INNOVATIVE APPLICATION OF LARGE SCALE GAS DECONTAMINATION METHODS AT LUGAR CENTER (TBILISI, GEORGIA)

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Introduction

The National Center for Disease Control and Prevention (NCDC) of Georgia's Richard G. Lugar Center (LC) for Public Health Research was started as an initiative under the US Department of Defense (DoD) Cooperative Biological Engagement Program (CBEP). It is the first and only laboratory with high containment capabilities in the Caucasus region. It serves as a foundation for the national biosafety and biosecurity infrastructure of Georgia. In 2013, NCDC relocated to a newly commissioned and validated laboratory facility. Processing large laboratory rooms and large quantities of various types of equipment of the former building, was a challenge given the lack of experience and special equipment. Our goal was the relocation of an entire institution from one building to another and its assets, while maintaining the safety and security of personnel and the environment.

Methods

For the decontamination of the NCDC rooms, formaldehyde gas decontamination was chosen although the LC had equipment to utilize vaporized hydrogen peroxide (VHP) decontamination (Figure 1). A team of biomaintenance engineers and biosafety officers developed a process for the application of large-scale formaldehyde gas decontamination to be used at the former NCDC building (Figure 2). Because of a lack of modern gas aerosolization equipment for formaldehyde, we used very simple, every-day tools including: restaurant-grade frying electrical pans; fans; extension cords; aluminum foil; humidity meters; and a Daigger meter (Figures 3-5). Staff were trained using the developed standard operating procedure and related safety issues (e.g., use of chemicals, respirators, waste disposal, etc.; Figure 6). To mimic the real environment, before conducting the actual procedure, a dry run with biological indicators and clean equipment (e.g., centrifuge) was performed in the NCDC non–laboratory rooms.

Figure 1. Bioquell Clarus L2 VHP decontamination unit at LC.

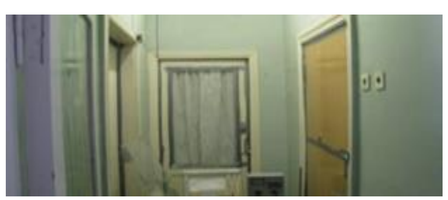

Figure 2. Old "airlock area "with wooden doors and cracked walls.

Figure 3. Electrical pan used for holding paraformaldehyde.

Figure 4. Temperature and humidity monitoring.

Figure 5. Ammonium bicarbonate covered with aluminum foil to prevent early neutralization.

Figure 6. Training on PPE use.

Results

Eight rooms, 50 pieces of large laboratory equipment (e.g. freezers, incubators, biosafety cabinets), and numerous small devices were successfully decontaminated using this method. The use of this system created a secondary gas decontamination capability at the LC.

Discussion

Processing the large laboratory rooms in the old building, and large quantities of equipment was a challenge, considering the only gas decontamination method used in country was small-scale formaldehyde gas decontamination. Several challenges were identified during the decontamination and movement of equipment, including: The condition of and outdated nature of some construction materials of the original NCDC (e.g., cracked walls, open penetrations, porous finishes of benchtops); additional efforts to effectively monitor biological indicators and potential release of gas; absence of large scale decontamination procedures and equipment in the country; and lack of experience in large scale decontamination procedures. Initially, only VHP was intended as the decontamination method of choice at the LC, however, due to a unique and unforeseen need to decontaminate for relocation purposes, we were able to build a second gas decontamination capability at the LC. We currently use both VHP and formaldehyde decontamination methods at the facility.

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