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53. TREATMENT APPROACH IN BIOLOGICAL CRISIS. AN EPIDEMIOLOGICAL AND ETHICAL POINT OF VIEW

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In the book *Genetics: the Clash Between the New Genetics and Human Value*, by David Suzuki and Peter Knudtson, biological warfare s defined as "the deliberate use of microorganisms or toxic substance derived from living cells for hostile purposes".

Many of the diseases most easily adapted to military use are infectious diseases, which have ravaged the human population for the centuries. Respiratory anthrax, pneumonic plague, smallpox, tularemia or botulism are diseases of which pathogen agents are suitable to be weaponized.

Biological warfare is generally regarded as highly unethical and morally repulsive.

The attraction for biological weapons, as well as for chemical or nuclear weapons in war and in terrorist attack is attributed to their devastating effects, due to their common property of wreaking mass destruction.

The particular attention focused on biological weapons is attributed to their low production costs and easier access to a wide-range of microorganisms that can be used in criminal purposes.

DaSilva considers that one of the main goals of biological warfare is the undetermining and destruction of economic progress and stability. The emergence of bio-economic warfare as a weapon of mass destruction can be traced to the development and use of biological agents against economic targets, such as crops, livestock and ecosystems.

Anticrop warfare, involving biological agents and herbicides, results in debilitating famines, severe malnutrition, destruction of the agriculture production. Defoliants in the Vietnam War have been widely used as agents of anticrop warfare. Cash crops that have been targeted in anticrop warfare are sweet potatoes, soybeans, sugar beets, cotton, wheat and rice. *Puccinia graminis tritici* and *Piricularia oryzae*, fungus *Tiletia caries* and *Tiletia foetida* were used as biological weapons against the targets mentioned above. Fungus *Fusarium* have been used as a source of the mycotoxin warfare in Southeast and Central Asia.

The use of such warfare agents in order to destroy the national economy of the targeted country, area or population is followed by serious health disorders in all population, in addition with economic crash. In the same area of food warfare agents there are very well known the bacterial and viral agent that contaminate food and cause a wide range of foodborne disease, like dysentery, cholera, hepatitis A, typhoid fever etc.
Such warfare can always be carried out under the pretexts that their effects are caused by natural circumstances as epidemics, with plausible denial.

Therefore, from the natural to manmade biological crisis is only an imaginative matter. Biological weapons have many features that makes them suitable for military or terrorist purposes. They have a large area of application, from incapacitating guerilla attacks to fatal epidemics that sweep enemy population.

Disadvantages of using biological weapons must be considered when we are thinking about a biological attack. The evolution of epidemics is difficult to be predicted and in the same time to be controlled, especially if the agents is human to human transmissible. Many external factors such as wind direction, temperature, humidity may influence the result of the attack. The threat of spreading the infection at long distance including the population that launched the attack is real.

Looking at particularities of biological warfare we must do understand that the model

is the nature itself. The natural evolution of a disease is the best teacher we have to learn and to understand the disease, how to diagnose, to treat and to prevent it. History of epidemic of plague, cholera, influenza, anthrax or smallpox witnesses that epidemics, especially with lethal agents are the most frightening events, may be similarly with earthquake or hurricanes, except that mortality is quite different.

Thinking about the West Nile epidemic in United States and Europe, or Bovine Spongiform Encephalitis or the most recent zoonozes in Europe, that cause not only economic disorders but confusion in population too, we must accept that anytime, anywhere a biological crisis could occur.

In the last twenty years a new problem occurred. Progress in biology, medicine, and immunology and genetic opened large and optimistic doors to treat and to save human lives. Genetic research broth a new and effective therapeutic arsenal in fighting with diseases, including infectious diseases too.

Genetic engineering techniques like DNA recombinant technologies are used to obtain vary effective vaccines, as hepatitis A and B vaccines, it is used to develop new diagnosis methods.

Unfortunately the same scientific discoveries could be used to develop modified warfare agents. Genetic techniques help to produce vaccine resistant strains for terrorist and warfare purposes, to modify the susceptibility of the germs to antibiotics or to enhance their invasiveness and pathogenity. Genetic engineered commensals became redoubtable pathogens against the " virgin" immune defense system of the host body. The end of this fight is very ease to be predict.

Genetic modified organisms can be used to produce a wide variety of potential biological weapons such as:

- organisms resistant to antibiotics, vaccines or immunotherapy;
- organisms with modified antigenic profile that do not match known identification and diagnosis standard procedures;
- organisms with enhanced resistance in hostile environment or to disinfectants;
- organisms producing modified toxin, venom or enzyme;
- organisms with modified targets and pathogenity.

Considering the facts above mentioned, to define a particular concept regarding the diseases caused by dissemination of biological warfare agent become a necessity.

This new clinical entity may be named *Biological WeaponBorne Disease* (BWBD). The concept is necessary in order to achieve the main aim of medical response to a biological attack, life saving and preserving of the patients and minimizing of all biological damages of the environment that are included in biological crisis. A unique concept will help all the governmental, local, political, medical organizations and professionals, involved in public health and medical support, to understand and to develop together the policy and the strategy of medical response. I want to emphasize that a unique conception is the key and the basement for an effective plan.

Having a generic name, BWBD, case definition must de define. The definition should notice the following details:

- the pathogen with its specific reservoir in the nature, vectors, natural way of transmission, entering way in the human body, pathogenesis and natural clinical symptoms of the disease and classic treatment of natural disease;
- the dissemination methods of pathogen as biological weapon (BW);
- changes of the incubation, clinical aspect and evolution;

- treatment requirement in severe form;
- general and specific prophylaxis and preventive measures in case of mass dissemination of the pathogen;
- possible changes made by genetic engineering;
- environment impact of spreading the pathogen.

All of these details, that are not the exclusive list, help to construct a properly medical response to biological attack.

In case of biological warfare casualties' huge questions are rising: who is treated first? Which is the most effective treatment? What stock of medicine we must have to face with a large number of victims? Do we choose the best solution? Could we treat all casualties? And many other questions.

Only a very reasonable plan, based on local realities and capabilities

These questions and other many additional are the clues in response to biological treatment.

In case of a natural disaster the intervention is influenced by several factors, including the disorganization of medical services. Despite that intervention is effective and safe for the emergency team. Biological attack means identification of the pathogen and until it is not characterized the external support is highly risky.

The education of all-medical personnel and people involved in emergency situation, primary care providers and emergency personnel in dealing with biological weapon victims is essential. Training should include basic epidemiological principles, like way of pathogen transmission from human to human, primary preventive measures, disinfection and self-protection against secondary contamination, clinical information on diagnosis and basic treatment.

Preparedness activities must be conducted from the public authorities level, including emergency network, facilities for medical assistance, communication and transportation. Reserves of medicine are crucial and involve huge funding that may be never will reimbursed. Antibiotics and vaccine are short shelves life products that require refreshing from time to time. Community must pay for that, otherwise all effort are useless.

Treatment in biological crisis is a very sensitive problem due to large variety of pathogenic agents and their different way of interaction with the human body.

In my opinion treatment in biological crisis must cover the following areas:

- medical treatment of victims;
- medical surveillance of population in the affected area;
- veterinarian surveillance livestock if situation requires that;
- cleaning and disinfection of the contaminated area;
- prophylaxis of contact people.

Medical treatment is a very large concept and very complex too. The aim is to save lives. Treatment does not consist only in antibiotics or vaccine or specific immune therapy.

Vital function sustaining, acute failure in renal or liver or cardiac. in case of chronic disease that victims are suffering, the proper way to administrate medicines, are only few areas that public health authorities must consider.

As example what are we doing in case of allergy to antibiotic choose for the treatment or the antibiotic is threatening for the victim du to its side effects? There is an alternative treatment? It is necessary to storage the alternative medicine and in what amount ?

My experience is not optimistic. An outbreak with *Shigella flexnery* resistant to almost antibiotics, except colimicine (polimixine B) was very difficult to be controlled and stopped because the lack of specific antimicrobial in the stockpiles. Practically the medicine

is used only in pediatric practice, 2-4 tablets daily. Adult dose is almost ten time more. How to treatment simultaneously 6-700 people is we have medicine for only 200 and that only for one day?

Considering the prophylaxis in infectious disease we have only few diseases fully preventable by vaccination. Other disease like anthrax or cholera is partially preventable and antibiotic treatment is required. Is mass vaccination useful in such situation? Problem is complex and may rise several questions? Way to be vaccinated if vaccine is not efficient? Or way to take antibiotic if I am immunized against infection? Confusion was always a very serious enemy for the people.

All of the aspects mentioned above and the list is much longer, reveal that medical treatment is a very sensitive problem that is not the attribute of medical support.
Scientific aspects must be in charge of professionals and academics but planning and response to threat are problems of the society.

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