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Point of Dispensing Location Optimization Plan for Fulton County, Georgia Using RealOpt©

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An abstract of

A thesis submitted to the Faculty of the

Rollins School of Public Health of Emory University

in partial fulfillment of the requirements for the degree of

Masters of Public Health

In Global Health

2018

Abstract

Point of Dispensing Location Optimization Plan for Fulton County, Georgia Using RealOpt©

By Alexandra Koch

Background: Point of Dispensing (POD) sites are pre-determined locations where medical countermeasures will be dispensed to the population at-large. These sites should be community-based locations and able to accommodate a large influx of people moving through the site quickly. PODs can be used in response to any natural or man-made biological event, such as an Anthrax release, Smallpox release, an emerging infectious disease or during influenza season.

Project Goal: This special studies project through the Rollins School of Public Health assists the Fulton County Board of Health's Office of Emergency Preparedness with Point of Dispensing site selection and optimization for both mass vaccination campaigns and mass antibiotic dispensing events.

Methods: RealOpt©-Regional optimizes which PODs in a jurisdiction should be established based on varying throughputs and the population in the designated area. It then assigns some specific radii of the population to the nearest POD, calculating the total coverage of the designated area in the ideal time frame. Possible POD locations were selected based on polling location information from Fulton County GIS.

Results: RealOpt©-Regional identified 29 POD locations out of 88 potential sites, serving 92.12% of the Fulton County population and dispensing antibiotics for 2 days using a household model with 300,672 households served out of 326,702 households. Households excluded from the model must drive >10 miles to the closest POD location. These households are in the more rural, southern areas of Fulton County. Using these identified POD locations for a mass vaccination campaign, RealOpt© postulated it would take 7 days to serve 99.72% of the population.

Conclusions: If future planning includes stakeholder involvement, vetting of the POD locations sites, and further exercises, Fulton County will be more thoroughly prepared for a public health emergency requiring medical countermeasure dispensing.

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Acknowledgements

I would like to thank my committee chair, Dr. Allison Chamberlain, and my committee member, Dr. Dabney P. Evans, for their patience, support, and advice throughout this process. Thank you both for providing guidance to grown, learn, and further develop my love for public health emergency preparedness. Special thanks to Dr. Chamberlain, who sat through many meetings and drafts of this document to make it as pristine as possible.

Furthermore, I would like to thank the Fulton County Board of Health's Office of Emergency Preparedness. Specifically, I would like to thank Wendy Smith, Emergency Preparedness Administrator, and John Callahan, Strategic National Stockpile/Cities Readiness Initiative Planner, for their insight and aid through the development of my project.

Finally, I would like to thank my family and friends for being consistently positive and encouraging support from idea inception to conclusion. Without their willingness to hear my rants and sometimes scattered thoughts I could not have completed this project. I would especially like to thank my parents, Douglas Koch and Theodora Bovis-Koch, who have listened, respected, and always challenged me.

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Acronyms

Point of Dispensing/Distribution	POD
Medical Countermeasure	MCM
Strategic National Stockpile	SNS
Centers for Disease Control and Prevention	CDC
Receiving, Storing and Staging	RSS
Board of Health	BOH
United States Postal Service	USPS
Geospatial Information System	GIS

Chapter 1: Introduction

This chapter provides background information for mass dispensing of medication in the case of public health emergencies. This introductory chapter is followed by a literature review of the research on mass dispensing of medication methods. Chapter three includes a discussion on the methods used for revising possible Points of Dispensing (POD), also known as Points of Distribution, site locations within Fulton County. In chapter four, the full POD summary for Fulton County is presented as the easily accessible document for jurisdictional leadership that I prepared for Fulton County for this project. Chapter Five integrates the research and optimization plans for Fulton County and discusses next-steps for public health preparedness as it relates to medical countermeasure dispensing.

Project Content

This special studies project through the Rollins School of Public Health assists the Fulton County Board of Health's Office of Emergency Preparedness with Point of Dispensing site selection and optimization for both mass vaccination campaigns and mass antibiotic dispensing events. PODs are pre-determined locations where medical countermeasures will be dispensed to the population at-large. These sites should be community-based locations and able to accommodate a large influx of people moving through the site quickly. PODs can be used in response to any natural or man-made biological event, such as an Anthrax release, Smallpox release, an emerging infectious disease or during influenza season.

Identifying locations appropriate locations for PODs prior to an event requires finding sites which fit the requirements needed for an effective POD. These requirements

include physical characteristics and security requirements. Another important planning consideration is the number of PODs. If there are too many PODs, shipping countermeasures to many POD locations could slow distribution. If there are too few sites, community members and residents may find it difficult to go to PODs and/or the sites may be too crowded. Thus, optimizing which PODs should be open throughout the county and balancing the right number of sites to serve the ideal number of residents requires careful planning. This project provides Fulton County just that; a balanced, research-based geographic distribution of potential POD sites to be activated during a public health crisis either by city or the county as a whole.

Background

The events of September 11th, 2001 and the subsequent Anthrax letters illuminated a greater need for infectious disease and bioterrorism preparedness at the local level. The US Centers for Disease Control and Prevention (CDC) in 2002 required jurisdictions (e.g., states and localities) to plan for unexpected health-related events and assisted in development of public health emergency plans through the Public Health Security and Bioterrorism Preparedness and Response Act. [3] This Act released nearly $1 billion dollars to support state and local emergency preparedness and response efforts. [3] Thus, more concerted planning for mass medical countermeasure (MCM) ensued across the U.S.

The Strategic National Stockpile (SNS) houses the US government's supply of medical countermeasures. MCMs take on three forms; biological products, medications, and devices. Biological products include vaccines, blood products, and antibiotics. [4] Medications include antimicrobials and antivirals.[4] Finally, devices include diagnostic tests, personal protective equipment (PPE), respirators, and ventilators.[4] A plan to

distribute MCMs and test the plan well in advance of an actual emergency is necessary in order to stand ready for initiation when a threat to the public's health is identified.

For jurisdictions to obtain medical countermeasures for their PODs, the state or local public health department first needs to request assistance through the Governor's office. The Governor will request assistance from the CDC. Next, CDC will deploy shipments of MCMs from the Strategic National Stockpile. [5] If the threat is known, shipments include countermeasures necessary for the given agent; if the threat is unknown, the shipments can come in the form of "push packs" which contain various MCMs useful across a spectrum of threats. [5] SNS supplies are transported within 12 hours of a request to a Receiving, Storing and Staging (RSS) sites in the state. [5, 6] It is then the responsibility of each state to transport the supplies to predesignated POD locations within smaller jurisdictions like counties or cities. [5] During the time a public health emergency is declared and the Governor is going through the process of obtaining support from the CDC, county and jurisdictional leadership can begin the process of opening POD locations. It is the responsibility of the county or city to dispense MCMs from the PODs to the public in a timely and efficient manner.

What medical countermeasures are distributed depends on the threat present, as each threat poses different challenges and medications. POD planning therefore relies on the public health threat, longevity of the event, and the medications which are dispensed. Furthermore, how medications are dispensed has been discussed in the literature as well as tested in real-life scenarios. Finding the optimal dispensing strategy for each jurisdiction is pertinent. Chapter 2 discusses such specifics.

Chapter 2: Literature Review

This chapter summarizes academic literature and government planning for biological emergencies and several dispensing models for medical countermeasure (MCM) distributing. This chapter also provides a dispensing case study and review of the Point of Dispensing (POD) modeling software RealOpt© for selecting POD locations.

Each jurisdiction must plan according to the threat and spread of disease. Emergency planning should consider the characteristics of the threat (infectiousness of the disease, extent of the spread, intervention strategy) with respect to logistical concerns (where to locate emergency response clinics and how to allocate key public health and mental health resources).[7]

Planning Threats

Public health preparedness deals with two dominant threats; man-made and natural threats. One of the most concerning public health emergencies is the intentional release of a dangerous biologic agent against which large proportions of a population are susceptible. This would include bioterrorism events with agents like Smallpox or Anthrax. The second group of threats is natural, which includes pandemic influenza and emerging threats which are still unknown. These four threats, categorized as man-made or natural, require flexibility in POD planning based on their unique epidemiology, MCM dispensing requirements, and operation requirements (Table 1). This review discusses Anthrax, Smallpox, Pandemic Influenza and emerging threats through their response time frames, medical countermeasures to be dispensed, and the specific POD planning characteristics for each.

Anthrax

During a wide-spread Anthrax attack, exposed and potentially exposed individuals would mostly likely be given a ten day supply of antibiotic post-exposure prophylaxis (PEP) within the first 48 hours after exposure.[8] A delayed response of one or two days has a 50 percent increase in morbidity and mortality.[9] Not only would this initial medication course appropriately prevent disease in susceptible individuals, it would provide enough time for public health personnel to investigate the release and determine the affected groups or individuals. After ten days, exposed individuals would have to ingest another 50-day supply of medication.[1] As anthrax would require dispensing of MCMs twice, public health professionals should consider sites which can either be open continuously or be opened twice within 2 months. Additionally, this short time frame for dispensing MCMs means POD locations must be opened as quickly as possible, as any time taken away from dispensing increases morbidity and mortality.

Threat	*Initial Response Timeframe*	*Sustained Response Timeframe*	*Medical Countermeasure*
Anthrax	48 hours	10 days after initial dispensing, 50-day supply of MCMs must be administered	Antibiotic prophylaxis
Smallpox	4-10 days	Until PH professionals have deemed the vaccination campaign successful	Vaccination
Influenza	Seasonal/as PH surveillance has deemed an epidemic	*Ongoing*	Vaccination; Antivirals
Emerging Threat	as PH surveillance has deemed an epidemic	*Ongoing*	Can take on many forms. Intravenous medications, antibiotics, vaccinations, etc.

Table 1: Threats and Responses for a Public Health Emergency. [1]

It is important to note the various MCMs which can be used during an Anthrax outbreak, as public health professionals and nurses will be required to dispense the correct medication based on patients' medical histories and the emerging situation. Currently, four antibiotics are FDA-approved during physical exposure or aerosolized (airborne) spores of Anthrax. [10] For healthy adults ages 18-65, a 60-day treatment of either ciprofloxacin or

doxycycline in addition to a three-dose series of vaccine beginning as soon as exposure or potential exposure is recommended.[10] Levofloxacin is reserved only when drug tolerance issues or antimicrobial resistant patterns begin arising and may only be used for 28 days. [10] Amoxicillin may also be used if the Anthrax strain is proving to be more susceptible. [10] These medications may also be used for gastrointestinal Anthrax exposure. Because of the various antibiotic options available for different circumstances, understanding ahead of time which medications should be distributed to which patients ensures efficient and appropriate dispensing.

Smallpox

Smallpox preparedness and response poses an additional threat to the population. Smallpox is a highly infectious agent to which most of the U.S. population has no immunity since mass vaccination campaigns were stopped in 1972. [11] Smallpox is a very severe disease that can be acquired by proximity as well as droplets, leading to the necessary quarantine of infected individuals.[12] While highly unlikely, should a bioterror event occur involving smallpox, a mass vaccination campaign would be needed between four[8] and ten days[1] once an outbreak has been verified. Unlike Anthrax which is found naturally in the environment, Smallpox has not existed naturally since its eradication in 1978[11], thus any incidence of Smallpox would immediately be considered bioterrorism and would require a massive public health response. [12]

For Smallpox, the Strategic National Stockpile (SNS) stores enough ACAM2000, the Smallpox vaccine, to vaccinate the entire US population.[12] The vaccine contains a live virus of vaccinia, which is a “pox”-type virus causing milder disease. Biological material created from the vaccination site, such as scabbing, must be taken into precaution

to prevent the spread of disease. [12] As this is a live virus, individuals may experience symptoms of Smallpox, such as fever, head and body aches, and vomiting.[13] Public health professionals should educate individuals seeking treatment or vaccination of this concern and keep biological material contained.

There are potential side effects when vaccinating for Smallpox. One in 175 adults who get the vaccine for the first time experience myocarditis and pericarditis, which is a serious swelling of the heart and surrounding tissue.[12] Individuals with weakened immune systems should consult a medical professional about the risk associated with taking the medication. This is an important consideration for POD planning; if it is anticipated that certain individuals will have serious complications from the countermeasure itself, plans should be in place to have the space and staff necessary to not only provide medical education to POD visitors, but resources for accessing medical care should they experience these types of events.

Influenza and Emerging Threats

In addition to intentional release of bioterror agents that would warrant disbursement of SNS supplies via PODs, other emergencies include pandemic influenza or a currently unknown emergent infectious threat. Seasonal influenza vaccine planning occurs annually, and vaccination campaigns are common through clinics, doctors' offices, and places of employment.[14] Although vaccination campaigns keep potentially large-scale influenza epidemics from occurring, new influenza strains or emerging threats also pose threats to public health. Planning assumptions for these types of events can take two forms: boosting vaccination campaigns that already exist through common channels, or standing up temporary designated sites (i.e., points of distribution) for distributing

vaccines.[15] For POD establishment, different POD models exist and are better suited based on the threat and location. This chapter continues by discussing the different types of models and how to determine which model is optimal.

POD Organization and Dispensing Models

There are several key characteristics that the standard POD model includes (Figure 1). The sites can be in schools, recreation centers, private companies, or any facility which can hold a large amount of people and includes ample parking.[16] Medical facilities (ex.

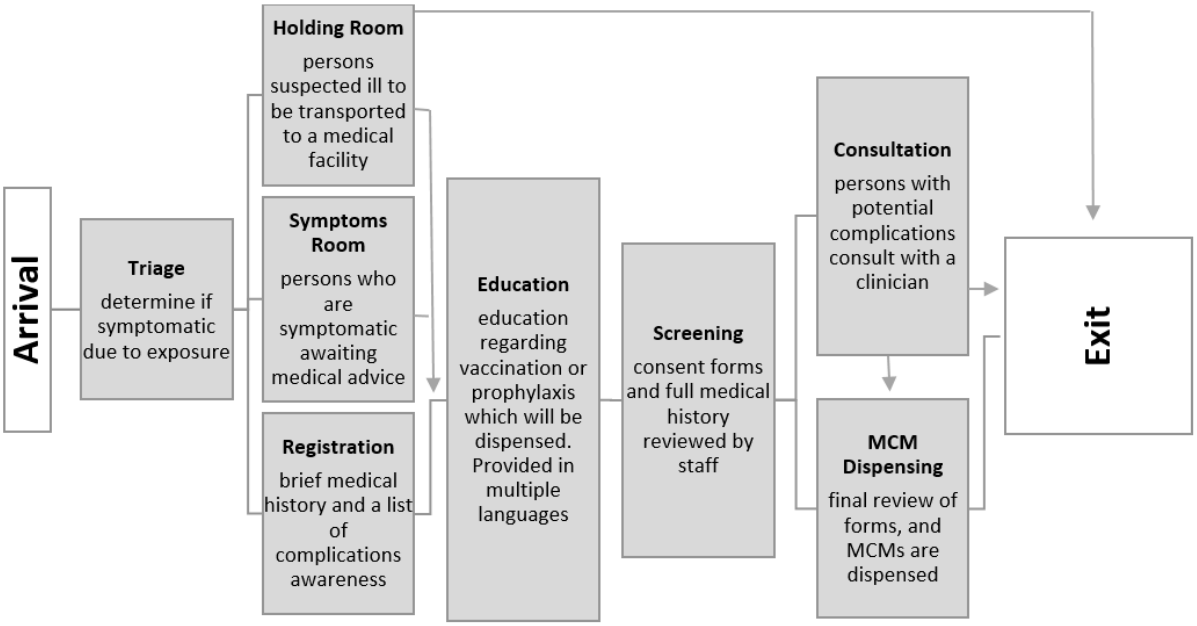


Figure 1: POD Layout [1]

Hospitals, clinics, etc.) are not recommended as POD locations because of the need to remain focused on caring for acutely injured and existing patients.

As detailed in Whitworth's 2006 discussion on designing a response plan for an Anthrax attack, every POD should have a triage site, registration site, education site, screening site, and medical countermeasure dispensing or vaccination locations. [1] Once at the POD, individuals seeking consultation or countermeasures will go through a triage

process to determine if they are symptomatic. Those that are will be transported to a medical facility. If no symptoms are present, the individual will continue through to registration. At the registration station a brief medical history and list of medications will provide awareness on possible side effects. At this station, education regarding vaccination, treatment or prophylaxis will be given. Education will be distributed in various languages as well to accommodate language needs. Once educational material is distributed, individuals go through a screening process where consent forms and medical histories are reviewed by medical personnel. If there are potential complications, individuals will be redirected to a consultation station to discuss possible complications with a doctor. Those who refuse medical treatment will leave the clinic and be monitored by public health officials. Those who choose to be vaccinated will proceed to the vaccination and/or dispensing station. At the final station, a nurse reviews the forms, vaccinates/dispenses to the individual, and reviews what to do in case of emergency before the resident leaves the POD. The throughput is the number of individuals that can go through this entire process within a specific timeframe (e.g. per hour). The higher the throughput, the more individuals can receive medical countermeasures. This also means that the greater the need, the greater the required personnel, stations, and resources.

POD logistics, such as finding suitable locations for large scale events, staffing the necessary workforce such as medical professionals and public health officials, and security issues are all critical to POD site planning.[17] Staffing is a major effort, as it takes considerable time to find, train, and deploy “just-in-time” volunteers – an endeavor which takes at least 24 hours, thus consuming even more time in the limited 48 hour window for an Anthrax attack, for example. [18] While highly unlikely, especially in the U.S., PODs

can also be targets for secondary attacks since they will likely be conspicuous and crowded with additional people.[17] Additional complications can include parking constraints, road back-ups and abandoned vehicles.[1] As these difficulties define life and death in an emergency, novel and inventive solutions have been presented as alternatives. Open/closed POD dispensing, drive-through PODs, pharmacies, and United States Postal Service (USPS) delivery system are the most popular proposed mechanisms. It is important to review these other types of PODs to understand the variety of dispensing mechanisms and find the right model for each location.

Open and Closed PODs

General POD planning usually consists of two different categories of PODS: open and closed PODs. Open PODs are public; they accept all members of the community. These PODs are often staffed by volunteers and public health jurisdiction employees. [17] The sites are often schools, community centers, and other publicly owned facilities.[17] In contrast, closed PODs are restricted dispensing locations which serve specific subgroups affiliated with a specific organization. This can include places of employment, places of worship, or students at a university.[17] These are not organized or sponsored by governmental public health agencies. Closed POD dispensing has grown in popularity among private companies who want to assist in response efforts and protect their employees.[14] Private organizations willing to host a closed POD for their workforce relieve open PODs, and subsequently the reliance on local public health, from both personnel requirements and the population to be serviced. [19] Closed PODs also can have more upfront planning than an open POD; because their target population can be

enumerated and contacted in advance of a threat, they can prescreen and exercise regularly.[18]

Drive-Thru POD

A variation on the classic POD model is the Drive-Thru POD model. Drive-thru PODs have been tested mainly as influenza vaccination campaigns.[17] In this model, individuals or members of an entire household drive to the site, go through a similar screening and consent process, and receive medication or immunization all while remaining in their vehicle.[17] The efficacy of drive-thru PODs depends on several factors; namely, parking capacity, the throughput of the parking area, the amount of nuisance traffic on the roads, the speed at which breakdown, accidents, and abandoned cars can be removed, and the POD flow and staffing plan.[1] Multiple lanes can be employed using this model, but it is difficult to plan for complications surrounding parking lot flow, road backups, and general traffic.[1] For example, The Center for Emergency Response Analytics conducted a study of drive-thru POD capabilities found that changing roads from two to one way near the site did little to mitigate gridlock; panic and general fear might encourage desperate individuals to leave their cars further adding roadway blockage and throughput difficulty.[1] Despite these challenges, drive-thru PODs are more efficient and effective in decreasing transmission rates, as less physical contact between infected individuals decreases exposure within public spaces.[1]

Pharmacies

Another POD model is the use of community pharmacies. Nearly 25 to 30 million doses of the seasonal influenza vaccine are dispensed in pharmacies each year, almost 1/3 of the nation’s supply.[14] They are therefore a natural location to consider dispensing other

MCMs during an emergency. In one study conducted in 2006, in which grocery stores, retail pharmacies, and wholesale chain pharmacies were interviewed about their willingness to respond during an emergency, the researchers found that nearly all retail executives concurred that hosting PODs during a public health emergency was the "right thing for the community and the nation" and would be the "right thing for their business in the long run." [14, 17] Moreover, the CDC concluded that 95% of the US population is within five miles of a pharmacy. [14] These locations are therefore ideal dispensing locations.[2] As normal operations would need to continue, only one pharmacist would be able to dispense MCMs full time.[17] Memoranda of Understandings (MOUs) would be necessary for each pharmacy, which would require heavy planning capabilities on the front end and continual updates. [17] Additionally, there are so many pharmacies that sites would need to be selected based on additional POD considerations such as ease of entrance and exit, as well as non-medical staff for support.

USPS Delivery Service

A unique and inventive idea, utilizing the United States Postal Service (USPS) delivery service and their predetermined routes to dispense MCMs, would keep all infected individuals at home. In this model, USPS postal employees would go door to door with a security team to hand deliver medications to each household. This model has not been developed for vaccination campaigns, as it would require medical personnel to accompany the postal employees. The USPS model was popularized by an Executive Order by President Obama on December 30, 2009 followed by a funding announcement for testing the model in metropolitan areas in 2011.[19]

Determining the Optimal POD Model

There are three main characteristics of dispensing models which delineate their effectiveness during an emergency. The first is speed of dispensing, followed by staffing requirements, and concluding with the level of security necessary for the specific model. Anke Richter of the Defense Resources Management Institute and Sinan Khan of the Emergency Preparedness and Response Program of LA County Department of Public Health assisted the LA County public health department and other county wide stakeholders in comparing dispensing methods in 2009. Using the previously mentioned characteristics, their study found that the USPS delivery system, followed closely by the pharmacy dispensing method, were the most effective distribution methods compared to the classical POD methods.[17] The USPS dispensing method was the quickest dispensing method with a speed 36% higher than classical PODs, with the pharmacy dispensing method 24% faster.[17] Drive thru PODs were found to be no faster than classic Pods. If the necessary throughput for a county is less than 1,300 people per hour, pharmacy dispensing is more effective. When the throughput necessary increases to over 1,300 people per hour, USPS delivery becomes more efficient. Although drive-thru POD models are popular and utilized across the nation, Richter and Khan determined that they neither reduced staff burden, improved security, nor increased the speed of dispensing from other POD sites. Increasing drive-thru PODs as well was not seen as a viable option, as the staffing necessary for larger operations is not comparable to the few additional staff necessary to upstand more dispensing sites from either pharmacy or USPS delivery service.

The planning burden surrounding USPS delivery or pharmaceutical dispensing are draining on local public health departments.[17] Although this model theoretically

provides complete coverage over a targeted area, questions regarding its security and absenteeism of employees plague the model and rendered it unrealistic. [17, 19] For pharmacies, organizing MOUs and integrating security parameters are costly and time consuming.[17] For initial emergency planning, such as what this project aimed to achieve for Fulton County, traditional and drive-thru PODs are the best options until a more effective models can be established.

POD Modeling Software

Organizing where open POD locations should be situated is an additional difficulty that challenges public health planning. Open POD locations must be owned publicly and have large rooms or spaces to accommodate large crowds.[20] They must also have easy entrances and separate exits, most efficiently across from each other. [20] Finally, they must have parking and car capacity for the vast number of people that need to go through.[1] Finding such locations can be challenging, but optimizing which locations are more suitable adds an additional complexity. Professor Eva Lee of Georgia Tech has created a system called RealOpt© a system "for planning large-scale emergency dispensing clinics to respond to biological threats and infectious disease outbreaks."[8] The program consists of three models; RealOpt©-POD, RealOpt©-Regional, and RealOpt©-RSS. RealOpt©-POD, organizes the most efficient pathway and organization for PODs within the input parameters. The system shortens wait times, queue lengths and increases throughput.[8] RealOpt©-Regional optimizes which PODs in a county should be open based on varying throughputs and the population in the designated area. It then assigns specific populations to the nearest POD, calculating the total coverage of the designated area in the ideal time frame.[8] Finally, RealOpt©-RSS is used for state public

health departments to enhance distribution to said POD sites.[8] Each of these models are useful to public health emergency planning and prioritize throughput and efficiency of PODs in a realistic scenario.

Considering the threats and the weaknesses of mentioned dispensing systems and the efficacy of various dispensing models, this chapter concludes with a preference for open POD planning using the RealOpt©-Regional software for Fulton County.

Chapter 3: Methods

POD Planning Calculations

This chapter describes how to approach the POD planning process relative to preparation, practical accessibility and other servicing requirements.

Regardless of the POD model, all sites must meet relevant SNS site guidelines and security criteria[2]. Physical characteristics of the site include[2]:

- Accessibility
- Electricity
- Sufficient parking
- Sufficient floor space
- Climate control
- Available restroom facilities

Security guidelines are also an integral part of POD location planning. Considerations include the ability to secure and guard medications and availability to control POD entry and exit points [2]. Facility, safety and security requirements, and staffing requirements are illustrated in Table 2.

Point of Dispensing Location Planning Considerations	
Facility Requirements	
Accessibility (both from adjacent roadways and for individuals with physical disabilities)	Available restroom facilities
Electricity	Sufficient Floor Space
Climate Control	Sufficient Parking
Safety and Security Requirements	
Ability to secure and guard medications	Availability to control POD entry and exit points
Staffing Requirements	
Medical Staff	Non-Medical Staff

Table 2: Planning Considerations [2]

The number of POD locations and scalability of the model for any given jurisdiction is a planning intensive activity for public health professionals. Population density is one of the most critical considerations in determining where to place PODs; more densely populated areas should have either multiple PODs or larger PODs.[8] There should be locations in rural communities as well, which do not require more than a 10-mile drive.[8] As there is a short time frame to dispense MCMs, throughput

(that is, the number of people who can go through a single POD per hour) must be as efficient as possible. The relationship for POD location planning is as follows: [19]

$$Number\ of\ PODs > \frac{Population\ visiting\ PODs\ in\ person}{Hourly\ per-POD\ throughput\ X\ 24\ hours}$$

Project Methods

In the past, Fulton County has exercised both Drive-Thru POD locations and open POD locations using the head of household model. Through exercises it was determined with optimal staffing, a through-put of 600 persons/hour can be used for planning purposes. There are an estimated 326,702 households in Fulton County.[21] *At least* 23 PODs are needed to meet the above algorithm.

Polling locations are recommended as POD sites, as they have been used for public events, are usually county owned, and are well-known to the public that resides in the area.[16] Polling locations for Fulton County were determined from the Fulton County Department of Registration and Elections, which in collaboration with the GIS Division in the Department of Information Technology created a Geospatial Information System (GIS) map.[21] This information is publicly available on the Fulton County GIS data website. Schools, colleges, places of worship and private facilities were excluded, as they would require greater reliance on private collaborators or would negatively impact day-to-day community activities.

To begin optimizing the 88 potential POD location sites from the polling data, each potential POD site was input into RealOpt. Those locations were automatically displayed on a map of the county. Each site was given a throughput of 600 people/hr, which is the exercise information Fulton County provided. For Anthrax prophylaxis dispensing the county would employ the head of household model. The average household in Fulton

County is 2.35. Therefore, individuals coming for Anthrax prophylaxis would receive an average of 2.35 MCMs for the event. In the case of Smallpox or influenza, all individuals would need to be vaccinated. Individuals coming for Smallpox of influenza would therefore receive one MCM per person. The final parameter RealOpt© required was staffing requirements. Two shifts of 12-hours each was employed for this model.

RealOpt©-Regional identified 29 POD locations out of 88 potential sites, serving 92.12% of the population dispensing antibiotics for 2 days using a household model with 300,672 households served out of 326,702 households. Households that were not served in this model must drive >10 miles to the closest POD location, as some rural sites have too sparely populated areas for a POD. These households are in the more rural, southern section of Fulton County. Using these identified POD locations for a mass vaccination campaign, RealOpt© postulated it would take 7 days to serve 99.72% of the population (See Table 3).

Parameters	**Mass Vaccination Campaign**	**Antibiotic head of household dispensing**
Population served	1.01 million individuals	300,672 households served
Percent of the population	99.72% population	92.12% population
Time frame	7 days, 12-hour shifts	2 days, 12-hour shifts
Driving radius	10-mile radius	10-mile radius

Table 3: RealOpt Results for Fulton County

Limitations

There are limitations to utilizing RealOpt©. The program does not automatically update with the latest population data. Moreover, because jurisdictional population counts are always changing, RealOpt estimates of optimized POD locations may have to be recalculated periodically to obtain the most up-to-date and appropriate POD distribution.

RealOpt© also assumed that each POD site has a throughput of 600, as was exercised by Fulton County. But in reality, each facility can process a different amount of people. A balance exists between the resources needed to staff larger facilities with their ability to process more people. While RealOpt only works from uniform estimates, exercises at every facility will be required to obtain more accurate estimates of the throughput capacities for each facility. RealOpt© POD can maximize the internal logistics of PODs.

Additionally, although polling location lists are the most readily accessible public building database, each location will have to be inspected for proper POD requirements (e.g. restrooms, ample space, handicap accessibility) that extend further than this review discusses. Polling locations have similar requirements, but do not include the medical parameters necessary for POD sites. Thus, this is only the first step of many which the Fulton County Board of Health will need to take to adequately prepare for a public health emergency that requires medical countermeasure dispensing. Chapter 5 presents future steps in detail.

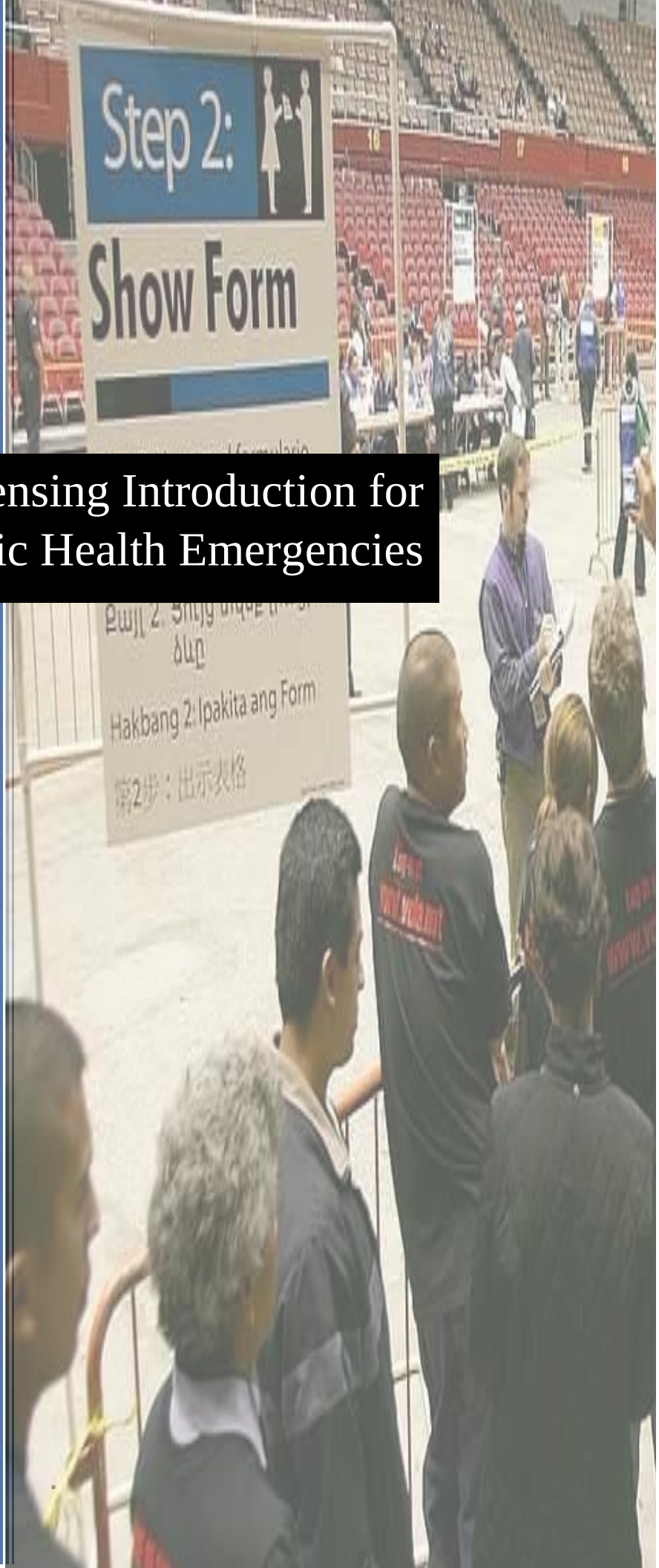
Chapter 4: Project Content and Scope

The *"Point of Dispensing Introduction for Public Health Emergencies"* document follows guidance shown in prior chapters and has been submitted to the Fulton County Board of Health (BOH) Office of Emergency Preparedness. As a resource for partner agencies, this document describes how PODs operate, what makes certain locations ideal for a POD, and how the BOH can work to ensure that POD planning and operations go smoothly with their jurisdictional partners in the event of an emergency.

This report is one portion of the Fulton County BOH medical countermeasure deployment plan.

While this introduction was followed by an Appendix listing exact locations for possible POD sites divided by three areas: north Fulton, central Fulton (Atlanta), and south Fulton. The list further is organized by city. Both general POD locations and those identified by RealOpt as optimized locations. The POD locations are confidential to the Fulton County Board of Health and cannot be included in this thesis.

Point of Dispensing Introduction for Public Health Emergencies



Fulton County Board of Health

Office of Emergency Preparedness

Spring 2018

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What is the purpose of this document?

During a public health emergency requiring mass dispensing of prophylactic medication to the public, it is the health department's responsibility to ensure that distribution happens quickly, efficiently and equitably. For the Fulton County Board of Health, this means coordinating *well ahead of time* with community partners to draft operational plans for points of distribution (POD) sites across its 14 municipalities. This document serves as a resource for partner agencies on how PODs operate, what makes certain locations ideal for a POD, and how to work with the Fulton County Board of Health (BOH) Office of Emergency Preparedness (OEP) to ensure that POD planning and operations go smoothly in the event of an emergency.

What is a public health emergency?

A public health emergency is defined as "an emergency need for health care [medical] services to respond to a disaster, significant outbreak of an infectious disease, bioterrorist attack or other significant or catastrophic event." (The National Disaster Medical System Federal Partners Memorandum of Agreement). This document focuses on response to human-caused or naturally occurring biological threats including anthrax, smallpox, plague, novel or emerging biological threats, and seasonal or pandemic influenza. Although acts of bioterrorism are undoubtedly concerning, the likelihood of a bioterror event is far less probable than naturally-occurring biological threats like seasonal or pandemic influenza. The Ebola, Zika, and 2009 H1N1 outbreaks were all previously known infectious diseases; however, they challenged the public health systems preparedness and real-life response capabilities. Developing and improving these systems thus remains pertinent and vital.

Table 1 describes various public health threats and the countermeasure response requirements for each.

What are PODs and how can jurisdictional-level leaders assist before and during a public health emergency?

Threat	*Initial Response Timeframe*	*Sustained Response Timeframe*	*Medical Countermeasure*
Anthrax	48 hours	10 days after initial dispensing, 50-day supply of MCMs must be administered	Antibiotic prophylaxis
Smallpox	4-10 days	Until PH professionals have deemed the vaccination campaign successful	Vaccination
Influenza	Seasonal/as PH surveillance has deemed an epidemic	*Ongoing*	Vaccination; Antivirals
Emerging Threat	as PH surveillance has deemed an epidemic	*Ongoing*	Can take on many forms. Intravenous medications, antibiotics, vaccinations, etc.

Table 1: PH Threats and Response

PODs are geographical sites used by public health emergency planning professionals for the mass distribution of medical countermeasures (MCMs). PODs can be "open" or "closed;" open PODs are those serving the general public, whereas closed PODs are those accessible only to certain individuals (e.g., members of a certain community, organization or private company).[1] MCMs come in various forms including pills (e.g. antibiotic prophylaxis), vaccines, or intravenous medications (IVs). During a public health emergency, it is the public health department's responsibility to erect PODs across its jurisdiction to distribute the appropriate medical countermeasures for a given threat (See table 1, column "Medical Countermeasures").[2]
For the Fulton County Board of Health, the success of POD planning and execution depends largely on the health department's successful collaborations with community partners.

What activities happen in a POD?

In order to create an effective and reliable POD, certain activities need to take place. These include triage, registration, education, screening, medical consultation and MCM dispensing. In every POD, having separate areas for these activities – as well as staff devoted to carrying out the tasks associated with each activity - is strongly encouraged to enable a controlled flow of people through the POD. Figure 1 depicts the mentioned POD activities and the recommended process flow. [3]

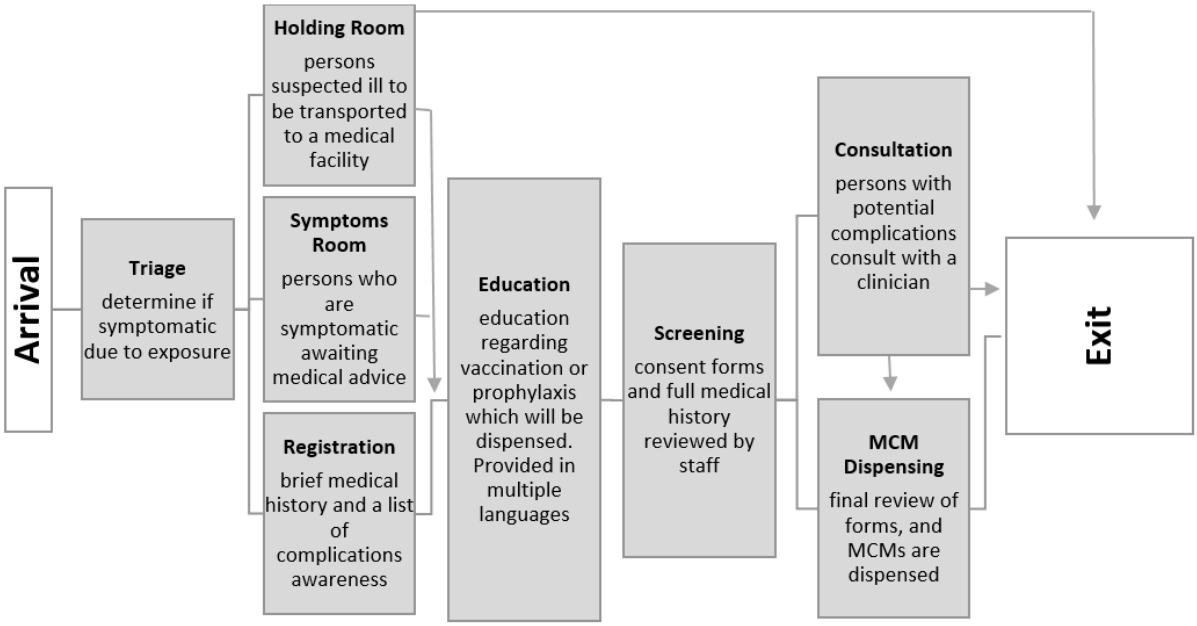

Figure 1: POD station description and flow

Open PODs can choose a "head of household" distribution model, where one member of the family goes to the POD to receive medicine for the entire family. While this model is preferable for controlling crowds, it requires clear communication to the public and completion of medical history and consent forms prior to arrival for all members of the family.[4] Fulton BOH may direct the public during an emergency to visit the Dispense Assist website (http://dispenseassist.net/) prior to arriving at a POD to complete the necessary forms in advance.

Point of Dispensing Location Planning Considerations	
Facility Requirements	
Accessibility (both from adjacent roadways and for individuals with physical disabilities)	Available restroom facilities
Electricity	Sufficient Floor Space
Climate Control	Sufficient Parking
Safety and Security Requirements	
Ability to secure and guard medications	Availability to control POD entry and exit points
Staffing Requirements	
Medical Staff	Non-Medical Staff

Table 2: POD Location Planning Considerations

Where should PODs be located?

POD sites can be in schools, recreation centers, private companies, or any facility that can hold a large amount of people and parking. Medical facilities (ex. Hospitals, clinics, etc.) are not recommended as POD locations, as they need to prioritize caring for those acutely injured or already experiencing symptoms.[5] Schools are also not recommended, as the length of time needed to continue dispensing operations may hamper school operations and safety. Fulton County suggests selecting locations that have been open to the public previously, such as polling locations,[1] to increase public awareness of the site. Factors which must be considered for POD locations can be found in Table 2.[6]

What are the staffing needs for a POD?

Successful PODs rely on pre-identification of medical and non-medical volunteers. Pharmacists, doctors, nurses, public health professionals and non-medical volunteers, which can be identified through the volunteer Medical Reserve Corps (MRC), local chapters of professional societies, local professional schools (medical, nursing, public health or pharmacy schools), community emergency response teams (CERTs) and community leaders, can all serve during a public health emergency. Pre-recruitment and POD training is optimal, as it is difficult to accomplish and conduct routinely. Just-in-time volunteer training is often necessary, and this training is usually coordinated by the Fulton County Board of Health (BOH) Office of Emergency Preparedness (OEP) in collaboration with partner agencies. [7]

Are there other types of PODs?

Another variation of the POD model is the "Drive-Through" POD. These drive-through PODs have been tested mainly as influenza vaccination clinics. In a simple set up, individuals or families/ households drive to the vaccination delivery site, go through a similar screening and consent process, and receive medication or immunization from Public Health clinicians and/ or MRC volunteers, all while remaining in their vehicles. [6] The efficacy of drive-through PODs depends on several factors: parking capacity, the throughput of the parking area entrances and exits, its proximity or contribution to nuisance traffic on the surrounding roads, the speed at which broken or abandoned cars can be removed, and the POD flow and staffing plan. [3]The advantage of drive-through PODs is that they are explicitly more efficient and effective in decreasing transmission rates, as less physical contact between contagious/ infected individuals decreases the number of additional cases. When contemplating POD locations, Drive-Through PODs should be considered when there are large parking lots with easy entry/exit points.

What happens when an emergency occurs that requires PODs?

Depending on the public health emergency, your jurisdiction will be notified by the Fulton BOH OEP's team to assist in activating POD locations and operations in your jurisdiction.

Next steps and future planning

Attached to this document is a list of possible POD locations for 3 distinct areas of Fulton County. ~~(Appendix A)~~ These lists are comprised of polling sites, public libraries, community centers, gymnasiums and recreation fields that may be useful POD sites within specific jurisdictions. Among this list, we have identified "Optimal POD locations" using a POD-optimization software called RealOpt.[7] A suggested "Optimal POD location" means that this site is theoretically situated in an area that is optimal for rapid MCM distribution during a county-wide emergency.

FOR THIS THESIS, APPENDIX A HAS BEEN REMOVED

References

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Chapter 5: Recommendations and Conclusions

Recommendations

During a public health event which requires medical countermeasure dispensing, many different stakeholders need to be involved. Federal agencies, state agencies, law enforcement, and community leaders are only some of the partners which will work in tandem to effectively respond. Most notably, local leaders and community responders (fire chiefs, and police chiefs) understand the landscape of their jurisdictions best. Their involvement with selection of POD locations is vital, as public health simulation models often fail to incorporate the social and demographic implications that community leaders know. It is recommended that Fulton County BOH organize community meetings with stakeholders who will assist during a public health response to receive their input and guidance on POD selection.

Community leaders can help assist with POD selection as well by vetting locations which have been chosen by RealOpt©. The software does not account for facility requirements and safety/security requirements. Each site must be inspected to make sure they meet the standards for a POD site. Additionally, each site will need response plans, which should include who from the facility will run operations and how the various stations will be organized within the facility. This is labor intensive and will require site supervisors and public health officials to visit and thoroughly examine the site to foresee how the site would be operationalized for deployment of MCMs.

After POD sites have had community leadership involvement and sites have been vetted for operations, it is recommended that Fulton County BOH conduct tabletop and full-scale exercises to test their plans. By conducting exercises, the county can establish

which sites work as planned and which sites fail to operate during a realistic process. Additionally, throughput of each site will help determine if larger sites are more effective than smaller sites. As discussed in chapter 3, RealOpt© assumes that each POD has a throughput of 600 people/hr. But if sites can withstand more or less than 600 people, that will skew the geographic spread produced by RealOpt©. Therefore, exercises at each site to determine real-life throughput will be required.

Finally, the literature detailed in Chapter 2 mentions that of all the dispensing models, pharmacy dispensing may be most effective. This model is planning intensive and will require private partnerships that currently extend beyond Fulton County's BOH capabilities. This review recommends Fulton County BOH outreach to Georgia Public Health Department to discuss bringing large private stakeholders, such as pharmacies, to the planning table. If large pharmacies have expressed a desire to assist during a public health emergency, the process can begin with initial discussions that can then precipitate partnerships. Beginning the conversation surrounding private-public partnerships while simultaneously planning public site-specific PODs will set Fulton County BOH in an optimal position to respond to a public health emergency.

Conclusions

In the event an outbreak occurs in a specific area of Fulton County, like a specific city within the county, this list can be employed to open PODs specifically for that area. By having two lists, one can open or close PODs based on the infected area, which allows for more targeted response and the ability to narrow resources only to the infected area. This also means that POD locations which were not selected by RealOpt© may need to be

opened. Opening PODs which were not selected by RealOpt© can increase the response rate.

All the RealOpt© sites should be used for county wide emergencies. If there is a public health crisis which needs all three subsets of Fulton to respond, the RealOpt© POD selection sites are optimized by geography and population density to the county. RealOpt© sites allow for county responders to target the right locations to assist the population as efficiently and quickly as possible.

If future planning includes stakeholder involvement, vetting of the POD locations sites, and further exercises, Fulton County will be more thoroughly prepared for a public health emergency requiring medical countermeasure dispensing. This special studies project begins the process for comprehensive medical countermeasure planning. With dedicated public health professionals serving to protect our communities, the Fulton County BOH will have an appropriate, timely, and effective response strategy from public health threats.

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