Decision-Making Modules for the RSS-POD Supply Management Game

A Game-Based Assessment of Crisis Decision Making During Inventory Management and Distribution of Medical Countermeasures

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This document introduces and explains two new modules for the RSS-POD Supply Chain Management Game, a Microsoft Excel-based, computer simulation game designed to provide practice in managing inventories of medical countermeasures during a large-scale public health emergency. As with an earlier version of the game described by Chan et al. (2009), players perform the role of inventory manager at a Receipt, Storage, and Staging (RSS) facility and must allocate inventory among multiple points of dispensing (PODs). This new version of the game introduces Modules 4 and 5, which are designed to promote group discussion regarding decisions about how to allocate scarce resources. Specifically, in Module 4 players must decide how many and which points of dispensing (PODs) to open in the face of a staffing shortage. In Module 5 players must decide how to allocate and dispense medication when shipment delays cause a temporary inventory shortage.

The RSS-POD Supply Chain Management Game is part of a larger set of tools developed by RAND that states and localities can use to assess and improve readiness related to the Strategic National Stockpile (SNS). Since 2006, RAND has been working with the Center for Disease Control and Prevention’s Division of the Strategic National Stockpile (CDC DSNS) to develop assessments of jurisdictions’ SNS-related capabilities.

Instructions for using the game are included in the Excel-based game, which is provided with this report. The report itself will be of primary interest to those wanting details on the development of the game. Readers well versed in countermeasure delivery and the SNS, and those familiar with the earlier version of the game, might wish to proceed directly to the game. Players are also directed to the brief Player’s Guide (Appendix A). Facilitators and evaluators are directed to the Facilitation and Evaluation Manual (Appendix B) and Game-Specific Crisis Decision Making Assessment Tool (Appendix C). Because Appendices A and B are intended as stand-alone guides for different readers, they do share substantial amounts of common text.

Development of the game is continuing and the goal of this paper is to make the initial version available for broader review and comment. Comments should be directed to Dr. Andrew Parker (parker@rand.org).

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SUMMARY

In the event of a large-scale public health emergency, mass dispensing of medical countermeasures (e.g., antibiotics, vaccines, and antidotes) could be required to reduce illness and death. In many such instances, the Centers for Disease Control and Prevention (CDC) would send materiel from the Strategic National Stockpile (SNS) – a cache of medical countermeasures maintained at undisclosed locations around the country – to a warehouse (known as the Receipt, Storage, and Staging facility, or RSS) designated by the relevant state or local authority. From there, state and local health departments are responsible for distributing the materiel to Points of Dispensing (PODs), at which the countermeasures would be dispensed to the public.

EXISTING EXERCISES OFTEN DO NOT ADEQUATELY TEST CRISIS DECISION-MAKING

Poor decision-making has often been cited as a critical failure in emergency response (e.g., after Hurricane Katrina). Yet, public health practitioners often have little experience with crisis decision making and, given the fortunate rarity of large-scale public health emergencies, little opportunity to practice, assess and improve their skills.

To begin to address this gap, we recently developed the Public Health Emergency Response Decision-Making Assessment Tool, which provides a simple, paper-and-pencil assessment of crisis decision-making in the context of exercises or real incidents (Parker et al., 2009). Yet, extensive experience in developing and running exercises, along with discussions with numerous practitioners, suggests that exercises typically do not provide realistic opportunities for practicing and testing crisis decision-making, for a variety of reasons.

In many exercises key decisions are “scripted” in order to set up standardized scenarios for addressing other capabilities (e.g., calling-down staff, dispensing medication). For example, many exercises of SNS-request processes assume that SNS assets will be requested, that shipments will be complete and timely, and that there are enough staff, equipment, and facilities at all levels of the supply chain for the distribution to succeed. This leaves little opportunity for decision-makers to practice weighing tough tradeoffs under realistic time and informational conditions. In other instances decision-making is tested, but players get little feedback on whether their decisions might lead to effective outputs and outcomes. For instance, tabletop exercises that practice decisions to
close schools, issue public messages, or dispense medications rarely provide any specific feedback on the degree to which these measures might actually reduce disease transmission or cause undesirable secondary effects. Moreover, most exercises require a considerable amount of time, effort, and money to plan and execute; this limits the frequency with which they can be conducted, and hence limits the frequency which with crisis decision making can be practiced.

NEW MODULES FOR RSS-POD SUPPLY CHAIN MANAGEMENT GAME FOCUSES ON DECISION-MAKING

In order to provide low-cost and frequent opportunities to test crisis decision-making, we created an a Microsoft Excel-based computer game that provides an opportunity for players to practice and test a specific set of crisis decision-making skills in the context of a simulated medical supply chain management operation. The game builds upon the recently-released RSS-POD Supply Chain Management Game. In the game’s earlier version, three sequential modules teach players basic principles of medical supply chain management. In this version, two new modules provide practice in making decisions in the face of unexpected contingencies that require allocation of scarce resources. Specifically, in Module 4 players must decide which Points of Dispensing (PODs) to open in the face of a staffing shortage and how to staff them. Players can also choose to play with 25, 50, or 75 percent available staff. In Module 5 they must decide how to allocate and dispense inventory when shipment delays cause a temporary inventory shortage. After dealing with an initial delay in the materiel delivery, players are asked whether they want to alter the standard of care to speed the process of dispensing countermeasures to the backlogs of waiting citizens. Unlike the earlier version, the game is intended to be played by small groups of 2-5 people, although decision makers may wish to preview the modules individually.

In the game, one player (regardless of his or her job in an actual emergency) performs the role of the inventory manager at the RSS, with others representing other individuals involved in key RSS-related decisions. This inventory manager is assumed to have all the decision-making authority necessary to allocate inventory among PODs. The computer provides orders placed by PODs. In many cases, the available RSS inventory is insufficient to meet the perceived needs of the PODs. The RSS inventory manager (player) must allocate his/her available inventory among the PODs, with the goal of distributing countermeasures to as many people as possible.
An assessment tool (derived from a more general public health crisis decision-making tool developed by RAND; Parker et al., 2009) is provided to aid in evaluating decision-making processes and identifying gaps. By the end of the game, players should better understand the strengths and limitations of their current SNS distributions plans when dealing with unexpected contingencies, have an increased appreciation of group decision making during crisis, and have identified information requirements that will support future crisis decision making efforts.

NEXT STEPS

The decision-making add-on to the RSS-POD Supply Chain Management Game should be considered an initial prototype of an experiential learning exercise. It is being released for testing by users in state and local health departments who would have to manage inventory in an actual emergency, as well as by staff of CDC DSNS who provide technical assistance to those health departments.

During this period of testing, we are interested in learning:

- The extent to which the issues dealt with in these game modules mirror real public health crisis decision-making experiences or plans
- Which aspects of the game are confusing and which can be improved
- Whether, in a more general sense, experiential learning games such as these are an effective strategy for teaching technical concepts to health-department users
- How the use of stand-alone games such as this may improve performance in more general exercises, such as warehouse drills and full-scale mass dispensing and distribution exercises.

Ultimately, testing validity and usefulness will require the development of good metrics for the larger exercises, as well as data collection over time.
ACKNOWLEDGMENTS

We gratefully acknowledge the individuals who provided insight, guidance, and criticism at all stages of this project. We begin by thanking the staff of the Centers for Disease Control and Prevention’s Division of the Strategic National Stockpile (CDC/DSNS) for helping us over the years to understand the operational realities faced by state and local health departments. In particular, we thank Linda Neff, Pamela Nonnenmacher, Bernard Benecke, Rick Pietz, Jaime Jones, and Kas Salawu. We also thank the many state and local health departments who let us attend their exercises and observe their warehousing and distribution operations. In particular we would like to thank the health departments of the State of Ohio, the State of Missouri, the State of California, and the County of Los Angeles. These conversations and visits gave us insight into the systems that are used to manage inventory and transportation, and the potential problems that may arise. We also benefited from the comments of users who played early prototypes of the game.

We also acknowledge the insights and assistance of Jeffrey Wasserman and the expert editing and administrative support of Gina Snyder. We alone, however, bear responsibility for the content of the report and the game.
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<td>AAR</td>
<td>After Action Report</td>
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<td>CDC</td>
<td>Centers for Disease Control and Prevention</td>
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<td>DSNS</td>
<td>Division of Strategic National Stockpile</td>
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<td>HSEEP</td>
<td>Homeland Security Exercise and Evaluation Program</td>
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<td>IP</td>
<td>Improvement Plan</td>
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<td>MOU</td>
<td>Memorandum of Understanding</td>
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<td>POD</td>
<td>Point of Dispensing</td>
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<td>RSS</td>
<td>Receipt, Storage, and Staging</td>
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<td>SME</td>
<td>Subject Matter Expert</td>
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1. INTRODUCTION

In the event of a large-scale public health emergency, mass dispensing of medical countermeasures (e.g., antibiotics, vaccines, antidotes) could be required to reduce illness and death. State officials can request supplies from the Centers for Disease Control and Prevention’s Strategic National Stockpile (SNS). Materiel from the SNS would be sent by the federal government to the Receipt, Storage, and Staging (RSS) warehouse designated by the relevant state or local authority. From there, state and local health departments are responsible for distributing the materiel to Points of Dispensing (PODs), at which the countermeasures would be dispensed to the public. Thus, distribution involves supplying PODs, while dispensing refers to providing materiel to the public.

EXISTING EXERCISES OFTEN DO NOT ADEQUATELY TEST CRISIS DECISION-MAKING

Poor decision-making has been cited in many instances (e.g., Hurricane Katrina; U.S. Government Accountability Office, 2006; U.S. House of Representatives, 2006; U.S. Senate, 2006; U.S. White House, 2006; Ringel et al., 2007) as a critical failure in response. Yet, public health practitioners often have little experience or training in crisis decision making and can be uncomfortable with the need to make decisions based on often-incomplete information and short time lines. Given the fortunate rarity of large-scale public health emergencies, public health practitioners have little opportunity to practice, assess and improve crisis decision making. Further discussion of these gaps is presented in Parker et al. (2009).

In order to help address this gap, we recently developed the Public Health Emergency Response Decision-Making Assessment Tool, which provides a first generation tool for assessing crisis decision making in the context of exercises or real incidents (Parker et al., 2009). The tool focuses on the quality of decision-making processes – i.e., how decisions are made – as opposed to outcomes of decisions, which are often highly contextual and difficult to critique; or the characteristics of the individuals and organizations involved in the decision, which tell us relatively little about the actual ability to make decisions. Loosely modeled after the Crew Resource Management approach widely used in aviation and (increasingly) in medicine (Helmreich, Merritt, and Wilhelm, 1999; U.S. Air Force, 1998; Gawande, 2007), the assessment identifies a set of crisis decision-making processes that have been validated.
through experimental research (e.g., Gigone and Hastie, 1993; Isenber, 1986; Klayman and Ha, 1987; Schulz-Hardt, Frey, Luthgens, & Moscovici, 2000; Stasser, Stewart, and Wittenbaum, 1995; Stewart and Stasser, 1995) and through study of real decisions by experienced practitioners (e.g., Endsley, 2000; Klein, 1999; Weick and Roberts, 1993; Weick and Sutcliffe, 2001).

Extensive experience in developing and conducting exercises (e.g., Dausey et al., 2005; Dausey et al., 2006), along with reviews of After Action Reports and discussions with practitioners, suggests that many exercises do not provide realistic opportunities for practicing and testing crisis decision making. In many exercises key decisions are “scripted” in order to set up standardized scenarios for addressing other capabilities (e.g., calling-down staff, dispensing medication). For example, many exercises of SNS request processes assume that SNS assets will be requested, leaving little opportunity for decision-makers to practice weighing tough tradeoffs under realistic time and informational conditions. In other instances decision-making is tested, but players get little feedback on whether their decisions might lead to effective outputs and outcomes. For example, tabletop exercises that practice decisions to close schools, issue public messages, or dispense medications rarely provide any specific feedback on the degree to which these measures might actually reduce disease transmission. Moreover, large, complex exercises require a considerable amount of time, effort, and money to plan and execute, limiting the frequency with which they can be conducted, and hence limiting the frequency which with major crisis decisions can be practiced.

The modules presented here address the need for low-cost solutions to testing decision-making capabilities that need to be used in high-stakes situations. The game itself is necessarily an abstraction, presenting a simplified model of a highly-complex event – an anthrax release (although with minor modification the concepts exercised in the game may be applicable to a wide range of mass-prophylaxis activities, ranging from other bioterrorism events to mass vaccination campaigns for influenza). As such, the game leaves many of the details to be filled in by players, allowing them to tailor play to their local realities. Additionally, Modules 4 and 5 make use of facilitator-led group discussion to test and provide feedback on decision making using a previously-developed, structured assessment tool. Game play in these modules focuses on learning about decision making when faced with complex and uncertain contingencies. In contrast, Modules 1 – 3 focus on learning relatively straightforward mathematical concepts from supply chain management and applying them to RSS and POD operations.
EXERCISE DESIGNED TO AID IMPROVEMENT

This game is part of a larger suite of assessments designed by RAND to help jurisdictions measure and improve operational capabilities required for the SNS program (e.g., Chan et al., 2009; Nelson et al., 2009; Shelton et al., 2009). As such, the assessment tools are intended as a supplement to the Technical Assistance Review tool (TAR), which focuses on plans, personnel, and other aspects of SNS capacity (Nelson et al., 2009).

While many of the earlier SNS assessments that RAND developed are intended to be used for accountability purposes, this game is intended to be used as a formative assessment. That is, it can help jurisdictions identify problems and improve their performance. However, it is not designed for use in systems that link performance levels to funding or other incentives. While such uses might be possible in the future, considerable additional development and testing would be required to ensure that the assessments provide an unbiased and low-error estimate of true crisis decision-making capabilities.

PROCESS FOR DEVELOPING THE GAME

We began by identifying a set of decisions that practitioners might have to make when managing inventory of medical countermeasures during a large-scale public health emergency (e.g., which PODs to open and how to allocate available staff to these PODs, how to distribute scarce materiel throughout a network of PODs, and whether to alter standards of care to increase throughput). The list of decisions were arrived at through (a) a review of decision-making literature and after action reports (see Parker, et al., 2009) and (b) efforts to develop the earlier version of the RSS-POD Supply Chain Management Game, which included observation of RSS exercises and discussions with practitioners.

Next, the RAND team drafted the two new modules to focus on these decisions. The game was then tested by a range of RAND researchers who played the game and reviewed the facilitation and evaluation manual, player’s manual, and assessment tool. The goal was to prepare the game for field testing with a broad group of practitioners.

REPORT OVERVIEW

In this next chapter, we provide background for the exercise, including a more detailed justification for its development, the players who could benefit from the exercise, and the activities involved in the exercise. Chapter 3 concludes with some suggested next steps in the development and testing of the exercise.
A Player’s Guide is included as Appendix A. Given that the game will most often be played by small groups of players, Appendix B provides a Facilitation and Evaluation Manual designed to guide discussion during game play and evaluate decision-making processes used during the game. Decision making can be evaluated using the game-specific version of the Public Health Emergency Response Decision-Making Assessment Tool presented in Appendix C.
2. THE RSS-POD SUPPLY CHAIN MANAGEMENT GAME

The computer game described in this report provides an opportunity for players to practice and test their crisis decision-making skills in the context of managing the supply of medications during a simulated anthrax-related emergency. In the game, players perform the role of the inventory manager at an RSS, making decisions about how to allocate inventory and adapt to unexpected contingencies (e.g., delay in materiel delivery) in order to dispense medication to as many people as possible. Specifically, these decisions include:

- Which PODs to open and how to allocate available staff to these PODs,
- How to distribute scarce materiel throughout a network of PODs, and
- Whether to alter standards of care to increase throughput.

PARTICIPANTS

Modules 4 and 5 are intended to be played by a group of 2 – 5 staff or volunteers who would be responsible for managing inventory at an RSS. This includes the personnel operating the inventory management system at these locations, as well as senior decision makers (perhaps located at the health department operations center) ultimately responsible for the allocation of scarce resources. The game is designed to promote group discussion regarding decisions faced by the RSS manager. However, for convenience, it may be beneficial to designate one individual to control the computer interface, even though decisions are made by the group.

ACTIVITIES

The game builds upon the recently-released RSS-POD Supply Chain Management Game (Chan, et al., 2009). In the game’s earlier version, a series of three modules teaches players basic principles of medical supply chain management:

- **Module 1** enables players to become familiar with the play of the game, and to see some of the pitfalls associated with having limited information about POD operations.
- **Module 2** makes visible to the RSS inventory manager the inventory levels and number of people served during the previous period at the POD, with the intent that players will be able to make better decisions as a result.
• Module 3 presents players with a simple mathematical algorithm to make distribution decisions. Players may choose to use this algorithm to see if they can improve their performance.

Here we add two new modules to provide practice in making decisions about allocating scarce resources and adapting to unexpected contingencies.

Scenario 4: Dealing with Staff Shortages

Module 4 begins by elaborating on the public health emergency scenario from Modules 1 – 3. Specifically, players are informed that an anthrax release happened at that morning’s annual St. Patrick’s Day parade, and that 50% of their staff is currently unavailable. The players’ task will be to determine which of their PODs to open and with what staffing. To allow the scenario to be played with different constraints, the percentage of unavailable staff can be set to 25%, 50%, or 75%.1

In addition, unlike Modules 1 – 3, Module 4 asks players to load data on their own locality’s PODs. An Excel template is provided to help enter and structure these data, and should be completed prior to game play. Actual module play involves a spreadsheet interface that displays each POD and its relevant characteristics (i.e., maximum hourly throughput, staffing required for maximum throughput, expected hourly demand, RSS-POD travel time, and starting inventory). Players must decide how to allocate the available staff to existing PODs. Facilitation, both through the game and the facilitator, encourages discussion of different staffing levels, characteristics of specific PODs, special populations, and so forth. After making their final allocation decisions, players are led through a series of questions designed to reflect on their current POD plan and their decision-making processes.

Scenario 5: Delayed Supplies and Altering the Standard of Care

Module 5 returns players to the same game interface used in Modules 1 – 3. However, as with Module 4, players use data on their own PODs. This module starts

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1 These options reflect results in the limited literature on the willingness of staff to report during a disaster. For example, Shapira et al. (1991), using hospital staff in Israel, report that 42% would be willing to report during an unconventional weapons attack, but this would increase to 86% if personal safety measures were instituted. Balicer et al. (2006) report that nearly half of local health department workers are likely not to report to work during a pandemic. A large survey of healthcare providers in New York (Qureshi et al., 2005) shows that self-reported ability and willingness to report to work during a disaster ranges from less than 50% to over 80%, depending on disaster type.
players with full staff, but this time materiel is late in delivery, forcing them to decide how to allocate the limited inventory already at their disposal. After three rounds of the simulation, sufficient resupply arrives, but now players are faced with insufficient POD throughput to distribute the delivered medication to everyone within the specified 48-hour timeframe. At this point, the game offers players the opportunity to alter the standard of care, therefore increasing throughput while accepting the potential for a greater error rate. Three alterations are offered: reduce the number steps in the PODs, allow non-medical staff to augment or replace medical staff at the PODs, and spend less time with clients at each step in the PODs. Players are encouraged, through the game and facilitator, to discuss the ramifications of each of these options. Once making their decisions, players proceed through three more rounds of play, which allow them to see the affects of their decisions. Closing screens provide feedback on POD performance, and as with Module 4, encourage introspection into current POD planning and the decision-making processes exhibited during play.

**FACILITATION**

Unlike Modules 1 – 3 (Chan et al., 2009), Modules 4 and 5 involve the use of a facilitator to help monitor and guide decision making. The level of facilitation will depend on whether the purpose of playing the game is primarily evaluative or instead focused on process improvement. If the game is being used for evaluation, the facilitator may want to hold back and see if players raise these issues naturally. If the game is being used for process improvement, the facilitator may want to play a stronger role in moderating and stimulating the discussion. A players’ guide is provided in Appendix A. Appendix B provides a detailed facilitation and evaluation manual.

**ASSESSMENT**

To assess decision making, these modules may be played while an evaluator completes a game-specific version of the Public Health Emergency Response Decision-Making Assessment Tool (Parker et al., 2009), modified to reflect the specific decisions and decision-making processes elicited by the game.

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2 POD functions can include, but are not limited to, greeting, form distribution, triage, medical evaluation, transportation assistance, mental health evaluation, briefing, drug triage, and dispensing (see, e.g., Hupert et al., 2004).
As noted elsewhere (Parker et al., 2009), the original version of the tool was developed for use during exercises and real incidents, and was developed from literature review, consultation with SMEs, review of AARs, and observation of exercises. The paper-and-pencil tool is designed for use by exercise evaluators and focuses on three key aspects of crisis decision-making processes:

- **Situational Awareness.** An assessment of threats and vulnerabilities for human health and the resources available for mitigating health effects during a response; includes making sense of the current state of affairs and making projections about future trends.

- **Action Planning.** Identification, evaluation, and selection of courses of action to mitigate or control the health effects of the incident, including plans for contingencies.

- **Process Control.** Steps taken to manage the flow of the entire decision process and to keep track of the flow of information and resources.

The game-specific version of the tool retains the structure of the original version, with non-relevant items (e.g., those outside the scope of the game) grayed out, so evaluators can easily skip them. However, these items have been retained in case discussion ranges outside the scope of the game. For example, the game automatically implements orders regarding altering the standard of care, making irrelevant a tool item about clearly stating and communicating a decision. However, while not elicited by the game, a group of players could still discuss such a communication plan, which could be noted by the evaluator.

Similarly, examples have been provided for each non-grayed item. To provide further guidance for evaluators, an extra column containing sample evidence has been added to the tool.

Like the earlier version, the assessment tool collects information about the evaluator and the exercise or incident upon which the assessment is made. However, items not relevant to this particular game have been deleted. The game-specific assessment tool is provided in Appendix C.

**LIMITATIONS**

The Decision-Making Modules for the RSS-POD Supply Management Game described in this report represent provide opportunities for public health officials and their partners to practice and self-assess their capability to make tough decisions in the
context of countermeasure delivery operations. Nonetheless, readers should bear in mind that the current version of the game represents an early effort and is therefore subject to a number of limitations.

First, the simulated operational environment provided by the game cannot simulate all the pressures of real incidents. Thus, while the game forces players to make tough decisions about allocating scarce resources, it does not simulate the full richness of political, organizational, and ethical pressures that face decision makers in real operations. The game seeks to increase the degree of realism by encouraging players to use real PODs from their countermeasure delivery plans. Yet, it relies on players and facilitators to imagine the full spectrum of constraints and pressures. Similarly, the game represents only the interaction between PODs and the RSS and does not simulate the influence of traffic congestion, public information, and other factors outside the POD and RSS. Finally, and as noted elsewhere, the section of the game that allows players to change the standard of care is based on a simplified model of POD operations. While these assumptions were validated using computer-based POD models, the game does not represent the full complexity of POD operations. However, this may also be a strength, since the focus on specific response functions and decision-making elements may give players the opportunity to learn more about how they process and act on relevant information.
3. NEXT STEPS

This decision-making add-on to the RSS-POD Supply Chain Management Game should be considered an initial prototype of an experiential learning exercise. It is being released for testing by users in state and local health departments who would have to manage inventory in an actual emergency, as well as by staff of CDC DSNS who provide technical assistance to those health departments.

During this period of testing, we are interested in learning:

- The extent to which the issues dealt with in these game modules mirror real public health crisis decision-making experiences or plans
- Which aspects of the game are confusing and which can be improved
- Whether, in a more general sense, experiential learning games such as these are an effective strategy for teaching technical concepts to health-department users
- How the use of stand-alone games such as this may improve performance in more general exercises, such as warehouse drills and full-scale mass dispensing and distribution exercises.

Ultimately, testing validity and usefulness will require the development of good metrics for the larger exercises, as well as data collection over time.
APPENDIX A. RSS-POD SUPPLY CHAIN MANAGEMENT GAME PLAYER’S GUIDE

This Player’s Guide is modified from one originally designed for Modules 1 – 3 (Chan et al., 2009).

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INTRODUCTION

In the event of a large-scale, public health emergency such as an anthrax attack or pandemic influenza outbreak, state and local health departments may need to distribute countermeasures to affected populations via Points of Dispensing (PODs). Supplies of countermeasures will be distributed from Receipt, Storage, and Staging (RSS) warehouses to PODs (see Figure A1). The establishment of the supply chain that distributes supplies from RSS warehouses to PODs must occur quickly and efficiently to minimize population morbidity. RSS-POD supply chain management involves making decisions about how to allocate inventory and adapt to unexpected contingencies (e.g., a delay in materiel delivery) in order to dispense medication to as many people as possible. Yet, the personnel who are asked to manage the RSS and PODs often have minimal experience with supply chain management and may not be familiar with the information systems used by the health department to manage the supply chain. In addition, public health practitioners often have little experience with crisis decision making, and given the fortunate rarity of large-scale public health emergencies, little opportunity to practice, assess, and improve it.
GOAL

The accompanying RSS-POD Supply Chain Management Game is designed to teach users some basic principles of supply chain management through simulated hands-on training experiences. Three modules gradually increase the user’s understanding of how to implement best practices in managing scarce resources during a public health emergency. Two additional modules present resource constraints that force users to explore difficult decisions.

The intended users of this RSS-POD Game include public health staff or volunteers who, in an emergency, would be expected to function as warehouse inventory managers, POD inventory managers, transportation planners, or operations center staff. Modules 1-3 can be played by individuals or in small groups, whereas Modules 4 and 5 should be played by small groups.

RSS-POD SUPPLY CHAIN MANAGEMENT GAME

Background

In the RSS-POD Game, users are responsible for the distribution of countermeasures from the RSS to PODs. In Modules 1 through 3, the distribution network consists of one warehouse serving ten PODs. Module 4 requires players to use POD specifications (i.e., address, maximum hourly throughput, etc.) from their own distribution network. In Module 5, players have the choice of using their own
distribution network or default POD data. We assume that only one medication is needed and distributed. The RSS receives deliveries of additional supplies of this medication every six hours and has a sufficient number of trucks available to serve all ten PODs during each shipment from the RSS. PODs are able to treat patients at a constant rate, without interruption or rest. It is assumed that patients who arrive at a POD with no supplies will wait at that POD until it has been resupplied, forming a backlog.

Proper supply chain management requires understanding the timeline of activities (see Figure A2). After a POD places an order for countermeasures, the RSS allocates the available inventory and dispatches truck(s) from the RSS to the POD.\(^3\) Later, the POD receives the shipment. The time between the order and receipt at the POD is the lead time. In this game, the lead time is constant for each POD, but varies across the PODs based on distance from the RSS. Over the course of the game, PODs must place multiple orders; the time between POD orders is the review period. For simplicity, in the RSS-POD Game, the review period is four hours for all PODs. POD orders, RSS allocation decisions, and truck departures occur simultaneously for all PODs. In this game, the computer plays the roles of the POD inventory managers who place POD orders.

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3 In the game, it is assumed that it takes a fixed amount of time to perform each of these activities: load a truck at the RSS, drive from the RSS to a given POD, and unload a truck at the POD.
Launching the Game

The game is written for Microsoft Excel for Windows. Detailed instructions are provided on-line in the game. Users need only open the game and follow the instructions. The game uses macros in Microsoft Excel. In order to run the game, users must adjust the security settings in Microsoft Excel to allow macros to be run. In Windows, go to: Tools -> Macro -> Security, and set your security level to “Medium.” Close the game without saving, then re-open it. Upon re-opening, users will be prompted with a dialog box; choose “Enable Macros.”

How the Game is Played

The RSS-POD Game begins after the declaration of a public health emergency. The user plays the role of the inventory manager at the warehouse who must allocate inventory in response to POD orders with the goal of effectively managing his or her inventory to meet demands during this crisis.

Users play through a sequence of five modules, making decisions on how to allocate resources under different conditions. Each module ends with an “After Action Review” where one can see how well one managed the inventory in the system and reflect on how decisions were made. The first three modules cover the same 24-hour period, so that comparisons of inventory management performance can be made across these modules. Modules 4 and 5 focus on making decisions about how to allocate scarce resources and adapt to unexpected contingencies. These modules make use of facilitator-led group discussion to test and provide feedback on decision making using a previously-developed, structured assessment tool.

In Module 1, the user must make decisions based on a limited amount of information. Users know information about the design of the PODs (e.g., capacity), what PODs have ordered, but not what the PODs have in inventory. Users then allocate available inventory based upon this information. It should be noted that POD managers may or may not be ordering as they might given a larger (i.e. system-wide) perspective; they may not know how quickly their inventory is being depleted or how many patients will be coming to their POD to receive countermeasures. The game then simulates the activities of the next review period, tracking the remaining inventory at the POD, the number of patients served, and backlog, i.e., number of patients waiting for countermeasures. Performance is based upon the total number of patients served and backlog across all PODs.
In Module 2, the user has access to more information. Users have access to information about the design of the PODs, what PODs have ordered, inventory remaining at PODs, number of patients served during the previous review period, and backlog of patients at PODs. This additional information allows the manager to make more informed decisions regarding allocation of inventory in response to POD orders.

In Module 3, the user may choose to allocate inventory based on an inventory algorithm, a simple mathematical formula that determines a target inventory level based on the expected hourly demand rate, lead time, and review period. (The algorithm is described on-screen in the game.) The target inventory level includes safety stock to account for variability in lead time and demand rate. Orders are then filled based on inventory remaining at the POD.

In Module 4, players are faced with a staffing shortage. Using their own POD specifications, players must decide which PODs in their POD plan to open, and at what staffing level, in order to achieve the goal of dispensing countermeasures to as many people as possible.

In Module 5, players return to their original POD plan at full staffing levels. However, shipments of materiel (i.e., antibiotics) are delayed and there is not enough inventory to cover demand until the next shipment arrives. The player is faced with deciding whether and how to modify standards of care to address the situation.

Users are encouraged to play all five modules in order, but may focus on a subset of them (i.e., Modules 1-3, 4, and/or 5). In particular, Modules 1 – 3 build on each other progressively and may be played by a single person. In contrast, modules 4 and 5 are designed to be played by groups of 2 to 5 people. Modules 4 and 5 both address decision making under resource constraints, and may be played singularly or consecutively.

**CONCLUSION**

During a large-scale public health emergency, health departments likely will rely on staff and volunteers to manage the supply chain that distributes countermeasures from the SNS and other suppliers to RSS warehouses down to the PODs. To effectively manage this supply chain, users need to understand what information is needed and how that information can be used to minimize population morbidity. Modules 1 – 3 of the RSS-POD Game are designed to introduce staff to some basic concepts in inventory and supply chain management, so that they may serve as more effective managers of inventory in a time of crisis.
RSS managers and other public health officials will also be called upon to make critical decisions when events do not go as planned. Because of the difficult tradeoffs and uncertainty surrounding these decisions, choices cannot always be spelled out in advance. Good decision-making processes can leverage resources available to decision makers, such as subject matter experts and other sources of information, and lead to better outcomes. Modules 4 and 5 of the RSS-POD Game are designed to allow small groups of decision makers to exercise crisis decision making, identify strengths and challenges, and to pinpoint obtainable information that could aid in future decisions.
APPENDIX B. FACILITATION AND EVALUATION MANUAL FOR
MODULES 4 AND 5

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PURPOSE

The accompanying RSS-POD Supply Chain Management Game is designed to teach users some basic principles of supply chain management and decision making through hands-on training experiences. In the game, players perform the role of the inventory manager at an RSS, making decisions about how to allocate inventory and adapt to unexpected contingencies (e.g., delay in materiel delivery) in order to dispense medication to as many people as possible. Specifically, these decisions include:

- Which PODs to open and how to allocate available staff to these PODs,
- How to distribute scarce materiel throughout a network of PODs, and
- Whether to alter standards of care to increase throughput.

This version of the game introduces two new modules to the three modules of the recently released RSS-POD Supply Chain Management Game (Chan et al., 2009). Unlike Modules 1 – 3 (Chan et al., 2009), Modules 4 and 5 involve the use of a facilitator to help monitor decision making and ensure that discussion covers key points. To assess decision making, these modules may be played while an evaluator completes a version of the
Public Health Emergency Response Decision-Making Assessment Tool (Parker et al., 2009), modified to leverage specific decisions and decision making processes during the game. This manual provides guidance for a facilitator and evaluator during modules 4 and 5.

**SCOPE**

Overall, the RSS-POD Supply Chain Management Game consists of five modules. The first three modules (Chan et al., 2009), which can be played by an individual, gradually increase the user’s understanding of how to implement best practices in managing scarce resources during a public health emergency:

- **Module 1:** The first module enables the player to become familiar with the play of the game, and to see some of the pitfalls associated with having limited information.
- **Module 2:** In the second module, the inventory levels and number of people served during the previous period at the POD are also made visible to the RSS inventory manager, with the intent that the player will be able to make better decisions as a result.
- **Module 3:** In the third module, the player is presented with a simple mathematical algorithm to make distribution decisions. Players may choose to use this algorithm to see if they can improve their performance.

Modules 4 and 5 present resource constraints (e.g., personnel, materiel) that force users to explore difficult decisions. This manual focuses on Modules 4 and 5, which deal with group decision making and adaptation to unexpected contingencies:

- **Module 4:** In the fourth module, players are faced with a staffing shortage. Players must decide which PODs to open, and at what staffing level, in order to achieve the goal of dispensing countermeasures to as many people as possible.
- **Module 5:** In the final module, players return to their original POD plan at full staffing levels. However, shipments of materiel (i.e., antibiotics) are delayed and there is not enough inventory to cover demand until the next shipment arrives. The players are faced with deciding whether and how to modify dispensing methods to address the situation.

Users have the option of playing all five modules in order, or may focus only on a subset of them (i.e., Modules 1-3, 4, and/or 5). In particular, Modules 1 – 3 build on each other progressively and may be played by a single person. In contrast, modules 4 and 5 are designed to be played by groups of 2 to 5 people. Modules 4 and 5 both address
decision making under resource constraints, but may be played singularly or consecutively.

PARTICIPANTS

Modules 4 and 5 are intended to be played by a group of 2-5 staff or volunteers who would be responsible for managing inventory at an RSS. This target audience includes the personnel operating the inventory management system at these locations, as well as more senior decision-makers (perhaps located at the health department operations center) responsible for determining the allocation of scarce resources. The game is designed to promote group discussion regarding decisions faced by the RSS manager. However, for convenience, it may be beneficial to designate one individual to control the computer interface, even though decisions are made by the group.

GENERAL FACILITATION STRATEGIES

Modules 4 and 5 involve the use of a facilitator to help ensure smooth progress through the game, guide discussion when necessary, and help monitor decision making. Specific facilitation guidance is provided for each module. This includes both instructions for facilitators and examples of specific prompts to be spoken (presented in unbolded italics).

Level of facilitation. The level of facilitation will depend on whether the purpose of playing the game is primarily evaluative or instead focused on process improvement. To evaluate decision making, the game should be played in a more naturalistic setting with little facilitator interaction so that decision making can proceed as it would naturally. Following each module, the facilitator may lead players in a discussion of how things went, in order to (1) probe decision processes that were not clear from discussion and (2) identify immediate lessons learned. If the session is instead focused on process improvement, facilitation should be more engaged, including use of the facilitator prompts to probe at decision-making considerations.

Use of break-away discussions. The game itself provides basic models of RSS-POD communications, throughput, demand, and other key processes. At times, players may identify contingencies, options, or other details that are outside the scope of the game. For example, the game presumes a fixed and finite supply of staff, but players may be aware of MOUs with neighboring jurisdictions that could potentially relax this constraint. Furthermore, discussing these issues may lead to productive planning and decision making. Rather than limit discussion to the game, the facilitator in these
situations may choose to “break away” from the game – essentially saying, “OK, what you’re suggesting is outside the scope of the game, but worth discussing further. Let’s step away from the computer for a moment and have a conversation about this issue.” After discussing, the facilitator can then transition back to the game at the point of breaking away. For example, “That was a good discussion. Let’s now return to where we left off in the game.”

USE OF THE DECISION-MAKING ASSESSMENT TOOL

To assess decision making, the modules may be played while an evaluator completes the included version of the Public Health Emergency Response Decision-Making Assessment Tool (Parker et al., 2009) that has been modified to leverage the specifics of the game. The tool measures three key decision-making processes:

- **Situational Awareness.** Situational awareness incorporates an assessment of threats and vulnerabilities for human health and the resources available for mitigating health effects during a response. Situational awareness includes making sense of the current state of affairs and making projections about future trends. Items on the tool cover four main components of situational awareness: assessing the incident, determining personnel, determining non-personnel resources, and projecting future changes.

- **Action Planning.** Action planning involves the identification, evaluation, and selection of courses of action to mitigate or control the health effects of the incident, including plans for contingencies. The tool focuses on two aspects of action planning: developing, evaluating, and selecting options and initiating execution.

- **Process Control.** Process control involves steps taken to manage the flow of the entire decision process and to keep track of the flow of information and resources. The tool focuses on two aspects of process control: managing decision-making resources and engaging multiple perspectives.

The 34-item paper-and-pencil tool is intended to allow public health practitioners to assess their baseline crisis decision-making capabilities and identify shortfalls and shortcomings that may represent opportunities for internal process improvements. The tool has been modified to leverage the specific nature of the game. In particular, the game-specific tool grays out those aspects of decision making that are not prominent in the game (e.g., one item – clearly stating a decision – is not likely to be relevant, since the game enforces clear decisions). However, since conversation will not necessarily follow
the game’s constraints, the game-specific tool does provide evaluators with the flexibility to use grayed-out items (e.g., a side conversation might address the real-world need to clearly convey decisions to response partners). The game-specific tool provides instructions for completion, including sample evidence for each non-grayed item.

To facilitate assessment, this manual also provides links (in the form of call-out boxes) to specific items in the assessment tool. While not exhaustive, these highlight places in game flow where key decision processes are likely to occur. It is recommended that the facilitator and evaluator familiarize themselves with the assessment tool prior to the session.

**INFORMATION TO GATHER PRIOR TO PLAYING THE GAME**

Before playing the game, players should gather information on their PODs. The accompanying POD Template file (shown in Figure B1 below) provides the structure for importing this data into the game. Information can either be typed directly or cut-and-pasted into the template. Within the template, the “Generate Nicknames” button will automatically generate short nicknames for each POD, based on the POD Names provided.

![Figure B1. POD Template File](image)

Other potentially useful information for playing the game includes a map of current POD and RSS locations, as well as current POD planning materials.
MODULE 4

LEARNING OBJECTIVES

- To explore key considerations relevant to POD and staffing choices when available staff is limited
- To decide which PODs to open and how to allocate available staff to these PODs
- To identify obtainable information that could facilitate these decisions

MODULE WALKTHROUGH

Module 4 begins with the following screen, which lays out the basic scenario.

![Module 4: Dealing with Staff Shortages]

*Figure B2. Module 4, Opening Screen*

Players have the option of choosing how constrained the scenario will be by selecting the percentage of staff that will be unavailable (25%, 50%, or 75%). This decision can either be made ahead of time based on planning assumptions, or the facilitator may lead players in a discussion of which percentage they would like to play
the game with. The module can be repeated, so players can see how their decisions change depending on how many staff they have available.

Note that the default for percentage staff unavailable is 50%. The percentage staff listed as unavailable in the second paragraph of the slide will change depending on which button (i.e., Use 25% Absent Staff, Use 50% Absent Staff, or Use 75% Absent Staff) is selected.

The facilitator may want to pause here and ask players if they have any questions.

NET DATA ENTRY

As noted in Figure B2 above, Module 4 requires players to use their own POD specifications from their SNS plan. The interface for loading POD data is shown in Figure B3. Note that the “Use Current POD Data” button would be of use if players are replaying the module and want to use previously loaded POD data.

![Module 4: Loading POD Data](image)

**Figure B3. Module 4, Load POD Data**

The accompanying POD Template file provides the appropriate structure for this data, which can then be loaded in the following screen. Within the template, the
“Generate Nicknames” button will automatically generate short nicknames for each POD, based on the POD Names provided.

After loading the appropriate data, the next screen (Figure B4) describes the POD-selection interface. The facilitator may want to ask players if they have any questions at this point.

Figure B4. Module 4, Description of POD-Selection Interface

Hitting “Continue to POD Decisions” will take users to the POD-selection screen (the main interface for Module 4), displayed below in Figure B5. Note that the font size will depend on the size of the computer screen being used. The game is optimized for 1024 x 768 resolution, but may be played with finer resolutions.
MODULE 4 FACILITATION

At this point, players should begin discussing which PODs to open and with how many staff. This decision should include tradeoffs between multiple considerations, such as those below:

- Existing plans
- Size/characteristics of PODs
- Geographic distribution
- Transportation
- Affected populations
- Who will not get served because of the current constraints

If the game is being used for evaluation, the facilitator may want to hold back and see if players raise these issues naturally. If the game is being used for process improvement, the facilitator may want to play a stronger role in moderating and stimulating the discussion. In this case, both general and specific prompts are provided below to encourage discussion.

- General prompts:
  - What other considerations might be important for decisions like this?
  - Is there additional information you
currently don’t have that would affect your decision? If so, how can you gather this information?

- Existing plans
  - What parts of your current plans or procedures are relevant to this scenario?

- Size/characteristics of PODs:
  - Are there specific characteristics about particular PODs that make them better candidates?

- Geographic distribution:
  - How does the location of PODs play a role in choosing which PODs to open?

- Transportation:
  - How do people tend to get to the PODs? Will this affect which PODs you open and how you staff them?
  - Have you considered whether people can walk to your PODs?

- Affected populations:
  - Which populations are most likely to be affected by this crisis? How should PODs be located and staffed to account for this?
  - Are there sub-populations that might be particularly vulnerable?
  - Are there other populations that need special considerations?
  - Who will likely not get served because of constraints?

Based on this discussion, players should use the POD selection interface to select which PODs to open and with what staffing levels. To open a POD, players type in the number of staff to allocate to the POD. Players can choose not to open a POD by typing a “0” or leaving the cell blank.

After players finish the POD and staff selections, they will be taken to a conclusions slide shown below (Figure B6). Regardless of whether the game is being played for the purpose of assessment or process improvement, the facilitator should lead players in a discussion of how the module went. Suggested questions are listed on the screen below.
In order to capture lessons learned and begin to think how to address any challenges that arose, the facilitator or evaluator should take notes on players’ answers to these questions. Follow-up questions include:

- **How did the group do in this module?**
- **What were the barriers or problems that limited the group’s ability to make decisions about POD staffing?**
- **What are some recommendations for improvement?**
- **What are some changes in plans, policies, and procedures that might address these barriers/problems?**
- **What initial actions are needed for implementing these changes?**
- **What issues remain unresolved or require follow-up?**
This information can then be used to inform an After Action Report (AAR) and Improvement Plan (IP).\textsuperscript{4}

\textsuperscript{4} An AAR “captures observations of an exercise and makes recommendations for post-exercise improvements,” while an IP “identifies specific corrective actions, assigns them to responsible parties, and establishes targets for their completion” (U.S. Department of Homeland Security, 2007). For additional guidance on AARs and IPs, see HSEEP (DHS, 2007).
MODULE 5

LEARNING OBJECTIVES:

- To determine an appropriate allocation of materiel among PODs when supplies are limited
- To explore altering standard of care and other key considerations relevant to increasing throughput
- To identify obtainable information that could facilitate these decisions

MODULE WALKTHROUGH

Module 5 begins with the follow screen, which lays out the scenario:

Figure B7. Module 5, Opening Screen

As noted in the screen above, Module 5 can be played with the users’ own POD specifications or with default (i.e., hypothetical) data provided with the game. If users played Module 4 using data from their own PODs, they have the option of using the same...
POD data for Module 5. Clicking on “Use Current POD Data and Continue to Module 5” will make use of whatever data is currently loaded into the game (noted at the bottom of the screen). If no user data has been loaded, the game will use default data. Finally, clicking on “Use Current POD Data and Continue to Module 5” results in the following screen:

To keep play manageable, the game restricts control to 10 PODs – players are asked to assume that other PODs are being supplied and operating similarly. The game will randomly select 10 PODs for the user to control. This random selection is stratified to help ensure that the sample represents the full range of throughputs present in the available PODs. The user has the option of accepting the random choices (click on “Accept Choices”), choosing a different random selection (click on “Choose Randomly Again” button), or choosing their own 10 PODs (click on “Choose Your Own PODs” button).

Clicking on “Accept Choices” takes the player to the familiar game interface from modules 1 – 3 (shown below in Figure B9), where players begin the task of deciding how to allocate limited materiel among the 10 PODs.

Note that the “Suggest Shipments” button does not consider shortfalls, so at times will suggest larger shipments than current inventory will allow. This restriction on the algorithm forces players to decide for themselves how cut-backs should be made.
If players click on “Choose Your Own PODs” rather than “Accept Choices,” the game takes players to the following screen (Figure B10) where they can custom select which PODs they want to play with. PODs are selected by placing a “1” in the left-hand (“selected”) column.
Figure B10. Module 5, Manual Sample Selection

Once 10 PODs are selected, clicking on “Done” takes the player to the main game interface (Figure B9), where players begin the task of deciding how to allocate limited materiel among the 10 PODs.

MODULE 5 FACILITATION

This module involves two focal sets of decisions: how to allocate scarce materiel and, once adequate materiel arrives, whether to alter the standard of care to increase throughput.

In determining how to allocate materiel among the PODs, players should discuss multiple considerations, including:

- Existing plans
- Size/characteristics of PODs
- Affected populations
- Who will not get served because of the current constraints

If the game is being used for evaluation, the facilitator may want to hold back and see if players raise these issues naturally. If the game is being used for process improvement, the facilitator may want to play a stronger role in moderating and stimulating the discussion. In this case, both general and specific prompts are provided below to encourage discussion.

General prompts:
What other considerations might be important for decisions like this?
What methods may be used to allocate limited inventory?
Will certain PODs be given priority?
Will certain populations be given priority?
Is there additional information you currently don’t have that would affect your decision? If so, how can you gather this information?

Existing plans
What parts of your current plans or procedures are relevant to this scenario?

Size/characteristics of PODs:
Are there specific characteristics about particular PODs that would inform your decision?
Should you trim every POD’s allotment evenly?
How will this affect overall POD operations?

Affected populations:
Which populations are most likely to be affected by this crisis? How should materiel be distributed to account for this?
Are there populations that need special considerations?
Who will likely not get served because of constraints?

Based on this discussion, players should allocate available materiel to PODs, playing through several rounds. It is entirely possible that players will completely run out of materiel prior to new shipments arriving. If so, play will be limited to observing decreased inventory and increased backlog. If the module is being played for evaluation, the facilitator may want to hang back and see whether and how players discuss the

Links to Assessment Tool
Discussion of unknown information may reflect situational awareness (items 1f-g) and process control (items 8b-c).

Links to Assessment Tool
Discussion of current plans may reflect situational awareness (items 2a and 3a), action planning (item 5a), and managing resources (items 7a and 7c).

Links to Assessment Tool
Discussion of POD characteristics reflects awareness of current resources (items 3b).

Links to Assessment Tool
Discussion of affected populations reflects situational awareness (items 1a).
progression of the scenario. If the session is for process improvement, the facilitator may wish to prompt discussion, as follows:

- Prompts:
  - Are you noticing anything interesting in how these numbers are playing out?
  - If you were to play these first few rounds again, would you do things any differently?
  - What information might have been useful to have when making your initial allocations? Could you gather this information?

Once the shipment of antibiotics arrives, players face another problem: the lines of people that have built up waiting for their medication (Figure B11).

![Module 5: Standard of Care Deliberation](image)

**Resupply Shipments Have Arrived, But Is It Too Late?**

The shipments of medications have arrived. Now you need to get them to the people standing in line as quickly as you can: the 48 hours you had is quickly running out...

However, the lines of people that have built up waiting for their medication are now overwhelming your potential POD throughput. It will take many hours to process all of these people.

At this point, you may request that the standard of care be altered in any of the following ways:

- Reduce the number of steps in the POD
- Allow non-medical staff to augment or replace medical staff at the POD
- Spend less time with clients at each step in the POD

Each of these will increase POD throughput. However, this will likely come at a greater error rate and could have significant negative health effects on some people. However, failing to get the medication to people could have significant negative health effects on even more people.

Take some time now to discuss this tradeoff, your options, and their implications, before going to the next screen and making the decision.

![Continue to the Decision](image)

**Figure B11. Module 5, Resupply Notification and Throughput Discussion**
In order to address the build-up of lines at PODs, players have the option of altering the standard of care provided at the PODs. In deciding whether to alter the standard of care, players should consider trade-offs and implications. As explained in the screen above (Figure B11), players have the option of requesting the standard of care be altered in any of the following ways: reduce the number of steps in the POD, use additional, non-medical personnel to staff the POD, and/or spend less time with clients at each step in the POD. Players should assume that 1) non-medical staff have at least minimum competency and 2) each option will increase throughput. Below are some prompts the facilitator may wish to use to prompt discussion:

- Do you want to consider altering the standards of care?
- If so, what do you think of these options in general?
  - Broadly, what are the implications of these changes, in terms of both gains and costs?
- How would each of these options affect throughput?
- Do you have any time-study data to inform your decision? If not, how could you go about collecting this data?
- What steps can you shorten or skip in the POD to enhance throughput?
  - Can you eliminate or reduce the filling out of forms? What info needs to be collected from the patient and can it be done in other ways?
  - What drug tracking will you still do? How will you deal with medications that might require follow-up?
  - Can the patient screening process be shortened?
  - Who has the authority to make adjustments to POD operations?

**Links to Assessment Tool**

Discussion of tradeoffs between costs and benefits reflects action planning (items 5c-d). If players will discuss options outside the scope of the game, this could be noted for item 5b.

**Links to Assessment Tool**

Discussion of time-study data could lead to consideration of unknown information (items 1f-g) or accessing individuals with key knowledge (items 8 b-c).

**Links to Assessment Tool**

Deviations from current plans requires knowledge of those plans (item 5a) and reflects contingency planning (item 5e). Players may also discuss concrete steps needed to implement such changes (item 6a).

**Links to Assessment Tool**

Decision-making authority is addressed in item 7c.
• Who is currently allowed (i.e., what training or licensing is required) to carry out the steps in your POD (e.g., screening, dispensing)?
  o Do non-medical personnel perform these tasks? If not, can they? What rules and laws govern this? Are there processes for waivers and/or exceptions to these?
• How big an impact do you think your decision will have on throughput?
• Is it worth it to alter standards of care?

After players discuss the options and implications, they choose how they would like to recommend altering the standard of care, if at all, as shown below (Figure B12):

![Figure B12. Module 5, Decision to Alter Standard of Care](image)
The game uses a simple formula to calculate the effects of the chosen options on throughput.\(^5\) However, to help ensure that the discussion focuses on the decision to alter the standard of care and not the mathematics behind the game, the facilitator should avoid revealing this calculation to the players until after they have made their decision and seen how it plays out, if at all. After making their choices, players will receive notification of their choices, as in the following screen (Figure B13).

\(^5\) Specifically, each option that the players choose will increase throughput by 11.5%. This is based on simulations using Clinic Generator, which is produced by the Institute for Systems Research at the University of Maryland, College Park. It can be downloaded from [http://www.isr.umd.edu/Labs/CIM/projects/clinic/](http://www.isr.umd.edu/Labs/CIM/projects/clinic/). The simulations show that, under specific assumptions, a 10% decrease in time spent in a POD, either through reduction in number of POD steps or time spent at each POD step, increases throughput by approximately 11%. This result is, of course, scalable to the percentage decrease in time spent. Allowing nonmedical personnel to perform tasks would increase staffing by an amount scalable with the size of the substitution. Here, we assume that using non-medical personnel would allow overall staffing to increase by 10% percent. So, for purposes of the game, we chose to implement each alteration as an increase of 10% in throughput. Increases in throughput from each alteration to the standard of care are assumed to be independent and multiplicative (e.g., when choosing two options above, throughput will increase by \(1.1 \times 1.1\)).
Players can then resume playing and see how their decision plays out. Note that the game does not reflect this decision until after players complete at least one round of play. Once the allocations are complete, the game will display a summary graph of distribution decisions (shown below in Figure B14). This graph is the aggregation of the POD-level graphs displayed in the main game interface. The main differences from Modules 1 – 3 will be decreased inventory and increased backlog prior to the shipment materiel, which arrives after 12 hours (shown by the dashed vertical line in the graph below). After this point (when the standard of care is either altered or not), inventory will spike and backlog will start to decrease.

Figure B13. Module 5, Feedback on Decision to Alter Standard of Care
Figure B14. Module 5, Performance Summary

Group discussion should recognize these effects of the scenario. If not, the facilitator may prompt discussion, as follows:

- How did the shortage of materiel at the beginning of the Module affect your performance?
- What happened after the new shipment arrived?
- What were the effects of your decision regarding altering the standard of care?

Hitting the Continue button will take players to the closing discussion screen (shown below in Figure B15).
The facilitator should then lead players in a discussion of how effective they were at getting medications to the community. Some questions may include:

- **How did the limited materiel affect your allocation decisions?**
- **What were the main options and considerations in deciding whether or not to recommend altering the standard of care?**
- **Was there additional information that you need to make these decisions?**
- **If so, could any of that information be gathered in preparation of these decisions? What sources of uncertainty will remain no matter what you do?**

In order to capture lessons learned and begin to think how to address any challenges that arose, the facilitator or evaluator should take notes on players’ answers to these questions. Follow-up questions include:

- **What were the barriers or problems that limited the group’s ability to make decisions about distributing and dispensing materiel?**

Discussion of unknown information and strategies for obtaining it are part of situational awareness (items 1f-g).
What are some recommendations for improvement?

What are some changes in plans, policies, and procedures that might address these barriers/problems?

What initial actions are needed for implementing these changes?

What issues remain unresolved or require follow-up?

This information can then be used to inform an After Action Report (AAR) and Improvement Plan (IP).6

---

6 An AAR “captures observations of an exercise and makes recommendations for post-exercise improvements,” while an IP “identifies specific corrective actions, assigns them to responsible parties, and establishes targets for their completion” (U.S. Department of Homeland Security, 2007). For additional guidance on AARs and IPs, see HSEEP (DHS, 2007).
APPENDIX C. GAME-SPECIFIC PUBLIC HEALTH EMERGENCY RESPONSE DECISION-MAKING ASSESSMENT TOOL

This tool is designed to help assess and improve the quality of public health emergency decision making in the context of exercises and real incidents. Items in the tool focus on evidence-based processes that apply to a wide variety of decision contexts, including, but not limited to, the decision to request SNS materiel, allocation of scarce resources, decisions to close schools, and so on. The tool has been designed to provide a basis for both assessment and process improvement but has not been validated for use as an accountability tool. It was originally designed to provide a basis for evaluating crisis decision making that involves complex issues for which existing plans do not provide sufficient guidance. This version of the tool has been adapted for use with Modules 4 and 5 of the RAND RSS-POD Supply Chain Management Game. Items relevant to game play are supported with example evidence. Items that are unlikely to be relevant to game play are grayed out, but retained for optional use.

Modules 4 and 5 of the game are designed to be completed by a group of decision makers, with the session managed by a facilitator. This game-specific tool should be administered by an external evaluator (who may or may not also be the facilitator) who has familiarized him- or herself with the items ahead of time. During the game, the evaluator should take notes on relevant processes as they occur, and then review and finalize ratings after the game has concluded. Alternately, the evaluator could complete the tool after the game (although the unreliability of memory makes this a less preferred option). All scoring should be based on overt discussions (although evaluator perceptions may be noted in space provided for each item).

Each section may be completed for (a) Module 4, (b) Module 5 or (c) a specific decision within the game. Action Planning, in particular, may be more appropriately applied to specific decisions (e.g., whether to alter the standard of care), with summary ratings made after the exercise. In this case, it is recommended that multiple copies of each section be printed ahead of time and completed as necessary.

Caveat: This tool is a DRAFT that is currently in development. As such, the structure, items, examples, and response scales are evolving based on feedback.

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<thead>
<tr>
<th>Scoring:</th>
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<tr>
<td>0: Should have been done, but was not</td>
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<tr>
<td>1: Not sufficient</td>
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<td>2: Somewhat sufficient</td>
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<td>3: Mostly sufficient</td>
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<td>4: Completely sufficient</td>
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N/A: Not applicable to this situation (requires brief explanation)
N/D: Not able to determine

Key terms:
- **Sufficient.** Action/activity was complete AND timely enough so that the assigned tasks and/or response could be accomplished. Exemplary efforts that go beyond completely sufficient may be describe in the notes section.
- **Relevant decision maker(s).** Those who, in the evaluator’s judgment, should be involved in the decision at hand. The tool does not assume that all present will or should be involved in every facet of decision making.
Situational Awareness: Attention to and interpretation of threats/vulnerabilities and awareness of resources; involves identifying and testing assumptions, recognizing uncertainties, and predicting the future development of the incident.

These ratings are of: □ Module 4  □ Module 5  □ a specific decision (specify): _________________________

<table>
<thead>
<tr>
<th>Score</th>
<th>Item</th>
<th>Notes</th>
<th>Example Evidence</th>
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<tbody>
<tr>
<td>1. ASSESSING THE INCIDENT. Relevant decision makers discussed:</td>
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<tr>
<td>0 1 2 3 4 N/A N/D</td>
<td>a. Number &amp; location of people affected by the incident</td>
<td>Discussion of the game scenario as it regards who is currently affected, where they are, and when they were affected.</td>
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<tr>
<td>0 1 2 3 4 N/A N/D</td>
<td>b. Agent/cause of the incident</td>
<td>An explicit discussion of the agent(s) responsible for the public health emergency and what this implies in terms of countermeasures.</td>
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<tr>
<td>0 1 2 3 4 N/A N/D</td>
<td>c. Severity of the incident</td>
<td>An explicit discussion of how heavily affected the area is, including potential disruption to infrastructure crucial to response; discussion of how the incident will affect availability of staff and delivery of materiel.</td>
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<tr>
<td>0 1 2 3 4 N/A N/D</td>
<td>d. Potential countermeasures</td>
<td></td>
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<tr>
<td>0 1 2 3 4 N/A N/D</td>
<td>e. Timeline for responding to the incident</td>
<td>An explicit recognition of the fact that the timeline for responding to the possible anthrax release may not be met due to the restrictions to countermeasure delivery in Module 5; discussion of how these delays and shortages will affect the timeline; additional discussions to update awareness and revise timeline.</td>
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0 = should have been done, but was not, 1 = not sufficient, 2 = somewhat sufficient, 3 = mostly sufficient, 4 = completely sufficient
N/A = not applicable to this situation (requires explanation), N/D = not able to determine

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<tr>
<td>f. Unknown information likely to affect the understanding of or response to the situation</td>
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<td>g. Strategies for gathering information to address unknowns in Item 1f</td>
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2. DETERMINING PERSONNEL (staff and volunteers). Relevant decision makers discussed:

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<tbody>
<tr>
<td>a. Number/skill mix of personnel needed for optimal response to the incident (above and beyond those currently deployed)</td>
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<td>b. Number/skill mix of personnel currently available for deployment</td>
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3. DETERMINING NON-PERSONNEL RESOURCES (materiel, supplies, equipment, facilities). Relevant decision makers discussed:

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<tbody>
<tr>
<td>a. Non-personnel resources needed for optimal response to the incident (above and beyond those currently deployed)</td>
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<tr>
<td>b. Non-personnel resources currently available for deployment</td>
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4. PROJECTING FUTURE CHANGES. Relevant decision makers explicitly discussed predictions about future changes in:

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<tr>
<td>a. Number/location of people affected</td>
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<tbody>
<tr>
<td>b. Need for and availability of response personnel</td>
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<td>c. Need for and availability of non-personnel resources</td>
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<td>d. Strategies to deal with resource shortfalls</td>
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Discussion of how to leverage the resources currently available; in Module 4, discussion of what characteristics of planned PODs makes them more/less attractive for staffing; in Module 5, discussion of the impact of materiel shortfall.  
For Module 4, discussion of limited staffing availability and its impact on dispensing; for Module 5, discussion of supplementing current staff.  
Discussion of delay in receiving materiel; how to handle inventory once materiel arrives.  
Discussion of strategies for dealing with limited staff, limited materiel, and limited throughput capacity.
**Action Planning:** Identifying, evaluating, and selecting among options designed to mitigate or control the health effects of the incident, including planning for contingencies. Action planning also involves specifying and assigning responsibility for tasks.

These ratings are of: □ Module 4 □ Module 5 □ a specific decision (specify): _________________________

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<tr>
<td>5. DEVELOPING, EVALUATING, AND SELECTING AMONG OPTIONS. Relevant decision makers:</td>
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<tr>
<td>0 1 2 3 4 N/A N/D</td>
<td>a. Discussed relevance (or need to adapt) pre-existing plans, policies, and procedures</td>
<td></td>
<td>Discussed the feasibility of the default POD staffing plan, given the current situation; discussion of policies for altering the standard of care.</td>
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<td>0 1 2 3 4 N/A N/D</td>
<td>b. Discussed possible courses of action</td>
<td></td>
<td>Explicit discussion of the options available to decision makers, including what PODs to open and with what staffing (Module 4), and alternate means of distributing materiel (Module 5).</td>
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<tr>
<td>0 1 2 3 4 N/A N/D</td>
<td>c. Discussed likely consequences of alternative courses of action</td>
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<td>Discussed ability to service the maximum number of people, ability of community members to get to PODs, equity in dispensing, etc.; discussion of possible negative side effects to some actions.</td>
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<td>0 1 2 3 4 N/A N/D</td>
<td>d. Discussed assumed pros and cons involved in alternative courses of action (e.g., speed versus accuracy in prophylaxis dispensing)</td>
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<td>Discussed how different PODs may achieve different goals (e.g., geographic equity vs. opening PODs with the greatest maximum throughput); for Module 5, weighted benefits of different methods for altering the standard of care against their cost, in terms of error rates.</td>
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<tr>
<td>0 1 2 3 4 N/A N/D</td>
<td>e. Contingency plans to address deviations from key assumptions in Item 5d</td>
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<td>Discussed what might go wrong and when; whether some options would work (or not) no matter what.</td>
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<td>0 1 2 3 4 N/A N/D</td>
<td>f. Clearly stated a decision (or provisional decision)</td>
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**Process Control:** Structuring group discussion in order to ensure adequate information processing; leadership, group norms, and organizational structure can all facilitate or hinder process control.

These ratings are of: □ Module 4 □ Module 5 □ a specific decision (specify): _________________________

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<tbody>
<tr>
<td>7. MANAGING DECISION-MAKING RESOURCES. Leaders and other relevant decision makers:</td>
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<tr>
<td>e. Discussed and followed timeline for making decisions</td>
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<td>f. Spent an appropriate amount of time on deliberations, given the speed required for an effective response</td>
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8. ENGAGING MULTIPLE PERSPECTIVES. Consistent with the incident timeline, relevant decision makers:

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<tbody>
<tr>
<td>a. Explicitly acknowledged roles, skills, knowledge, and expertise possessed by specific decision makers</td>
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<td>b. Discussed information and perspectives specific to certain decision makers</td>
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<td>c. Encouraged full range of views</td>
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Clearly requested information not specified within modules from those responsible for knowing it; consultation with experts and key stakeholders.

Leadership explicitly requests dissent (e.g., by encouraging decisionmakers to question assumptions) or assigns or plays a devil’s advocate.
INFORMATION ABOUT EVALUATOR

1. Number of years of experience in emergency response and/or public health emergency preparedness: ______

2. Number of years experience with ICS: ______

3. ICS roles/sections that you have experience in (check all that apply):
   - Incident Commander
   - Liaison Officer
   - Logistics Section
   - Public Information Officer
   - Operations Section
   - Finance/Administration Section
   - Safety Officer
   - Planning Section
   - None of the above

4. Relative to other public-health first responders, how knowledgeable/experienced are you with this type of incident (i.e., anthrax)?
   - 1 Much less
   - 2 About average
   - 3 Much More
   - 4 Experienced
   - 5 Experienced

5. In the past year, how many exercises have you participated in:
   - As a player: ______
   - As an evaluator: ______

6. How many incidents have you been involved in that required ICS: ______

7. Primary field(s) of expertise (check all that apply):
   - Public Health (PH)
   - Medicine
   - Fire
   - PH, Administration
   - Nursing
   - Police
   - PH, Environmental Health
   - Pharmacy
   - Academia
   - PH, Epidemiology
   - Emergency Management
   - Other: ________________
   - PH, Health Education
   - EMS
INFORMATION ABOUT EXERCISE

1. Date of game play (mm/dd/yyyy): __________

2. Game start time (24 hour clock time HH:MM, e.g., 13:00): __________

3. Game end time (24 hour clock time HH:MM, e.g., 13:00): __________

4. Location of exercise: ____________________

5. Number of players: _____ and facilitators/evaluators: _____

6. To what extent were all relevant decision makers present during the exercise:

   1  2  3  4  5
   Few were present Some were present All were present
REFERENCES


U.S. House of Representatives (2006). *A failure of initiative: The final report of the Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina*. Washington, D.C. As of July 12, 2009:
http://katrina.house.gov/full_katrina_report.htm


http://georgewbush-whitehouse.archives.gov/reports/katrina-lessons-learned/
