Application of a POD Exercise to University Education Programs

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ABSTRACT

This paper offers a novel method and subsequent partnership to engage and teach university students. Prior to 11 September 2001 or 9/11, much of the public safety readiness responsibility was limited to a few government officials. Today, public safety is much more widely managed. For this effort, we developed a strategic partnership between state and local government and Purdue University that provides an improved environment for learning and for public health and safety. By using an exercise deployment Strategic National Stockpile (SNS) in a Point of Distribution (POD) exercise, our efforts with partnering between state and local government and the university provide benefits and opportunities to each. Simultaneously, we tested a full scale POD mass prophylaxis response to an anthrax attack through teaching and training university students who also gain valuable internship-like experience. The ongoing relationship between government and the university's student talent can benefit all in developing paths for future research and data analysis expected of academia and of improving public safety and responsiveness of government.

Keywords: Homeland Security, Public Health, Full Scale Exercise, Point of Distribution

1. INTRODUCTION

The terrorist attack on New York City on 11 September 2001 led the federal governments to establish a Strategic National Stockpile (SNS) to be used in an emergency. Partnerships between state and local government and neighboring universities are beneficial to the government and students by providing training and exercise readiness. The government's goal was to stimulate a full scale Point of Distribution (POD) exercise in response to an anthrax attack. The university's goal was to develop a novel method to teach students. The focus of this paper is to discuss the role that government and universities play in their partnership. The government will receive benefits through the assistance of students with public safety and public health planning knowledge and the students obtain internship-like experience, making them more desirable to future employers. The ongoing relationship between government and the university can benefit all in developing paths for future research and data analysis expected of academia and of improving public safety and responsiveness of government.

2. STRATEGIC NATIONAL STOCKPILE (SNS)

The SNS contains medical supplies which can be beneficial after emergencies, such as a terrorist attacks, flu outbreaks, or natural disasters. Upon deciding the SNS is needed, the federal government will distribute necessary medical supplies to states, for further distribution into communities, as quickly as possible. It is important for the federal, state, and local communities to all have complementary plans that can be implemented with little to no notice in order for the SNS to be distributed as efficiently as possible and to maintain the publics' well-being [1]. The CDC recently reviewed health preparedness in the context of terrorism readiness in terms of policies and procedures that reinforced the need for prophylaxis of more than 50 million Americans against anthrax, plague, or tularemia, smallpox vaccine for every person in the USA and antidotes for weaponized nerve agent chemicals [2].

The SNS medical supplies consists of oral and intravenous antibiotics, antitoxins, vaccines, medicines for emergency conditions, IV fluids kits, ventilators, airway maintenance and first-aid supplies. The Department of Health and Human Services (HHS) and the Centers for Disease Control and Prevention (CDC) both manage the SNS. The CDC is primarily in charge of maintaining and distributing the SNS, while HHS establishes policy for the SNS deployment. State and local community health departments are responsible for readiness planning required for the distribution of the SNS to local communities once approved for deployment from CDC. The local health departments must make arrangements to distribute and dispense the contents of the SNS to the public through a wholesale distribution method.

Intended Purpose.
While any single natural disaster or terrorism act is impossible to predict, the potential for the civilian US population to need massive quantities of medical supplies after one of these events is highly probable. The CDC developed and currently maintains the SNS in order to respond to a variety of high consequence and low probability disasters because the resources and capabilities needed to do this are neither commonly available nor reasonably available at most state or local levels. The CDC published a 2010 report that outlined the actions needed to further strengthen national health preparedness [3].

These types of emergency events may either be difficult to predict or nearly impossible to have their effects mitigated. Therefore, Congress directed that the SNS become the mitigation program to provide these medical supplies and materials. The SNS's mission is to have a system of supply depots and industry partnerships to provide re-supply of these large quantities of medical material to meet local needs following a community's emergency. The CDC's program goal is to provide initial delivery of the necessary supplies twelve hours following the federal declaration of need. The national program relies on a variety of confidential national stockpile storage locations and administration. To meet the twelve-hour requirement, the federal program must be ready to effectively reinforce state and local programs whose ready local plans, mobilization locations and trained volunteers employ the SNS by receiving, staging, and dispensing specific medications to public [4].

The short and aggressive deployment requirement necessitates that the CDC maintain global surveillance of risks and threats to determine the composition of the medical assets in the SNS. To do this, the HHS and the CDC must consider international chemical and biological threats as well as the recommended exposure and treatment strategies that may require medical supplies and materiel. Included in the assessments are the most cost effective methods for ensuring a long-term set of supplies that ensure the rotation of supplies to maintain appropriate shelf lives in twelve-hour Push Packaged items that are protected from weather, easy to handle and secure. Push packages are preconfigured short duration segments of the SNS that respond to the needs of specific risk scenarios that avail easy distribution and quick resupply as needed [3].

The current CDC public health preparedness capabilities fit into the following broad categories; Biosurveillance, Incident Management, Information Management, Epidemiological Investigation, Community Resilience, Surge Management, Countermeasures and Mitigation. Table 1 shows the 15 entire public health capabilities identified for public health preparedness [5].

Deployment of the Medical Stockpile.
The request process SNS medical supplies can be requested for use by state departments of health or national agencies. Upon request, the HHS and the CDC evaluate the need and determine the best action to proceed with and then release the appropriate items from the SNS. While the specific locations of where SNS supplies are stored are not public information, the repositories are strategically located around the United States to arrive in a minimal time to any locality from the storage locations. Commercial partnerships were made to store, maintain and rapidly transport the supplies as needed.

The approval process requires that the federal government gets the SNS plans from each state's health department consistent with each state's planning needs and the national program goals. Once the SNS is received by the state department, the SNS can be further sorted by specific assets or configurations to dispense it to the local communities where plans to provide the needed supplies to the public are made [1]. The local jurisdictions manage the delivery or the mass prophylaxis, where the public obtains emergency supplies or medical countermeasures, contained in the twelve-hour push packages. The local jurisdictions arrange the dispensing to the public through centers as needed.

Integration with US Department of Homeland Security (DHS) and Federal Emergency Management Administration (FEMA).
The CDC integrates the administration of the SNS for purposes of disaster and emergency policy management with the US Department of Homeland Security (DHS) and Federal Emergency Management Administration (FEMA). The large quantities of medical supplies from the SNS provide program coverage of 72 metropolitan areas, approximately 57% of the U.S. population [6]. The eventual goal is to develop the ability to dispense medical countermeasures to 100% of the population within 48 hours of an event. FEMA defines the concept of preparedness as,

> "A secure and resilient nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to and recover from the threats and hazards that post the greatest risk." [7].

The CDC has defined the lowest level implementation of the SNS as for a POD for local municipalities in order to facilitate training and preparedness for a mass prophylaxis campaign by offering immunization hubs located as needed throughout the community in the event of an emergency [8]. FEMA has designed a distance-learning program for a POD to assist with

Table 1. CDC Public Health Preparedness Capabilities [1]

Public Health Domains	Public Health Capabilities
Biosurveillance	Public Health Laboratory Testing
	Public Health Surveillance and Information Management Epidemiological Investigation
Community Resilience	Community Preparedness
	Community Recovery
Countermeasures and Mitigation	Medical Countermeasure Dispensing
	Medical Materiel Management and Distribution
	Non-Pharmaceutical Interventions
	Responder Safety and Health
Incident Management	Emergency Operations Coordination
Information Management	Emergency Public Information and Warning
	Information Sharing
Surge Management	Fatality Management
	Medical Surge
	Mass Care
	Volunteer Management

the readiness of local community's health and public safety officers [9].

FEMA describes planning for a POD as activities that systematically engage the whole community [9] in the development of an executable plan based on the strategic national guidance, the operational goals as stated in the state plans and the tactical or community-based approaches to meet the specific objectives of a particular disaster or emergency. The delivery of SNS medical supplies must begin dispensing operation through a POD within the first 48 hours, according to the CDC guidance, following bioterrorist attacks, such as anthrax [10]. Local planners must offer care when developing POD plans making special note of the area's population considerations and accessibility or special needs individual considerations.

3. LOCAL PREPAREDNESS

The local planning team operates within the can be quiet peculiar to the individual region, county demographics and population served. A typical county might include key partnerships with the county health department, county medical reserve corps, county sheriff, county emergency management agency, and the American Red Cross as obvious initial partnerships.

State Health Departments. The state health department establishes the operational context for the POD based on the CDC strategic goals. The state supports the tactical context of the local health department needs including resources like the SNS, providing common training products, assisting with security needs around the SNS transportation and providing staffing assistance when possible.

County Health Offices. The county health office, like all local health offices, administers the POD. This includes the planning, training, exercise and response when needed of the POD. The county health office coordinates with all other county offices for the necessary resources.

Community Health Offices. The community health offices, if present, are similar to the county health office and conduct the planning, training, exercise and response when needed of the POD. The local health office coordinates with all other local offices for the necessary resources.

Law Enforcement. The local law enforcement provides security for the POD operations and overall planning. The presence of health threat will have severe demands on law and order in the community and law enforcement assets will be stressed to limits in this kind of emergency. To meet the demands, law enforcement will rely extensively on reserve officers and volunteer assets.

4. IMPLEMENTATION OF THE PROGRAM

The POD exercise program will begin well in advance of the actual exercise date. The planning will be tailored to the community need as defined in the plan and specific POD exercise goals. Tippecanoe County Health Department developed and published a specific POD plan to meet the county's needs [11].

POD Exercise Goals. The POD exercise goals will be extensively designed with examples presented in Table 2. The objectives are linked to the public health capabilities, which are distinct critical elements necessary to achieve the specific mission area(s) and exercise objectives. Each exercise plan will have an approach that suits the local jurisdiction based on the Public Health Capabilities in Table 1.

POD Variety. POD designs and exercises will vary widely based on the local community and specific assets therein. This includes the construct of the POD plans needed to cover the community and the exercises that are used to validate the plans.

POD Designs. The POD designs include a number of models that may be employed to cover the entire community. The first is an Open POD, which would be planned by the local office to cover the community at large. These designs will vary in size but in most communities the Open POD may be quite large in order to provide the capacity to cover the entire community population within the required timeframe. Generally, the capacity of the POD would be defined by standards established by RAND to estimate the number for PODs and geographic

Table 2. General POD Exercise Goals.

Example Exercise Objective	Public Health Capability
Evaluate the ability to provide medical countermeasures in support of prophylaxis	Medical Countermeasure Dispensing
Evaluate the ability to communicate & disseminate information effectively	Communications
Evaluate participating agencies ability to coordinate & manage multiple situations	Incident Management
Evaluate the ability to mobilize and organize volunteers	Volunteer Management

placement. This standard asserts that the number of PODs needs to be greater than or equal to: (a) the number of persons needing to receive prophylaxis at PODs divided by (b) per POD throughput multiplied by 24 hours (48 hours minus 12 hours for initial CDC delivery to warehouse and 12 hours to get material from warehouse to PODs). The equation, Equation 1, is as follows:

$$Number\ of\ PODs \geq \frac{Population\ visting\ PODs}{Hourly/POD\ Throughput * 24\ Hours} \quad (1)$$

The 24-hour estimate for POD operations is based on the CDC's assumption that it could take up to (a maximum) of 12 hours for the initial delivery of material to arrive at the POD from the warehouses. These standards are used to determine the number of staff required to fulfill the operations, including POD security, and maintain the required hourly throughput of each POD. The standards also dictate that jurisdictions have at least one viable and exercised rapid dispensing protocol that is able to direct clients through the POD, decide which medications to dispense, dispense medication, and disseminate information about the medication [6].

The second design is a Closed POD, which would be used in companies or organizations that choose to collaborate with local government for the benefit of their workforce or their company. For instance, a Closed POD might be employed to reduce the wait time for employees at the POD to improve the availability or predictability of the workforce attendance. The Closed POD sponsor may add to the resources needed to administer the POD, such as personnel or space. In limited cases, the Closed POD may use assets mobilized by government. Closed POD visitors are limited to the closed POD site agreement and do not provide for the general public's access. There are a number of additional POD models that might be employed. For instance, a Drive-through POD may be used in areas where space permits and the public has concerns about maintaining social distancing or providing personal security. The Drive-through POD concept may be used in an area that has limited available physical infrastructure to hold large group gatherings.

[6] Nelson et al. (2008) suggest that in cases in which POD throughput times vary significantly, a slightly more complicated formula could be employed;

$$\sum_{All\ PODs}(Hourly\ throughput \times 24) \geq Population\ visiting\ PODs \qquad (2)$$

By allowing for varying sizes and throughputs at the POD, this formula, Equation 2, sums throughputs at each POD location to ensure sufficient of total throughput in a 24-hour period.

Exercise Design. The exercise of a POD like other homeland security related exercises are subject to the Homeland Security Exercise Evaluation Program (DHS HSEEP) (HSEEP). HSEEP provides guidance for content and scheduling for a number of components including debriefings, hot wash, participant feedback forms, evaluation, an after-action report (AAR), and improvement planning. HSEEP also prescribes a schedule that defines the exercise planning before the event of the exercise as well as the exercise improvement planning process conducted after the exercise.

Exercise types can vary in terms of resources required and configuration as defined by HSEEP [12]. These exercise types include discussion based or operational based exercises. Discussion based exercises include seminars, workshops and table top exercises which are all essentially classroom oriented activities that provide knowledge power from the integrated exercise participant group and skills they bring to the exercise. The second exercise type or operational exercises can include drills, functional exercises of full-scale exercises. In each case, the cost, time to plan, and complexity increase from seminar to full-scale exercise. Full scale exercises can be the only way to fully test the full mobilization process including staff sufficiency and time needed.

Table 3. Validating Plans with Exercise Objective Examples.

Example Exercise Objective	Example Date to Validate Assumptions
Evaluate the ability to provide medical countermeasures in support of prophylaxis	Determine the processing time for individuals in the public at a POD site
Evaluate the ability to communicate & disseminate information effectively	Determine the bandwidth or number of talk groups for a POD site
Evaluate participating agencies ability to coordinate & manage multiple situations	Determine the staff size for coordinating the POD site at the jurisdiction emergency operations center
Evaluate the ability to mobilize and organize volunteers	Determine the setup and breakdown times for a POD

In the most fundamental, the exercise design regardless of seminar or full-scale exercise for a POD validates the plan. The plans are constructed with facts and assumptions that must be tested for validity and the exercise is an ideal way to do this in a structured experiment. When built with this rigor, the HSEEP planning process provides a means to test these assumptions and provide the improvement planning needed as a process to record observations and resolve any issues through a series of concrete corrective actions, prioritized and tracked as a part of a continuous improvement plan for program improvements. The typical improvement plan specifies corrective actions, assigns responsibility, and establishes completion due dates.

The HSEEP process essentially provides a validation of plans. This plan validation, when completed systemically, allows for the testing of important key facts and assumptions in order to provide assurance that the POD plans are ready to be implemented when needed. The example exercise objectives in Table 2 can be used to validate certain assumptions as seen in Table 3.

Exercise Players. HSEEP defines a number of functions for individuals in an exercise also called exercise participants. The term participant many include individuals or groups of people and is not strictly limited to an exercise participant. Groups of participants involved in the exercise, and their respective roles and responsibilities, include the following: players, controllers, evaluators, actors, observers and support staff.

Players are individuals with an active role in discussing or performing their regular roles and responsibilities during the exercise. Players discuss or initiate actions in response to the simulated emergency. Since the players in a POD event represent the public at large, the numbers of individuals needed could be quite large depending on the exercise goals.

Controllers and evaluators plan and manage exercise efforts towards the data collection needed to validate the plans. Controllers direct the exercise pace, provide players key data as needed, or may initiate certain actions to ensure the continuity of the exercise. Additionally, controllers manage safety and exercise timeline to ensure that all data is collected with the safety of exercise participants. Evaluators are a special kind of controller who provide interactions with players to document the performance.

Numerous actors would be needed in a POD exercise to simulate specific roles of all individuals but especially the public during exercise plays. Roles may normally be the public or patients, media, POD volunteers, health office staff, law enforcement, emergency management personnel and other bystanders.

Observers visit or view selected segments of the exercise as needed to support the exercise or the public confidence in the preparedness activity. Observers do not play in the exercise, nor do they perform any control or evaluation functions. Observers may include elected officials, colleagues from another county/district or others who may benefit from seeing preparedness planning in action. Observers, similar to the

media, should be escorted by a controller, evaluator or support staff at all times to control the POD preparedness message being constructed.

Support Staff comprise the last category of the exercise support staff and include individuals who perform administrative and logistical support tasks during the exercise. For example, registration functions, media escorts, observer escorts or the provision of snacks, meals & drinks.

POD Components.
Some of the advantages of a POD method for delivery include the openness to the public for which the POD has been a thoroughly established method of emergency medical distribution with a good deal of location flexibility. The POD disadvantages include the inability to care for special needs individuals. The POD also can expose the public to additional risks and the staff can be large enough to obtain and train. One challenge is volunteer lists maintenance and procedures for training and security needed to acquire and manage the POD site volunteers [13]. As an integrated public safety activity, the POD must also operate within Incident Command Structure (ICS) structure while maintaining the required patient flow [14]. The ICS and patient flows required have been reported to be obtainable in as little as 15 minutes [15].

POD Setup and Components. Ideal design reception, medical screening and evaluation, medical dispensing, exit and question management, site management and personal assistance, training, data collection, communications, volunteer management,

Security. Published POD standards include detailed formulas and guidelines to determine staffing requirements useful to determine security operation needs. Run with the flow of regular POD operations. Another useful thing this source provides is a suggestion on what kind of documentation we should have. For example, it suggests we have: Documentations of the members of the team assigned to the security staff, copies of the site security assessments that we provide, and documentations of the POD security assessments that we perform. This source also provides us with suggestions of the documentation we should gather for POD transportation and selection [16].

Open POD security presents a particular challenge with keeping the medical distribution open to the public with acceptance but with suitable security maintained inside and outside of the POD. The security can be achieved with the assistance of checklists to be used by the individuals coordinating security at the POD. Key areas include secure, aid, protect, and patrol that involves security sweeps, door monitoring, and personnel postings at entrances and exits. [17].

Traffic Impacts. Since the large public gathering at a POD is a risk in some ways equal to the possible disease threat, traffic control must be provided the same level of security concern as the building egress and interior. The traffic management especially in the high speed areas of approach to the buildings must be protected. Assigning and managing external security with additional duty law enforcement is necessary to manage the traffic and transportation risks.

5. ACADEMIC IMPACT

The POD exercise offers a significant capability to establish and maintain for public safety. A major university can be another significant asset for a community in many ways and in the case of a POD enhancing public safety.

Academic Courses. Purdue developed a partnership with the Tippecanoe County Health Department to assist with the POD full scale exercise as an enhancement to the classroom learning that we would expect on a large major research university campus. Originally, our plan was to assist with role players and the large number of volunteers needed to complete the exercise. We realized that opportunities at every level of exercise planning and implementation existed in novel ways that could improve the exercise, improve learning and improve public safety.

We organized five classes to support the POD exercise during the Spring 2014 semester at Purdue University and Ivy Tech Community College in West Lafayette and Lafayette, Indiana, respectively. Each of the classes was selected to provide great benefit to the students while supporting the county's public safety goals. Purdue contributed students from graduate classes; Managing Resources in Homeland Security and Epidemiology and from undergraduate courses; Nursing Professional Practice and Pharmacy Practice. Ivy Tech Community College contributed student from the Nursing Associate's program of study.

Held on April 15, 2014, the Tippecanoe County Health Department conducted a Full-Scale POD Exercise included 117 participants from the community and universities. The scenario was a laboratory confirmed anthrax bioterrorism attack that required activation of county public health Mass Countermeasure Dispensing plan during a full scale exercise which included SNS deployment to the area.

The exercise included setup for the approved county POD site timed at 50 minutes followed by Just-In-Time-Training (JITT) for the staff and volunteers including the student volunteers. Two sessions were conducted with a minimum of 75 actors to be processed through the POD. The first 75 actors processed through the POD in 29 minutes and 42 seconds. A second set of individuals were process totaling 104 actors who were processed in 59 minutes and 20 seconds [18].

The classes performed in roles (players, controllers, evaluators, actors, observers and support staff) consistent with the roles consistent with the students' professional training. Public health students assisted with data collection as controllers of the POD data generated. The nursing students took part as actors representing our county's public and as players representing the trained volunteers working the POD's medical screening station. The pharmacy students also took part as actors with some representing our county's public and as players representing the trained volunteers working the POD medical distribution station. The homeland security course students helped at all levels developing statistical role player information cards that were given to all actors who were representing families from our community, data collection, players, evaluators and observers. Taking advantage of graduate student research, we also developed computer models that helped predict the processing rates for the entire county population and JITT training research to improve the training delivery in future POD activation. All students and faculty involved were recognized for the contributions and making the exercise a success.

Internship Opportunity. Many employers preferentially hire students with experience that demonstrates the professional

skills obtained during a college education. This is the primary reason for many programs of study that require professional practice courses or internships. Many of the professional practice courses require extra resources in terms of clinical faculty who can provide the professional experience in a classroom setting. This type of faculty was leveraged in the POD. The Purdue faculty and students used the class activity as a learning laboratory that presented an internship-like opportunity integrated with the classroom in a way that made the classroom lectures and practical experience merge.

Computer Modeling Estimating resources is a particularly large problem in public safety. There are few rigorous data collection activities that result in high quality data that might lead to modeling for public safety and there are fewer yet instances on the proper and validated measurement method for public safety. This POD exercise activity which included 117 technical and soon new professional experts offers just the kind of opportunity to develop such models and methods. The potential for a predictive model that can help future emergency managers and public health planners to better estimate the needs for personnel, training, time and space are essential to improving our public safety and public health institutions.

Supporting Local Community. At Purdue like many colleges, University impacts on the community are common complaints including too much traffic, too many young people and too much noise. We took on this partnership to improve on the advantages that a major university has on a community. Our gifted students can impact positively on the community through their intellectual and emerging professional talents. These kinds of partnerships and projects that support the community are common at Purdue University. This project and the outcome demonstrate the potential in combining academic projects with public and public safety needs. The community was enhanced by the presence of the university in creating a more robust POD exercise outcome and potential to continue this partnership to the benefit of the community, future research and the education process.

6. CONCLUSION

Prior to September 11, 2001 or 9/11, the federal government determined the strategic preparedness needs to respond the possibility of public health and established the Strategic National Stockpile (SNS) to be used in case of any public health emergency. Our efforts with partnering between state and local government and area universities provide benefits and opportunities to each as part of a training and exercise readiness event such as a terrorist attack involving the release of Anthrax spores. The government goal of this project was to simulate a full scale POD mass prophylaxis exercise in response to an anthrax attack. The university goal was to develop a novel method to engage and teach students. The focus of this paper is the role that each play in partnership. Government receives the benefits of talented students to assist with public safety and public health planning while the university students gain valuable internship-like experiences that future employers will be seeking. The ongoing relationship between government and the university can benefit all in developing paths for future research and data analysis expected of academia and of improving public safety and responsiveness of government.
The submitted contribution must be in their final form and of good appearance because it will be printed directly without any editing. The document you are reading is prepared in the format that should be used in your paper.

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