

“Dark Winter,” I will discuss how to properly respond in the event of an outbreak. In the “Dark Winter” exercise, numerous deficiencies were found in current response methods and training of providers, which would ultimately lead to a large-scale epidemic with the potential to infect people globally.

Results: This discussion is only hypothetical in nature, and its ideas will only be put into practice in the event of an outbreak. However, by drawing from the deficiencies found in the outbreak exercise “Dark Winter,” changes are suggested in the response and training of medical personnel to better identify the disease and roll out a vaccination plan.

Conclusion: Through more thorough training, medical providers can be better prepared for the possibility of a biological attack involving smallpox. If an attack did occur, there would most certainly be chaos and civil unrest, tied with a public frightened from the disease. By employing lessons learned from previous outbreaks, and tying in modern ideas, the chances of a global pandemic forming can be reduced if applied appropriately and quickly.

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CBRN Information Appropriate - We May be Wiser,

But is it Useful?

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Study/Objective: Information is power, especially when first responders are dealing with hazmat Chemical, Biological, Radiological, and Nuclear (CBRN) incidents, when time is of the essence and there could be multiple casualties, including themselves. A usability study was conducted to see whether one of the main hazmat CBRN tools was providing appropriate information and capabilities, in a format that was useful to users. The feedback is being used to improve the tool.

Background: The National Library of Medicine has a suite of Hazmat CBRN tools and applications for first responders: WISER, CHEMM, and REMM. The most widely known tool, WISER, compiles information from many trusted sources and provides identification support, physical characteristics, human health information, containment and suppression advice, and mapping capabilities. Due to its extensive user base spanning public safety health, health care, and planners/trainers, a usability study was conducted to determine whether the tool was providing users with the types of information needed, in the format needed, and on the devices needed.

Methods: A usability study was performed on five user groups (First Responders, Hazmat Specialists, EMS, Hospital Providers, Preparedness Planners) for WISER. Nine participants from each group were tested on the tool, delving into the information sources/structure, unique features, tools, etc. - testing utility and functionality.

Results: Many users knew WISER and had downloaded it, but few knew all capabilities offered. Most knew how to search for substances and found the information helpful, but only the Hazmat specialists were familiar with the unique features. The tool was easy to use, but navigation and conciseness of information was an issue.

Conclusion: User feedback has provided the necessary direction to make the tool more comprehensive and user-friendly. Some changes have been incorporated, others are pending. Such studies should occur periodically on all public safety/health/medical tools and applications to ensure they evolve with the field's demands.

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Bio-Weapons Testing: History, Ethics, and Values

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Study/Objective: An inquiry into open-air testing of biological weapons, by the United States and the United Kingdom, and the changed understanding of the propriety of such tests.

Background: During World War II and the Cold War, US and UK military authorities conducted hundreds of open-air tests with pathogens, and also with less dangerous microbes described as “simulant” agents. The causative agents of diseases including anthrax, plague, and brucellosis were released in largely unpopulated areas to assess their effects on test animals. Simulants including *Serratia marcescens* and *Bacillus globigii* (*Bacillus subtilis*) were released in population centers to study the dispersal patterns of potential warfare agents in a human population.

Methods: included development of information, based on past open-air biological weapons tests, review of current relevant literature, and of the evolution of ethics and values regarding human subject research.

Results: Besides providing information about the efficacy of biological weapons, the open-air programs left a legacy of unintended consequences, including lawsuits against the government for concealing information about the tests and their possible dangers. The simulants, *S marcescens* and *B globigii*, previously considered by some to be harmless, are now deemed human pathogens.

Conclusion: Western political culture has changed since the early days of the American and British testing programs. People have become less reluctant to question authority, and institutional review boards must now pre-approve research involving human subjects. Further, the heightened stringency of laboratory containments has accentuated the safety gap between a confined test space and one without physical boundaries. All this makes it less likely that masses of people would again be unwittingly subjected to secret, open-air, biological warfare tests.

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Improvements that FP7 European Projects Provide to CBRN SOPs and Responder Protection

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Study/Objective: The aim of this presentation is to select key results learned from FP7 funded European projects on security research on the CBRNE field.

Background: International events remind us that Chemical, Biological, Radiologic, Nuclear, and Explosive (CBRNe) events can have multiple facets and can concern the civilian population. Our goal is to take care of victims and to keep the First Responders (FRs) safe while they perform their tasks at the scene and in hospitals. Recent events in Paris have impacted our way of understanding the suitability of our current countermeasures and demonstrated the accuracy of securing and increasing the FR's protection.

Methods: Several European projects, such as Extension Disaster Education Network (EDEN) and IFREACT, that we have been working on offered the opportunity to compare standard operational procedures (SOPs) in large field exercises and to test FR's protection means. In this presentation, EU project's innovations are highlighted in a medical aspect, in particular, the medical response in a CBRNE environment, from decision making on the scene to the care of victims in the hospitals.

Results: In all CBRNE situations, anticipation, adaptability, flexibility, and interoperability are the key goals to achieve. They rely on a doctrine which firstly implies situational awareness and information sharing between all the stakeholders. Secondly, it also includes safety measures and security issues for FRs with the adapted equipment and PPE (personal protective equipment) enabling decontamination procedures in a contaminated area. And thirdly, it provides safe health procedures with fast medical triage and treatment on the scene and in hospitals.

Conclusion: Increasing technology efficiency with user-friendly communication and detection tools, increasing the FR's safety and training with non-bulky PPE, and educating the population are key factors to improve SOPs and human behavior.

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The Role of Rapid Enzymatic Escharotomy and Eschar Removal in Burn Mass Casualty Incidents

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Study/Objective: To present a rapid acting enzymatic debridement agent that can help overcome bottlenecks and increase surge capacity in the treatment of burn mass casualty incidents (BMCI).

Background: BMCI are quite common worldwide, and in developing countries have even been termed a silent epidemic. Agencies dealing with CBRN preparedness estimate that the detonation of a nuclear device in a major city will lead to thousands of conventional burn victims, in addition to other tragic results. Reducing dependency on scarce, highly trained surgical teams and surgical facilities is a major goal in preparedness for BMCI, as these are the main established bottlenecks.

Methods: NexoBrid (NXB) is an enzymatic debriding agent evaluated in numerous preclinical and clinical studies, proving its efficacy in removing burn eschar rapidly and selectively in a

single 4 hour application. NXB can be applied immediately on fresh burns indiscriminately of burn depth as it does not harm viable tissue, leading to significantly reduced needs for surgical facilities and blood loss. The clean wound bed can then be covered by dressings allowing for spontaneous healing or autografted as needed.

Results: NXB has been proved to be a rapid effective debriding agent. Early NXB debridement significantly reduces the surgical burden (surgical debridement, autografting and escharotomy) and the dependency on specialized personnel and facilities. Its use in a real BMCI has already been demonstrated after the Romanian nightclub fire in 2015. Additionally, a porcine study has also demonstrated NXB ability to debride Sulfur Mustard contaminated tissues.

Conclusion: NXB significantly reduces surgical burden thus offering a potential solution for first line escharotomy and eschar removal in BMCI.

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Mass Exposure to Hydrofluoric Acid and Response:

The Green Island Fire, New York

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Study/Objective: This case study will evaluate a mass casualty disaster caused by Hydrofluoric Acid (HFA), as well as the importance of interdisciplinary coordination in dealing with such an event.

Background: HFA is an extremely toxic and widely used solvent in industry. Upon exposure, profound hypocalcemia, arrhythmias and multisystem failure can occur. In high concentrations of HFA, as little as 2.5% BSA exposure can be lethal. On November 3, 2015 during an industrial fire in Green Island, New York, 33 firefighters and employees were accidentally exposed to high concentration HFA when it was accidentally aerosolized in the process of extinguishing the fire.

Methods: Not Applicable

Results: Upon identification of the HFA exposure disaster protocols were initiated. Local emergency departments were notified, and the on scene physicians established an on-site command center. Decontamination sites were established on scene and at a nearby fire headquarters. Local providers were in close communication with all local hospitals involved. Numerous measures were performed to ensure readiness. This included clearing the Emergency Department of existing patients, assistance from hospitalists and trauma surgery, and triaging in the ED. Ad hoc standardized treatment protocols and order sets, were written for rapid patient evaluation and treatment. Pharmacy staff compounded calcium compounds for topical and intravenous administration. Patients underwent various interventions in the ED for their exposure.