Chapter 4

PREVENTIVE MEDICINE IN MILITARY OPERATIONS OTHER THAN WAR

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INTRODUCTION

At the direction of the National Command Authority and in support of US national interests, the men and women of the armed forces have served the United States throughout its history in a variety of missions that do not fit into the strict dichotomy of war versus peace. From the Jefferson administration onward, soldiers took the lead in the exploration of the North American continent and in protecting citizens on the frontier. They enhanced westward expansion by building roads, railroads, bridges, and canals. Following natural and man-made disasters (both in the US and abroad), entire operational units or task-appropriate, multidisciplinary teams provided assistance and relief to stricken populations. More recently, US military forces have found themselves engaged in peace operations in a variety of trouble spots around the globe.

With the ascendance of the United States as a world superpower in the latter half of the 20th century, such operations have quickened in their "pace, frequency and variety."[1chap13] These missions have been designated "stability and support operations" and military operations other than war (OOTW) and describe a wide range of military activities short of declared war.[1] These OOTW could call for the use of troops in actual combat, yet the focus is generally to resolve conflict and promote peace, nation building, disaster relief, and humanitarian assistance.[2] These OOTW may occur before or after war or during war in the same theater. In addition, it should be noted that many OOTW in the modern era are mixed in nature (eg, peace operations and humanitarian relief) and at times can be described as complex humanitarian emergencies (see Chapter 44, Complex Emergencies). These complex humanitarian emergencies are characterized by political turmoil, a lack of physical security, mass population movements, and high morbidity and mortality.

As in wartime, the priority mission for military preventive medicine professionals in OOTW remains the protection and maintenance of the health of the command (eg, through disease and injury prevention and control, health promotion, and surveillance). When so directed by the National Command Authority, these same preventive medicine skills have proven, however, to be of extraordinary worth in protecting of large civilian populations in need of help. In fact, as one moves along a continuum from high-intensity conflict (war) to the low-intensity activities of OOTW, the visibility and value of preventive medicine professionals increases dramatically. Where sustainability and long-term impact are the goals, missions involving humanitarian assistance, disaster relief, and nation building in particular should have a very strong public health and preventive medicine component. Exhibit 4-1 provides a list of the tra-

EXHIBIT 4-1

INVOLVEMENT OF PREVENTIVE MEDICINE PROFESSIONALS IN OPERATIONS OTHER THAN WAR

Preventive Medicine Professionals Providing Leadership

- Humanitarian assistance (international and domestic)
- Disaster relief (international and domestic)
- Nation assistance, nation building and development

Preventive Medicine Professionals Providing Unique Support

- Arms control
- Counterterrorism operations
- Support to domestic civil authorities
- Security assistance
- Support for insurgencies and counterinsurgencies

Preventive Medicine Professionals Providing Traditional Warfighter Support

- Noncombatant evacuation operations
- Counterdrug operations
- Peace operations
- Sanctions enforcement
- Show of force
- Attacks and raids
- Support for preventive diplomacy

Sources: (1) Department of the Army. *Operations*. Washington, DC: DA; 1993. (2) US Army Field Manual 100-5. MHS 2020 Team. *Medical Health System 2020 OOTW Report*. Washington, DC: Department of Defense; 1998.

ditional missions and activities of OOTW subdivided by the degree of involvement of military preventive medicine personnel. This chapter, while not an exhaustive review of the subject, seeks to describe the critical and evolving role of preventive medicine in OOTW throughout the United States' history, through periods of domestic focus (isolationism) and international leadership.

DOMESTIC ASSISTANCE AND RELIEF IN THE 19TH CENTURY

Through the first half of the 19th century, the responsibility for providing domestic disaster and humanitarian relief rested on the local and state government within whose jurisdiction the calamity occurred. In the case of a major disaster, however, it did not seem reasonable that a devastated municipality should have to rescue itself. Nevertheless it remained a hot topic of constitutional debate.[3] One early exception to existing policy by the federal government came in 1832. With smallpox threatening the western Indian nations, Congress provided for a mass vaccination program to be carried out by both civilian and military physicians, especially those serving at frontier forts in Illinois and Michigan. Despite their efforts to immunize the nomadic tribes, it is estimated that half of the native Americans in this region died in an epidemic 5 years later.[4]

Thirty-three years later, at the conclusion of the Civil War and faced with over 4 million destitute former slaves, the federal government became much more involved in providing for the emergency needs of its citizens. In 1865, Congress established its first welfare agency (the Bureau of Refugees, Freedmen and Abandoned Lands[5]), appointing Major General Oliver Howard as its commissioner. From this point on, the federal government became a more willing provider of humanitarian assistance, through a variety of agencies, when local governments were not capable of doing so. The US Army, in particular, participated in at least 17 such major relief efforts between 1868 and 1898, including the Chicago (1871) and Seattle (1889) fires , the Charleston earthquake (1886), the Johnstown (1889) and other major floods, and various yellow fever epidemics. More often than not, Army disaster relief was logistical in nature (as it frequently is today), taking the form of providing rations, clothing, bedding, and tentage.[3]

Armed with few effective disease control measures, military medical personnel did what they could to care for the sick and injured and to stem the spread of disease in these situations. In New Orleans (1853) and Key West (1877), military posts were made available (at the initiative of the local commanders) for the quarantine and treatment of yellow fever epidemic victims.[6] In 1869, under the threat of a smallpox epidemic in the town of Warsaw, Ky, one enterprising detachment commander quarantined an infected family and saw to it that his surgeon vaccinated most of the local civilian population.[7]

THE SAN FRANCISCO EARTHQUAKE: AN OPPORTUNITY FOR LOCAL INITIATIVE

Two violent tremors greeted the 450,000 inhabitants of San Francisco the morning of 18 April 1906. Within hours, more than 28,000 buildings had been destroyed by either the seismic events or the ensuing firestorm fed by broken gas mains. In the end, over a charred area of 4.7 square miles, 498 people had died, 415 were seriously injured, and nearly 300,000 people were left homeless.[8] Sensing the great need in the early hours after the earthquake, Lieutenant Colonel George H. Torney, the chief surgeon and commander at Letterman General Hospital, dispatched medical teams into the city and opened the doors of his facility to civilian casualties. By the end of the first day, the hospital had admitted 127 civilians. This number would increase dramatically the second day as more people learned of the services being offered at Letterman. With basic public services out of commission and the homeless huddled in makeshift camps in vacant lots across the city, the threat of epidemic disease loomed.[3]

The US Army's participation in the San Francisco relief effort was crucial in that they alone were local and still functioning. The organization that was intended to handle such a disaster, the Red Cross, was by its own admission not ready or able to respond.[9] The Army at the turn of the century possessed a complement of physicians and sanitarians trained and experienced in public health interventions for large populations. Military medical officers had been at the forefront of this era's medical-scientific advances in the etiology of infectious disease and the sanitation movement. In particular, many serving in uniform were veterans of the major sanitation cleanup campaigns in the occupied territories after the Spanish-American War (see Chapter 3, The Historic Role of Military Preventive

Medicine and Public Health in US Armies of Occupations and Military Government).

Brigadier General Frederick Funston, himself a veteran of the Philippine Insurrection and the acting commander of the Division of the Pacific, headquartered in San Francisco, ordered Lieutenant Colonel Torney to take charge of the sanitation of the city. Respecting this decision, the mayor and the president of the health commission of San Francisco quickly appointed Dr. Torney to serve as the head of a joint committee to control the sanitation of the city. In this capacity, Lieutenant Colonel Torney and his civilian and military medical staff supervised or ran more than 100 camps for more than 50,000 homeless citizens[10] (Figure 4-1). Retired Brigadier General Charles R. Greenleaf, a physician with firsthand experience from the sanitation cleanup of Cuba and Panama, also volunteered to help Lieutenant Colonel Torney in the effort. At his suggestion, the city was divided into six districts, each with an assigned health officer who would report back to Torney daily. Identified cases of contagious disease in the camps were transferred to a 200-bed hospital set up in Harbor View Park. Water in the camps was monitored closely for contamination. Smallpox vaccinations (3,500 doses per day) were given by Army personnel to all who were willing to receive them. A brief increase in typhoid fever and smallpox cases was noted in the weeks following the earthquake, but these cases occurred outside of the Army-monitored camps and did not rise to epidemic levels.[9] In a resolution later unanimously adopted by the California Academy of Medicine, Lieutenant Colonel Torney was officially thanked for his efforts and those of the Army.[11] So efficient and effective was the relief effort mounted by the Army that military personnel had difficulty disengaging from the operation until July of that year, some 4 months later. The San Francisco earthquake marked the first time that military medical personnel played such a primary role in a major domestic disaster relief effort, but it also highlighted the danger to the military of being "stuck" with the mission beyond the emergency phase of the operation.

Over the next 10 years, the military would continue to participate in disaster relief efforts in the United States in a supporting or advisory role, with control remaining in the hands of local and state officials. An example of this came during the flooding of the Mississippi River in 1912, when the Surgeon General sent Major Reuben B. Miller and Captain Jacob M. Coffin to numerous refugee camps and centers. They distributed supplies and performed sanitary inspections, and the expert consultation (and accountability on follow-up visits) they provided was credited with preventing

Fig. 4-1. US Army-run displaced person camp adjacent to Letterman General Hospital following the San Francisco earthquake, 1906. Army assets in San Francisco stepped in to help when civilian organizations were incapacitated. Source: Foster GM. *The Demands of Humanity: Army Medical Disaster Relief*. Washington, DC: Center of Military History, US Army; 1983: 59.

serious epidemics in the flooded areas.[12,13]

The flooding of the Miami and Ohio rivers the following year was equally devastating, requiring a significant commitment on the part of the US military. So hazardous were the health conditions within the city of Dayton itself that local officials in discussions with the visiting Secretary of War decided to appoint a federal officer to be in charge of the sanitation effort. Major Thomas L. Rhoads, who had been accompanying the Secretary of War (and was the President's personal physician), was placed in charge of a host of local and federal health care workers. These workers quickly set about making inspections of buildings and homes, treating and evacuating the sick and injured, isolating those with communicable disease, disseminating advice on preventing disease, and locating health and sanitation hazards. Once identified, various crews were tasked to eliminate these hazards, removing a huge amount of debris and filth while restoring potable water. Not only did these preventive medicine efforts successfully ease the burden on local hospitals, but no serious outbreaks of measles, scarlet fever or diphtheria occurred.[14,15]

During this same flood, Major Sanford H. Wadhams and Dr. M. S. Alexander worked side by side for 9 days to stem a meningitis epidemic, which had already claimed a number of lives in the predominantly black town of Deckerville, Ark. Though the state refused to help, these two individuals provided food, improved sanitation, successfully treated the sick with intrathecal serum and gave immunizations to more than 500 people, most of whom were trapped in railroad boxcars by the rising waters.[16]

In addition to these domestic disaster relief missions, military medical personnel were active on the American frontier in response to significant public health problems within native American populations. One such case was the comprehensive community needs assessment performed by Captain Paul C. Hutton among the Alaskan Indians in the Haines Jones Point and Hindustucky communities outside of fort william H. Seward in 1908. Identifying rampant poverty and squalor, endemic tuberculosis and trachoma, and an infant mortality rate of 275 per 1,000 births among the Alaskan Natives, Dr. Hutton established a hygiene and sanitation education program. In addition, he sent a detailed report of his findings to the Surgeon General of the Army with specific recommendations. A subsequent Grand Jury report on the diseases of Alaska, based on Captain Hutton's work, was forwarded to the US Congress, which took action that same year to develop a sanitation system for these communities.[17]

DIGGING THE PANAMA CANAL

A more exciting story of the victory of humans over communicable disease does not exist than that of the conquest of yellow fever, malaria, and plague that allowed for the building of the Panama Canal. The timely participation of military officers in the professional fields of medicine and engineering merits the inclusion of this event as an OOTW. The French had lost more than 22,000 men to tropical disease when, after 7 years of futility, the company constructing the canal went bankrupt. Ignorant that malaria and yellow fever are transmitted by the bites of mosquitoes (*Anopheles* and *Aedes* species respectively), French physicians in Panama did little to protect their workers. In fact, they were said to have placed the legs of hospital beds in water to keep crawling bugs from getting to their patients, thus increasing the available breeding sites for the vectors. After buying the rights to build the canal for 40 million dollars and compensating the Panamanians for their secession from Colombia, the US government took charge of this colossal project. Lieutenant Colonel George Washington Goethals was named engineer-in-chief of the project in 1907 after initial attempts at civilian leadership failed.[18]

Having earned an international reputation as a sanitarian in the cleanup of Havana, Cuba, Major William Crawford Gorgas was promoted to the rank of Colonel and appointed the Chief Sanitation Officer in charge of the isthmus. Applying the breakthrough work of Major Walter Reed and Sir Ronald Ross that linked the transmission of these diseases to mosquitoes, he established 25 sanitary districts within the Canal Zone, each with its own sanitary inspector. Within each of these districts, his teams drained every lake, pond, swamp, and ditch possible. Those that could not be drained were covered with a thin coating of oil to kill the mosquito larvae and eggs (Figure 4-2). Buildings were screened and fumigated. Tall grass was cut down, garbage burned, and rats destroyed.[19] So successful was this program that the last case of yellow fever among workers was recorded in December 1905. By 1913, the last year of canal construction, the incidence of malaria had fallen by

Fig. 4-2. Controlling mosquitoes and the diseases they carry was of vital interest to the builders of the Panama Canal. One method they used, shown here, was to deposit a thin film of oil onto standing water. Their success in disease control made possible the completion of the canal. Photograph: Courtesy of the National Museum of Health and Medicine, Armed Forces Institute of Pathology, Washington, DC. Catalog number: Reeve 62699.

90% from 1906 levels.[20] An estimated 78,000 lives were spared and 39 million work days from sickness saved as a result of these efforts.[21] Colonel Gorgas would be promoted to the rank of Major General and named the Surgeon General of the Army in 1914.

THE MEXICAN CRISIS

William Gorgas' tenure as Surgeon General was anything but boring as Mexico went through a period of revolutionary conflict, fledgling democracy, and a military coup d'etat that threatened vital US interests. An estimated 1 million Mexicans lost their lives during this period of instability between 1910 and 1920.[22] In addition to the immediate physical safety of US citizenry along the border and in Mexico were concerns for the spread of communicable disease from arriving refugees. By 1914, US Army medical personnel had already joined the Red Cross in detaining and providing relief to some 5,000 Mexican citizens who had crossed the border. The refugee camp at Fort Bliss, Tex, was in fact run by an Army medical officer and featured programs of mass immunization for typhoid fever and smallpox, malaria control, and strict sanitation. Despite these efforts, however, the death rate among those refugees was recorded at 21.8 per 1,000.[23,24]

HUMANITARIANISM IN THE WAKE OF WORLD WAR I

In the aftermath of World War I, Europe and parts of the Near East faced widespread famine, epidemics, and major migrations of displaced persons and refugees. A number of private organizations became involved in relief efforts soon after the cessation of hostilities, yet in many cases they were poorly resourced, understaffed, and without the required expertise to complete their intended missions. In response, President Wilson extended the wartime commitments of US military personnel who volun-

teered to work with these private US relief agencies being sent to Eastern Europe and the Near East. While still in the employ of the Department of War, these individuals engaged in situations where the presence of formal US military units would have been problematic. Historians have commented that the United States' intentions were both humanitarian and political.

> Herbert Hoover, who directed the American effort, and his boss, President Woodrow Wilson, sought through American relief measures to prevent civil disintegration, preserve a liberal world order, and thereby to check the spread of Bolshevism.[3(p80)]

Serbia

Major Edgar E. Hume (later Major General) was detailed with 25 other Army medical officers and 5 dental officers to work with the Red Cross Commission in postwar Serbia. From February 1919 to the summer of 1920, their priority was to control a typhus epidemic that had first entered the country in 1915. The US officers also helped establish a public health laboratory for the nation and supervised the cleanup of various prison camps.[25]

Armenia

Further to the east in the newly independent country of Armenia, Colonel William N. Haskell, US Army, led a military humanitarian relief mission from September 1919 to August 1920 under the auspices of the Near East Relief (NER), Caucasus Branch (a private philanthropic organization). The returning refugees were described as having survived

> five years of the havoc wrought by the destruction and devastation of war, with its accompanying famine, starvation and virulent epidemics. It is estimated that as a result of binding themselves unreservedly to the Allied cause, one million men in Turkish Armenia alone lost their lives by either massacre, starvation or deportation [sic]. Probably three-quarters of a million more perished as a result of disease and of epidemics of cholera, typhoid, dysentery, typhus, influenza, and relapsing fever.[26p140]

Many of those returning were women and children who had been rescued from Arabs, Kurds, and Turks who had taken them captive.

The NER team consisted of 20 US Army officers and 75 civilians (eg, relief workers, nurses, orphanage workers, chauffeurs). Major Walter P. Davenport served as the Director of Medical Relief. With his US and Armenian staff, Dr. Davenport provided hospital care to about 4,000 individuals. In addition to distributing foodstuffs, the NER built pit latrines, native concrete latrines, baths, laundries, and delousing and disinfecting facilities. As a result of an NER campaign, 190,000 people received smallpox and tetra (cholera, typhoid, and paratyphoid A and B) vaccinations. It was estimated that 500,000 Armenians survived due to the feeding program alone. Sadly, the NER mission withdrew in advance of the Russian takeover of Armenia in the autumn of 1920.[26,27]

Poland

In 1919, the newly independent country of Poland faced two significant problems. The first was the ongoing war with Russia (the Bolsheviks) and the second was a raging epidemic of typhus, fed continually by the incessant flow of refugees and prisoners of war across its eastern frontier. Among the 2.4 million people crossing border checkpoints from the East for one 14-month period, at least 26,580 were found to have active typhus.[28] In the spring of 1919, some estimated that more than 10,000 died of typhus a day. Another estimate put the annual death toll from typhus to be some 200,000 by June 1920.[29] The mortality among health care providers was particularly heavy, with two hospitals losing seven-eighths and ten-twelfths of their doctors in the epidemic.[28]

To assist in the control of the epidemic, the first contingent of the American Red Cross Commission (headed by Lieutenant Colonel Walter C. Bailey) left Paris for Poland in February 1919.[29] By this point it was already clear that Poland represented the "rampart against the dangers of this disease"[28p623] for Europe and the world, but that the country itself lacked the resources to adequately respond. By April, the American Red Cross had established field units at Maciejow, Pruzana, Dolsk, and Bereza-Kartuska.[29]

Also working in Poland was Colonel Harry L. Gilchrist, US Army, who headed up the Polish Typhus Relief Mission, later redesignated the American Polish Relief Expedition. Dr. Gilchrist was hand-picked because of his public health experience with the military government in Manila and the San Francisco earthquake relief effort. More recently, Gilchrist had been in charge of the delousing programs in France to curb the spread of typhus there. Initially this mission was viewed as a direct extension of the Medical Department of the American Forces in Germany.[30]

Coordinating its actions with the Polish Ministry of Health, the American Polish Relief Expedi-

tion under Gilchrist had the goals of eliminating the typhus-carrying lice. This was attacked through the establishment of a strict sanitary cordon along the eastern border of Poland. All those crossing the border were required to undergo cleaning and delousing before being allowed through. In addition, bathing and delousing facilities were either constructed or brought in by mobile columns to local communities. US military personnel also helped run refugee camps, distribute food, and provide blizzard relief.[31] Three US servicemen died during this relief effort, one of typhus (Lieutenant Colonel Edward C. Register). In all, more than 40 commissioned officers and 500 enlisted personnel participated.[32] With over 2.5 million prisoners of war and civilian refugees flooding across the eastern border between 1 November 1918 and January 1920, the sanitary cordon was at times overwhelmed and bypassed. Likewise, the attempts to delouse local communities met with mixed success. By the summer of 1920, the Russian army overran the eastern border, effectively putting an end to the sanitary cordon supervised by the US military. With this, the United States focused its efforts on preparing for transport from Danzig to New York the 12,000 Polish-Americans (discharged soldiers of Haller's Army) who had fought for Poland before the US's entry into the war. Major Charles Halliday summarized the experience this way:

> the majority of physicians who went to Poland left feeling that, in so far as sanitation and preventive medicine were concerned, they had accomplished very little....many of the plans and recommendations made are now in force and are being extended as rapidly as means and circumstances will allow. Typhus, however, continues in epidemic form.[29p443]

Soviet Russia

Ironically, 1 year later (December 1921) the US government assigned Major F. H. Foucar MC, US Army, to work with the American Relief Administration, which was tasked to provide medical and sanitary relief to Russia. For 18 months, Dr. Foucar served as the district physician for the Samara region where severe famine and disease conditions prevailed. The American Relief Administration began an adult feeding program because many villages had exhausted their supplies of food. En route to Samara, Foucar described the misery of disease and death seen at the Kazan train station as "the most gruesome scene in [Dante's] Inferno."[33p692] Through the winter of 1921 to 1922, the incidence of louse-borne typhus rose to 19 new cases per 1,000 population per month. Major Foucar observed that "[s]oap was extremely dear and very bad and of ill reputation; public pay-baths were in operation, but charged more than the poor of the population, who most needed their facilities, could afford to pay."[33p692] The efforts of the ARA included rehabilitating hospital facilities, placing an ambulatory clinic in the train station, establishing feeding kitchens to feed the hungry, and establishing free bath houses (where more than 181,000 baths were given; also offered were haircuts, soap, and sterilization of clothing). By February 1923, the incidence of typhus had declined to 0.19 cases per 1,000 population per month—a 100-fold decrease.

More than 10,000 cases and 5,000 deaths from cholera also occurred in an epidemic in the Samara region in 1921. This was reduced to only 33 cases and 6 deaths in 1922 because of the institution of bacteriological testing of the city's water supply and the installation of two Wallace Tiernan, direct-feed chlorinating apparatuses at the city water-pumping station. More than 475,000 two-dose courses of a tetra vaccine were administered to the populace by the American Relief Administration in the summer of 1922, driving rates of cholera, typhoid fever, and paratyphoid fever to their lowest levels in 15 years. In addition, more than 10,000 smallpox vaccinations were given to adults and children who did not show evidence of previous protection. Programs were also initiated for the control and treatment of malaria, trachoma, and syphilis. The once-famous Roux laboratory, the maker of various vaccines and anti-toxins for the region, was not functioning when the American Relief Administration arrived at Samara. With the rehabilitation of its facilities and horse stables, purchase of equipment, and feeding of its personnel, the American Relief Administration returned this public health laboratory to full function within 2 years.[33,34]

HUMANITARIAN AND DISASTER RELIEF BETWEEN THE WORLD WARS

With the rise to prominence of the American Red Cross and the bolstering of state health boards, the role for the US military in domestic relief efforts diminished significantly after World War I. Army medical personnel continued to participate in a variety of preventive medicine efforts as needed, though. In response to an outbreak of typhoid fever in 1921 in neighboring Jacobstown, NJ, soldiers and medical officers from Fort Dix established and administered an anti–typhoid fever program for the

community.[35] In 1925, severe flooding hit southwestern Georgia, and Colonel Percy L. Jones led a team from Fort McPherson to the town of Newton, where they started an immunization program against typhoid and paratyphoid fevers for the townspeople. They also supervised mosquito control efforts and the distribution of Lyster bags for drinking water.[36] (Colonel Jones would later serve as a sanitation advisor to civilian health officials in West Palm Beach, Fla, following the hurricane of 1928.) Similar flooding in Arkansas in the spring of 1927 led to the mobilization of four Army physicians, who not only provided first aid, inoculations, and relief supplies but also conducted sanitation surveys and directed sanitation in camps.[37] With massive flooding of both the Mississippi and Ohio rivers in 1937, a hospital company (six medical officers and 93 enlisted personnel) was dispatched from Carlisle Barracks, Penn, to Louisville, Ky. Cooperating with the Red Cross, they established an emergency hospital in a local high school and took over the operation of an inoculation center from the City Board of Health. They provided 5,114 typhoid fever and 66 smallpox inoculations within the first 2 weeks of relief efforts.[38] Of note is the importance placed on immunization by the military during these disasters, with the provision safe drinking water being left to civilian relief agency workers.

With the exception of post–World War I Europe, US military relief operations overseas were few and far between during the 1920s and 1930s. The largest of these missions followed the Japanese earthquake of 1923, which initial estimates said left 2 million people homeless, 100,000 seriously injured, and 200,000 dead.[39] In light of the hostility of the Japanese government to the United States at the time, however, American involvement was limited to the restoration of St. Luke's hospital and the new construction of a 480-bed facility (the Bei-Hi hospital), which was turned over quickly to local control.[40]

A very different response was permitted following the Nicaraguan earthquake of 1931, which almost completely destroyed the capital city of Managua (by shock and fire) and left an estimated 5,000 people dead. US Navy physicians and corpsmen who were stationed locally went immediately to work caring for the injured. They would soon be joined by two Army surgeons (part of an engineering survey team) and personnel from the USS Lexington. All injured patients were automatically given prophylactic tetanus toxoid. In response to an early sanitary assessment that revealed a total cessation of public sanitation services and a lack of safe water, these professionals directed that water from the lake be boiled and chlorinated before consumption. Working with local officials and the Nicaraguan National Guard, relief camps holding 10,000 people apiece were established with strict sanitary regulations and vaccinations (ie, smallpox, typhoid fever). For fear of rabies, free-roaming dogs were ordered shot.[41]

RELIEF EFFORTS IN THE EARLY COLD WAR

In 1948, the United States assumed the responsibilities of world leadership with the passage by Congress of the Economic Cooperation Act, which established the European Recovery Program commonly known as the Marshall Plan. With Eastern Europe under the control of the Soviet Union, this plan offered more than just material assistance to 270 million Europeans in the west; it offered hope. When the Marshall Plan ended in 1951, Congress sought to link military and economic programs by creating the Mutual Security Agency. Leaders of the Army Medical Department, such as Major General Heaton, recognized early on that some of the United States' best diplomats in these endeavors would be her military medical personnel.[42]

An early example of this came in February of 1953 when more than 1,700 people died in the Netherlands due to flooding from unusually high tides and strong winds. At the request of the Dutch government, US military personnel assisted in the rescue and relief effort. Learning that the people were without safe water, the chief surgeon for US Army Europe, Major General Guy B. Denit, decided that the critical health care need was for emergency sanitation rather than casualty care. Military sanitary engineers took the lead in this effort, running water purification units in 19 areas. Those units ultimately furnished 75,000 gal of water a day for the populace.[43]

When the Brahmaputra River and its tributaries overflowed their banks in 1954, millions of Pakistanis were displaced from their homes. In response to their plight, a major relief effort was mounted by the US government that involved sending the chief of the Preventive Medicine Division of the Far East Command, along with the 37th Medical Company (Preventive Medicine) and 42 additional enlisted personnel, to Pakistan. With the region threatened by waterborne diseases, they formed 40 immunization teams with local military officials. In short order and at the same time that food and relief supplies were being distributed by others, these teams immunized more than 850,000 people against

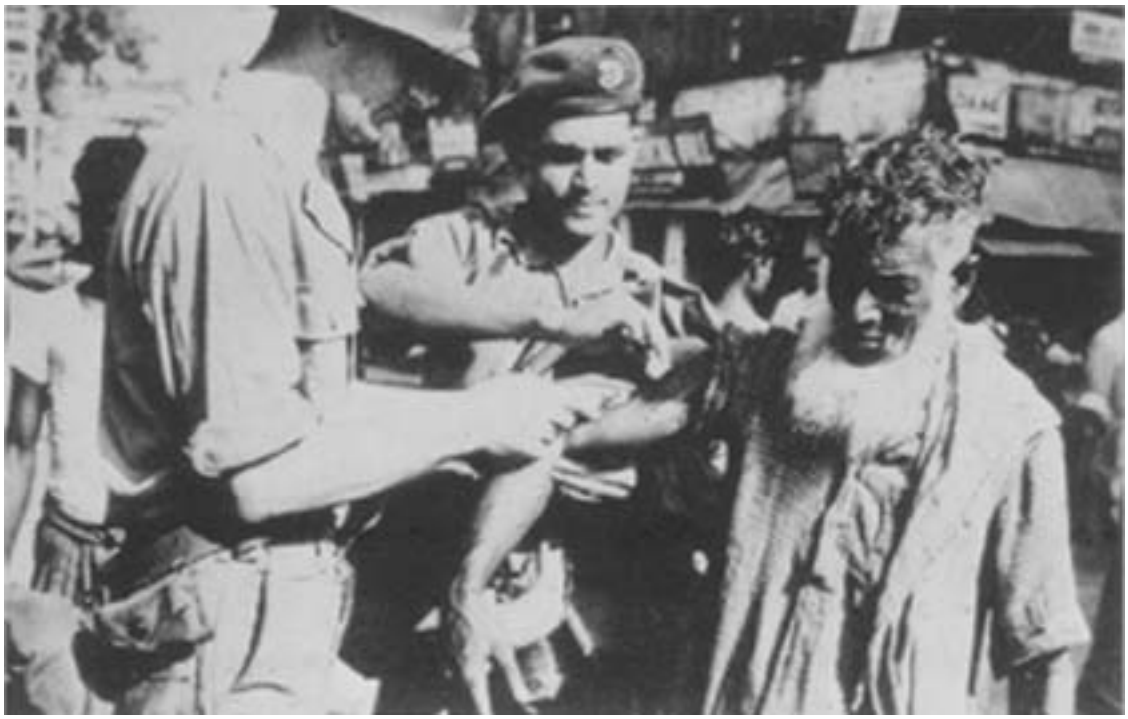

Fig. 4-3. The US military sponsored a typhoid fever and cholera immunization program in Pakistan after a devastating flood in 1954. This campaign immunized more than 850,000 people and provided high visibility for the US government. Photograph source: Armed Forces Institute of Pathology. As used in: Foster GM. *The Demands of Humanity: Army Medical Disaster Relief*. Washington, DC: Center of Military History, US Army; 1983: 150.

cholera and typhoid fever[44] (Figure 4-3). For the time and place, giving immunizations represented a high-tech, high-visibility intervention that the US military was uniquely prepared to deliver given its logistical muscle. No mention was made of efforts to secure safe drinking water for the masses or of the effectiveness of the immunization campaign.

In 1956, the US military deployed to Mexico to provide relief from Hurricane Janet in the Tampico area. As the Tamisi and Panuco river basins flooded, an estimated 800 people died, while some 5,000 were stranded on their roofs. Twelve US Navy medical officers and 24 corpsmen from Pensacola, Fla, and the USS Saipan worked with Mexican personnel to establish screened pit latrines and distributed hypochlorite compounds with which the people could treat their water. Together they vaccinated more than 54,000 people against typhoid fever, diphtheria, pertussis, and tetanus and sprayed much of the town with DDT and chlordane for vector control. Records indicate that no increase in typhoid fever or malaria was seen during this period.[45]

In response to a severe earthquake that rocked northwestern Iran in September 1962, killing more than 10,000 people, the US Army Europe sent the entire 8th Evacuation Hospital and the Preventive Medicine Surveillance Detachment from the 485th Medical Laboratory. Personnel from this detachment were instrumental in performing surveys, setting up delousing stations, supervising immunization teams, and providing sanitation instruction.[46,47]

Three months later, in January 1963, US Army Europe again responded to a major foreign disaster by sending an Army preventive medicine team to the flood-ravaged Moroccan province of Rabat to join US Navy and Air Force personnel already engaged in relief operations. Led by the US Army Europe Chief of Preventive Medicine (Lieutenant Colonel Joseph W. Cooch), this team of four physicians, three sanitary engineers, an entomologist, and eight preventive medicine technicians administered 41,000 doses of typhoid fever vaccine, deloused 9,000 people, and treated 75 wells.[48] These interventions were quite impressive in scope, yet no surveillance data were collected to assess their effectiveness.

Concurrent with these sporadic opportunities for US military involvement in goodwill missions overseas were institutional changes within the federal government as to which agency should orchestrate humanitarian assistance programs; they were felt to lack necessary focus and coordination. The issue itself was hotly debated during the 1960 presidential election. With his victory, John F. Kennedy made foreign assistance a top priority for his new administration. This prompted the US Congress to pass the 1961 Foreign Assistance Act, which called for the establishment of the US Agency for International Development (USAID) within the State Department. The first test for this new agency, the executor of all US foreign assistance programs, would be in the Republic of (South) Vietnam. In an effort to check the spread of Communism, USAID established a program based on counterinsurgency and democratic and economic development.

VIETNAM: NATION BUILDING, MEDICAL CIVIC ACTION, AND REFUGEE RELIEF

With the defeat of the French army at Dien Bien Phu by the Viet Minh and the resulting cease-fire agreement in Geneva, Vietnam was partitioned in 1954 at the 17th parallel into a procommunist north and an anticommunist south. As Ho Chi Minh's forces descended onto Haiphong and the rich Tonkin delta region to consolidate their gains, the US Navy mounted a 100-ship evacuation operation called "Passage to Freedom" that ultimately rescued 310,848 people fleeing the north. Key to this operation was Lieutenant (Junior Grade) Thomas A. Dooley who led the Navy's Preventive Medicine and Sanitation Unit at the refugee camps and embarkation sites in Haiphong. For his outstanding work with the fleeing refugees, Dr. Dooley was awarded the "Officier de l'Ordre National de Vietnam" by the President of South Vietnam in 1955.[49]

Within months of the political partition of Vietnam, the US government sent advisers to train the military of South Vietnam to deal with rebel forces known as the Viet Cong. The United States' first unconventional or guerilla war since the Philippine insurrection some 50 years before, the Vietnam War presented unique and serious challenges to the armed forces. Concurrent with the conduct of this war were OOTW known as medical civic action programs, which were complementary (in theory) to efforts in-country being managed by USAID. A mix of psychological operations and humanitarianism, these programs were intended to "win the hearts and minds" of the people while providing underutilized military medical personnel with an outlet for their skills.[50] The first of these programs, the Medical Civic Action Program (MEDCAP I), was begun in January 1963 to provide increased outpatient care for Vietnamese civilians living in rural areas. The strict intent was to enhance the "prestige" of the South Vietnamese government and army; US personnel were to have only a supporting role. US participation came primarily from advisory personnel assigned to Vietnamese Army units.[51,52]

In one example, MCA (Medical Civic Action) team #20 operated as a moving dispensary from April through December of 1963, visiting 121 villages and seeing some 20,000 civilian patients. With helminthiasis, conjunctivitis, and anemia among the most common diagnoses being made by his team, Captain James Anderson commented "it is obvious that a medical civic action program offers real opportunities for preventive medicine."[53p1056] In spite of this realization, no sustainable, long-term preventive medicine interventions were recorded by MCA team #20.[53]

By comparison, the US Special Forces (SF) working with the minority ethnic groups (eg, Montagnards, Nuongs, Cambodians) in the Vietnamese central highlands not only provided curative care but also sought to educate the people in basic sanitation and health measures. Captain Lowell Rubin, an SF physician who led much of this work, believed that the long-term objective of improving the health of these people could not be met any other way.[54] These tribes played a critical role in counterinsurgency efforts spearheaded by the SF. Referring to the Civilian Irregular Defense Group program of which these tribes were a part, Colonel Charles Webb (then the John F. Kennedy Special Warfare Center Surgeon and a preventive medicine physician) emphasized that comprehensive internal defense and development required that village health workers be trained appropriately. "A preventive medicine-oriented program, attacking the sources of disease, is necessary for any lasting contribution to local welfare... programs which provide safe water sources, sewage disposal, and the control of disease reservoirs and vectors."[55p392] According to Webb, veterinary officers also proved to be invaluable in these programs by assisting "in the prevention and eradication of zoonotic diseases, in slaughter and food

preparation programs and in the treatment and care of domestic and pack animals."[55p394] The SF medical leadership (under Colonel Lewellyn Legters) was so serious about bringing state-of-the-art preventive medicine to unconventional warfare and medical civic action that they established the US Army Special Forces–Walter Reed Army Institute of Research Field Epidemiology Survey Team (Airborne).[56,57] Another demonstration of SF's commitment in this arena came in 1971, when the 1st SF Group in Okinawa helped quash typhoid fever epidemics in neighboring Malaysia and the Philippines by sending in immunization teams.[3]

Apparently these and other lessons were also being followed by the enemy. Captain Arthur Ahearn in his description of Viet Cong medicine states:

> The Viet Cong are quite conscious of public health, and they employ the principles of sanitation extensively in their civic action and propaganda efforts. During the recent flood in the Danang area, they launched an intensive campaign to educate the villagers about the dangers of water pollution and measures to be taken to protect water and food from contamination. Such slogans as "Prevention of Disease is Patriotism" and "Prevention of Disease is Fighting the Americans" have been observed.[58p221]

Declaring MEDCAP I a success because it had demonstrated that the government of South Vietnam cared about its citizens, the Military Assistance Command, Vietnam (MACV), phased the program out by 1965 (for all but SF) and replaced it with MEDCAP II. This new program had the same goals as MEDCAP I but would involve US and free-world military units of battalion size or larger in the direct provision of medical care to civilians. Each of these allied units had the option of conducting a MEDCAP II program in their area of operation if they had the approval of the local Vietnamese provincial authority, the US Overseas Mission, and the MACV sector advisor.[59] From 1 December 1967 to 31 March 1968, an average of 188,441 civilians received outpatient treatment and 17,686 were immunized through MEDCAP II activities each month. By 1970, the MEDCAP II program was seeing between 150,000 and 225,000 outpatients monthly. As part of these efforts, US Army veterinary personnel established training in swine husbandry for farmers and provided cattle vaccinations. As part of a rabies control program, 21,391 animals in civilian communities were immunized in 1967.[52]

In reviewing the conduct of MEDCAP programs, Lieutenant Colonel (later Major General) Floyd Baker, Surgeon of the 1st US Field Force, observed that

> the ultimate goal of medical assistance rendered to the Vietnamese is to have the Vietnamese themselves capable of maintaining a satisfactory level of preventive and therapeutic medicine. Although much has been contributed by US medical efforts, these efforts, at times, result in only temporary relief of a situation and contribute little to the long term improvement in the health status of the Vietnamese.[60p10]

In what would prove to be an instructive example of what MEDCAPs were intended to be, Dr. Baker described the appropriate disposition of an epidemic of plague in one hamlet. Thirty people were ill and three had already died. Although US military MEDCAP personnel were ready to handle the outbreak unilaterally, they instead coordinated with the provincial health director to have the Vietnamese authorities take charge, with US medical personnel in an advisory role only. The process took longer, but all cases of plague were identified and treated, and people in the surrounding area received appropriate immunization. Villagers learned the proper way to dust with 10% DDT (then in use) to control fleas. They also learned how to control the rat population.[60]

Jeffrey Greenhut in his excellent review of medical civic action programs in Vietnam perhaps sums up these efforts best in saying that

> The overall effectiveness of medical civilian assistance programs is difficult to measure. Medically they could make no real impact on the general health of the population ignorant of basic health measures....[It] must be kept in mind that the primary purpose of all the programs was to assist in winning the "hearts and minds" of the population and, in this, no reliable measure of effectiveness exists.[59p127]

Ironically, US involvement in OOTW in Vietnam ended much as it began some 20 years earlier. With the fall of South Vietnam in April 1975, the United States mounted Operation New Life to accommodate more than 120,000 refugees in camps in the Philippines, Guam, and the US mainland. Once again, preventive medicine personnel stepped forward in this humanitarian effort to provide camp sanitation, communicable disease control, health and hygiene education, and mass immunizations.[61,62]

OPERATIONS OTHER THAN WAR IN LATIN AMERICA

Since the establishment of the Monroe Doctrine, no part of the world has felt the dominant foreign intervention hand of the United States like the countries of the Western Hemisphere, particularly those of Latin America. While the US military buildup in Vietnam was just starting in April of 1965, there was increasing political turmoil in the Dominican Republic, a country the United States had occupied from 1916 to 1924. Fearing a Cuban-style communist takeover, President Johnson sent elements of the 18th Airborne Corps there. When the troops arrived and secured the capital city, they quickly learned that the civilian casualty rate had been greatly exaggerated. (In fact, it was several days before arriving hospital units could find any Dominican casualties to treat.) US battle casualties also proved to be relatively light, with 16 killed and 148 wounded, 68 of whom who required hospitalization. A common complaint was that the 22,000 servicemen participating in this operation (named Power Pack) found themselves with little to do.[63]

Preventive medicine personnel, however, found themselves to be in great demand. The threat of epidemic diarrhea spreading from the city to the troops spurred the 714th Preventive Medicine Detachment to quickly organize and train field sanitation teams (a total of 114 personnel) for the deployed force. The administration of immune globulin successfully curbed a nascent outbreak of hepatitis A in the troops. Vector control initiatives were credited with there being no reported cases of malaria or dengue among troops in the field.

In the civilian community, preventive medicine personnel worked closely with the Red Cross and the Ministry of Health to restore public services damaged in the fighting, such as the potable water system, and prevent the spread of disease by such activities as a typhoid fever immunization program. Through 1966, the emphasis for these public health cooperative efforts was placed on water testing, rodent control, restaurant inspection, field sanitation team training, venereal disease control, and garbage disposal.[63]

Although this intervention in the Dominican Republic to prevent anarchy proved to be a relative success with little loss of US service member life, the concurrent war in Southeast Asia proved to be otherwise. The Paris Peace Accords had allowed the United States to withdraw from South Vietnam in 1973, but the war itself left the United States with a severe reluctance to enter into another armed conflict. Instead, at the height of the Cold War, US military doctrine would focus for the next decade on the nuclear arms race and preparing to fight a conventional war with Warsaw Pact forces across the central plains of Germany. The military would engage in few humanitarian missions during this time. Peacekeeping missions, as we currently understand them, were not even a consideration.

A bloody coup by communist revolutionaries on the island of Grenada changed all of this. In October 1982, under the name Operation Urgent Fury, the US military and forces from six Caribbean nations flew to the island to restore order and to rescue approximately 1,000 US citizens being held captive. A myriad of preventive medicine issues confronted the preventive medicine officer (Colonel N. Joe Thompson) and the environmental science officer (Major John B. Czachowski) for the 18th Airborne Corps. (They would be joined by the 714/155 Preventive Medicine Detachment from Fort Bragg, NC.) After addressing preventive medicine issues involving US soldiers, these professionals moved on to the problem of caring for the basic sanitation and public health needs of some 800 detained Cuban and Grenadian personnel. With most of the senior leadership of the ministry of health killed in the coup, Colonel Thompson and Major Czachowski worked closely with representatives from USAID to restore the public health services of the island (eg, garbage disposal, sewage treatment, insect control, replacement of lost vaccines). Most notable were the efforts of an Army sanitary engineer from the US Army Environmental Hygiene Agency who established a system of "wash throughs" to clear a portion of the city water system of a toxin, paraquat, placed there by a saboteur.[64]

After the attempted communist takeover of Grenada, a significant concern arose that other countries in Latin America could slip into the Cuban and Soviet sphere of influence. A number of factors favored insurgency movements in these countries, such as the gross disparity in living conditions between rich and poor and an apparent lack of concern on the part of existing governments for the welfare of their own citizens. Following communist doctrine, Soviet surrogates would deploy civic action teams (eg, medical, engineering, teaching) to many rural areas to build support for their revolutionary cause while seeking to discredit the

existing government. These rebels would further try to destabilize the government by disrupting its economy and ability to provide services to the people.

For struggling democracies to have their best chance to succeed against such a threat, they needed assistance from the outside. With health care matters and economic recovery being inexorably intertwined, the most appropriate role for military medicine in this low-intensity conflict (LIC) environment became that of nation building rather than the more traditional combat service support. While not usurping the State Department's job of development through the USAID, the Army Medical Department was nevertheless uniquely positioned to build on lessons learned from its MEDCAP programs in Vietnam.[65–67] It was important for the leaders and military of these countries to be seen as caring for their own people.

Throughout the 1980s, El Salvador was embroiled in a civil war between the Farabundo Marti Liberation Movement (Marxist-Leninist guerrillas supported by Cuba and Nicaragua) and the El Salvadoran democrats. Early in the insurgency, the guerrillas found it fairly easy to discredit the abusive military government and was known to have provided health care and other public services to the impoverished peasant farmers in the rural areas they controlled. Involvement of the US military in this conflict was severely limited by Congressional action. By the late 1980s, it became obvious to senior leaders of the El Salvadoran government that an end to hostilities could only be reached through significant government human rights reforms and free elections. Inherent in winning back the trust of the people was the need for significant civic action programs on the part of the El Salvadoran military. A team of officers and senior enlisted personnel from the Army Medical Department assisted in many of these efforts, which included the provision of prosthetic devices to those who had lost limbs to land mines, the establishment of an infectious disease reporting system, and the building of a human waste disposal system for the capital city of San Salvador.

The involvement of the Army Medical Department in Honduras largely began in 1983 with the military exercise Big Pine II (Ahuas Tara) through which US personnel of the Medical Element of Joint Task Force-Bravo (41st Combat Support Hospital) initiated a series of humanitarian civic action–type training activities termed Medical Readiness Training Exercises (MEDRETEs). In the first year, 135 villages were visited, 47,228 patients evaluated, 21,047 teeth extracted, and 37,067 animals treated. Medical personnel also participated with Honduran officials in providing 202,339 immunizations against polio, diphtheria, pertussis, tetanus, tuberculosis, and measles during the country's national immunization week.[68,69]

Over the next decade, MEDRETEs would be repeated frequently by many units deploying to Latin America and would provide training opportunities for health care professionals from all of the US armed services, including National Guard and Reserve units. Not unlike their MEDCAP forefathers in Vietnam, these MEDRETEs were planned with the best intentions yet too often proved to be ineffective and costly, providing but a transitory benefit to the rural populations served. In fact, many of these missions failed to even address the communities' public health requirements of potable water, human waste disposal, vector control, personal hygiene and sanitation, and basic health education.[70,71] Rarely, if ever, were medical outcomes followed in time to see if the interventions had a beneficial effect.

Because of the training benefit to the units involved, these missions continue to the present day, often involving National Guard units. Starting in the 1990s, these programs have come under greater scrutiny by the respective regional commander-in-chief and the Peacekeeping and Humanitarian Assistance Office of the Assistant Secretary of Defense to ensure that they are properly coordinated with the local ambassador and military attache and that their goals, methods, and content meet certain criteria. "Tailgate" medicine is no longer considered appropriate for these missions.

Distinct in funding and statutory authority from the humanitarian civic assistance–type projects mentioned above are humanitarian assistance programs, which enable the commanders-in-chief to finance projects customized to their regions' specific needs. Perhaps the best example of such a humanitarian assistance program funded by commander-in-chief initiative funds is the establishment of a sustainable computerized infectious disease surveillance system for a number of countries in the Caribbean region. This project, begun in 1997, has been a collaboration between preventive medicine professionals at the Walter Reed Army Institute of Research, the Pan American Health Organization, and the respective national ministries of health.

THE MODERN ERA OF COMPLEX HUMANITARIAN EMERGENCIES

Iraq and the Kurds

In March 1991, in the aftermath of the Gulf War, Saddam Hussein ruthlessly suppressed a popular uprising among ethnic Kurds in northern Iraq with the army divisions spared in the Persian Gulf War. Faced with certain retribution, 1.5 million people in this region attempted to flee the country in advance of Iraqi Army troops. More than 500,000 of these Kurds ended up massed along the austere mountainous border between Turkey and Iraq with no means to protect, feed, or shelter themselves. At the direction of President George Bush, the US military in Europe led a North Atlantic Treaty Organization relief effort (Operation Provide Comfort). This effort began with air drops of supplies in April 1991 (Figure 4-4) and culminated with the resettlement of the people into their towns by late summer (Figure 4-5). The 10th SF Group was the first and primary responder sent in to stabilize the situation in the mountains. First providing security for the people from hostile forces, these professionals quickly organized an efficient distribution system for food and relief supplies (Figures 4-6 and 4-7). Colonel Michael Benenson, an Army preventive medicine physician from the 7th Medical Command in Heidelberg, Germany, was named the Combined Task Force Surgeon for Operation Provide Comfort. Colonel Benenson and his staff supervised all of the medical aspects of the relief effort, assigning the placement of arriving military and civilian medical relief units where needed most. Two other preventive medicine physicians (Captain Ralph L. Erickson, US Army, from the US Army Special Operations Command, Fort Bragg, NC, and Lieutenant Commander Trueman Sharp, US Navy, from the 7th Preventive Medicine Unit, Sigonella, Italy) served with the Public Health Disaster Assistance Response Team (PH DART) from USAID's Office of Foreign Disaster Assistance in assessing the public health needs of the mountain "camps" on a daily basis. Working in both the camps and at the main staging base in Siloppi, Turkey, this team provided the coordinating link between the military (initially 10th SF Group, later numerous NATO allied units) and the follow-on civilian relief workers from private voluntary agencies. In this assessment and coordinating role, the team collected data concerning the incidence of in-

Fig. 4-4. Aerial food resupply of Kurdish refugee camp at Curcurcka, Iraq, during Operation Provide Comfort in 1991. The mountainous terrain of this border region made this form of resupply the only one practical. With significant rotary-wing airlift capability, the US military forged a productive collaboration with its civilian counterparts in the relief effort. Photograph: Courtesy of Lieutenant Colonel Ralph L. Erickson, Medical Corps, US Army.

Fig. 4-5. Kurdish refugee families being transported from mountain camps back to their homes in northern Iraq during Operation Provide Comfort, 1991. Photograph: Courtesy of Lieutenant Colonel Ralph L. Erickson, Medical Corps, US Army.

Fig. 4-6. Food distribution at Kurdish refugee camp at Curcurcka, Iraq (Operation Provide Comfort, 1991). In running this distribution network, the US military made use of the Kurd family-clan hierarchy. Mortality and health surveillance data were collected from the families at the time food was picked up. Photograph: Courtesy of Lieutenant Colonel Ralph L. Erickson, Medical Corps, US Army.

Fig. 4-7. At its peak, the Kurdish refugee camp at Curcurcka, Iraq, held 100,000 people (Operation Provide Comfort, 1991). With little protection from the elements and only a few intermittent streams from which to drink, hundreds of people, especially children, died from hypothermia or diarrhea. This excess mortality was greatly decreased with the provision of tents, food, and chlorinated water. Photograph: Courtesy of Lieutenant Colonel Ralph L. Erickson, Medical Corps, US Army.

fectious disease (eg, diarrhea) and mortality in the camps. It also helped prioritize necessary public health interventions, such as provision of safe water and sanitary facilities. Within this broad effort, a cholera epidemic was tracked and controlled. In response to an outbreak of measles, this team administered a program that led to more than 45,000 children under the age of 5 years being immunized (Figure 4-8). Members of the PH DART also conducted a cross-sectional health survey in this vulnerable age group, revealing significant acute malnutrition.[72,73]

Haitian Refugees

From 1991 to 1994, tens of thousands of Haitians fled their country because of a deteriorating economy and the violent repression of the ruling military junta. Many of those fleeing by small boats and rafts, hoping to travel to Florida, were interdicted by the US Coast Guard and brought to an established refugee camp at the US Naval Base at Guantanamo Bay, Cuba, where their immigration status could be further evaluated (Operation GTMO). From October 1991 through May 1992, more than 34,000 Haitians were cared for at this camp, with 26,000 of them being eventually repatriated to their home country to apply for immigration through traditional channels. The infectious diseases carried by this predominantly male population included filariasis, malaria, tuberculosis, and human immunodeficiency virus infection. Though security was the number one public health priority at all times, the logistics of providing sanitation and safe food and water was an arduous task. These duties and others (eg, disease surveillance, vector control, immunizations) kept preventive medicine personnel from all of the uniformed services constantly busy.[74] Although the camp census fell considerably (to less than 1,000) following President George Bush's executive order to halt the bringing of migrating Haitians to Guantanamo (but rather to repatriate them directly to Haiti), conditions within Haiti continued to deteriorate through July 1994, prompting some to predict that more than 100,000 would attempt to flee within the coming months if something were not done.[75]

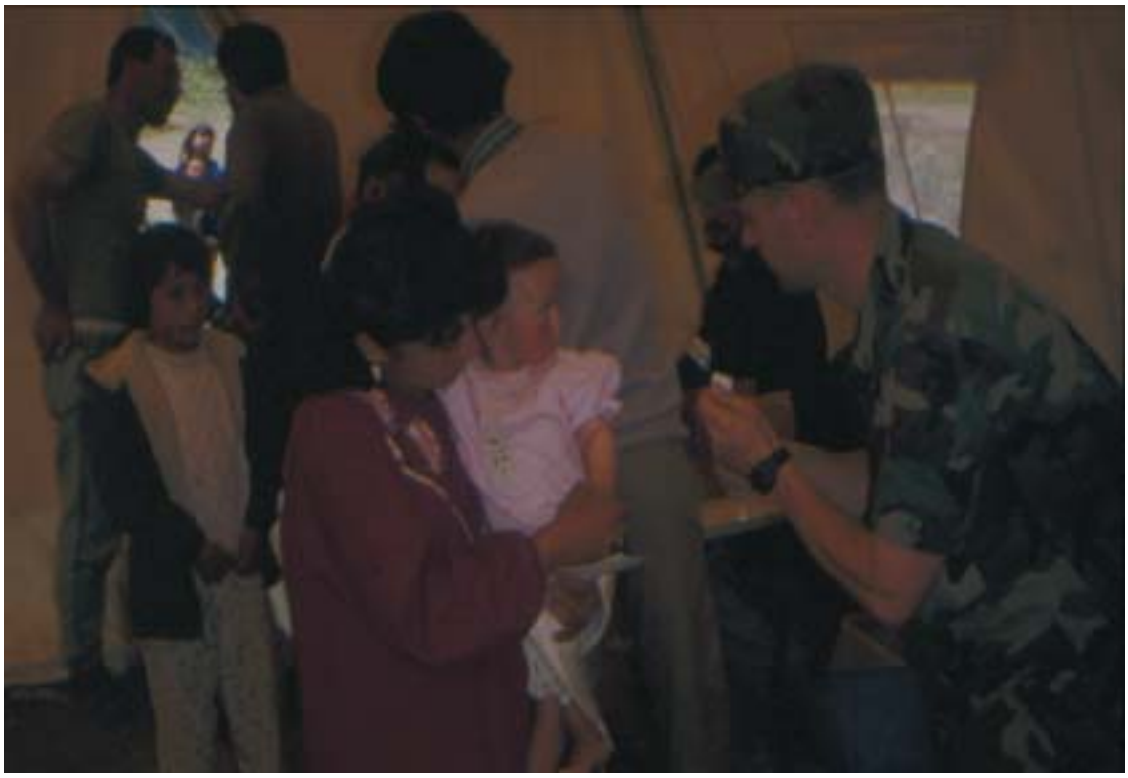

Fig. 4-8. A US preventive medicine officer provides measles immunizations to Kurdish refugee children during Operation Provide Comfort, 1991. Mortality from measles can be especially high in refugee settings where children are undernourished and stressed. In response to an outbreak of 26 cases of measles at the camp of Yekmal, more than 45,000 Kurdish children were immunized. Photograph: Courtesy of Lieutenant Colonel Ralph L. Erickson, Medical Corps, US Army.

In September 1994, US forces arrived in Haiti leading a multinational force to remove the military dictatorship and restore democracy (reseating President Aristide). Preventive medicine professionals deploying in support of Operation Uphold Democracy quickly established field sanitation, vector control, and safe water for the US (and later United Nations) camps.[76] An effective febrile disease surveillance system ultimately tracked incidence of dengue fever and hepatitis E among the peacekeepers, resulting in renewed emphasis on personal protective measures and sanitation.[77] The scope of preventive medicine services eventually expanded into the civilian community as personnel from the 61st Preventive Medicine Detachment conducted inspections of hotels, restaurants, and government institutions.[78] Personnel from the 94th Medical Detachment (Veterinary Medicine) also immunized nearly 50,000 dogs and cats for rabies as part of Operation Mad Dog.[79]

NATURAL DISASTER RELIEF IN RECENT TIMES

Following the deadly Alaskan earthquake of 1964, Army preventive medicine personnel assisted civilian public health officials in relief efforts in Anchorage, Valdez, and Seward. The Army personnel conducted sanitation surveys, provided a safe water supply, and provided immunizations where indicated. In the wake of three hurricanes hitting the United States (Betsy 1965, Beulah 1967, and Agnes 1972), Army units again participated as needed to ensure the public health safety of the populations affected through, respectively, the provision of typhoid immunizations, basic sanitation, and consultation.[3]

Responding to a December 1972 earthquake that leveled Managua, Nicaragua, leaving an estimated 5,000 people dead and another 20,000 injured, the US Southern Command deployed a Disaster Area Survey Team, commanded by Colonel Raymond L. Coultrip, to the city. In assessing the needs of the population and providing consultation to the US

Ambassador concerning US participation, this team performed two vital preventive medicine services. The first involved coordinating the repair of the city water system; the second was the turning back of an unnecessary typhoid fever immunization program even though political pressure was brought to bear to use some 900,000 doses of a vaccine contributed by another Latin American country.[80]

Hurricane Andrew swept ashore on 24 August 1992, destroying 25,000 homes and leaving 200,000 homeless or temporarily displaced in south Florida. In its eventual sweep through the Bahamas, Florida, and Louisiana, it would cause at least 48 deaths. Within hours, the 44th Medical Brigade under the command of Brigadier General (now LTG) James Peake formed a relief task force to aid civilian authorities in the devastated area, which happened to include Homestead Air Force Base. An early assessment revealed that the local public health system had collapsed and that tap water, though available, was not potable. Personnel from the 44th quickly established a series of 28 free clinics for both civilians and military members from the community. Efforts were also undertaken by the military to provide field sanitation facilities and water. Lieutenant Colonel Jose Sanchez and Captain Vincent Fonseca, representing the Epidemiologic Consultation Service of the Surgeon General (headquartered at the Walter Reed Army Institute of Research), established an outpatient surveillance system among the 28 clinics. With a complementary system established by the Dade County Public Health Unit, they demonstrated a sustained low prevalence of diarrhea and respiratory disease for the first month of relief operations. These data proved invaluable to senior leaders in the relief effort who were then able to prioritize interventions correctly (eg, avoiding an unnecessary typhoid fever immunization program, turning back an excess of health care volunteers), while reassuring the public that things were under control.[81]

Six years later, on 24 October 1998, Hurricane Mitch pummeled the Caribbean coast of Central America for more than 48 hours. The heavy, continuous rains and resulting landslides and flooding were estimated to have cost up to 25,000 lives in Honduras, Nicaragua, El Salvador, and Guatemala. In Honduras alone (the country most severely hit), more than 1.5 million people were affected, many without shelter.[82] In response to this immense human tragedy, the US Southern Command organized Operation Fuerto Apoyo (Strong Support), sending 5,400 servicemembers from all four armed services and 140,000 lbs of supplies to the region. Joint Task Force-Bravo spearheaded the effort in Honduras, while Task Force Aguila (Eagle) addressed the needs of El Salvador, Nicaragua, and Guatemala. Preventive medicine physicians and sanitarians from the US Army Center for Health Promotion and Preventive Medicine (Aberdeen Proving Ground, Md) played key roles through the initial assessment of the public health needs of these countries. The US military provided massive amounts of drinkable water (420,000 gal) at various locations and cleaned out contaminated wells. They also helped spray for vectors and provided consultation in the control of outbreaks of cholera, typhoid fever, leptospirosis, malaria, and conjunctivitis.[83]

SUMMARY

The participation of the US military in OOTW both within the United States and abroad, especially in the last 40 years, is perhaps best explained by necessity. Taking nothing away from the Federal Emergency Management Agency, the American Red Cross, the United Nations, and a host of nongovernmental organizations, the US military has unmatched capabilities and training that are useful in emergency situations. Transportation assets and logistical depth top the list. In addition, the Department of Defense's ability to provide credible physical security while maintaining command, control, communication, and intelligence in a highly unstable field environment is also unique. Though various groups are working to become self-sustaining under austere conditions, no other organization trains to the level of preparedness of the US armed forces. The military's field medical capabilities, particularly the depth of preventive medicine equipment and expertise, allow for rapid employment without a prolonged period of acquisition or training.

With the dissolution of the Soviet Union and the end to the Cold War, the decades-long tensions between superpowers have eased considerably, but previously suppressed religious and ethnic rivalries have resurfaced with a vengeance. The collapse of the Soviet bloc has left a number of fragile, internally conflicted states, two of which in 2001 contain US military peacekeepers: Bosnia and Kosovo. Given decades of corruption, civil war, and rampant disease (eg, HIV), a number of profoundly weak nations, particularly in Africa, have nearly collapsed in recent years. Transitional nations—those trying to emerge from national conflict or

political change)—are poised for either growth or chaos. The challenge for the US National Command Authority in this unstable, post–Cold War era is to be ready and to have established criteria for the employment of military forces in these OOTW.

The central role played by preventive medicine personnel in OOTW is best illustrated in the missions of humanitarian assistance, disaster relief, and nation building. From the earliest days on the American frontier to the aftermath of the San Francisco earthquake to the conquest of deadly disease in the building of the Panama Canal to complex humanitarian emergencies in places such as Poland or Northern Iraq to the devastated countries of Central America after a hurricane, these preventive medicine professionals have risen to the occasion. They have applied the latest science and practice of sanitation, water purification, immunization, and vector and disease control in service to those in desperate need. It remains a given that US military preventive medicine officers and enlisted personnel will continue to play THE leadership role for the military's medical departments in these and other similar missions of the future.

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