ORIGINAL RESEARCH

Testing Emergency Medical Personnel Response to Patients with Suspected Infectious Disease

Kelly R. Klein, MD;[1] Jenny G. Atas, MD;[2] Jerry Collins, CHSP[3]

1. Weapons of Mass Destruction/Disaster Medicine/EMS Fellow, Department of Emergency Medicine, Wayne State University/Michigan Department of Community Health, Detroit, Michigan USA
2. Clinical Associate Professor, Department of Emergency Medicine, Wayne State University School of Medicine, Detroit, Michigan USA
3. Director of Public Safety, Detroit Receiving Hospital, Detroit, Michigan USA

Correspondence:
Kelly R. Klein, MD
WMD/Disaster Medicine/EMS Fellow
Wayne State University
4160 John R
Suite 616
Detroit, MI 48201 USA
E-mail: KleinKR@mindspring.com or KKlein@dmc.org

Keywords: bioterrorism; disaster plan; drill; infectious disease; moulage; prehospital drill; smallpox

Abbreviations:
DRC = Disaster Research Center
ED = emergency department
EMS = emergency medical services
EOC = Emergency Operations Center
IRB = Institutional Review Board
JACHO = Joint Accreditation Commission of Healthcare Organizations
LEPC = Local Emergency Planning Committee
NDMS = National Disaster Medical System
PPE = personal protective equipment
US = United States
VA = [US] Veterans Administration

Abstract

Objectives: In the United States (US), hospitals are required to have disaster plans and stage drills to test these plans in order to satisfy the Joint Accreditation Commission of Healthcare Organizations. The focus of this drill was to test if emergency response personnel, both prehospital and hospital, would identify a patient with a potentially communicable infectious disease, and activate their respective disaster plan.

Methods: Twelve urban/suburban emergency departments (ED) received patients via car and ambulance. Patients were moulaged to imitate a smallpox infection. Observers with checklists recorded what happened. The drill's endpoints were: (1) predetermined end time; (2) identification of the patient and hospital "lock-down"; and (3) breach of drill protocol.

Results: None of the ambulance personnel correctly identified their patients. Of the total 13 mock patients assessed in the ED, seven (54%) were identified by the ED staff as possibly being infected with a highly contagious agent and, in turn, the hospital's biological agent protocol was initiated. Of the correctly identified patients, five (71%) were placed in isolation, and the remaining two (29%), although not isolated, were identified prior to their ED discharge and the appropriate protocol was activated. The six remaining mock patients (46%) were incorrectly diagnosed and discharged. Of the hospitals that had correctly identified their "infected" patients, only two (29%) followed their notification protocol and contacted the local health department.

Conclusion: This drill was successful in identifying this area's shortcomings, highlighted positive reactions, and raised some interesting questions about the ability to detect a patient with a possibly highly contagious disease.

Klein KR, Atas JG, Collins J: Testing emergency medical personnel response to patients with suspected infectious disease. *Prehosp Disast Med* 2004;19(3): 256–265.

Introduction

Historically, disaster-planning activities have been assigned to administrative personnel or safety officers without much senior management enthusiasm or support.[1] This is due partially to the belief that disaster problems are an extension of routine, daily emergency measures.[2] Since 11 September 2001, personnel from hospitals, emergency medical services (EMS), and state and local governments have spent a significant amount of time and resources developing hospital response plans for natural and/or man-made disasters. Unfortunately, after being written and developed, just as before 11 September 2001, these plans often may be placed on a shelf and never tested, but thought to be concrete. This false sense of security in planning is well-documented and known as the "paper plan syn-

Received: 16 March 2004
Accepted: 20 April 2004
Revised: 20 June 2004
Web publication: 29 September 2004

drome".[3,4] As an illustration of the disparity between the "paper plan" and disaster response reality, the Disaster Research Center (DRC) at the University of Delaware reviewed 29 actual United States (US) disasters in regions that had pre-existing disaster plans. Of the plans reviewed, only 21% were found to have followed a pre-designated communication plan; <50% carried out prehospital transport of patients according to a written plan; and the majority of affected personnel did not understand the disaster plan nor know their role in it. In fact, the review noted that most prewritten plans were not followed as written.[5]

Hospitals and other healthcare facilities are required to have disaster plans and must exercise these plans twice each year in order to satisfy the Joint Accreditation Commission of Healthcare Organizations (JACHO) requirements. However, most plans are created for situations in which planners have little or no experience, and are incongruent with what people are most likely to do.[6,7] Evidence suggests that regular disaster drills can have beneficial effects on subsequent mock and real disaster responses.[4] As plans are enacted and scenarios envisioned, experiences can be added to plans to help make them better for future drills and disasters. Although difficult to quantify the results, the usefulness of drills in improving the response to subsequent disasters has been cited anecdotally.[1] Of significance was the observation that city workers in conjunction with Emergency Management, were able to improvise and set up a new Emergency Operations Center (EOC) in the days following 11 September 2001 because of frequent training, drills and exercises that included the mayor of New York City.[8]

The focus of this multi-hospital drill was to determine, in the case of a bioterrorism event, if emergency response personnel, both prehospital and hospital, would identify a patient with a suspicious communicable infectious disease, and in turn, activate their prehospital or hospital's bioresponse disaster plan. The overall drill goals and objectives were to: (1) conduct an unannounced regional drill with a bioterrorism focus; (2) involve multiple hospitals, prehospital care providers, and the public health department; (3) assess communication and cooperation via pre-established communication lines among healthcare providers, EMS, city and state public health departments, and the public information network; (4) assess the ability of urban and suburban prehospital and hospital venues to recognize and triage appropriately, potentially highly contagious bioterrorism victims; and (5) to ascertain if the area's infectious disease bioterrorism plan would be activated. The scenario involved moulaged patients who came to various emergency departments with complaints of a prodromal illness, which included a high fever, malaise, and a simulated smallpox rash. Drill outcome measures included: (1) recognition of potential contagion by prehospital personnel; (2) hospital isolation of the "infected" patient; and (3) subsequent activation and implementation of each participating hospital's major communicable disease response protocol. The purpose of this retrospective analysis is to report on the area's first responders' experiences so that other hospitals and prehospital systems may draw from their experience and augment their existing contagious disease prehospital and hospital protocols as necessary.

1. Conduct an unannounced regional drill with a bioterrorism focus
2. Involve multiple hospitals, a prehospital system, and the public health department in a large metropolitan area
3. Assess communication and cooperation via pre-established communication lines among healthcare providers, prehospital EMS, city and state public health departments, and the public information network
4. Assess the ability of urban and suburban prehospital and hospital venues to recognize and triage appropriately, potential highly contagious bioterrorism victims
5. Ascertain if the regional bioterrorism disaster plan would be activated

Table 1—The overall goals and objectives of the drill (EMS = emergency medical services)

Background

The unannounced disaster drill was held in a major metropolitan area with an international border and a population exceeding 4.4 million people. The city has a fire department-based emergency medical service (EMS) system with a 9-1-1 emergency call volume of >130,000 calls per year. More than 90% of all ambulances are staffed by an advanced life support technician and a basic emergency medical technician (EMT). The fire service does not respond to any medical or trauma calls unless needed for extrication. The 12 hospitals that participated in the drill all were members of the Local Emergency Planning Committee (LEPC) Medical Subcommittee and included three large regional hospitals, a children's hospital, community hospitals, and an urgent care center, which is defined as a facility that does not take 9-1-1 EMS patients. The average number of emergency department (ED) annual visits at each participating hospital was 60,000–90,000 patients with an average of the yearly ED hospital visits for the area of almost 500,000 patients. Most of the participating hospitals' emergency departments are staffed by experienced emergency nurses and emergency medicine-boarded, attending physicians with some of the hospitals also having an emergency medicine resident.

Methods

Planning efforts began one year prior to the date of the exercise as a special project of the LEPC Medical Subcommittee, which is made up of medical representatives who directly report to the main LEPC. The initial Exercise Working Group included representatives from the large, regional medical center, the city fire department, the National Disaster Medical System (NDMS), and the local city and hospital emergency managers. Discussions focused on creating a list of goals and objectives (Table 1), possible biological agents to be used, hospital and agency drill participants (Table 2), systemic communication system to be tested (i.e., correct contact telephone numbers, appropriate contact people, etc.), health department surveillance, hazard vulnerability analysis, and coordination of available resources. In order to test the region, the Drill Committee

City Public Health Department
Veterans' Administration Hospital
State Health Department
State Police
Emergency Medical Services
National Disaster Medical System (NDMS)
Hospitals involved the LEPC Medical Subcommittee

Table 2—List of agencies that volunteered to participate actively in the planning of the exercise (LEPC = Local Emergency Planning Committee)

decided that the drill would be unannounced. In order to ensure that there would be no overt drill information leak from the Planning Committee, the Emergency Management Coordinator for the region developed a confidentiality agreement, which was signed by the Drill Committee Participants (Appendix A). As this was a *post-hoc* analysis of a drill, no Institutional Review Board (IRB) review was requested for this retrospective analysis.

Since the drill's purpose was to assess the overall response to a suspected bioterrorism agent, and not to assess the ability to identify the exact agent, a well-known, highly infectious agent, smallpox (*Varicella major*), was chosen. The reasons for this choice were based on smallpox's defined incubation period with well-known signs and symptoms, and its characteristic "B-B pellet" rash, which is easy to simulate with moulage. In addition, during the previous months, ED staff members from each of the 12 hospitals had undergone bioterrorism awareness training on-line and/or via lecture, and had the opportunity to attend a regional bioterrorism symposium in which smallpox had been one of the lecture topics. Smallpox posters developed by the LEPC medical subcommittee were posted in their triage and treatment areas along with local protocols and contact numbers.

Drill volunteers included 11 adults and two children who were American-English speakers with no overt speech or hearing impediments. Their ages ranged from 10–45 years and were recruited through the Veteran's Administration (VA) volunteer drill pool. Children, with prior approval from their parents, were included because a children's hospital was participating in the drill.

The volunteers received no pre-training, received a [US]$10 compensation, and were provided with breakfast and lunch. They were paired with drill observers who were pre-informed as to the drill scenario, given a brief overview of hospital and EMS infectious disease response protocols, and were given the opportunity to review the drill checklist. The drill observers were volunteers from the LEPC Medical Subcommittee, and had to sign the drill confidentiality agreement. The responsibility of the drill observers was to help with mock patient transport, complete the drill checklist (Appendix B), and ensure participants' safety. The drill observers were blinded to their hospital assignment until the morning of the drill, and were not assigned to their own facility. Mock patients, who were transported by EMS, were driven to known ambulance staging areas by their drill observer. The scenario called for them to walkup to the ambulance and request a ride to the closest ED, instead of going through the 9-1-1 dispatch center. Patients not going via ambulance were driven by their drill observer to the walk-in triage area at the ED of their pre-assigned drill hospital.

On drill day, volunteers had moulage placed on the right side of their neck, in a 6 cm by 6 cm area, to simulate a smallpox rash. The moulage used was obtained from commercially available hypoallergenic kits provided and applied by one VA employee who was a regional member of the NDMS and had many years of moulage application experience.

After the moulage was placed, volunteers and pre-trained drill observers were assembled and briefed on the clinical scenario to be presented to the prehospital and hospital personnel at the participating drill hospitals. All volunteers were assigned the same medical scenario including signs, symptoms, and prodromal history (Appendix C). Both mock patients and drill observers were present at the morning drill briefing, where they were given the verbal and written drill instructions. As a safety feature for the mock patients, they were instructed not to allow blood to be drawn for laboratory evaluation and to use the excuse that they could not have blood drawn for religious reasons.

At the end of the briefing, all participants reiterated verbally the instructions that were given, and an open question and answer session was held by the drill controllers for drill participants. As part of the drill packet, drill observers were given a folder with the drill checklist, a list of emergency and check-in contact numbers, and their hospital assignment, and were instructed to call the drill controller via cell phone to provide updates as to their patient's progress (i.e., when was the patient registered, how long until they got back to the main treatment area, and when the patient was discharged from the ED). Mock patients were given a unique "patient" identification number to be used at the patient registration area so the mock patient's chart could be purged from the hospital's registration system after the drill, saving the mock patient from accidentally being sent a bill. Mock patients also received a drill identification card that explained that they were drill patients and gave verification telephone numbers if a hospital representative wanted to speak to a controller.

In order to have a standardized hospital start time, mock patients and their observers were staggered in their initial deployment from the VA as the distance of the different hospitals varied from the VA starting point. Mock patients were transported to local ED via EMS ambulance or via the personal cars of the drill observers. If the patients were transported via EMS, their drill observer met them at the ED. An early morning start time for the drill was used to ensure a lower ED patient load.

The drill's endpoints were determined by one of three possible scenarios (Appendix D):

1. Pre-determined end time, approximately eight hours after the start of the drill, regardless of the state of the patient's care.
2. Individual hospital lockdown where the "patient" was identified and hospital personnel initiated appropriate protocols as determined by the pre-trained observer.

3. A "breach" of drill protocol had occurred. This last endpoint was broadly defined and could be activated by any of the observation team if they felt that drill or participant safety was being compromised.

At the end of the drill day, a large debriefing was conducted at the VA. More than 50 people participated, including the trained patient observers, representatives from the 12 participating drill hospitals, LEPC subcommittee members, and local and state health department agencies. A scribe was available to record all of the comments and limitations brought up by the group. The meeting was facilitated by the lead drill controller.

Results

From the data collected by the drill observers, none of the EMS ambulance personnel in the ambulances, that transported four of the mock patients, correctly identified their patient as being infected with a possible contagious biological agent. Additionally, ambulance personnel did not don any personal protective equipment (PPE) available to them on the ambulance (i.e., gloves, or N-95 mask) nor did they place a mask on their mock patients.

Of the total 13 mock patients, all of whom were seen in a hospital's emergency department, seven (54%) were identified by the ED staff as possibly being infected with a highly contagious agent and, in turn, the hospital's biological agent protocol was initiated. Of these correctly identified patients, five (71%) were placed in isolation and the remaining two (29%), although not isolated, were identified prior to their ED discharge, and the appropriate protocol was activated. The remaining six mock patients (46%) were incorrectly diagnosed and discharged with a variety of diagnoses including a viral syndrome, West Nile Virus, or upper respiratory infection. Because it was nearing the end of the drill deadline, these patients did not return to the hospital to see if there would be any changes in their overall treatment if they reported worsening symptoms.

Of the hospitals that correctly had identified their "infected" patient, only two (29%) followed their notification protocol and contacted the local health department. A total of four hours elapsed before the state health department officially was contacted by the local health department. At that time, the state health department drafted and sent a drill fax "alert" to local and regional health departments, but not to the hospitals or prehospital EMS providers, which constituted a deviation from normal practice. Total time spent by mock patients in public areas awaiting registration and triage ranged from 20–60 minutes. Additionally, the time spent by the identified mock patients in patient care areas not wearing a protective surgical mask or being placed, isolation ranged from 1.75–2.00 hours.

The debriefing brought to light two major issues regarding the preparedness of the region to identify and act when a biological event occurs. A line can be drawn between the larger and busier hospitals and the smaller hospitals that took part in the drill. It was the larger hospitals that have a larger ED patient annual volume, that did not quickly identify and diagnose the mock patients; and when they did identify the problem, there seemed to be a subsequent lack of desire to initiate bioterrorism plans. The larger hospitals also allowed the mock patients to roam the waiting room lobby after registration and triage, while awaiting a call into the general patient care area. It also was noted that in the larger hospitals, patients were discharged quickly and assigned a variety of incorrect diagnoses. This occurred despite the patient's presenting classic signs and symptoms of smallpox.

In contrast, the smaller hospitals appeared to identify their mock patients very quickly and participated more eagerly in the drill experience. They quickly isolated their patients, donned appropriate personal protection (i.e., gloves, N-95 and surgical masks, instituted "lock-down" procedures, and contacted the appropriate personnel on their "smallpox" chart). An additional finding during this drill was the absence of communication back to EMS regarding the possibility of their exposure to a potentially infectious biological agent.

Discussion

The goal of the drill was to assess if emergency response personnel, both prehospital and hospital, would identify a potential biological agent as a communicable infectious disease in a patient and, in turn, activate their prehospital and/or hospital's biological response disaster plan. This was the first "no-notice" drill of this magnitude undertaken that involved multiple hospitals and public agencies (24 organizations and 12 hospitals) in the coordinated planning of a large-scale drill. One of the initial concerns and pivotal limitations of implementing an unannounced drill revolves around the assurance of confidentiality for the no-notice drill in this area.

Because there was not a 100% hospital infectious disease protocol activation, a lack of prehospital exposure notification, and less than 100% local health department and subsequent state health department notification, it can be assumed that drill confidentiality was maintained. Only 54% of hospitals identified the mock patient and began the activation of their hospital biological agent protocols, with only 2% of them completing the protocol by contacting the local public health department. This demonstrated that, despite much forefront education, hospital and prehospital personnel still are not able to rapidly identify infectious biological agents from symptoms and signs presented, and either are not aware of appropriate biological agent policies, or are reluctant to activate them, possibly out of fear of being wrong and chastised.

At this time, it is unclear why the smaller hospitals were able to respond quickly to a possibly contagious patient and the larger hospitals were not, as all hospitals involved were not overly busy at the time of the drill. There are two possible explanations for these differences: (1) the smaller hospitals experienced a breach of confidentiality; and/or (2) some of the moulage may have appeared not convincing or had fallen off of the patient, and hence, there were not enough visual clues to stimulate the consideration of a diagnosis of smallpox.

The absence of communication back to the prehospital EMS personnel who had conveyed the mock patients to the hospital regarding the possibility of their exposure to a potentially infectious biological agent was not surprising, as often there is a lack of communication with outside agencies when the plan is not practiced regularly.[2] However, communication channels already are in place for notification of prehospital EMS in this region, since state law requires notification of prehospital personnel regarding exposure to reportable communicable diseases such as tuberculosis and meningitis within 24 hours; and this also is performed by local health department personnel.

The lack of EMS notification during this exercise is troubling, as it is a well-known, although not heavily publicized fact, that hospital and prehospital healthcare workers often perform patient care despite being ill.[9–11] Thus, in theory, eight EMS workers and four ambulances were exposed to smallpox; and even if contaminated, probably would continue working with other patients even into the highly contagious prodrome phase of the disease. This lack of communication between the health department, prehospital EMS personnel, and the hospital, could be attributed to the fact that this was a drill, and therefore, there was no urgency placed on performing such notifications. It also could be explained by the observation that most notifications of exposure of EMS personnel are performed urgently within 24 hours, and hence, are not done routinely. As such, notification of EMS personnel might not have been considered a priority.

Based on this retrospective analysis, it is probable that if a communicable, biological agent were to be released into this metropolitan area, the state health department eventually would be notified, and an alert would be sent to all regional hospitals and local health departments. However, based upon the agent and where the victims went for care, it is not known how long it would take for the state health department to be notified. From the experience obtained during this drill, it can be assumed that if the patient went to a smaller hospital, his/her chances of identification and subsequent activation of the hospital's biological agent plan might be accomplished faster than if an infected patient went to a larger and busier hospital. This drill identified that there still is a lack of overall communications between prehospital EMS, the hospitals, and the health department. If prehospital EMS personnel actually had been exposed and subsequently became contaminated with a communicable, bioterrorism agent, the possibility of large-scale exposure and infection of a population would be great and devastating.

Limitations

During the debriefing as well as during the examination of the drill checklist, some limitations were identified and include:

1. The checklist did not have a place to record all specific drill events. It would have been advantageous to have known how long each patient was in each area of the hospital or in the ambulance (i.e., exact contact time, actual start and stop time of each element of the registration and triage component).
2. The moulage was not as realistic as it could have been, and it even fell off of one of the mock patients. If this drill is repeated, the moulage should be placed in a location other than the collar line. However, the placement of the moulage in this drill did not seem to be too much of a detractor, because in one instance when a moulage fell off one patient prior to arrival to a hospital, the patient still was identified quickly as a possible biologically contaminated patient by using the person's patient history, and thus, the hospital was able to activate its communicable-agent protocol and participated fully in the drill.
3. There was not a good local and state health department feedback mechanism to the drill controllers. Information came from public health employees who were observers of the drill.
4. Confidentiality of the drill could not be confirmed, and had to be inferred from the results.
5. Drill observers were not with the mock patients 100% of the time, and some information for the drill checklist was obtained through mock patient reporting (i.e., isolation time and mask placement). In order to prevent this from happening during the next drill, an observer cover story should be in place to ensure that the mock patients are not left alone.

Since ambulances were not dispatched through the 9-1-1 system, EMS dispatch/surveillance was not tested to determine if they would identify a patient cluster, although this originally was part of the drill checklist.

Conclusion

An unannounced drill to test whether emergency personnel would activate the regional disaster plan was successful. It helped highlight positive reactions, identified the area's shortcomings, and raised some interesting questions about this region's ability to detect a patient with the possibility of presenting with a highly contagious disease. Based on these results and observations, further frontline education in infectious disease recognition and communication training for both prehospital and emergency department personnel is needed so as to ensure the quick detection and an effective response for patients infected with suspected highly communicable, infectious agents.

References

1. Auf der Heide E: Principles of hospital disaster planning. In: Hogan DE, Burstein JL (eds): *Disaster Medicine*. Philadelphia, Pennsylvania: Lippincott Williams & Wilkins, 2002, pp 57–89.
2. Auf der Heide E: *Disaster Response: Principles of Preparation and Coordination*. St. Louis, Missouri: CV Mosby 1989.
3. Auf der Heide E: Designing a disaster plan: Important questions. *Plant Technology & Safety Management* 1984;3:7–18.
4. Auf der Heide E: Disaster planning: Part II. Disaster problems, issues, and challenges identified in the research literature. In: Morres CA, Burkle FM, Lillibridge S (eds), *Emergency Medicine Clinics of North America*. Philadelphia, Pennsylvania: WB Saunders, 1996, pp 453–480.
5. Quarantelli EL: *Delivery of Emergency Medical Care in Disasters: Assumptions and Realities*. New York, New York: Irvington Publishers, 1983.
6. Dynes RR, Quarantelli EL, Kreps GA: A Perspective on Disaster Planning. 3rd ed. Report series 11, Disaster Research Center, University of Delaware, Newark, 1981.
7. Dynes RD: Community emergency planning: False assumptions and inappropriate analogies. *International Journal of Mass Emergencies and Disasters* 1994;12:141–158.
8. Kendra J, Wachtendorf T: Elements of Community Resilience in the World Trade Center attack. Disaster Research Center, the University of Delaware; 2003.
9. Davis ML, Blanchard JC: Are Local Health Responders Ready for Biological and Chemical Terrorism? Issue Paper, *RAND*, 2002.
10. McKevitt C, Morgan M, Dundas R, Holland WW: Sickness absence and working through illness: A comparison of two professions. *J Public Health Med* 1997;19:295–300.
11. Rosvold EO, Bjerters E: Doctors who do not take sick leave: Hazardous heroes. *Scan J Pub Health* 2001;29;71–75.
12. Perkins MR, Higton A, Witchomb M: Do junior doctors take sick leave? *Occup Environ Med* 2003;60:699–700.

Appendix A—Confidentiality Agreement

Confidentiality Agreement

The following is a confidentiality agreement that binds the hospital representative to secrecy regarding the upcoming drill. Consequence for violating this agreement will be the forfeiture of inclusion in future regional drills for no less than two (2) years.

1) I,_____, agree that I understand that the nature of the upcoming drill involves the testing of hospital disaster plans. Due to the sensitive nature of the drill subject, I will not discuss: **drill plans, drill date, drill scenario, or drill outcome goals** with anyone not specified and pre-agreed upon by the drill planning team.

2) I,_____, agree to the consequence of non-inclusion in future regional drills for a minimum of two (2) years if my representative or I break this agreement. The punitive length of time of this exclusion from drill participation may be extended based upon the magnitude of the aforementioned breach of this contract.

We, the drill planning committee, understand that you as the hospital representative cannot control all situations. However, in signing this confidentiality agreement, you are agreeing that to the best of your ability, you will willingly participate and commit yourself and your hospital to the task of upholding the terms laid out in this Confidentiality Agreement.

_____

Hospital Representative

https://doi.org/10.1017/S1049023X00001850 Published online by Cambridge University Press

Appendix B—Drill Observer Checklist (D/C = discontinue; ED = emergency department; EMS = emergency medical services)

Observer Checklist

Patient "name":_____ **Hospital:** _____
Time of Patient Arrival:_____ **Time of D/C from ED:** _____
Time of Isolation: _____ **Time of Drill End:** _____

I. EMS Call

A. What was dispatch information to the EMS crew (Sick person/General weakness)?

B. Did dispatch recognize a cluster pattern?	Yes	No
1. Rash	Yes	No
2. Viral syndrome	Yes	No
3. Fever prodrome	Yes	No
C. If dispatch recognized a cluster pattern, what notification?		
1. Supervisor	Yes	No
2. Hospitals	Yes	No
3. Police department	Yes	No
4. Local Health Department	Yes	No

II. EMS Transport

A. Was there an index of suspicion?	Yes	No
B. Were HEPA masks worn (N-95 or equivalent)?	Yes	No
C. Was concern verbalized to Triage?	Yes	No
D. Was prehospital contact made with hospital?	Yes	No
E. Was Field Supervisor notified?	Yes	No
F. Was ambulance taken out of service?	Yes	No

III. Triage

A. Did triage officer suspect?	Yes	No
B. HEPA masks donned (N-95 or equivalent) by healthcare worker?	Yes	No
C. Hospital notification tree activated?	Yes	No
D. Were triage contacts isolated?	Yes	No

IV. General ED

A. Nursing assistant and/or ancillary staff concern/identification	Yes	No
B. Nurse concern/identification	Yes	No
C. Doctor concern/identification	Yes	No
D. Patient sent home?	Yes	No
E. If patient sent home, were they called back?	Yes	No
F. Was hospital notification tree activated?	Yes	No
G. Length of time for ED stay	_____	
H. Was local health department notified?	Yes	No

https://doi.org/10.1017/S1049023X00001850 Published online by Cambridge University Press

Appendix B—Continued

V. Isolation		
A. HEPA mask donned by healthcare worker?	Yes	No
B. Implementaion of appropriate hospital plan?	Yes	No
C. Notification of EMS for ambulance/crew isolation?	Yes	No
D. Was EMS crew isolated?	Yes	No
E. Was EMS ambulance taken out of service and decontaminated?	Yes	No
F. ED contacts isolated per hospital policy?	Yes	No
VI. Public Health Department		
A. Local Health Department notified?	Yes	No
B. If no, was state health department notified?	Yes	No
C. Notifications		
1. State Health Department?	Yes	No
a. Fax	Yes	No
b. Telephone	Yes	No
c. E-mail	Yes	No
2. Hospitals located in their jurisdiction?	Yes	No
a. Fax	Yes	No
b. Telephone	Yes	No
c. E-mail	Yes	No
3. Healthcare providers in their jurisdiction?	Yes	No
a. Fax	Yes	No
b. Telephone	Yes	No
c. E-mail	Yes	No
4. Adjoining local health departments?	Yes	No
a. Fax	Yes	No
b. Telephone	Yes	No
c. E-mail	Yes	No
5. Local emergency management?	Yes	No
a. Fax	Yes	No
b. Telephone	Yes	No
c. E-mail	Yes	No
D. Local Health Department initiated Active Surveillance for additional cases?	Yes	No
E. Local Health Department hospital notification		
V. End of Drill		
A. Code word given	Yes	No
B. Time limitation 8 hours	Yes	No
C. Lock-down success	Yes	No
D. Local Health Authority notification	Yes	No

https://doi.org/10.1017/S1049023X00001850 Published online by Cambridge University Press

Appendix D—Exercise Scenario

Exercise Scenario

Background:

Patient complains of fever, headache, and backache to the point of immobility for four days and a rash that began two days before. Patient's history was negative for travel and pretty uneventful except for attending his/her church's Annual Missionary and Outreach Picnic on Belley Isle (or Annual Missionary and Outreach Luncheon at the Convention Hall) approximately 2.5 weeks ago.

Physical appearance:

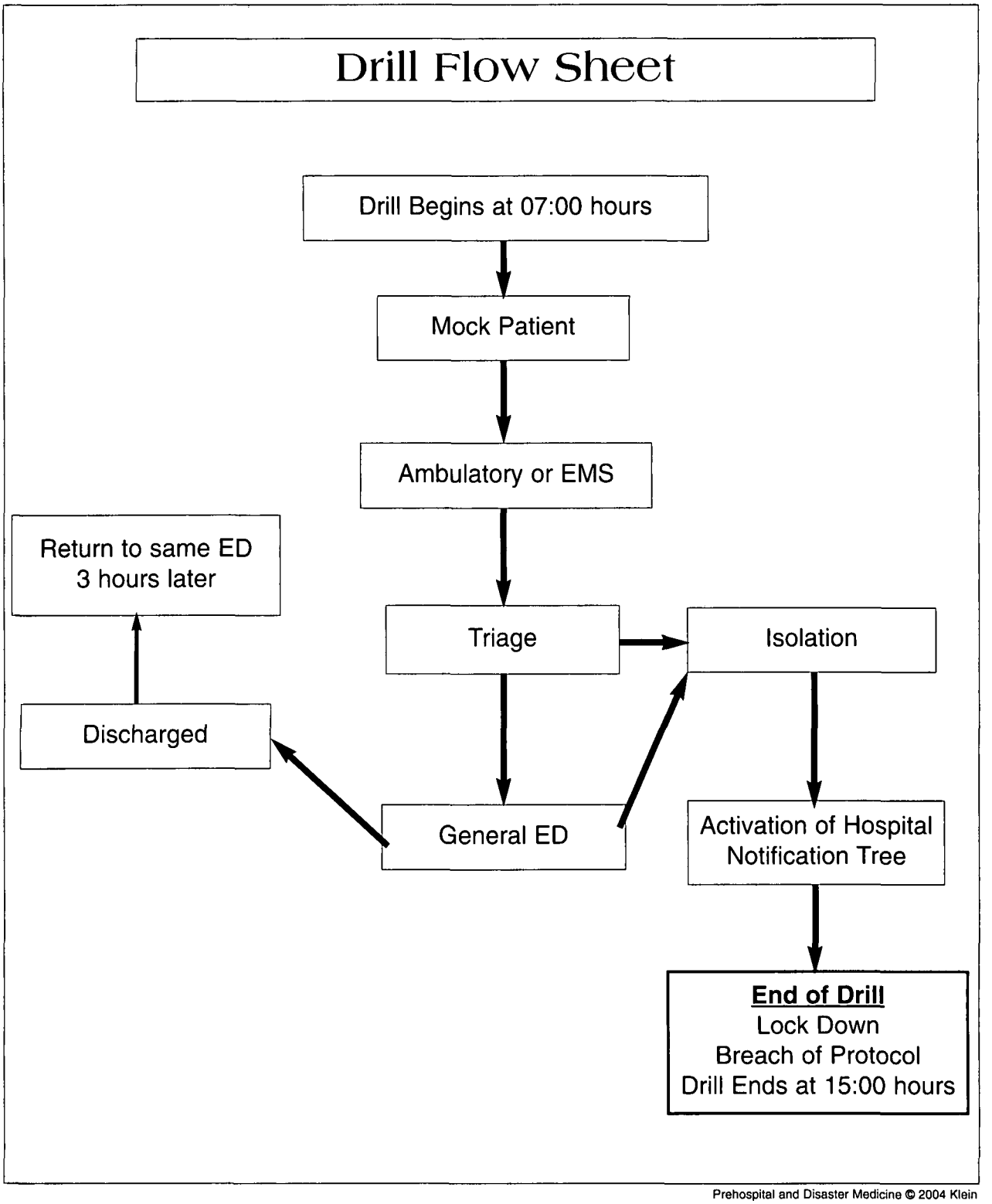
There is a pustular rash (all in same stages) present on palms of hands, forearms, and face with the beginnings of spread to upper chest.

Later presentation:

Rash spreading to chest and trunk and with patient complaining of being in a great deal of pain; fever continues.

https://doi.org/10.1017/S1049023X00001850 Published online by Cambridge University Press

Appendix D—Drill Flow Sheet (ED = emergency department; EMS = emergency medical services)



https://doi.org/10.1017/S1049023X00001850 Published online by Cambridge University Press