack releases viruses, bacteria, or other germs to cause illness or death. These biological agents are typically found in nature. But they can sometimes be made more harmful by increasing their ability to cause or spread disease, or to resist medical treatment. Just like the medical profession, the dental profession could also play a potential and a significant role in the emergency response to a major bioterrorism attack.[3]

HISTORY:[4]

Though bioterrorism is a future threat to mankind, it has old historic roots. In the Crimean War (1346), the Tartars besieging the town of Caffa suffered from an outbreak of plague. They turned this disaster into war weapon; with catapults, they flung the corpses of the dead into the city of Caffa. The defenders abandoned the city when plague broke out. Their westward migration resulted in the spread of plague to Italy, the harbinger of the Black Death, which killed one third of Europe's masses.

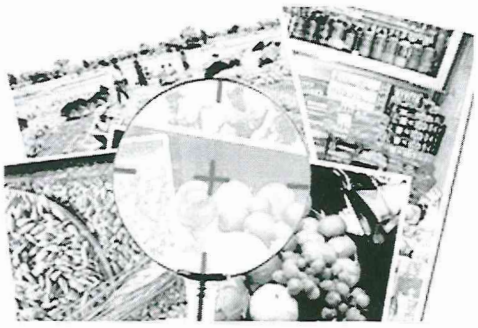
Much later, in 1763, the English overcame hostile native American tribes in Ohio by distributing the blankets of patients affected by small pox. The resulting epidemic killed most of the tribes.

More recently, the Unit 731 of the Japanese Army launched plague and anthrax bombs on Chinese civilians during World War II, with untold casualties.

In fact, this unit's germ warfare research was the foundation of the American germ warfare research that is now driving global counter terrorism strategies.

Closer home (India), the first bio-crime occurred in 1933, when Binayendra Chandra Pandey murdered his brother by using Pasteurella pestis, the plague bacterium as was then called, stolen from Calcutta's Pasteur Institute. Pandey used a pin loaded with the bacteria to prick the victim. He was sentenced to kalapani.

MODES OF SPREAD OF A BIOLOGICAL AGENT: Biological agents spread through the air, water or in food. They can be very hard to detect, and they don't cause illness for several hours or days. Some agents can also be spread from person to person.



What are the requirements for a serious biological weapon to spread?

- The disease must be severe within a short time: it must have a short incubation time
- It must be able to cause disease by inhalation (for airborne threats) or survive in water (for drinking water threats) or endure in contaminated food.
- It must be possible to produce the causative agent in large amounts at minimal risk.

Scientists worry that anthrax, botulism, hemorrhagic fever viruses such as Ebola, plague, or smallpox could be used as biological agents.

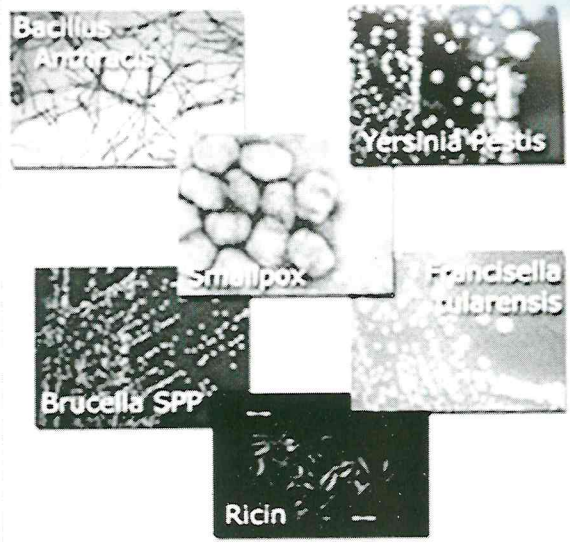
1. **Anthrax**, caused by *Bacillus anthracis.*
2. **Plague**, caused by *Yersinia pestis* .
3. **Tularemia**, caused by *Francisella tularensis* The reason why *F. tularensis*

   is a candidate weapon is that 10-50 organisms can already be lethal when inhaled.
4. **Cholera** caused by Vibrio cholerae, present in contaminated water.
5. **Botulin**, the toxin produced by

Clostridium botulinum, is a potent toxic

agent that can be present in spoiled (canned) food.

Salmonella, present in contaminated salads



With these organisms experiments have been carried out to investigate how 'suitable' they are to be used as a weapon. They were found remarkably suitable, though there remain severe practical problems, mainly with the mode of spreading/spraying (to be effective the organisms have to be spread in a fine mist of aerosols), and the weather (humidity, wind, temperature) strongly influences the effects.

However, viral diseases are unpractical to produce as a weapon, since viruses can only reproduce inside a body (or inside a cell under laboratory conditions). This makes the production of viruses expensive, technically difficult and tedious. Nevertheless, smallpox has been considered as a bioweapon by several countries, and repositories of the virus exist till this day. [5]

THE SCIENCE OF COUNTER TERRORISM:

Biodefense involves medical measures to protect people against biological agents. This means medicines and vaccinations. It also means medical research and preparations to defend against bioterrorist attacks. It is not at all easy to choose, produce and detect a biological weapon.

The public health approach to bioterrorism must begin with the development of local and state level plans. Completion of the following five phases of activities prior to an incident are essential for successful response to a bioterrorist attack:[6]

1.Preparedness
2.Early Warning Phase
3.Notification Phase
4.Response Phase
5.Recovery phase

ROLE OF DENTIST IN COMBATING BIOTERRORISM:[7]

The dental profession could potentially play a significant role in the emergency response to a major bioterrorism attack.

On November 17-18, 2003, the ADA and the American Dental Education Association (ADEA) cosponsored a workshop, "Terrorism and Mass Casualty
Curriculum Development," in Chicago, Illinois. The workshop brought together leaders in dentistry, dental education, and bioterrorism training. The questions included how best to incorporate bioterrorism training into the dental school curriculum and how extensive the training should be. The goals of the workshop included resolving these issues and developing models to integrate bioterrorism
education into the dental school curriculum.

The workshop participants agreed that:

a) All dental students should receive a minimal level of bioterrorism training with the option to receive additional training.
b) the core competencies taught to all dental students should make them familiar with the potential agents that might be used in an attack prepared to respond to a significant attack, and able to become a source of surveillance information in the event of an attack.
c) Dental students should be familiar with the key agents likely to be used in a bioterrorism attack so that they can recognize patients exhibiting signs and symptoms resulting from such agents. These agents should include the agents identified by the Centers for Disease Control and Prevention (CDC) as Category A and B chemical, nuclear, and radiological threats, with an emphasis on the biological agents. The CDC Category A and B agents are considered the highest priority based on transmission rates, morbidity and mortality rates, and potential public health impact.
d) The skill should enable dentists to recognize symptoms in patients and enable them to assist with basic triage in the event of a major attack. Triage can be broadly defined; in this instance, it is used to mean that dentists can assist in categorizing individuals in the event of an attack based on the presence and apparent severity of symptoms.
e) Dental schools should also prepare dental students to respond once an attack is recognized.
f) All dental students should be trained to assist in containing an agent and isolating infected

individuals in the event of an attack.

g) Optional advanced training may provide students with the skills necessary to provide inoculations and advanced cardiac life support (ACLS).

h) Basic skills should be taught to enable dentists to respond immediately to a terrorism event in a manner that would minimize the spread and impact of the threat.

i) Finally, dental students should be able to report surveillance information to appropriate sources. Reporting may include ongoing monitoring of the spread of disease and the recurrence of disease following the initial treatment.

Training all dental students in these core competencies will provide them with the skills necessary to react to situations that may arise within their practice, should an attack occur using biological or other agents of terrorism.

INCORPORATING BIOTERRORISM TRAINING INTO THE DENTAL CURRICULUM:

Workshop participants identified three primary methods by which terrorism training can be implemented into the predoctoral dental school curriculum;

1. A new course or courses should be created in which students would receive training.
2. Bioterrorism training can be seamlessly implemented into courses already contained in the current curriculum or,
3. The third scenario combines the previous two scenarios by incorporating training into the current curriculum with the addition of a concluding capstone course to the current curriculum.

Each method has advantages and disadvantages that must be carefully considered. Ultimately the workshop participants concluded that while the addition of new courses related to terrorism training to the curriculum would allow for more extensive training and may prove simpler than incorporating the training into multiple existing courses, the already crowded predoctoral curriculum leaves little room for the addition of entirely new courses. Thus, incorporating the core competencies into existing courses like oral medicine, oral pathology, ethics, and practice management proves a more viable option.

THE INDIAN SITUATION:

Bioterror formally visited India in 2001 when Chhagan Bhujbal, Maharashtra's Deputy Chief Minister, received an anthrax-laden envelope. Since then, the Department of Defence, through its arm called the Defence Research and Development Organisation (DRDO) has been working on bioterrorism countermeasures. Ravi S. Kane and a group of investigators have developed an anthrax anti-toxin in a project funded by the National Institute of Allergy and Infectio:us Diseases. India is one of few countries with an anthrax vaccine. Says Rajesh Jain, a senior official of Panacea Biotech, the Indian manufacturer of the vaccine "The vaccine is undergoing Phase 2 trials", and should be in the market in the near future. India is now facing the epidemic of MDR-TB (Multi Drug Resistant Tuberculosis), considered in the U.S. as a category C bio-weapon. It would not be a surprise to read future news headlines claiming that Indian MDR-TB crisis is a biological attack from an external source!" According to Government sources ricin, a toxic agent from the beans of the common castor plant, Ricinus

communis, and botulinum could be used as biological terror agents in the future in India.

SUMMARY

There is an urgent need to increase actions to prevent bio-terrorism and enhance biosecurity. Bio-terrorism is a trans-national threat and we are thus mutually dependent.

There is no silver bullet that would resolve the bio threat issue. Increased capabilities for surveillance, detection, diagnostics, vaccines and therapies will enhance the ability to respond to a deliberately introduced infectious disease.

The first alarm of a bio-attack will most likely be sick patients in a hospital. There is an urgent need to improve our ability for early detection of microorganisms in the environment and for the rapid diagnosis of patients.

Likewise, vaccines, immunomodulators or efficient drugs to treat specific diseases are essential to increase the resistance of the community against diseases or to cope with actual outbreaks.

International standards need to be applied in order to compare and address the capabilities of early detection systems. An epidemiological network and global alert system under WHO, OIE and FAO, and harmonization of national and international response plans in cooperation with international organizations would assist in this effort.

If dentists are to play a significant role in response to bioterrorism, dental schools have a major obligation in preparing future dentists to fulfill appropriately this responsibility. Dental schools should train all students in a core set of competencies related to bioterrorism and provide additional opportunities for further education.

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