

**A Case Study in Assurance**

**A HAZE OVER HICKERNOODLE CITY:  
BIODEFENSE READINESS IN A COMMUNITY**

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### **Abstract**

This case study is fictional account of the November 16, 2001 release of poisonous gas in the subways of Hickernoodle City, with a population of 1.4 million. The case is based on the facts of the Sarin Poisoning on Tokyo Subway (Ohbu, et. al, 1997). Hickernoodle City, like many communities, has collaborated with its state agency to develop a biodefense plan for combating terrorist acts of biological, chemical, and irradiation destruction. A release of sarin gas in the Hickernoodle subway system in January 2002 tested the functionality of the City's disaster plan. As a result of two simultaneous releases of the poisonous gas within two trains during rush hour, over 5000 persons were exposed and became symptomatic. Because of the magnitude of the problem, the state Emergency Management Agency became involved to assist the Hickernoodle City emergency respondents to activate the Emergency Operations Center (EOC). The effectiveness of this community's response to disaster unfolds through analysis of this fictitious, yet conceivable, scenario. This case study reflects the diagnosis and investigation of health hazards in the community, one of ten essential public health services. The assessment focuses on identifying health, fiscal, administrative, legal, social, and political barriers that impede the community's ability to successfully handle mass disasters. The critical analysis of the health delivery system includes an evaluation of system capacity, public health leadership and collaborations, strategic planning, and imperative local roles in disaster preparedness. This assurance exercise aims to achieve the Healthy People 2010 Goal 23 of ensuring that Federal, Tribal, State, and local health agencies have the infrastructure to provide essential public health services effectively.

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### Introduction

Chemical terrorism has recently surfaced as a major threat as terrorist groups have become more sophisticated in their methods. An attack of this nature can result in many casualties and severely strain the emergency response and health care system, as well as disrupt the normal operations of a city. Public Health Departments and their communities must be prepared for such disasters. One of the three core functions of public health is the assurance of the public's health and safety (Institute of Medicine, 1988). Disaster preparation also addresses the Healthy People 2010 Goal 23 to ensure that Federal, Tribal, State, and local health agencies have the infrastructure to provide essential public health services effectively.

This case study is a fictional account of the November 16, 2001 release of poisonous gas in the subways of Hickernoodle City, with a population of 1.4 million. The case is based on the facts of the Sarin Poisoning on Tokyo Subway (Ohbu, et. al, 1997).

Hickernoodle City is a major metropolitan city in the mid-west. It has a mass transit system consisting of about 20 major passenger rail lines serving the distant city and suburbs which feed into five train stations near the downtown area. Over 100,000 passengers use this system daily. Each of these stations is connected to an extensive subway system serving the city. The rail stations are large, partially enclosed buildings that interconnect rail and subway lines.

### The "Facts"

On Thursday, November 16, 2001, the Metro Commuter Southline train that served Hickernoodle City was unusually crowded due to the arrival of the Dali Lama, who was scheduled to appear at a 10 a.m. rally in the city center. The train was filled with families and college-age students anxious to be in the presence of such a revered spiritual leader. At approximately 7:35 a.m., people on the third car noticed a paper bag had been left behind by an exiting passenger. Several people were later able to recall seeing an oily substance seeping from the bag. Within seconds all of the 65 or 70 people on that car began coughing, eyes tearing, and many were gasping for air. When the train stopped at the Southside Rail Station eight minutes later two dozen people had lost consciousness and were lying on the floor of the car; others piled out onto the platform and collapsed. Most of the victims were vomiting and in a daze. Over the next minutes fumes from the third railcar seeped into adjacent train cars and soon several hundred people were coughing, eyes watering, and complaining of pain in their eyes.

As people streamed out of the cars at the station, panic began to set in among the crowd of 3000 passengers in the rail station; many people were screaming. The station master ordered the entire train evacuated and called for emergency personnel to arrive on the scene. Before emergency personnel could arrive, security guards at the station pulled 45 people out of the cars and placed the victims on the train platform. Those who could walk found their way outside and many collapsed on the sidewalk. Those who could speak described feeling intense pain in their eyes and everything looking dark, as if they were wearing sunglasses. Some described a sudden pain

when taking a breath, as if they had been shot. Because of the large numbers of children on the train, there were a disproportionate number of children among those who had lost consciousness. Parents were frantically trying to find help for their children while they experienced breathing difficulty themselves.

By the time the paramedics and firefighters arrived at 7:55 a.m. there had been four fatalities, three of whom were children under the age of five. Emergency personnel found persons losing consciousness, foaming at the mouth, convulsing, stumbling and exhibiting respiratory problems; they quickly determined that some form of chemical emission had occurred on the train. To reduce continued exposure, emergency workers put on protective masks as they removed persons from the train. The immediate area was ordered evacuated and a Hazardous Material (hazmat) team assembled to enter the site.

Meanwhile, first respondents began treating others who were unable to evacuate the area by applying mask-valve-ventilator devices and providing oxygen. Atropine injections were prepared for those convulsing and nearing unconsciousness. However, many of the respondents were not certified paramedics, and under law, were not allowed to administer the prophylaxes. They were only able to provide protective masks and oxygen, until these supplies began to dwindle. Some personnel, without knowing the exact cause and venue of contamination, were afraid to provide mouth-to-mouth resuscitation for fear of receiving second-hand exposure. A number of the victims had to remain struggling for air.

#### Emergency Operations Center

Thirty minutes after the incident began at the Southside Station, a similar incident involving a chemical emission began to unfold on the Northwest line at the Westside Station about five miles away. When that train arrived at the Westside Station dozens of dazed passengers stumbled from the train coughing and gasping for air. At least 10 people had lost consciousness in the train car.

This time the Emergency Medical System (EMS) director was notified who quickly called the Hickernoodle Emergency Operations Center (HEOC) into action. The HEOC, upon realization that a terrorist-related incident may have occurred, notified the State Department of Health emergency officer who arranged for the EMS Chief to come to duty. The Chief of EMS and Highway Services began notifying the Point of Departure (POD) designated disaster hospitals. Since the incident occurred in two EMS regions of Hickernoodle City, two POD disaster hospitals (I and II) were notified and warned of a possible influx of patients. As required by protocol, POD Hospital I, which had already begun receiving patients, contacted all participating and resource hospitals to assess emergency department (ED) availability, number of beds, units of blood and inventory of ventilators and other supplies.

The area hospitals took inventory and began faxing in the required forms to the POD hospitals, which would forward the information on to the State Department who would coordinate resources for the remaining disaster time. The POD Hospitals fax-lines could not handle the influx of reports. Emergency personnel at POD Hospital II, confused about which health department was to receive their inventory and resource information, began faxing their information to the local health department. The EMS chief, upon receiving some faxes from

POD Hospital I, started rerouting ambulances according to the hospital information faxes. Many hospitals had recorded limited supplies and shortages of staff, yet the ambulances kept coming since the EMS chief had not yet received their list of inventory. Before long, emergency rooms began running out of ventilators, oxygen, antidotes and beds. One by one they started going on bypass, refusing to take any patients that arrived via ambulance.

Meanwhile back at the scene, Hickernoodle City Mayor Edgar M. Weekly ordered all rail and subway trains to stop at the next station until further notice and for trains and stations to be evacuated. The media arrived and began interrogating anyone willing to report on the situation. The State Health Department Director notified the State and Federal Bureaus of Investigation of the event. The mayor contacted his Director of Communications to coordinate communication responses that could calm the public. Fact sheets were obtained from the local health department on the likely agent of distress and messages on avoiding secondary contamination were prepared. Hospitals were ordered to redirect the media to the State Health Department emergency director who would provide updated reports on casualties, patient conditions and so forth.

The local Health Commissioner was disgruntled as she heard from an inside source that hospitals were simultaneously going on bypass and sending ambulances way out of their transport area. The city was running out of participating ambulances. The EMS director asked the fire chief to locate private ambulances in the area. However, the private ambulances refused service since a contract or payment couldn't be provided up-front. As hundreds of patients arrived at emergency departments, hospitals continued to go on bypass. The local commissioner called the POD hospitals to order that no hospitals remain on or resort to bypass status. As emergency rooms became saddled with patients for whom no supplies, beds or nurses to perform triage were available, the Chief of EMS was notified. Appalled and angered by the Commissioner's order, she contacted the Emergency Services Medical Director and they began calling hospitals to assess their conditions. Those lacking supplies and manpower were allowed to redirect ambulances. Some hospitals called other hospitals in their region and asked to borrow supplies in order to treat current ED patients. However, because no regulations mandate the sharing of supplies, even in a time of crisis, hospitals were hesitant to loan away equipment they might need themselves.

About five hours after the initial incident was reported, specially trained FBI agents in chemical and biological terrorism began investigating the scenes at the train stations. Air and fabric samples from the rail cars were collected as well as remaining passenger items. Of particular interest was a backpack from the Southside Station and an open package from the Westside Station that both contained canisters capable of delivering gases. Neither the city nor state laboratories were capable of analyzing chemical warfare agents. Therefore, military planes out of O' Ryan International Airport were used to transport the samples to the FBI crime lab in Maryland for analysis. A medical alert was sent out to regional healthcare agencies and local health departments to report any cases showing symptoms of nerve agents. As media began reporting the incident to the public, hospitals also began receiving the "worried well". In addition, persons at the stations or on trains where the crisis had occurred began paying attention to their breathing difficulties, tightness of chest or other mild symptoms that had previously been attributed to being in an excited or panicked state. They began worrying about the extent of their exposure.

The following day, the FBI lab reported that traces of sarin gas had been found in the rail cars and in the blood of victims. The canisters in the backpack and package were believed to be the means of dispersal. All rail and subway lines remained closed for three and one-half days. Sample collection at the attacked stations and adjoining tunnels and stations began on Friday, November 17 for clearance testing of the affected structures. On Saturday, November 18, Mayor Weekly announced that limited rail service would be available on Monday, November 20. Those stations and lines directly affected by the attack would remain closed until they were determined to be safe for use. Increased security would be implemented by all public transportation agencies and a long-range security plan would be developed.

As questions about inappropriate ambulance transport times, numbers of hospitals on bypass, inadequate supply of ambulances and other issue arose, the Commissioner, anxious to pin-point blame for the crisis, announced that a senate hearing would take place to investigate the disaster response.

### Human Toll

A total of 750 people from both trains were taken to area hospitals the day of the attack. Symptoms of the victims included complaints of headache, shortness of breath, severe pain when breathing, uncontrollable shaking, watery eyes, and foaming at the mouth. Many of the victims who had lost consciousness remained unconscious for 24-48 hours. A second wave of 250 people were seen in area emergency departments (EDs) over the next three days with similar symptoms as well as severe anxiety. Complaints of panic attacks, insomnia, and intense nervousness were reported. In all, there were seven fatalities, three of whom were young children. While most of those seen at area hospitals were released, 46 people remained hospitalized for up to 10 days.

In the days, weeks and months following the incident, many persons present or near the incident complained of nervousness, jitters, excessive dreaming, insomnia, increased tension, restlessness, some gastrointestinal effects and trouble concentrating.

Over the next six months many of the victims took advantage of mental health services offered in the community. Mental health workers reported that many of the victims had persistent sleeping problems including waking after only 2-3 hours and nightmares. Other symptoms included difficulty concentrating, hyper-excitability, and fear of being in confined spaces. Area mental health professionals reported symptoms of post traumatic stress among a significant number of people seeking services, including panic attacks, recurring flashbacks (of the incident), inability to enter the subway, obsessive thoughts about the possibility of another terrorist attack, and inability to experience pleasure. In addition to victims experiencing psychological effects of the attack, many of the emergency personnel and hospital staff who had attended the victims were experiencing anxiety symptoms. The demand for mental health services exceeded the availability of services and officials have needed to request assistance from other cities. Area businesses have seen unusually high rates of absenteeism and loss of productivity among employees impacted by the attack.

## Public Relations

On Friday, November 17, articles appeared in three of Hickernoodle's major papers. The Hickernoodle Sun Times' headline read Chemical War Zone at Southside Station. The Sun Times had a reporter at the Southside Rail Station who wrote a very descriptive account of the victims and the scene inside the Southside Station. The reporter described the scene as a "chemical war-zone", with rescue workers appearing in moon-suits to treat victims. He also mentioned that some of the rescue personnel were refusing to provide mouth-to-mouth resuscitation to some of the victims for fear of exposure.

The Hickernoodle Tribune's headline read Passengers Attacked with Nerve Gas. The reporter for the Tribune managed to interview victims at one of the hospitals, along with the hospital personnel. The personnel at the hospital mentioned the victims had been attacked with nerve gas, however at the time they could not determine exactly which kind. The Tribune's article also mentioned the confusion between the hospitals and the State and local health departments as to who was receive inventory and resource lists. With this confusion many victims were being rerouted to different hospitals or to hospitals that were already at capacity. "These victims were spending far more time riding around in an ambulance than they should have".

The headline for Hickernoodle Daily read City Transportation Paralyzed by Terrorist Attacks. The Daily not only gave detailed descriptions of the victims and overcrowding of the hospitals, but also took the angle of the major public transportation system being shut down. The Daily's reporter spoke with passengers stranded at both the Southside and Westside Stations. The state of panic led to bigger traffic problems, with taxies, press and emergency vehicles all trying to get to the stations.

Three local news networks were broadcasting live from the scene of the attacks. The reporters were talking to anyone they could - both victims and witnesses. Each of the networks also interviewed patients and emergency room personnel. One station had spoken with an ambulance driver who had been rerouted to three different hospitals. One of the other networks picked up on the packages and blood being flown out of state to be tested.

Each of the newspapers and the TV Stations reported that a nerve gas or agent had been released in the two stations. Fact sheets were obtained from the local health department on the signs and symptoms to watch for and how to avoid secondary contamination. The biggest communication problem was incomplete information being publicized. The FBI, the City of Hickernoodle, the local and state health departments simply did not have enough information to share with the public.

The City of Hickernoodle, the local and state health departments, and the FBI, called a joint press conference on the afternoon of the 16th. The press conference was first to confirm there was some form of terrorist attack on two morning trains. It was not yet known if the attack was of domestic or international origin. The chemical agents used in the attacks had not yet been identified. The second issue stressed during the press conference was the frozen train service for the Southside and the Westside Stations for at least 24 hours.

## Effect on Structural Systems

The attack caused great strain on the medical providers, both public and private, as well as taxing the transportation system, police, fire and communications personnel. Although Hickernoodle City had practiced disaster preparedness, they had never dealt with a disaster of this magnitude.

The timing of the disaster, at the height of rush hour, tended to compound problems related in getting to the attack sight, as did the lack of knowledge as to the agent used in the attack. Other confounding problems became apparent as the amount of devastation and the human toll mounted. A lack of trained medical professionals, both in the public health sector and the private sector to effectively handle the volume of injured and dying soon became apparent. A lack of available hospital beds for use in overnight observation and intensive care and the lack of a plan to evacuate the City in an orderly fashion all contributed to the confusion and hysteria.

With the shut down of the rail system, transportation into and out of the city on surface streets soon became grid locked. As the news of the attack spread through out the City, people poured out of their offices into the streets in an attempt to leave. This increased the difficulties in moving the victims from the triage site to the hospitals, and transporting replacement medical personal into the triage areas. The Office of Emergency Management was activated to deal with some of the transportation issues. They were able to secure air transportation for the serious victims and bus transportation for the less serious victims and medical staff. The police were assigned the task of crowd control. They were also empowered to clear the roads to and from area health facilities.

Communication among the emergency personnel, government officials, and the public was the greatest problem. The government officials, not wanting to cause mass hysteria, withheld vital information in the treatment of the victims. By doing this they not only delayed the administration of the proper reagent, but also caused secondary exposure to some of the first responders. Transportation agencies, not wanting to be closed for an extended period of time were slow in divulging the extent of the damage caused by the attack. Lastly the sheer volume of the disaster pressed the communications system to its limits.

The number of people affected in the attack exceeded the bed capacity for the City's hospitals requiring transportation to outlying facilities. Budgetary constraints imposed by the elected officials earlier in the quarter caused a reduction in the medical staff used to tend the needy. The staff reductions, in turn, increased the time it took for the victims to be seen. This in turn caused the milder cases to progress into more severe cases, which in turn increased the price of treatment.

The lack of knowledge as to the causative agent used in the attack increased the number of secondary exposure illnesses. A failure to communicate to the first responders the nature of the substance that they were encountering at the attack site caused them to be ill prepared. Of the emergency personnel who responded in the first wave, 50% became ill with sarin poisoning symptoms. The lack of decontamination facilities caused the spread of sarin poison from the attack site to the medical facilities. Members of the medical team that had had no contact with the attack site, other than treating the victims, were reporting mild symptoms.

In order to stem the cost of providing services, the Mayor of the city requested the Governor to declare a state of disaster. Once this was done the Federal Emergency Management Agencies became involved. This allowed the City to receive funding to pay for medical services, transportation services, improve communications and clean up activities. It also expanded the range of professionals available to provide assistance in dealing with the problems associated with the attack.

Because this was an act of terrorism, the FBI became involved. Their investigation slowed the return to normal by keeping the subway system closed. Their actions caused increased congestion and gridlock conditions as people looked for other means of transportation.

Post-traumatic stress symptoms were evident in many of the victims in the weeks following the attack. Cases that have been followed have sited a fear of the underground transit system. In addition to the nightmares, they reported fears of being trapped underground. Revenues from the subway operations have fallen off dramatically since the attack also.

### Closing

Although this is a fictional account, the majority of the “facts” could be realized in an actual community. The community had a disaster plan, but it was not detailed enough to account for a disaster of this magnitude, a bioterrorist attack with chemicals or potential problems at any point in the sequence of events. This disaster demonstrated the need for increased training at the worst-case scenario level. Any disaster planning must include all potential agencies involved, including the media. A strong communication system is vital to keep everyone informed at the appropriate level, to prevent panic and increase cooperation. Strong disaster plans are a vital component of a sound public health infrastructure.

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Information for planning a response

**Study Guide for  
A HAZE OVER HICKERNOODLE CITY:  
BIODEFENSE READINESS IN A COMMUNITY**

1. How could the train personnel have coordinated their communication?
2. How could the emergency personnel been better prepared to care for the victims of the chemical agent?
  - a. Equipment on board the ambulances at all times?
  - b. More information about the symptoms from the security agents or other rail personnel?
  - c. Two-way communication devices on board the train for the victims, not just alarms
  - d. What is included in the training of security personnel?
  - e. What equipment (first aid or more) should be kept in public places where throngs of people gather (sports arenas, rail stations, airports)?
3. How should the disaster plan be changed to improve the ambulance dispatchment and communication among the hospitals involved?
4. How should government officials be involved in the response to the disaster? Should there be a designated spokesperson?
5. How could the media be involved in a more productive way, from the planning through the event?
6. What could be done to prevent such terrorist attacks or limit their destruction?
  - a. Educate the public about the importance of observing and reporting unusual material or persons?
  - b. Signage or alerts on all public transportation vehicles?
  - c. Tips for first response?