

Chapter Six

New York City

INTRODUCTION

This book includes a chapter on New York City because military medical forces responded to ground zero. The telling of this story, mainly through the eyes of Army Medical Command officers detailed to the city, may provide valuable lessons on how to respond to similar events in the future. A major source for this chapter was the detailed after-action report of then Lieutenant Colonel Stephen C Wallace, the resource manager from Fort Eustis, Virginia, and the Army's official medical liaison to New York City after 9/11.

At 0959 on 9/11, 56 minutes after United Airlines Flight 175 struck the South Tower of the World Trade Center complex, the building imploded and crashed to the ground. At 1028, the North Tower also collapsed. The complete destruction of the two towers and the breakdown or demolition of other buildings in the complex spewed huge amounts of grit and trash into the atmosphere and created a rubble pile of incinerated concrete, steel, office waste, and human remains. The death toll from the worst terrorist attack on US soil, according to the 9/11 Commission Report published in 2004, was approximately 2,784 victims, including tower occupants, people on the ground, and airline passengers and crew.^{1(pp311,314),2(p1)} Later publications cited slightly different statistics: 2,752³ and 2,753^{4,5} for the total number of casualties including tower occupants, people on the ground, and airline passengers and crew. The exact number of victims from the attack on New York City may never be known.

INITIAL RESPONSE

Following the attack at 8:46, Major General Harold Timboe, commander of the North Atlantic Regional Medical Command (NARMC), alerted medical personnel at Fort Monmouth, New Jersey, to place medical response teams on standby to assist the beleaguered metropolitan New York area if its hospitals became

congested and hospitals in the surrounding region were needed to handle patient overflow. Timboe alerted the 8th Medical Brigade, a US Army Reserve unit, at Fort Hamilton in Brooklyn, New York, to the possibility of activation to provide medical support to the New York Army National Guard, which Governor George Pataki mobilized that morning along with other state militia. To increase primary care and mental health capabilities in support of the Guard as well as active duty military personnel and their families, General Timboe sent a primary care doctor and a psychiatrist from Fort Drum, New York, and a behavioral health team from Fort Monmouth to Fort Hamilton. He appointed Lieutenant Colonel Stephen C Wallace, the resource manager from Fort Eustis, Virginia, as the Army's official medical liaison to New York City. Wallace's mission was to assess the medical situation there. A former New Yorker who had worked as a civilian banker in the World Trade Center, Wallace requested the position. He was to serve as Timboe's "eyes and ears" in the area, reporting on casualties and on possible victims from the Army, Navy, and Air Force, along with their families. Wallace also took it upon himself to provide health briefings to the National Guard troops in the ground zero area. Timboe also prepared to send forensic teams to New York City, if requested.⁶⁻¹²

During the following 4 days, Army medical personnel in metropolitan New York and its environs prepared to support the city. Fort Monmouth began to augment the primary care capability at Fort Hamilton and sent its Patient Administration Department to screen civilian hospitals in the New York/New Jersey area to identify military patients with medical needs. The 344th Combat Support Hospital Medical Brigade at Fort Totten, Bayside, New York, meanwhile requested body bags and airway ventilators for New York City casualties in case it was called upon to help with the recovery effort. The medical commands of Fort Hamilton and Fort Totten prepared supplies to support the National Guard's medical units.^{10(pp2-4)}

Lieutenant Colonel Wallace often coordinated with Colonel Kevin Connors, the commander of a training support brigade at Fort Drum, who served as the Department of Defense (DoD) coordinating officer to New York City, a position called for in the Federal Emergency Management Agency (FEMA) Response Plan. As the senior DoD representative, Colonel Connors was the link between DoD units on standby and New York state and city disaster response resources. Because FEMA was responsible for coordinating the response to the World Trade Center tragedy, Connors worked out of the agency's disaster field office located at Pier 90 in New York Harbor and communicated with the on-site federal coordinating officer, Ted Monette, who was the senior FEMA representative on site. All state and federal personnel, without exception, supported the incident commander, who was the newly appointed New York City fire chief, Daniel Nigro (Nigro took the place of Department Chief Peter Ganci, who died in the collapse of the North Tower). In addition Colonel Connors, as defense coordinating officer, reported to the US Joint Forces Command, which in turn reported to the 1st Army's Office of the Director of Military Support.^{7(pp1,2),13,14(pp157,203)} (At the time of 9/11, the Army served as the executive agent within the DoD for all military support to

civil authorities. On 29 December 2010, DoD cancelled this directive. Today, the Assistant Secretary of Defense for Homeland Defense and Americas' Security Affairs working under the direction of the Under Secretary of Defense [Policy] is responsible for all military support to civil authorities.¹⁵⁾

Immediately after the attack the deputy mayor of New York City, not knowing how many survivors there would be, requested the assistance of a hospital ship informally through the Navy's commander-in-chief, Atlantic Command, and then from FEMA. After receiving a formal request from FEMA and the US Public Health Service (PHS), the US Navy authorized the USNS *Comfort*, moored in Baltimore, Maryland, to sail to New York City to help care for victims of the attack and to serve as a mortuary. The vessel left Baltimore for New York on 12 September with a crew of over 200. It stopped in New Jersey to pick up another 500 sailors and supplies and, on the 14th, docked at the Enterprise Pier (Pier 92), about six blocks from ground zero. By the time it anchored in Manhattan, the *Comfort*'s mission had changed from providing mass casualty treatment for up to 250 inpatients to supporting ground zero firefighters and rescue workers with a place to eat, shower, and relax. After its mission changed, nearly 450 medical and support personnel left the ship and boarded buses to return to normal



USNS *Comfort*, on a mission to help care for victims of the attack and to serve as a mortuary, sailed from Baltimore Harbor for New York on 12 September with a crew of more than 200. It stopped in New Jersey to pick up another 500 sailors and supplies and, on the 14th, docked at the Enterprise Pier (Pier 92), about six blocks from ground zero.

Photograph: Navy Public Affairs Office.

duty stations. The 150 core personnel left on board had the task of changing the surgical and medical facility into a support facility. The *Comfort's* medical capability included one functional operating room with two general surgeons, one anesthesiologist, one internist, three independent duty corpsmen, one psychiatrist, one pharmacist, two chaplains, and medical and nursing staff to care for surgical patients, the ship's company, and other military personnel. The *Comfort* also had a rehabilitative clinic for treatment of minor injuries, sprains, bruises, cuts, and blisters, and the ship's medical personnel attended to upper respiratory ailments and dehydration problems. The ship was self-supporting and did not draw resources away from the city.^{7,13,16,17} (The *Comfort*, which went to New York City in a 250-bed configuration, could also be configured as a 500-bed ship.)

ARRIVAL OF THE ARMY MEDICAL LIAISON

A medical service officer and combat veteran with joint service experience, Wallace served over 21 years in the Army. He had been an executive officer, held numerous staff officer assignments, helped plan medical support for operations in the Balkans, served as a medical planner for the search and recovery operations following the crash of the Air Force plane carrying Commerce Secretary Ron Brown in Croatia in 1996, and trained with civilian emergency medical services and fire departments. Having lived and worked in New York for many years, he knew the city well.¹⁸

On 15 September, Colonel Wallace arrived in Manhattan and, as directed by General Timboe, reported to the *Comfort*, where he met with the deputy commander for administration of Monmouth Army Hospital, Lieutenant Colonel David Budinger, who was responsible for supporting Monmouth's recovery effort in New York City, and with Fort Hamilton's clinic administrator and noncommissioned officer (NCO) in charge, Staff Sergeant Wayne Geitz, and individual NCOs from both military establishments. Colonel Wallace also visited the ship's executive officer, Commander Mary Harrahill, who briefed him on the *Comfort's* mission. After the meeting, Colonel Wallace met with FEMA's two military medical liaisons, US Air Force Major Harry Jefferies and US Army Major Stephen Kaiser, both from Joint Forces Command, who reported that they had been assigned to help coordinate requests from New York City that came through New York State and DoD channels, including the defense coordinating element, Colonel Connors and his staff, for major active duty military medical support.^{6,7(pp6,7)}

After leaving the *Comfort* Colonel Wallace went directly to the mayor of New York's Office of Emergency Management command center, which was also located at Pier 92, in the convention center, after its former offices in 7 World Trade Center, which was across from the World Trade Center site and connected to it by an elevated walkway, had been destroyed. He met there with Sam Benson, deputy chief for the office's health and medical cell, who arranged for him to become an attached member of the cell and receive the necessary security badges to visit ground zero. Benson was pleased to have a direct connection to General Timboe and through him to the Army surgeon general in case the city needed support from

the Army Medical Department. Benson also was appreciative that the Medical Department sent a single officer to serve as liaison with the emergency center rather than “dozens or hundreds of personnel.” Colonel Wallace shared office space at the command center with PHS personnel, with whom he maintained a good relationship. Among other benefits of this arrangement, the PHS staff were available to provide around-the-clock office support for his effort at the command center.^{7(pp2,7)}

After receiving a New York City Police Department security briefing on the situation, Colonel Wallace, wearing his Army BDUs (battle dress uniform) and carrying a red ground zero badge, visited the destroyed World Trade Center complex. His first impressions were of

total and massive destruction everywhere in and around the World Trade Center complex.

...

the frantic pace of firemen and policemen on the rubble pile digging and using many personnel on “bucket brigades” to remove the debris, dust, pulverized concrete, and pieces of metal debris light enough to be handled by people on the line.

...

the many [New York Army National Guard] soldiers on perimeter duty in and around Ground Zero.

...

the heavy choking smoke throughout the area.

...

The fact that too many people were not wearing masks of any kind or at best mostly surgical or other simple type masks—P100 respirator masks were not in great numbers that day and night.

...

the number of civilian first aid stations established around the perimeter of the rubble, loaded with every kind of imaginable medicine, drugs and equipment.

...

the frenzied but dangerous pace of people operating various heavy construction equipment which was being used to remove heavy metal and other large debris and load it on trucks driving in all directions.

...

Oxygen tanks with gasoline tanks strapped to them were rushed to the front of the rubble pile for fuel for torches to cut metal; fire extinguishers had to be rushed to the front to put out unintentional fires caused by gasoline spills.

...

Portable morgues were set up at side of the American Express Building on Vessey Street and in the lobby of a financial building down from the FDNY [Fire Department of New York] trauma treatment area (inside a Burger King), and these were manned by Medical Examiner, FDNY, NYPD [New York Police Department] and FEMA personnel.

...

FBI [Federal Bureau of Investigation], NYPD Detectives and NTSB [National Transportation Safety Board] personnel were everywhere at Ground Zero looking for aircraft parts and crime scene evidence.

...

Search and Rescue (SAR) and FDs [fire departments] from out of state were assigned search and rescue missions in buildings immediately around the WTC [World Trade Center] Complex.

...

The World Trade Center and surrounding area destruction looked like downtown Dresden, Germany (as seen by the LNO [liaison officer] after the fall of the Berlin Wall).^{7(pp8,9)}

While in the area late that evening, Colonel Wallace volunteered to lead an out-of-state fire department team through the partly destroyed Deutsche Bank building on Liberty Street in search of survivors (Wallace had worked in the building as a banker in the 1980s, when it was the Bankers Trust Building, and knew its layout). The team examined the top floors first, then moved to the lower levels where the bank vaults, generators, and telecommunications were located. The basement was waist-deep in dark fluid, and the smell of diesel oil and cleaning solvents was strong. No effective face masks for protection against environmental



Federal Emergency Management Agency (FEMA) search and rescue team on the rubble pile late at night.

Photograph: Lieutenant Colonel Stephen Wallace.

health hazards were available at ground zero that day, and Colonel Wallace and the firefighters had minimal protection during the search and rescue mission. After leaving the building, the team briefed the New York City Health Department about conditions inside, and the Health Department forwarded the information to the city's fire department. The next day, 16 September, fire department decided to send in a combined public health and medical team to evaluate buildings surrounding the World Trade Center for hazardous materials. The survey team was charged with writing a report describing the hazardous materials situation in the ground zero area of operations.^{7(pp3,8)}

After leading the firefighters through the Deutsche Bank, Colonel Wallace began focusing on his major objective: to promote the health, safety, and mission readiness of soldiers at ground zero. Army forces in that area during the search and rescue period included National Guard troops from New York and New Jersey, regular Army augmentees for the National Guard, and the US Army Corps of Engineers' 249th Engineer Battalion. By far the largest contingent of soldiers belonged to the New York Army National Guard, whose troops had been arriving at ground zero in increasing numbers since the attack. Between 11 September and the following June, about 6,000 National Guard troops in different task forces participated in the response.

Among the initial units were the 1st Battalion, 69th Infantry, 42d Infantry Division; the 1st Battalion, 101st Cavalry, 42d Infantry Division; Aviation Brigade, 42d Infantry Division; the 27th Infantry Brigade; and the 204th Engineer Battalion, 53d Troop Command. These soldiers were a part of Joint Task Force 42 under the New York Army National Guard's 42d Infantry Division, whose headquarters were at 67th Street and Park Avenue. For the ground zero mission, the Guard's command and control and medical services were based in Battery Park, a few blocks from the World Trade Center in lower Manhattan, where task force troops assembled before beginning their duties. National Guard soldiers secured the perimeter of ground zero, served as escorts within the zone, guarded electric wires, and asserted a military presence throughout the area. Because the city's police department lost many of its members on 9/11, National Guard soldiers were also used to direct traffic and to control pedestrians. Health hazards threatening the troops were many: smoke, dust, asbestos, glass, lethal chemicals, falling objects, the weather, and exposure to decomposing human cadavers.^{7(pp1,10,14),11,19}

Colonel Wallace spent the evening of the 15th and the early morning of the 16th contacting National Guard troops in the ground zero area. He discovered that many suffered eye irritations and were concerned about smoke, heat, and smells. Although focused on their assignment, they were tired. They wore respirator masks and goggles only if the smoke bothered them, or if they were engaged in body removal. As a regular Army officer and liaison, Colonel Wallace was not in the National Guard's chain of command and did not have the authority to direct the soldiers, but he advised them to wear defensive equipment "for their own personal safety protection." When boxes of P100 filtered masks, the most efficient type of masks available, arrived at about 1330 on the

16th, Wallace took it upon himself to counsel the troops at World Trade Center 4 and 5 (nine-story office buildings on the southeast and northwest corners of the World Trade Center complex that were damaged beyond repair on 9/11), to put on the masks and wear their helmets. He took one respirator mask for his own use. Thus began an almost daily routine of spending 4 to 6 hours walking through the World Trade Center area to check on the health of the National Guard troops, and to speak to their medical officers about his observations. Wallace's intention was to reinforce in them the necessity of following strict personal protective equipment (PPE) guidelines. Wallace regularly briefed the New York Army National Guard's deputy state surgeon, Major Floyd Burgher, who in turn, Wallace believed, briefed New York Army National Guard flight surgeon Colonel Walter Rivera.^{7(pp2,10),20}

Late on the 16th, Colonel Wallace reported to Colonel Collins, the defense coordinating officer, on the health of the troops he had observed the day before and on the general medical situation at ground zero. Collins and his staff passed on material about medical protection and safety measures to military units at ground zero, and to Collins's higher headquarters, 1st Army's Office of the Director of Military Support. Wallace also provided the *Comfort's* commander with data on health threats to the rescue workers going aboard the ship for meals, laundry, and rest and relaxation in case the commander had not already received it. As



New York Fire Department personnel fighting fires at ground zero.
Photograph: Lieutenant Colonel Stephen Wallace.

he learned about new and important health hazards from his colleagues at the city's Office of Emergency Management, Wallace continued to pass this kind of information to the Defense Coordinating Office, the New York Army National Guard, and the *Comfort's* command over the days that followed.^{7(pp2,10),20}

Wallace was the only military representative at the daily meetings of New York's Office of Emergency Management health and medical cell during the search and rescue operation. He had the opportunity to interact with federal, state, and city medical and health agencies, including the PHS, US Centers for Disease Control and Prevention, US Environmental Protection Agency (EPA), FBI, FEMA, US Occupational Safety and Health Administration, National Institute of Occupational Safety and Health, New York State Environmental Protection Department, and the New York City police department, fire department, health department, department of mental health, and hospital association. As the only military presence in the cell, Wallace focused on looking after the health interests of the soldiers working at every level of the effort.^{7(pp2,10)}

ENVIRONMENTAL HEALTH AND SAFETY ISSUES

Discussions at the early meetings of the health and medical cell focused on health and safety issues at ground zero. Environmental health experts from the



World Trade Center 2 (or South Tower).
Photograph: Lieutenant Colonel Stephen Wallace.

federal, state, and city agencies tried to determine the immediate health threats to the workers in the World Trade Center area and the requirements to keep them safe. After environmentalists from federal and state organizations monitored the air quality in and around ground zero and found the presence of toxic matter, especially asbestos, to be high, PHS representatives told cell members they would issue improved respirator masks to all federal employees at the site. Colonel Wallace coordinated with the PHS to provide P100 masks to National Guard troops at two issuing points in the World Trade Center area, 26 Federal Plaza and the American Express Building. The PHS assured everyone that the soldiers' masks would be fitted properly, have good seals, and pass a smoke impediment test. This information was passed on to the Guard's senior medical leadership in lower Manhattan and in upstate New York.^{7(pp1.10),11,12}

Discussions at the health and medical cell revealed that, although some emergency service people were very methodical about donning their protective gear, other New York City police, firefighters, and employees engaged in search and rescue operations on the rubble pile did not use their respirator masks and goggles because of the physical effort of searching for survivors; hot weather, which made wearing protective gear uncomfortable; and the time needed to have the equipment fitted properly. The cell members concluded that the intensity of search and rescue efforts at ground zero did not lend itself to the enforcement of protective gear requirements. To some members of the New York police and fire departments, the search and rescue effort came first.^{7(pp10,11),14(p61)} "Other issues could wait."^{7(p11)}

Colonel Wallace learned from frequent conversations with EPA representatives and from seeing air quality analysis results from eight test stations in and around ground zero that, in most areas outside ground zero, asbestos and other contaminants were usually at safe levels, except when the wind carried air from the rubble pile into lower Manhattan. The EPA informed him that the level of asbestos was unsafe for several days following the attack; that the first 40 floors of the World Trade Center had been covered with asbestos, and that the higher floors contained material that could be dangerous when exposed to heat. As a result of these findings, EPA was requiring its personnel to wear masks and other protective gear at ground zero; personnel not complying with the regulations faced discipline.^{7(p11)}

After one of his surveillance tours of ground zero, Colonel Wallace visited Battery Park, where he briefed the senior medical and line officers on the health hazards their soldiers faced, and the effect these threats might have on their ability to patrol the perimeter and provide security. He told them about the high asbestos readings and that asbestos, dust, and smoke might cause sore throats and burning sensations in airways, which might require immediate medical treatment and lead to long-term health consequences. Other biological and hazardous materials threats to soldiers' health, he added, are exposure to chemicals, fuels, sewage, and bodily fluids from handling human remains and body parts. Finally, he spoke of meal safety issues because food provided by volunteers or local vendors near ground zero might not have been properly stored, cooled, or heated.^{7(pp1.12),21(p4)}

After listening to the briefing, Aviation Brigade Chief of Staff Colonel Ray-

mond Doyle of the New York Army National Guard's 42d Infantry Division saw to it that his soldiers received instructions to use respirator masks when guarding the perimeter at ground zero; wear helmets to prevent injury from falling debris and glass; wear proper protective suits when handling hazardous materials, bodies, and body parts; eat food from approved food sources such as meals prepared by vendors brought in by the Guard; and drink lots of water and take rest breaks. Later, the Guard's on-site commander issued a direct order to this effect.^{7(pp1,12)}

To address food safety at ground zero, Colonel Wallace met with officials of the city's health department to reassure himself that they were instructing the police to safeguard the food supply by screening the sources of free food offered to the rescuers on site and prohibiting unauthorized food vendors at ground zero. The police subsequently closed down two vendors that were located near a temporary morgue and a portable toilet. By about day 7, food vendors from the Salvation Army and the Red Cross had replaced the volunteers.^{7(pp2,3,12),21(p4)}

Because of his work at ground zero, Colonel Wallace witnessed at first hand the number of rescuers without face masks. Joining the "bucket brigades" on the rubble pile in the evenings following his duties at the Office of Emergency Man-



All that remained of World Trade Center Tower 1 (right) and World Trade Center Tower 2 (left) at ground zero.

Photograph: Lieutenant Colonel Stephen Wallace.



National Guard troops on perimeter patrol at ground zero. Photograph reproduced with permission from: Rivera W, Burgher F. New York National Guard medical response to 11 September events. Slide presentation given at: Uniformed Services University of the Health Sciences; Bethesda, Maryland; November 8, 2001.

agement, he could see dust in the beams of lights at the scene and on his camera lens. He heard rescuers complaining of throat and eye irritations and knew they were concerned about shifting debris and glass as they maneuvered over mounds of rubbish in the search for survivors.^{7(p14)}

On September 18, Colonel Wallace shared an afternoon meal with members of the city's fire department. They expressed their concern "about all the stuff they had been breathing in since Day One." The fire department's chief of medicine, also concerned, issued corticosteroid inhalers for those who complained of breathing problems. A fire department physician also reported to the health and medical cell that he intended to give those firefighters pulmonary tests and continue to follow their progress.^{7(p14)}

The firefighters' worries about breathing problems were in contrast to information Wallace had received the evening before at a senior leadership meeting for officers of FEMA and the New York Office of Emergency Management, where some officials reported good air quality for lower Manhattan. Yet tests for hazardous materials continued to reveal periodic high asbestos readings and the possibility of other unsafe airborne contaminants at ground zero. This data disturbed Wallace, medical officials at the Office of Emergency Management, and FEMA, especially because rescue workers and other New York City personnel at ground



September 15, 2001. New York Fire Department, New York Police Department, and other rescue personnel forming a “bucket brigade” to remove debris and rubble in search for survivors at ground zero.

Photograph: Lieutenant Colonel Stephen Wallace.

zero still were not wearing masks. The health and medical cell could only advise New York City personnel to wear PPE because ground zero was still classified as a rescue area, and only the fire and police department incident commanders could issue orders to the rescuers.^{7(pp13,14)}

Adding to the difficulty of convincing New York City personnel to wear PPE was EPA Secretary Christine Whitman’s public announcement on September 18 that the air and drinking water near the World Trade Center was safe. “We are very encouraged that the results from our monitoring of air quality and drinking water conditions in both New York and near the Pentagon show that the public in these areas is not being exposed to excessive levels of asbestos or other harmful substances,” Whitman said. “Given the scope of the tragedy from last week, I am glad to reassure the people of New York and Washington, DC, that their air is safe to breathe and their water is safe to drink,” she added.²²

Whitman’s statement and other reports of good air quality for lower Manhattan led to “a confused policy,” recalled Kelly R McKinney, Associate Commissioner of Regulatory and Environmental Health Services, New York City Health Department, and an executive level member of the health and medical cell. “On the one hand the department thought it prudent for workers to use respirators, but

on the other hand, the substances they were testing for did not exceed accepted safety levels. Over the next year [2002] it became clear that even if workers did not breathe in toxins at dangerous levels, they were still subject to health risks and problems from other substances in the air they breathed at the trade center site.²²

Unable to get all rescuers ordered to wear PPE, Colonel Wallace did what he could. Aware that National Guard soldiers on perimeter duty sometimes thought it was safe to take off their face masks if they saw police, firefighters, and visitors in the area with uncovered faces, on September 18 he requested an official memo from McKinney strongly advising the use of PPE by military personnel. The memo was produced the same day, and Wallace sent copies of it to the defense coordinating officer and to senior members of the New York Army National Guard; he later noted a “marked improvement”^{7(p13)} in use of protective gear among 1-101st and 204th soldiers at ground zero. National Guard soldiers on perimeter duty nonetheless often continued following New York City personnel in not wearing protective masks. This problem surfaced every day.^{7(pp13,14),23}

Besides advising on the use of protective gear, the Office of Emergency Management’s medical representatives tried to ward off environmental health problems by providing tetanus and hepatitis B immunizations to ground zero workers who received cuts or were exposed to bodily fluids. The office also contracted for hand-washing and boot washing-stations and vehicle decontamination depots, and erected signs in the area alerting personnel where to use all of their PPE. When Wallace returned to ground zero in early December 2001, access was restricted; hand-washing, boot-washing, and vehicle decontamination stations were at entrances and exits; and all personnel were wearing PPE.^{7(pp13,14)11(p27),24}

Colonel Rivera of the New York National Guard, who was in touch with the Army surgeon general, the National Guard bureau surgeon, and the Joint Task Force 42 surgeon, arranged for soldiers at risk for exposure to human remains to be screened at Veterans Affairs (VA) hospitals in Brooklyn, Manhattan, and the Bronx. If it was determined they were at high risk, they were to be vaccinated for tetanus and hepatitis B.^{11(p27)}

Another Army medical officer interested in protecting ground zero workers from environmentally induced ailments was Colonel Robert Gum, an occupational medicine physician with the US Army’s Center for Health Promotion and Preventive Medicine (CHPPM), who at this time was serving at the Centers for Disease Control and Prevention. On 9/11, he was detailed to the Department of Health and Human Services’ Office of Emergency Preparedness, which is responsible for medical care in federally declared disasters (Gum was subsequently reassigned for duty to the office, where he stayed for nearly 3 years). Although not a PHS officer, Colonel Gum filled a PHS billet and headed a medical response team dispatched by Health and Human Services to the World Trade Center on 9/11. On the following day, he was assigned to Office of Emergency Preparedness’s management support team in New York City as its chief medical officer with responsi-

bility for healthcare operations and medical treatment within the perimeter of the disaster site. In effect, he became CHPPM's "eyes and ears" in lower Manhattan, providing the agency with "immediate feedback" on the situation in New York City and what CHPPM might do to help.^{21,25,26} "That was great, because it gave us something constructive to do," said Colonel Tim Mallon, director of CHPPM's Department of Clinical Preventive Medicine. "We could focus our energies and focus our immediate attention on what needed to be done."²⁵

Colonel Gum had made it clear to Colonel Mallon and to Colonel Paul Smith, preventive medicine consultant at the Office of the Surgeon General, that many rescuers at ground zero were unprotected against certain health hazards. Personnel seldom wore eye protection even though they had been issued dust goggles. Except for the first few days when dust and smoke levels were especially high, workers seldom used respirators. Mallon and Smith gave CHPPM's occupational environmental medicine staff the responsibility of ensuring that the workers in the World Trade Center area, including the Army National Guard, were aware of the health and safety hazards at the site and the need to wear PPE.^{21(p4),25}

In coordination with CHPPM's Office of Industrial Hygiene, the occupational environmental medicine staff developed recommendations on health hazards that might be present at ground zero (as well as the Pentagon) and the PPE needed by the work force on site. Respirators were the equipment of choice to help protect soldiers from such airborne hazardous materials as silica and burned and unburned jet fuel. The possibility of problems from contact with dioxin, phosgene, and oxidizer heat were also considered. The CHPPM hygienists gave their recommendations to the National Guard soldiers at the site and over the weeks that followed clarified the suggestions as their knowledge and experience grew.²⁵

According to Mallon and Smith, the Guard soldiers had difficulty getting their requests for equipment through the Office of the Director of Military Support, and, in many instances, never received what they needed. As a result, Guard hygienists requested equipment directly from the 3M Corporation (St Paul, MN). The company, after consultation with CHPPM's commander, Brigadier General Lester Martinez-Lopez, donated P100 filtered masks to the troopers at ground zero. Despite this donation and the respirators acquired from PHS, respirators were in short supply for the duration of the mission.²⁵

Shortly after the arrival of the respirators from the 3M Corporation, Colonel Walter Rivera, the state surgeon, New York National Guard, recommended the implementation of guidelines that all soldiers in the red zone (the World Trade Center complex) wear appropriate masks. Soldiers outside the destroyed complex were to carry masks but wear them at the discretion of their commander.¹¹

Because he had worked at CHPPM and had contacts with its industrial hygiene staff, Colonel Gum was able to provide Colonel Wallace, whom he met shortly after his arrival in New York City, with valuable information about health and safety issues. Dr Coleen Weese, a CHPPM program manager with the center's Office of Occupational and Environmental Medicine, provided Wallace with important data as well. He forwarded the information from Weese to the city's Office

of Emergency Management and the Army National Guard.^{7(p15),25,27(pp10,11)} By 20 September, according to Wallace, Colonel Gum was attending the Office's health and medical cell meetings "provid[ing] valuable insights into many issues."^{7(p15)}

By that time, with rumors flying that the rescue phase would shortly turn into a recovery and debris removal operation, the health and medical cell meeting attendance grew in numbers. Major Burgher, the deputy New York state surgeon, who also was safety officer for the New York National Guard's 42d Infantry Division and an occupational safety and health nurse, represented the Guard. Additional medical, health, environmental, scientific, and nuclear, biological, and chemical experts from various agencies joined the group, broadening the scope of discussion and illuminating many of the health issues of concern.^{7(pp2,15)}

By 24 September, health and medical cell discussions focused on more recent and definitive testing at ground zero that indicated possible worker exposure to hydrogen sulfide, acid, gas, and benzene. Occupational Safety and Health Administration staff, including the director of field operations, who was posted at the Office of Emergency Management to coordinate and advise on the use of federal medical personnel in New York City, recommended blood tests for construction and rescue workers who were using torches during rescue operations and who complained of problems with carbon dioxide. Talk also concerned more rigid health and safety measures at ground zero, where the mission had by then indeed changed from search and rescue to recovery and debris removal.^{7(pp15,16),21(p1)}

Shortly thereafter improvements began. New York City hired the Bechtel Corporation (San Francisco, CA) to create a commercial safety program at ground zero. Occupational health and safety fact sheets were distributed to workers and supervisors. The 42d's soldiers began wearing helmets and newly issued P100 masks about the same time as Colonel Rivera issued his recommendation. At this point Colonel Wallace, his mission accomplished, requested that NARMC return him to Fort Eustis.^{7(pp16,17),11(p27),21(pp4,5)}

MEDICAL EXAMINER'S OFFICE

Before leaving New York City, Wallace acted on an invitation from New York City's chief medical examiner, Dr Charles Hirsch, to visit his office. He learned from the medical examiner that more than 5,500 body parts and some 200 intact bodies had been recovered from ground zero. Dr Hirsch thought that most of the complete bodies had come from the lower levels of the World Trade Center and that the removal of debris by heavy equipment had uncovered them. Workers on the upper floors of the buildings and passengers in the jet plane would have been incinerated by jet fuel, and people trapped between floors would have been pulverized as the towers fell.^{7(pp16,17)}

Wallace then toured the forensic operation run by the Medical Examiner's Office and FEMA. Because of the huge size of the undertaking, portable receiving and processing stations had been set up on the street outside the Medical Examiner's Office on First Avenue. Also, a large tent had been erected in the building's

parking lot, in which coroners and pathologists received and examined bodies and body parts, checked the remains for personal possessions, and took DNA samples. The process of trying to identify the victims occurred in a special room inside the building, where forensic scientists took dental radiographs for comparison with dental records brought in by relatives and conducted DNA testing on very decomposed bodies and body parts. After that, bodies were placed in new body bags in a dedicated storage area. A large parking lot next to the medical examiner's building contained dozens of freezer vans that held bodies and body parts, and morticians came to pick up the identified victims. Nearby the remains of police and fire department victims were honored in ceremonies before being taken to funeral homes. Colonel Wallace was impressed by the efficiency and orderliness of the operation.^{7(p17)}

Before Colonel Wallace left the Medical Examiner's Office, FEMA's disaster mortuary operational response team coroner, Dr Douglas McKown, requested that he convey a proposal to the Army Medical Command for joint exercises with FEMA to prepare for future major disasters similar to 9/11, mass casualty incidents, and weapons of mass destruction situations. Colonel Wallace left New York City on 26 September.^{7(p17)}

MEDICAL TREATMENT

As the search and rescue and recovery efforts gained momentum, medical detachments from the National Guard set up aid stations where medics could treat the troops' minor injuries and those of any responders who requested help. Military victims with more serious health problems went to New York City hospitals and VA medical facilities in Manhattan, Brooklyn, and the Bronx. The VA hospitals were the preferred treatment sites for National Guard troops.^{11(pp21,27)}

Stress was a major threat to soldiers working at ground zero. The Army could not prevent stress, but its health providers could work to mitigate the problem. The New York National Guard deployed a seven-person critical incident stress management team to Park Avenue Armory, the headquarters of the 42d Infantry Division, to provide counseling. The unit set aside 14 beds at the armory for its patients and established a 48-hour evacuation policy. This meant that anyone who was not expected to return to duty within 48 hours would be evacuated to a hospital for more definitive, long-term treatment. In 5 days, the team's members debriefed 2,000 military personnel in and around ground zero. Personnel suffering acute stress were hospitalized at two VA hospitals. Most individuals were returned to duty, but a small number were released from active duty. The National Guard also relied on its chaplains and family support personnel to aid soldiers afflicted with anxiety. Once the *Comfort's* mission changed to humanitarian assistance, Guard soldiers could be seen by the ship's stress management team, composed of two psychiatrists, two chaplains, three behavioral health technicians (enlisted), and one clinical nurse specialist. Volunteers at ground zero also received counseling and rest and relaxation on the ship. The New York state

surgeon ensured that a leaflet on stress management went into the Joint Task Force newsletter for soldiers to read. After Governor Pataki signed a multistate emergency management assistance compact, the state surgeon requested additional stress management teams from New Jersey and Connecticut for duty at demobilization centers. The team members, including chaplains and family support personnel, provided counseling at local armories for several months after the Guard demobilized.^{11(pp31,33,36-39),28}

On 16 September, NARMC sent Major Kent Brockmann, a psychiatrist from Fort Drum, New York, and Gloria J Trainor, chief of social work at Fort Drum and acting chief of social work at Fort Monmouth, to Fort Hamilton with orders to conduct an assessment of the hospital's ongoing needs in caring for the mental health of soldiers working at ground zero. Upon arrival, the two obtained key leadership support for their mission, including debriefing rooms and organizational charts to identify personnel. They also received help from the post chaplain, Major David Cook, who had already established a relationship with the community, an advantage the mental health workers did not possess. Chaplain Cook identified individuals he thought would benefit from psychological counseling, participated in debriefing sessions, and answered calls for spiritual support. During the first 24 hours, the duo from Fort Drum used a psychological symptom profile, which indicated persons at high risk for stress, to screen over 100 soldiers. After learning that they were to provide treatment to National Guard troops working at ground zero, the mental health workers requested additional members from NARMC to form a combat stress control team. In response, the command sent a psychologist and two mental health technicians from Fort Bragg, North Carolina, to Fort Hamilton. All the team members conducted stress after-action reviews. Major Brockmann also did psychiatric evaluations, gave individual consultations, and prescribed medications. The psychologist performed diagnostic testing and individual consultations. The technicians carried out ancillary duties to support the team.^{29(pp1-3)}

The combat stress control team counseled and evaluated more than 400 soldiers during a 3-week period at Fort Hamilton. The team noticed that its members had almost "instant credibility" with the soldiers affected by visits to ground zero because the team had visited the site during their first week at Fort Hamilton and directly witnessed conditions there. Mental health workers also noticed that personnel who acted normally in informal situations might show stress during debriefing sessions. As a result, they could not assume that individuals who seemed healthy during casual conversations would not benefit from psychological counseling in the early stages of a traumatic event's aftermath. Another observation was that the development of individual healthy defense mechanisms resulted in improved psychological screening scores for people working at the disaster site as time progressed. However, the team cautioned that the screening instrument might be measuring coping mechanisms rather than mental health improvement. Clearly, psychological screening instruments had to be used carefully after a traumatic event.^{29(pp3,4)}

USNS *COMFORT*

While Army mental health personnel worked at Fort Hamilton, Navy mental health workers operated aboard the USNS *Comfort* during the 2 weeks the vessel was docked at Pier 92 in Manhattan. The ship's behavioral health team provided mental health care to the many ground zero rescue workers and other individuals who came aboard the vessel. The team, which was organized similarly to the Navy's specialized psychiatric rapid intervention team that was used in disaster situations, consisted of one psychologist (the team leader), two psychiatrists, one clinical nurse specialist, three behavioral health technicians (enlisted), and two chaplains.^{28(p90),30}

In helping rescue workers with mental health needs, the Navy behavioral health team replaced traditional methods involving structured, clinic-oriented counseling and medication with an outreach approach more appropriate to disaster situations. Initially, critical incident stress debriefings were offered on a voluntary basis each morning, but none of the hundreds of workers who boarded the ship each day attended. The team reasoned that the relief workers were too busy at the site to take time for the meetings; that the trauma was still too raw (in disasters, briefings are most effective after workers have finished their jobs and are physically and emotionally rested); that rescue workers belonged to groups and would attend a counseling session only with the rest of their colleagues; and that all concerned feared the stigma attached to attending a session of the sort. By the 4th day, the team decided to offer coffee rounds—informal conversations over coffee that enabled group members to share feelings and experiences. These conversations usually helped in the recovery process.^{28(p91)}

The team spoke to about 550 people during the rounds and then brought the approach to ground zero, where disaster psychiatry outreach members interacted with relief workers, offering them support and assurance but mostly listening to them speak. At the disaster site, team members met with PHS officials, police chaplains, and several groups associated with the city Office of Emergency Management to assess psychiatric needs and possible responses. The information they acquired increased their understanding of the incident, what workers were experiencing, and how the team could best help. These meetings established the behavioral health team's credibility and acceptance with relief workers, and the workers expressed their gratitude for the team's concern.^{28(pp90,91)}

The ship provided free laundry, food, lodging, and medical care 24 hours a day to rescue and relief workers from New York's fire and police departments and emergency medical services, all of whom were working 48-hour shifts at ground zero with occasional 30-minute breaks for meals and naps. With basic needs met, rescue and relief crews experienced less stress and coped better. Thousands of people benefited in this manner during the time the ship was docked in New York City.^{28(p91)}

US AIR FORCE

To support the response at ground zero, the Air Force sent a total of 35 hospital emergency beds from Keesler, Lackland, and Travis Air Force bases (in Mississippi, Texas, and California, respectively) to McGuire Air Force Base in New Jersey. McGuire also received a mobile forward surgical team and a critical care transport team from Wright-Patterson Air Force Base in Ohio. At the request of FEMA, the Air Force transported search and rescue teams, FEMA personnel, and radios to New York City. It also moved disaster mortuary operational response teams from Chicago to Stewart Army National Guard Base in Newburgh, New York.³¹ Additionally, the Air Force provided units of blood that the city used to treat patients. It also sent biological assessment teams to help test the city's air quality, but FEMA gave this job to the EPA.³²

REPERCUSSIONS OF THE AIR MASK USAGE SITUATION AT GROUND ZERO

Shortly after 9/11, the Army Medical Command worked out an agreement with the VA to provide medical support to New York National Guard troops who suffered injury and illness due to working on or near ground zero.³³ Five years later, about 8,000 firemen, policemen, and private workers (day laborers, contractors, volunteers from other towns, and paramedics) suffering from pulmonary disorders related to toxic substances at ground zero sued the City of New York, government agencies, and private companies for not providing adequate safety precautions and protection against exposure to contaminants in the debris field. The legal documents presented in the lawsuits stated that "most workers either did not have [air-filtering] masks or did not use them"; that in the first few days, many workers at ground zero wore surgical masks or paper dust masks, distributed by volunteers, which industrial health officers believed "were practically useless"; that, during the search and rescue phase, firefighters "never thought for a second of refusing to work without respirators, but they did wonder when they were going to be available"; that on 28 September 2001, the fire department had ordered from the city "5,000 P100 Organic Vapor/Acid Gas half-face masks . . . and 10,000 replacement filter cartridges,"^{34(pA-1)} but the city did not process the order until mid-November; and that before the end of the cleanup in June 2002, the Occupational Safety and Health Administration had distributed 131,000 half-face respirators, the EPA had provided another 22,000, and the union of operating engineers had distributed another 11,000, which should have been more than adequate for the 40,000 people working on the site. The responders sought health care support and compensation for damages.^{34,35}

The workers' legal representatives called the efforts of the above organizations to provide respirator masks "heroic but ineffective" because no single agency was responsible for the distribution of the respirators, there was no central distribution point, and no one in authority made sure the respirators were used. The lawyers said that many workers never received masks or were given masks that did not work properly. By contrast, workers at the Pentagon without respirator masks and

protective clothing had to leave the site.^{35(pA-2)}

In its defense, the city argued that its private contractors “did their best to provide adequate equipment and to get workers to use it, but many workers ignored the warnings.”^{35(pA-2)} Even if the city’s response was flawed, its lawyers said, the city is protected from litigation by the State Defense Emergency Act and other laws. They reasoned “that its concern for the health and safety of all workers and volunteers at the W.T.C. site began immediately after the September 11 attacks and continued until the end of the rescue, recovery and debris removal operations.”^{35(pA-2)} Also in the city’s defense, David M Newman, an industrial hygienist with the New York Committee on Occupational Safety and Health, a union labor organization, believed that the remarks made on 18 September 2001 of Christie Whitman, director of the EPA, that air sampling showed that the air was safe to breathe gave workers “a green light to say, ‘We don’t need to use respirators because the EPA says the air is OK.’”^{35(pA-3)}

The victims and their legal advisors also have been critical of federal officials for being “too limited and too late”^{36(p1)} in providing help to victims suffering from toxic substances inhaled at ground zero. In February 2006 President George W Bush appointed Dr John Howard, a pulmonary specialist and the director of the National Institute for Occupational Safety and Health, to coordinate the government’s 9/11 health efforts and provide \$52 million in the federal budget for treatment of related illnesses.²⁹ Dr Howard, who had no full-time support staff, believed that the money was “not nearly enough.”^{36(p1)}

Nearly 7 months later, on 31 August 2006, days before the fifth anniversary of 9/11, New York City released guidelines to help doctors diagnose illnesses related to 9/11 toxic substances. The reason given for the delay in responding was the difficulty in linking disease symptoms to dust and smoke—a linkage that required extensive and skillful testing. Although many firefighters complained of “trade center cough”^{36(p2)} and labor leaders and medical practitioners pleaded for help soon after the attack, there was still widespread belief among medical experts in 2006 that the symptoms would disappear. A large-scale, federally funded medical study produced by the Mount Sinai Center for Occupational and Environmental Medicine in 2004³⁷ began to shed some light on the problem. Its research revealed that of the first 1,138 victims studied, more than half continued to suffer serious pulmonary illnesses. Following studies corroborated Mount Sinai’s results about the persistence of 9/11 respiratory problems.³⁸ A 2006 New York City Fire Department study³⁹ showed that firefighters sustained the equivalent of a normal 12-year loss in lung capacity during the first year after the attack. More than half of 71,437 responders and residents who participated in a city and federal government survey⁴⁰ had experienced new and worsening health problems. In January 2006, a coroner’s report linked the death of Detective James Zadroga to World Trade Center dust.^{36(pp1.2)}

With mounting evidence of the persistence and deadliness of respiratory problems resulting from the 9/11 attack, more money became available for studies, screenings, and treatment. Mount Sinai received an additional \$81 million from the federal government and \$9.4 million from the Red Cross to continue its re-

search. In 2006 the federal government divided about \$52 million in unused workers' compensation assistance between treatment programs for firefighters and police officers. But the problem was large, and the funding inadequate. Many were concerned that not enough money was available to provide all the treatments and studies that the problem warranted.^{36(p3)}

Indeed, 9 years after the attack on the World Trade Center, ground responders were still suffering from illnesses associated with their work at the site. In June 2009 the New York State Health Department confirmed 836 deaths of responders, 20% due to environmental causes, car accidents, or assaults, and 80% from illness. A year later, the health department confirmed only 813 of the 836 after studying death certificates, autopsies, and medical records. In both instances, the department could not conclude that any of the deaths resulted from the victims' work at ground zero. Although it is not clear how many responders actually died of 9/11-related illnesses, thousands are still living with health problems associated with work in the Trade Center's debris field.⁴¹ In November 2010, after much negotiation, ground zero workers agreed to settle lawsuits over health damages and cleared the way for a financial settlement.⁴² The US Congress passed the \$4.3 billion 9/11 health bill on 23 December 2010, covering the cost of healthcare for responders and others who suffer illnesses from dust, smoke, and toxic fumes related to the attack on the World Trade Center.⁴³

SUMMARY

Although the Army Medical Department was prepared to support the World Trade Center disaster response, little DoD medical help was solicited by or used in New York City. The city and state had enough of their own medical assets. The only request the city made was for the USNS *Comfort*, but when large numbers of survivors did not materialize, the ship's initial mission changed from treating ground zero's victims to ministering to firefighters and other rescue workers for minor injuries and providing comfort services, rest, and relaxation. For 2 weeks the hospital ship was a symbol of hope. When the vessel left New York harbor, city residents knew no new survivors would be found.

As NARMC liaison to New York City, Colonel Wallace reported to the Army surgeon general on casualties and activities at ground zero. He attended meetings of the New York City Office of Emergency Management health and medical cell, where he represented Army personnel working at the World Trade Center disaster site. He promoted the health, safety, and mission readiness of National Guard troops in lower Manhattan. Wallace also served as a conduit of information on health and safety measures to the defense coordinating element, the New York Army National Guard, and the USNS *Comfort*. The Guard in particular responded with constructive orders to its troops on health and safety issues. Although not deployed by CHPPM, Colonel Gum, an Army occupational medicine physician filling a PHS billet, contributed information on environmental health and safety issues that helped the center produce PPE guidelines for National Guard troops. In this way he proved to be a valuable asset both to Colonel Wallace and to the

city's health and medical cell.

National Guard troops provided their own medical treatment centers, but Guard members residing at Fort Hamilton received primary care and psychiatric counseling on post. NARMC mental health teams from Fort Drum and Fort Bragg conducted stress debriefings for the base's traumatized population and for soldiers who requested it.

Overall, the experiences of Army Medical Department personnel in New York City in the aftermath of the World Trade Center tragedy provided valuable lessons regarding preparation for and the execution of effective responses to future terrorist attacks. Their awareness of the necessity of using PPE at ground zero and the widespread lack of adherence to good protective measures by rescue and recovery workers, especially employees of New York City, was prescient in light of the evidence that has emerged in the last 10 years regarding health problems among ground zero rescue and recovery workers.

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