

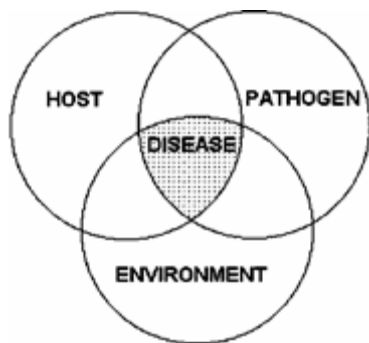


U.S. Army Heritage and Education Center

October 2014

U.S. Army War College

Carlisle Barracks, Pa.



Battling the Bug

The Army's Response to
Epidemics and Pandemics

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**Battling the Bug:
The Army's Response to Epidemics and Pandemics**

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I. Executive Summary

The epidemic is seldom mentioned and most Americans have apparently forgotten it. This is not surprising. The human mind always tries to expunge the intolerable from memory.¹

- H.L. Mencken

Numerous Ebola outbreaks have devastated West African communities. Beginning in March 2014, 7,470 people contracted the virus and 3,431 died in Liberia, Sierra Leone, Guinea, Senegal, and Nigeria. The disease has since spread to the United States and Europe. In the U.S., the disease has claimed one life and two more have become infected.² Previous Ebola epidemics occurred in West and Central Africa in 1976, 1995, 2000, and 2007. The 2014 outbreak is by far the deadliest, already approaching ten times the number of cases of the 1976 outbreak, the previous worst in history and the year of the virus' discovery.³

The magnitude of the epidemic has caused a global crisis and evoked a powerful response from the United States Government. On September 16, speaking at the Centers for Disease Control and Prevention headquarters in Atlanta, Georgia, Pres. Barack Obama resolved to "make [Ebola] a national security priority." The President's strategy comprises four elements: containing the spread, countering negative economic and communal ramifications, coordinating a global response, and developing public health systems in affected countries for the future. Further, President Obama announced the establishment of a military command center and field hospitals in Liberia, a healthcare training center in Senegal, and an "airbridge" to the region for supply and personnel transfer.⁴

President Obama's actions initiate a trend: military operations specifically targeting disease containment. This approach is comprehensive, but not new. Moreover, viruses such as Ebola emphasize the unpredictable nature of disease, emerging sporadically, without warning, and potentially virulently. Early planning for the aftermath of an outbreak is an essential component of containment and mitigation.

The U.S. military has encountered disease on a large scale throughout its history. This latest deployment benefits from centuries of combined wisdom in disease control. From 1776 until 1918, the so-called "Disease Era" of American conflict, the microbe, rather than the enemy combatant, was the Soldier's most lethal adversary. Indeed, all casualty counts must include a "disease and non-battle injury" (DNBI) category to

¹Lynette Iezzoni, *Influenza, 1918: The Worst Epidemic in American History* (New York: TV Books, 1999), 17.

²"WHO: Ebola Response Roadmap Situation Report," *World Health Organization*, October 3, 2014, accessed Oct. 16, 2014, http://apps.who.int/iris/bitstream/10665/135765/1/roadmapupdate3oct14_eng.pdf?ua=1.

³Joe Burgess, et al., "What You Need to Know about the Ebola Outbreak," *New York Times*, Sept. 17, 2014, accessed Sept. 19, 2014, http://www.nytimes.com/interactive/2014/07/31/world/africa/ebola-virus-outbreak-qa.html?_r=0.

⁴Barack Obama, "Remarks by the President on the Ebola Outbreak," The White House, Office of the Press Secretary, September 16, 2014.

include those who succumb to such maladies. Scientific and medical advancements have since learned the causes of various diseases, provided treatments, improved sanitation, and promoted hygiene. Disease rates in the military subsequently plummeted.⁵

Despite those successes, and the now-universal use of vaccines to protect the military and civilian workforce, their families, and retirees, disease remains a constant and growing threat. “Old” diseases thought to be eliminated, such as typhoid fever, or at least controlled, such as influenza, have returned, sometimes in new and more virulent form. Diseases such as Ebola, previously thought to be limited to developing nations, have appeared in more modern societies. “New” diseases, such as Severe Acute Respiratory Syndrome (SARS), have emerged.

This survey provides three case studies from American history in which epidemic disease affected U.S. Army operations. The Yellow Fever in Havana, Cuba in the 1890s and in Panama in the early 1900s demonstrates a case in which disease eradication required multiple Army control measures. Success was critical to complete the Panama Canal. The 1918-19 Spanish influenza demonstrates a case in which pandemic swept through the Army, taking advantage of mass mobilization as it devastated civilian populations as well. Diseases as debilitants during World War II and later conflicts demonstrate scenarios in which medicine taken according to a precise regimen drastically reduced mass infection.

These examples demonstrate how military forces have fought or contained disease of epidemic proportions. Although the diseases in these case studies use different vectors and vary greatly from Ebola in numerous respects, the Army’s response to them provides some similarities. The nature of Ebola, its speed of transmission, and the regions in which it is currently rampant provide the commander with significant challenges. The challenges to protect the force are much more complex under the threat of widespread infectious disease. This study offers some considerations for the commander and staff planning operations in support of mitigating the Ebola outbreak.

Training: The need for infectious protocol training exists not only for medical professionals, for whom it may be only a refresher, but also of all other deploying personnel. Anyone deploying to the affected region may run the risk of infection, and thus training is required. This training may include training on new, mission-specific equipment.

Equipment: Humanitarian operations often require different and specialized equipment from that which is currently assigned under U.S. Army Modified Table of Organization and Equipment (MTOEs), or at least readily available. That equipment, to include clothing and other mission-specific gear, must be identified, located, and issued to the deploying unit.

Resourcing: Army units are not typically funded for such missions, and the requirements for any such mission will be significant.

⁵V. J. Cirillo, “Two Faces of Death: Fatalities from Disease and Combat in America’s Principal Wars, 1775 to Present.” *Perspectives in Biology and Medicine* 51, no. 1 (Winter 2008): 121-33.

Interagency Cooperation: The case studies indicate the Army took the lead in these operations because only the Army at the time had the capability and/or capacity for such large-scale actions, with the medical expertise to direct appropriate actions. In the modern era, however, the Army will operate within a framework of the interagency and NGOs with medical professionals from around the world. Liaison officers to such agencies as the Centers for Disease Control (CDC), World Health Organization (WHO), Doctors without Borders, and the medical agencies of the countries affected could prove invaluable. Multiple, diverse participants increasingly characterize current operations in a diplomatic atmosphere calling for international responses. This reality underlines the criticality of clear articulation of command and control and lines of authority.

The US Army Medical Department History Office provides a wealth of information of value to the commander and staff. The bibliography at the end of this study provides numerous resources, but the AMEDD materials may be found at <http://www.cs.amedd.army.mil/borden/>.

I. The Origins of Infectious Disease and the Development of Immunization

Epidemiology is the study of the incidence, distribution, and control of a disease in a population. The study includes tracing the geographical and biological origins of a particular disease; determining the disease's scope, i.e. who is or can be infected; assessing the established and potential geographical range of diffusion; and virulence, including symptoms and secondary infections, such as pneumonia. Epidemiological study is the first step in prevention and containment of an outbreak before, during, and after it reaches epidemic or pandemic levels.

The World Health Organization (WHO) categorizes the widespread outbreak or incidence of infectious diseases as endemic, epidemic, or pandemic:

Table 1 – World Health Organization (WHO) Classifications

Endemic	Disease regularly found in or restricted to a certain area or population. Endemic diseases are often the source of an epidemic's "patient zero."
Epidemic	Regional or communal outbreak among particular population.
Pandemic	An epidemic that affects multiple populations. For influenza, this involves the appearance of a new virus subtype and easily spread (e.g. through respiratory droplets) human-human transmission.

(Adapted from Col. Pietro Tornabene, "The Military Response to Pandemic: The New Global Threat" Strategy Research Project (SRP), USAWC Class of 2009 (Carlisle, Pa.: U.S. Army War College, 2009), 4-5.; Peter Doshi, "The Elusive Definition of Pandemic Influenza," World Health Organization Bulletin available at <http://www.who.int/bulletin/volumes/89/7/11-086173/en/> accessed September 2, 2014.)

These conditions for qualification as endemic, epidemic, or pandemic are applicable to any disease in one or multiple populations.

Many diseases that pose an epidemic threat to humans, such as influenza and SARS, originate in animals such as birds, pigs, and bats. These animal vectors then act as reservoirs for transfer to a human host. Some animal populations also exhibit endemic infection. The 2003 H5N1 Avian Flu was endemic to poultry in parts of Asia and later became pandemic due to the infection of migratory birds.⁶

Other diseases, such as typhoid, are transmitted through the ingestion of bacteria found in fecal matter. As with dysentery, prevention lies in proper hygiene and sanitation. Mosquitos transmit diseases such as yellow fever and malaria, but such diseases do not infect the animals themselves.

⁶"Responding to the Avian Influenza Pandemic Threat: Recommended Strategic Actions." Communicable Disease Surveillance and Response Global Influenza Programme, (World Health Organization, 2005), 3. Available at http://www.who.int/csr/resources/publications/influenza/WHO_CDS_CSR_GIP_05_8-EN.pdf

Table 2 documents some of the most serious epidemic and pandemic outbreaks in the last century:

Table 2: Major 20th- and 21st-Century Epidemics and Pandemics

Pandemic	Deaths	Background
1918-1919, H1N1; ‘Spanish Flu’	~50-100 million	2/3 of deaths occurred in 24-week period; 675,000 US deaths; 20-40% globally infected
1957-1958, H2N2; ‘Asian Flu’	~2 million	Originated in China, spread to UK within 4 months; immunity rare in those under 65
1968-1969, H3N2; ‘Hong Kong Flu’	~1 million	Similar to but more mild than 1957 flu; originated in China, detected in Hong Kong
2003, H5N1; ‘Avian Flu’	243	Highly virulent – 63% mortality; 230+ million domestic birds culled to stop spread of disease
2003, SARS (Severe Acute Respiratory Syndrome)	774	Low human-human transmission rate; major global social and economic disruptions
2009-2010, H1N1; ‘Swine Flu’	~8,870-18,300	CDC estimates 43-89 million contracted flu; rapid response and vaccination caused decline
2014, Ebola Virus Disease	7,470 as of Oct. 3, 2014	Originated in Guinea, likely from fruit bat vectors, spread to Liberia, Sierra Leone, Nigeria

(Adapted from “What You Need to Know About the Ebola Outbreak,” updated September 18, 2014, The New York Times, <http://www.nytimes.com/interactive/2014/07/31/world/africa/ebola-virus-outbreak-qa.html> (accessed September 4, 2014).; G. A. Opie, *Pandemic Flu: Will the World Catch a Cold?* London: Ministry of Defence, 2009, Seaford House Papers, 162-5.; “Pandemic Flu History” FLU.GOV, <http://www.flu.gov/pandemic/history/> (accessed September 2, 14).)

Immunization had been a preemptive defense against disease for American soldiers since Gen. George Washington mandated compulsory smallpox inoculation of the Continental Army in 1777.⁷ Vaccine immunology progressed significantly in the next century due to the research and discoveries of French microbiologist Louis Pasteur, German physician Robert Koch, and other pioneers of medical science.⁸ Nonetheless, cholera, diarrhea, dysentery, and “camp fevers” such as Typhoid plagued soldiers throughout nineteenth-century conflicts. Preventive medicine remained rudimentary. Limited medical knowledge had not yet developed regimens for various diseases associated with wartime mobilization.

Disease barely killed more American soldiers than combat in World War I, at 51 percent. Moreover, the disease rate just for the AEF was down to 21 percent.⁹ Prior to

⁷Erna Risch, *Supplying Washington’s Army*, Special Studies Series (Washington, D.C.: U.S. Army Center of Military History, 1981), 380. Available at <http://www.history.army.mil/html/books/040/40-2/index.html>.

⁸“The History of Vaccines,” 2014, The College of Physicians of Philadelphia, <http://www.historyofvaccines.org/content/timelines/all> (accessed 9 October 2014).

⁹Col. Leonard P. Ayers, *The War with Germany: A Statistical Summary* (Washington, D.C.: U.S. Govt. Printing Office, 1919), 123. Available at

overseas deployment, the Army immunized soldiers against smallpox and typhoid but could not foresee the outbreak of the catastrophic Spanish influenza nor the rate of its spread, exacerbated by close-quartered living conditions.¹⁰ By the beginning of World War II, the Army immunized soldiers against smallpox, typhoid fever, cholera, plague, tetanus, yellow fever, and typhus.¹¹ Penicillin was the groundbreaking development of inestimable value. Wartime experience reportedly advanced medical knowledge by an estimated fifteen years.¹²

Wartime disease accounted for less than 2 percent of total lives lost in World War II, Korea, and Vietnam. Gulf War losses amounted to one hundred and forty-seven in combat and thirty from disease. Of those thirty, cardiovascular disease accounted for seventeen; infectious disease accounted for only one. At 0.004 percent, the disease death rate in the Persian Gulf was the lowest disease rate ever. In OIF and OEF, disease was a nonfactor. Cardiovascular, neoplastic, and other noninfectious diseases, as well as suicide, have eclipsed the old wartime scourges in death toll.¹³

Charts 1 and 2 compare disease and combat deaths in major American military conflicts from 1775 to 1991. Even as the average number of troops mobilized for war has increased, disease to combat death ratios as well as overall disease deaths have significantly decreased. Moreover, disease death (mortality) rates have decreased dramatically to as low as 0.004 percent during the Gulf War.

<http://babel.hathitrust.org/cgi/pt?id=mdp.39015030674876#view=1up;seq=7>. An extract is available at <http://www.vlib.us/medical/stats/statusus.htm>.

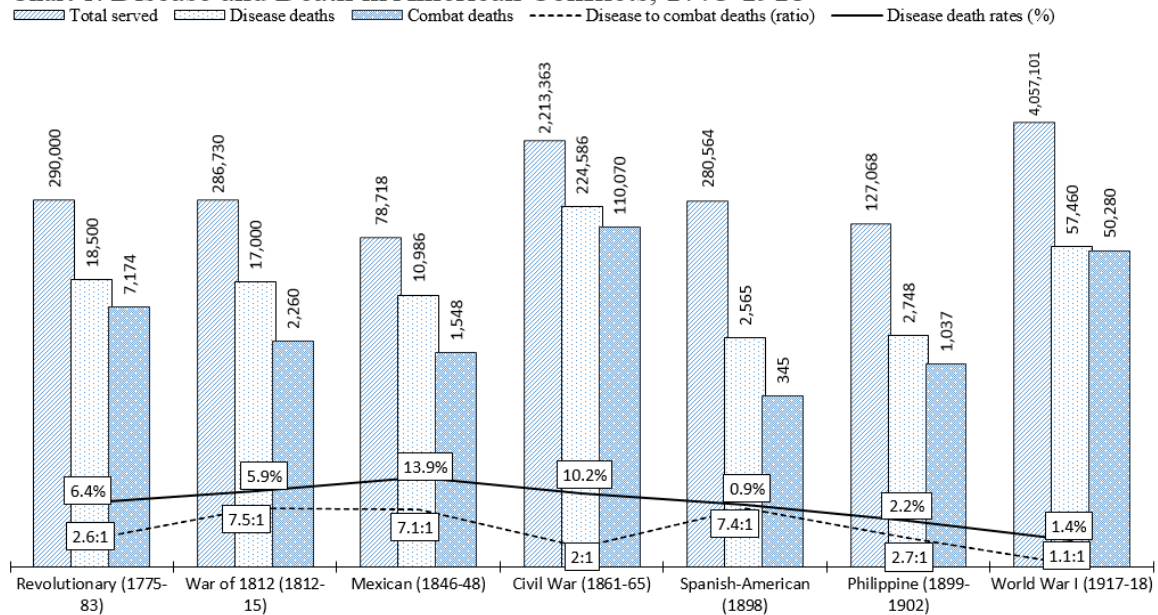
¹⁰John D. Grabenstein et al., "Immunization to Protect the U.S. Armed Forces: Heritage, Current Practice, Prospects," Vaccines.mil, <http://www.vaccines.mil/documents/library/MilitaryImztn2005fulc.pdf>.

¹¹Cirillo, "Two Faces of Death," 128.

¹²Historical Division, Army Medical Library, "Developments in Military Medicine during the Administration of Surgeon General Norman T. Kirk," *The Second World War, Special Subjects Series* (Washington, D.C.: U.S. Army Medical Department (AMEDD), Office of Medical History, n.d.), 620-21 republished from *The Bulletin of the U.S. Army Medical Department* 7, nos. 6-7 (June-July 1947), 520-62 & 594-646. Available at <http://history.amedd.army.mil/booksdocs/wwii/DvlpmntsinMilMed.htm>

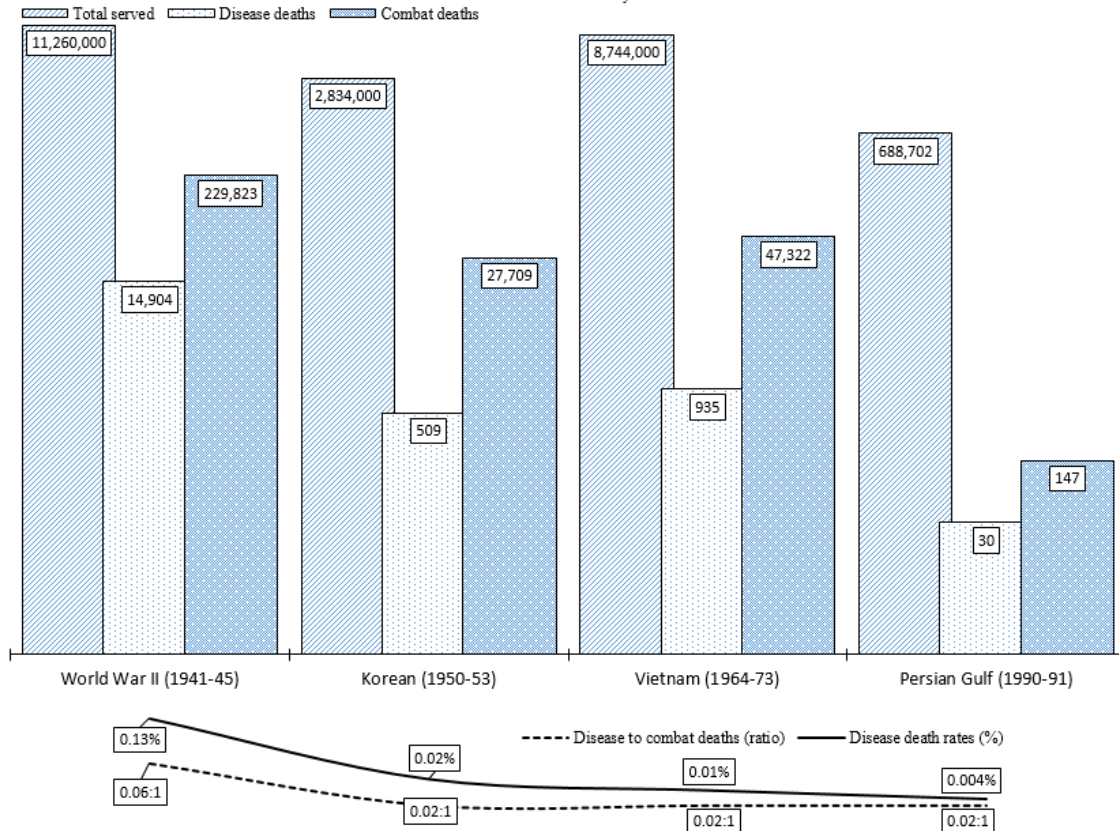
¹³Cirillo, "Two Faces of Death," 130.

Chart 1: Disease and Death in American Conflicts, 1775-1918



(Source: Vincent J. Cirillo, "Two Faces of Death: Fatalities from Disease and Combat in America's Principal Wars, 1775 to Present," *Perspectives in Biology and Medicine* 51, no. 1 (Winter 2008): 123.)

Chart 2: Disease and Death in American Conflicts, 1941-1991



(Source: Vincent J. Cirillo, "Two Faces of Death: Fatalities from Disease and Combat in America's Principal Wars, 1775 to Present," *Perspectives in Biology and Medicine* 51, no. 1 (Winter 2008): 123.)

III. Yellow Fever: from Havana to the Panama Canal

A. Background

On December 10, 1898, the Treaty of Paris ended the Spanish-American War. The treaty ceded Guam, the Philippines, and Puerto Rico to the United States and relinquished Spain's claims to Cuba, allowing the U.S. government to establish a provisional protectorate over the island.

Apart from the initial tasks of maintaining order and overseeing Spanish troop withdrawal, U.S. military leaders targeted an ambitious objective: eradicating the rampant yellow fever virus from the island. The virus, endemic to large parts of Latin America, had spread rapidly across the island since the beginning of the Cuban War of Independence in 1895. Further, yellow fever epidemics originating in Havana, a Caribbean commercial hub, had swept through the United States throughout the previous century.¹⁴ Understanding and eradicating the virus was necessary for continued local operations, future missions in the region, and, potentially, the public health of citizens in the U.S.

The late nineteenth century was a momentous time for the study of infectious disease. From the 1860s through 1880s, the work of German physician Robert Koch and French chemist Louis Pasteur had led to pivotal advancements in health sciences. Their experiments displaced miasma theory, the assumption that noxious air caused disease. Instead, they promulgated the idea that microorganisms caused disease. "Germ theory" became a fundamental concept in medical microbiology.¹⁵ Medical professionals attributed filth and infected individuals to the spread of contagion. In Havana, sanitation, and street cleaning began immediately.¹⁶

U.S. leadership understood yellow fever as an urban disease, forming due to the filth of city streets. The military government stationed soldiers outside city limits, placed immigrants and those who lacked immunity in camps outside of Havana, and fined residents for littering. The Department of Street Cleaning maintained a force of more than 500, sweeping 273 miles of street daily and rinsing the roads regularly with disinfectant.¹⁷ Despite the Army's efforts to sanitize the city of 250,000, the virus persisted. LTC Tasker H. Bliss, operating in Cuba as the Sixth Army Corps Chief Commissary in 1898, voiced his concerns:

¹⁴Mariola Espinosa, *Epidemic Invasions: Yellow Fever and the Limits of Cuban Independence, 1878-1930* (Chicago: University of Chicago Press, 2009), 7-9.

¹⁵Agnes Ullman, "Pasteur-Koch: Distinctive Ways of Thinking about Infectious Diseases," American Society for Microbiology, August 2007, accessed September 14, 2014, <http://forms.asm.org/microbe/index.asp?bid=52099>.

¹⁶Espinosa, *Epidemic Invasions*, 55-7.

¹⁷*Ibid.*, 34-7.

We came back by the village not far from which are the hospitals where there are over three thousand yellow fever patients. It is this disease that makes our problem so difficult. The fever always exists here. The records show that for 160 years there has been only one month without yellow fever. These cases occur among a comparatively small part of the population which is not immune. If we bring over thousands of men from the north there is no reason why they should be exempt from epidemic . . . As for me I shall protest against bringing troops here until the healthiest sites are selected and every possible precaution against infection has been taken.¹⁸

Nicknamed “yellow jack” in the tropics for the lemon-colored tint of its victims’ skin, yellow fever is an acute infectious disease transmitted by the female *Aedes aegypti* mosquito. Symptoms include fever, chills, head and body aches, nausea, jaundice, and fatigue, though the majority of infected persons are asymptomatic or develop mild illness. Rare cases included hemorrhaging into the stomach and intestinal tract, causing “black vomit,” and death.¹⁹ Treatment is symptomatic and patients are hospitalized for supportive care and observation when possible.²⁰

The earliest authentic records of yellow fever virus come from seventeenth century Spaniards in the West Indies. The disease, endemic to large parts of Central and South America, emerged across cities in the region throughout the eighteenth century. Emigrating northward via human hosts, yellow fever epidemics cropped up sporadically in North America, invading New York, Philadelphia, Boston, Baltimore, and various southern cities more than 160 times between 1705-1905.

In 1793, the disease took hold of Philadelphia, prompting its citizens to flee to the countryside. Nearly a century later, in 1878, yellow fever swept through the Mississippi River basin from New Orleans, infecting more than 100,000 and killing between 13,000 and 20,000.²¹ The ship carrying the disease had arrived from Havana, Cuba.²² Once in the United States, the virus moved upriver and spread along railroad lines, halting local economies and prompting rapid quarantines supported by Congress’ 1878 Federal Quarantine Legislation. “When the disease was announced in a town, everybody left who could,” recounted Maj. Gen. William C. Gorgas, (ret.), “The sick were frequently left without care, and often a great deal of cruelty and cowardice was shown.”²³

¹⁸Frederick Palmer, *Bliss, Peacemaker: The Life and Letters of General Tasker Howard Bliss* (New York: Dodd, Mead & Company, 1934), 58.

¹⁹Jon T. Hoffman et al., *The Panama Canal: An Army’s Enterprise*, CMH Pub 70-115-1 (Washington, D.C.: U.S. Army Center of Military History, 2009), 27. Available at <http://www.history.army.mil/html/books/panama/panamacanal/CMH-70-115-1-PanamaCanal.pdf>

²⁰“Yellow Fever,” December 13, 2011, Centers for Disease Control and Prevention, <http://www.cdc.gov/yellowfever/symptoms/index.html> (accessed September 5, 2014)

²¹Hoffman et al., *The Panama Canal: An Army’s Enterprise*, 27.

²²Espinosa, *Epidemic Invasions*, 32-3.

²³Hoffman et al., *The Panama Canal: An Army’s Enterprise*, 27.

By the beginning of the 20th century, improved sanitation and advancements in medical microbiology had all but eradicated former menaces such as cholera and dysentery within the United States. Still, overseas excursions brought new medical challenges. In Cuba, sanitation had proven ineffective in eradicating yellow fever. Maj. Gen. George M. Sternberg, Surgeon General of the Army, appointed the U.S. Yellow Fever Commission to investigate the etiology of the virus. He appointed to head the commission Army bacteriologist Maj. Walter Reed. Maj. Reed's staff included James Carroll, Aristides Agramonte, and Jesse W. Lazear.²⁴

B. Eradication of Yellow Fever in Havana

Cuban physician Carlos J. Finlay, at the U.S. National Board of Health since 1879, posited that mosquitos were transmitting the yellow fever virus to humans. Finlay also cast doubt on germ theory, showing that exposure to human waste did not spread the virus.²⁵

In August 1900, Dr. Reed's team successfully conducted human trials. Early testing supported the mosquito-vector hypothesis. Dr. Lazear, who oversaw the experiments, contracted yellow fever on September 18 after allowing himself to be bitten while visiting Las Ánimas, Havana's yellow fever hospital, and succumbed one week later. Reed's submitted a report based on the human tests to the American Public Health Association in October 1900.²⁶ The human trials continued in the newly constructed Camp Lazear and solidified the theory that yellow fever was a mosquito-borne illness.²⁷

In December 1900, Maj. Gen. Leonard Wood, the military governor of Cuba, authorized Dr. William C. Gorgas, the newly assigned Chief Sanitary Officer, to implement the findings of Reed's commission. Gorgas abandoned his first strategy, intentional infection as inoculation, following the death of three of the first sixteen volunteers. Following the guidance of Maj. Reed, Gorgas enacted a more ambitious strategy: the extermination of the mosquito population of Havana. "If it is the mosquito," said Gorgas, "I am going to get rid of the mosquito."²⁸

By February 1901, Gorgas' new strategy included quarantining patients behind screens to avoid spread via mosquito vectors; fumigating every building in Havana; and

²⁴Hoffman et al., *The Panama Canal: An Army's Enterprise*, 28.

²⁵Espinosa, *Epidemic Invasions*, 33; *The Panama Canal: an Army's Enterprise*, 28. Henry R. Carter, a Public Health Service scientist, corroborated Finlay's theory. Working in Mississippi during an 1898 outbreak, Carter took note of the 10-14 day period between yellow fever cases in new patients. He attributed the unusually long incubation period to an external vector: the mosquito.

²⁶William Crawford Gorgas, et al., *Yellow Fever, a Compilation of Various Publications. Results of the Work of Maj. Walter Reed, Medical Corps, United States Army, and the Yellow Fever Commission* (Washington, D.C.: G.P.O., 1911), 17-26.

²⁷Espinosa, *Epidemic Invasions*, 60-1.

²⁸Grace T. Hallock, *Walter Reed and the Conquest of Yellow Fever* (New York: School Health Bureau, Health and Welfare Division, Metropolitan Life Insurance Co., 1958), 21.

placing oil in, screening, or draining every receptacle containing standing water.²⁹ Cesspools were common in Havana homes and provided an ideal breeding place for mosquitos. Adding oiling to the receptacles killed the mosquito larvae within.³⁰ Special “disinfectant brigades” identified and fumigated infested areas to remove mosquitos and larvae. By March 1901, the government reassigned two-thirds of Sanitary Department crews to the house-to-house oiling campaign. In the first month, the crews treated nearly 20,000 houses.³¹

Though the Sanitary Department’s intrusive methods fomented public indignation, yellow fever cases in Havana decreased dramatically, from 1,400 in 1900, to thirty-seven in 1901, to zero in 1902.³² In 1901, almost 100 percent of homes in Havana contained larvae infestations. By March 1902, Gorgas’ efforts reduced the rate to 0.6 percent.³³ The efficacy of the methods was apparent: only four cases of yellow fever occurred in May 1901 and all survived. The following month was Havana’s first June without an incidence of yellow fever since 1761.³⁴ “This is so much better than anything that has occurred before,” Gorgas wrote in September 1901, “that we feel convinced it can only be due to the methods of disinfection adopted by order of the Military Governor; that is, the thorough destruction of infected mosquitoes in the neighborhood of the focus of infection.”³⁵

B. *The Yellow Fever in Panama*

The United States had first contemplated a canal to link the Atlantic and Pacific in Nicaragua. Instead, in 1902 Congress authorized the purchase of French assets for an aborted project to build a canal across the Isthmus of Panama. The French had abandoned the effort, hounded by terrain, weather, disease, financial mismanagement and wrongdoing. They had invested over \$260 million and 20,000 lives since commencing in 1881. The U.S. would require about \$375 million and another 5,600 lives to complete the task. Designers conquered the formidable terrain with an engineering marvel. Their

²⁹Hoffman et al., *The Panama Canal: An Army’s Enterprise*, 29.

³⁰William C. Gorgas, “Report of Vital Statistics of Havana, Guanabacoa, and Regla.” *Public Health Reports* vol. 16 (April 1901).

³¹Espinosa, *Epidemic Invasions*, 34-37, 65; Hoffman et al., *The Panama Canal: An Army’s Enterprise*, 32, 38-9.

³²Hoffman et al., *The Panama Canal: An Army’s Enterprise*, 29.

³³Joseph A. Le Prince, Assistant to Chief Sanitary Officer, to William C. Gorgas, Chief Sanitary Officer of Havana, May 19, 1902, File 4, Reports of Officials of the Military Government, 1901-1902, MGC/RG 140.

³⁴William C. Gorgas, “Report of Vital Statistics of Havana, Guanabacoa, and Regla” *Public Health Reports* vol. 16 (June 1901).

³⁵William C. Gorgas, “Report of Vital Statistics of Havana, Guanabacoa, and Regla,” File 1901/275, Letter Received, 1899-1902, MGC/RG 140, August 1901.

success, however, relied upon a concerted, coordinated effort across several medical fronts. The defeat of mosquito-borne yellow fever and malaria was paramount.³⁶

The Hay-Bunau-Varilla Treaty of 1903 provided a legal basis for operations and entrusted the United States with management of public health in Panama City, Colón, and the Canal Zone. This responsibility included caring for sick and injured patients, and basic sanitation measures such as street cleaning and garbage disposal. To assist, the cities of Colón and Ancon maintained large, well-equipped hospital facilities. Other medium- and small-sized patient care facilities were scattered throughout public health districts and villages.³⁷

In 1904, Gorgas arrived in Panama in an advisory capacity as the Chief Public Health Officer, operating under Admiral John Grimes Walker, appointed Chairman of the Isthmian Canal Commission.³⁸ During the previous decade, the inhabitants of the isthmus had suffered a history of diverse ailments: influenza and measles outbreaks, a severe smallpox epidemic, and yellow fever epidemics in 1897, 1899, and 1900. “Among infectious diseases on the Isthmus[,] yellow fever is undoubtedly the most to be feared by unacclimated [sic] persons,” wrote retired Brig. Gen. Henry L. Abbot, a veteran of the Civil War and former U.S. Army engineer working as a consultant at the Panama Canal.³⁹

Upon surveying the region, Gorgas’ proposed a strategy estimated to cost the Canal Commission \$1 million. The plan included requirements of medical staffs as well as costs of labor and supplies to continue with the task of mosquito eradication. Despite the support of Maj. Gen. Leonard Wood, the military governor of Cuba from 1899-1902, who had witnessed Gorgas and Reed’s success, Admiral John Walker denied Gorgas’ request. Instead, Admiral Walker authorized \$50,000 for supplies.⁴⁰ Walker’s shortsightedness delayed the containment of mosquito-borne illnesses and contributed to Pres. Roosevelt’s eventual decision to replace him.

In June 1904, despite skepticism and underfunding from Admiral Walker, Gorgas and his staff of seven began their work. Gorgas’ staff included Henry Carter, serving as his Director of Hospitals and Chief Quarantine Officer, and Joseph A. Le Prince, serving as Chief Inspector; both had previous work experience with Gorgas in Cuba.⁴¹

³⁶Elizabeth Nix, “7 Fascinating Facts about the Panama Canal,” History in the Headlines, History Channel, August 15, 2014, available at <http://www.history.com/news/7-fascinating-facts-about-the-panama-canal>.

³⁷Hoffman et al., *The Panama Canal: an Army’s Enterprise*, 31.

³⁸*Ibid.*, 30-1.

³⁹Henry L. Abbot, *Problems of the Panama Canal: Including Climatology of the Isthmus, Physics and Hydraulics of the River Chagres, Cut at the Continental Divide and Discussion of Plans for the Waterway, with History from 1890 to Date* (New York: Macmillan, [1907]), 102-7.

⁴⁰Hoffman et al., *The Panama Canal: an Army’s Enterprise*, 32.

⁴¹*Ibid.*

C. Army Leaders' Response

Many remained obstinate that sanitation was the key in the battle against yellow fever. When the disease continued to spread, Secretary of War William Howard Taft appointed Charles A.L. Reed, former American Medical Association (AMA) president, to investigate. Reed toured the area, scrutinizing health standards and the work of the Commission. On February 17, 1905, Gorgas hand-delivered Reed a memorandum detailing the commission's myopic shortcomings and recommending policy and funding reform. A yellow fever breakout in April-May 1905 that caused sixty-three workers to fall ill and claimed the lives of nineteen, including several high-ranking commission officials, caused further panic. In response to the outbreak, 500 American employees, three-fourths of the total, including John Wallace, the chief engineer, fled for home. The commission's intransigent misjudgments were costing lives, labor, and expertise.⁴²

Reed published an article in the *Journal of the American Medical Association* supporting Gorgas and requesting that President Roosevelt ask for the resignation of the commission. Already concerned with the project's progress, Roosevelt and Congress replaced the Commission's leaders. Disagreement between Gorgas and the commission persisted as Theodore P. Shonts, the new Chairman of the Canal Commission, requested the replacement of the Chief Public Health Officer. The request was forwarded to Secretary Taft and then to President Roosevelt. The President sought outside advice from Dr. William H. Welch, a founder of Johns Hopkins Hospital and first Dean of its School of Medicine, and Alexander Lambert, a close friend. Lambert captured the President's imagination with his observation, "If you fall back upon the old methods of sanitation, you will fail, just as the French failed. If you back up Gorgas and let him pursue his campaign against the mosquitoes, you will get your canal." The American Medical Association (AMA) and Robert Maitland O'Reilly, the U.S. Army Surgeon General, also supported Gorgas' efforts. President Roosevelt decided to support Gorgas and provided him the resources that were required.⁴³

Eradication or strict control of the spread of yellow fever was essential to the completion of the canal. The French had abandoned their eighteen-year effort in large part due to the tens of thousands who succumbed to the virus.⁴⁴ Gorgas' policies, although enacted later than intended due to doubts among Panama Canal Commission leaders, showed success within two years. A letter from Gorgas on Sept. 12, 1906 conveys the Colonel's satisfaction:

Our most important accomplishment, so far, from the point of view of the construction of the Canal is the eradication of yellow fever. . . If we were doing this work under the conditions and with the knowledge we had twenty-five years ago, we would be losing from yellow fever at the rate of 40 men per month, and this loss would fall entirely among the Americans, for we twenty-five years ago could probably have done no better in sanitary directions than the French did.⁴⁵

⁴²Hoffman et al., *The Panama Canal: An Army's Enterprise*, 33-4.

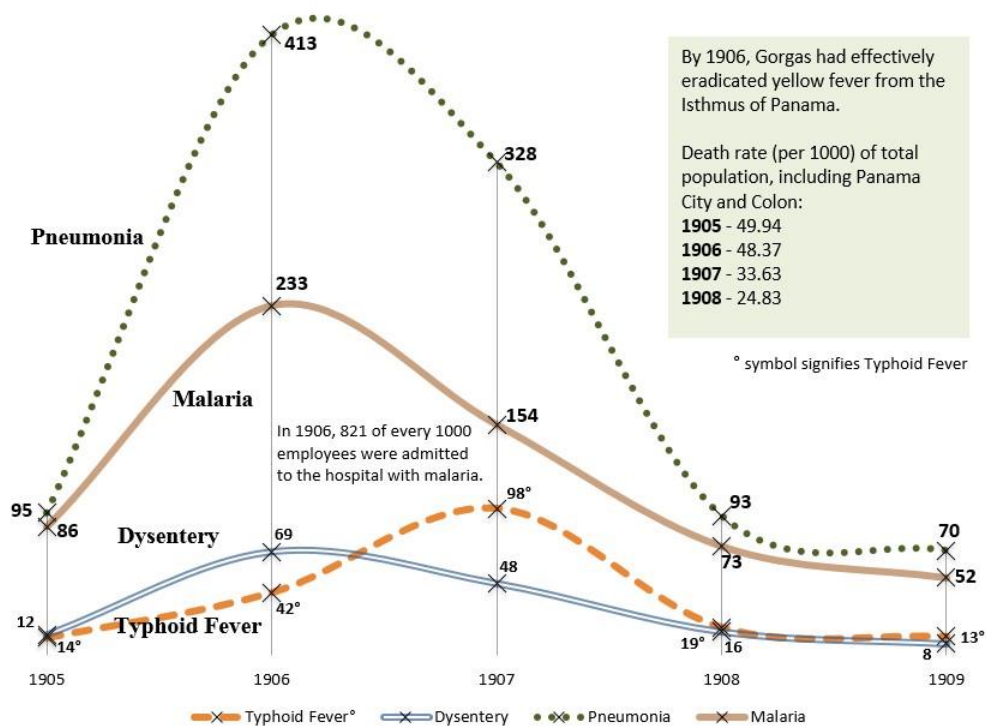
⁴³*Ibid.*, 35-6.

⁴⁴Espinosa, *Epidemic Invasions*, 120.

⁴⁵Abbot, *Problems of the Panama Canal*, 106-7.

Gorgas' fight against yellow fever ensured continued construction of the Panama Canal and, as a result, continued American commercial expansion.⁴⁶ By 1906, Gorgas and the efforts of his laborers eradicated yellow fever from the Panama Isthmus. Still, pneumonia, malaria, and other maladies would continue to plague workers. Malaria, though less virulent than yellow fever, was more widespread and physically incapacitating.⁴⁷ By 1913, Gorgas' measures of mosquito-control dropped malaria incidence to 10 percent of its 1906 rate in the Canal Zone.⁴⁸ As in Havana, various public sanitation policies continued despite prioritization of mosquito eradication.⁴⁹ Chart 3 depicts the success of the commission's comprehensive public health policies as recorded in Gorgas' 1909 sanitation report from the Canal Zone. In the absence of yellow fever, pneumonia, malaria, dysentery, and typhoid fever continued, albeit with decreasing incidence.

Chart 3: **Deaths by disease among Panama Canal employees, 1904-1909**



(Source: W.C. Gorgas, Annual Report of the Department of Sanitation of the Isthmian Canal Commission for the Year 1909, Washington Government Printing Office, 1910, 5-7.)

⁴⁶Paul S. Stutter, "Nature's Agents or Agents of Empire?" *Isis* 98, no. 4 (2007): 724-54.

⁴⁷W.C. Gorgas, Annual Report of the Department of Sanitation of the Isthmian Canal Commission for the Year 1909, Washington Government Printing Office, 1910, 5-7. Parts of the 1909 Annual Report of the Department of Sanitation of the Isthmian Canal Commission providing Gorgas' commentary regarding disease incidence are included at the end of this section.

⁴⁸Espinosa, *Epidemic Invasions*, 6-9.

⁴⁹*Ibid.*, 63-4.

IV. The 1918 Spanish Flu

A. Background

On April 2, 1917, three years after the onset of World War I in Europe, the United States entered the conflict on the side of the allies, Great Britain and France.⁵⁰ Looking to the horror of industrialized warfare from the safety of the United States, the American Expeditionary Force rapidly assembled military posts, camps, arsenals, airfields, and supply depots all over the country.⁵¹ With the federalization of the National Guard and a newly established draft, the Army grew from less than 100,000 in 1917 to 3.7 million by war's end.⁵² This rapid, explosive growth produced an Army for war on a scale previously unknown in American history, but also created an environment ripe for the incubation of disease. Further, the constant movement of troops to different camps, to ports, and finally overseas allowed the diseases to travel quickly and easily.⁵³

The previous couple of decades had seen momentous advancements in medicine. In March 1917, less than a month before Congress' declaration of war, a U.S. Public Health Service official wrote, "Those pestilences once considered as the inevitable accompaniment of military movement have been shorn of terror by the hand of science."⁵⁴ In 1885, Louis Pasteur performed the first successful rabies vaccination. The same year, Spanish physician Jaime Ferrán developed a vaccine against cholera, the first vaccine against a bacterial disease. From 1898 to 1914, the work of Dr. Carlos Finlay, Maj. Walter Reed, and Maj. Gen. William C. Gorgas confirmed yellow fever to be a mosquito-borne illness and facilitated the virus' eradication in Havana, Cuba and the Isthmus of Panama. By the time the U.S. entered World War I, American military personnel received vaccinations against smallpox and typhoid.⁵⁵ Maj. Gen. Gorgas had been appointed Surgeon General of the Army in 1914, and he continued to promote sanitation, hygiene, and nutrition among troops.⁵⁶

⁵⁰"Milestones: 1914-1920," U.S. Department of State, Office of the Historian, <https://history.state.gov/milestones/1914-1920/wwi> (accessed September 12, 2014).

⁵¹Carol R. Byerly, "The U.S. Military and the Influenza Pandemic of 1918-1919," *Public Health Reports*, supplement 3 (April 2010): 84.

⁵²Maurice Matloff, *American Military History*, Army Historical Series (Washington, D.C.: CMH, 1956; reprinted., 1989), 351-52, 376.

⁵³Carol R. Byerly, *Fever of War: The Influenza Epidemic in the U.S. Army during World War I* (New York: New York University Press, 2005), 84.

⁵⁴William Colby Rucker, "The Influence of the European War on the Transmission of the Infections of Disease, with Special Reference to its Effect upon Disease Conditions in the United States," MS 40 (March 1917): 258 cited in Byerly, *Fever of War*, 191 FN2.

⁵⁵John D. Grabenstein et al., "Immunization to Protect the U.S. Armed Forces: Heritage, Current Practice, Prospects," Vaccines.mil, <http://www.vaccines.mil/documents/library/MilitaryImztn2005fulc.pdf>.

⁵⁶Carol R. Byerly, "The U.S. Military and the Influenza Pandemic of 1918-1919," 85.

Still, the contemporary advancements in health sciences and subsequent preventative measures did and could not prepare the Army – or humanity, for the severity of the “Spanish” influenza. In March 1918, Fort Riley, Kansas teemed with thousands of newly inducted soldiers living in cramped quarters. A wave of influenza swept through the ranks but doctors overlooked the seriousness of this first, mild wave, unaware that the virus was spreading across the country.⁵⁷ On August 27, influenza appeared in Boston, Massachusetts, incapacitating three on the first day, eight on the second, and fifty-eight on the third. On September 8, illness broke out at Camp Devens, outside the city. The second wave had begun. Within ten days, thousands were hospitalized.⁵⁸ By October, the deadliest month of the pandemic for American soldiers, the Spanish flu would claim 195,000 American lives.⁵⁹

From Camp Devens, the contagion spread to Camp Upton, New York on September 13; onto Camp Grant, Illinois on September 21; and within a month had affected soldiers at every camp in the United States. Due to the close quarters in which soldiers lived, the rapidity with which the virus overtook camps was, upon outbreak or arrival of the initial patient, inevitable. Spread through microscopic droplets passed by sneeze, cough, touch, and lingering on surfaces, few could hope to escape infection.⁶⁰ Even so, Army provisions aimed at prevention and containment continued. “We knew perfectly well that we can control pneumonia absolutely if we could avoid crowding the men,” Maj. Gen. Gorgas, Army Surgeon General, reportedly told a training camp commander, “but it is not practicable in military life to avoid this crowding.”⁶¹

In the United States, the Medical Department increased the number of beds in Army hospitals more than tenfold, from 9,500 to 120,000. By 1918, almost 30 percent of American physicians were in military service.⁶² These physicians documented symptoms, cases, and findings; ran tests; performed autopsies; and shared their information through reports and articles.⁶³ Some commanders, such as Camp Upton’s Col. John Mallory, quarantined the 30,000 under his command, allowing travel for only “the most urgent business.”⁶⁴

⁵⁷“Spanish Influenza in North America, 1918-1919,” Contagion Historical Views of Diseases and Epidemics, Harvard University Library Open Collections Program, 2014, <http://ocp.hul.harvard.edu/contagion/influenza.html>.

⁵⁸Carol R. Byerly, “The U.S. Military and the Influenza Pandemic of 1918-1919,” 86.

⁵⁹“Spanish Influenza in North America, 1918-1919,” Harvard University Library Open Collections Program, Contagion Historical Views of Disease and Epidemics, 2014, accessed September 4, 2014, <http://ocp.hul.harvard.edu/contagion/influenza.html>.

⁶⁰G. A. Opie, *Pandemic Flu: Will the World Catch a Cold?* London: Ministry of Defence, 2009, Seaford House Papers, 161.

⁶¹W. C. Gorgas to H. L. Scott. 1918 April 10. Box 41, Entry 31, RG 112, Box 41, National Archives and Records Administration, College Park, MD.

⁶²Carol R. Byerly, “The U.S. Military and the Influenza Pandemic of 1918-1919,” 85.

⁶³*Ibid.*, 85-6.

⁶⁴“Close Camp Upton to Check Influenza,” *The New York Times*, September 1918, 17:10.

Within the camps, medical personnel provided facemasks for all camp residents and inspected bedridden patients daily. Hospitals offered relative isolation or screening between beds, well-ventilated chambers, and experimental vaccines.⁶⁵ Nonetheless, the virus persisted, ending the war for many troops long before they reached the battlefield. Military medical historian Carol Byerly studied the influenza epidemic of 1918 in *Fever of War: The Influenza Epidemic in the U.S. Army during World War I*, and concluded:

The Americans' brief military participation . . . meant that the influenza epidemic colored much of the American combat experience. Both were concentrated in September, October, and November 1918. Once it arrived in its deadly form in early September, the flu dramatically affected American war activities.⁶⁶

As thronged as trainees were in the overcrowded camps, the mildewed, rat-infested trenches of the European battlefield placed soldiers in even worse conditions. Some researchers, such as evolutionary biologist Paul Ewald, believe that the conditions of trench warfare empowered the aggressive virus against already compromised immune systems.⁶⁷ Once influenza had arrived in Europe, it spread again through the seaports to Asia, Africa, and Latin America.⁶⁸

During the American Expeditionary Force's largest campaign, the Meuse-Argonne Offensive from September to November 1918, influenza affected all facets of military efficiency, overwhelming hospitals as well as transportation lines. It left thousands of soldiers either dead or unable to train or conduct combat missions.⁶⁹ By year's end, the War Department calculated an overall loss of 8,743,102 days of labor among incapacitated and bedridden enlisted men.⁷⁰

Over the course of the war, disease accounted for 60 to 90 percent of AEF troop "noneffectiveness," or incapacity of duty. The primary offenders were influenza and epidemic diarrhea, but other maladies, such as typhoid fever, measles, mumps, and venereal diseases also impacted troop effectiveness. Due to the nature and relatively short timeframe of military operations as well as available health care, American troops rarely incurred trench nephritis, trench foot, or tetanus. Lice and scabies, endemic to the trenches, infested as many as 75 percent of the AEF's units.⁷¹ Military historian James T.

⁶⁵ Carol R. Byerly, "The U.S. Military and the Influenza Pandemic of 1918-1919," 90.

⁶⁶ Byerly, *Fever of War*, 8.

⁶⁷ P. W. Ewald, *Evolution of Infectious Disease* (Oxford: Oxford University Press, 1994), 110-13.

⁶⁸ Department of the Navy, *Annual Report, 1919*. (Washington, D.C.: U.S. Government Printing Office; 1920).

⁶⁹ Byerly, *Fever of War*, 9.

⁷⁰ Ibid. Byerly notes that exact rates of death and sickness are almost impossible to determine due to incoherent or incomplete records, medical misdiagnoses, and other factors.

⁷¹ *Reports of the Commander-in-Chief, Staff Sections and Services*, United States Army in the World War 1917-1919, vol. 15 (Washington, D.C.: U.S. Army Center of Military History, 1991), 372-375.

Seidule has studied the effects of environmental factors on soldiers' welfare in the AEF. He determined that malnutrition, inadequate clothing, and lack of sleep lowered morale and caused thousands of soldiers to suffer from combat exhaustion, and reduced the army nearly to ineffectiveness.⁷²

B. Army Leaders' Response

In units plagued by influenza, field officers dealt with the day-to-day challenges of soldiering while trying to keep up morale and the practice of preventative measures.⁷³ As revealed by the Army Medical Department, results were rarely positive: "the best result to be expected from any or all of these measures is a slowing of the progress of an epidemic rather than any considerable diminution in the number of cases."⁷⁴ Soldiers stationed abroad, daily enduring the trials of the trenches, shelling and bloodshed, feared for the lives of their non-military kin. "Every day nearly someone of my outfit will hear that his mother, sister, or sweetheart is dead," 24-year-old Captain Harry S. Truman wrote. "It is heartbreaking almost to think that we are so safe and so well over here and that the ones we'd like to protect more than all the world have been more exposed to death than we."⁷⁵

Emotional stress also took its toll on leaders. Col. Charles B. Hagadorn, a West Point graduate who had served in Russia and at the Panama Canal, was acting camp commander at Camp Grant, Illinois in October 1918 when the virus' brutal second wave took hold. Striking in earnest in late November, pneumonia-induced fatalities grew in number daily. In early October, mortality rates spiked: seventy-six deaths on October 4, more than one hundred on October 5, and one hundred and seventeen on October 6. On October 7, Col. Hagadorn, having lost more than 500 soldiers under his command, committed suicide.⁷⁶

At the highest ranks of Army leadership, applied research and efforts to stop the spread were offset by the disease's virulence and epidemic proliferation. Army Surgeon General Gorgas stressed hygiene, sanitation, clean water, fresh air, and proper nutrition, but admitted that little could be done to prevent overcrowding.⁷⁷ "There is to be expected

⁷²James T. Seidule, "Morale in the Expeditionary Forces," (Ph.D. diss., Ohio State University, 1997), 259.

⁷³Byerly, "The U.S. Military and the Influenza Pandemic of 1918-1919," 90.

⁷⁴War Department, Office of the Surgeon General, *Medical Department of the United States Army in the World War, vol. 9: Communicable and Other Diseases*. Washington: U.S. Government Printing Office, 1928, 123-4.

⁷⁵David G. McCullough, *Truman* (New York: Simon & Schuster, 1992), 136.

⁷⁶"Col. Hagadorn a Suicide," *The New York Times*, October 9, 1918, 24.

⁷⁷Byerly, "The U.S. Military and the Influenza Pandemic of 1918-1919," 85.

a definite relation between the degree of crowding and the amount of respiratory infection,” the Army Medical Department added.⁷⁸

In an attempt to understand the virus, Gorgas sent a small group of distinguished epidemiologists to Camp Devens to investigate. Calling the situation “grave,” the team recommended 16 measures for containment, including ceasing all personnel transfers to and from the base until the virus had subsided. When the scientists witnessed the autopsies of the deceased, they feared that “some new kind of infection or plague” had taken form.⁷⁹ With symptoms including high fever, head and body aches, fatigue, sore throat, nausea, congestion, and in some cases leading to pneumonia and pulmonary hemorrhaging, the H1N1 influenza subtype was so abnormally virulent that physicians misdiagnosed it as cholera and bubonic plague during the early stages of its spread.⁸⁰

In fact, the new infection was a highly virulent and communicable influenza subtype that thrived in a dense population of potential hosts. The environment in which influenza develops is a key determinant of its carnage or containment.⁸¹ The settings and circumstance of the H1N1 subtype, burgeoning army camps and insalubrious European battlefields, allowed the virus to flourish. By November 11, 1918, the AEF had evacuated 84,215 officers and enlisted men due to illness.⁸² In the U.S. Army, including Marines, disease deaths amounted to 57,460.⁸³ Overall, the virus circulated the globe and proliferated until it had affected an estimated 500 million people and killed 50-100 million worldwide.⁸⁴

⁷⁸War Department, Office of the Surgeon General, *Medical Department of the United States Army in the World War, vol. 9: Communicable and Other Diseases*. Washington: U.S. Government Printing Office, 1928, 111.

⁷⁹Simon Flexner and J.T. Flexner, *William Henry Welch and the Heroic Age of American Medicine* (New York: Viking Press, 1941), 376-7.

⁸⁰“The Great Pandemic: The United States in 1918-1919,” United States Department of Health and Human Service, Flu.gov, accessed September 4, 2014, http://www.flu.gov/pandemic/history/1918/the_pandemic/fightinginfluenza/.

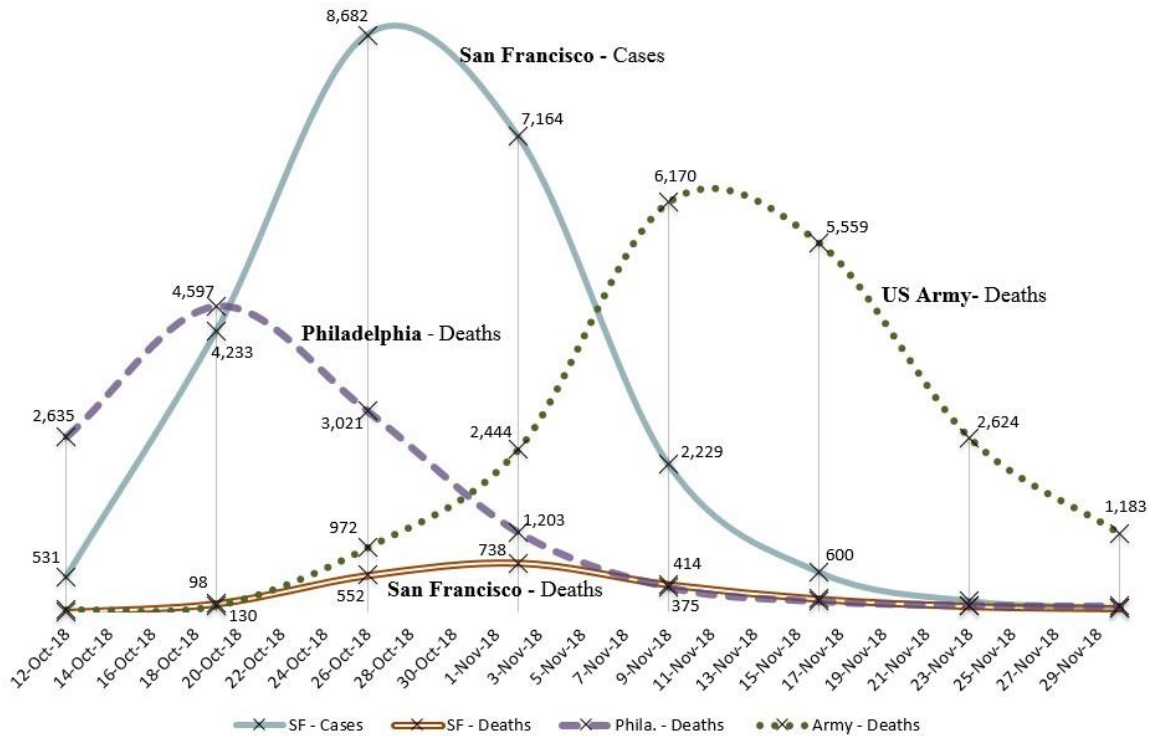
⁸¹Stacey L. Knobler et al., *The Threat of Pandemic Influenza* (Washington, D.C.: National Academies Press, 2005) 30.

⁸² *Reports of the Commander-in-Chief, Staff Sections and Services*, 377.

⁸³Cirillo, “Two Faces of Death, 123.

⁸⁴Niall P. A. S. Johnson and Juergen Mueller, “Updating the Accounts: Global Mortality of the 1918-1920 Spanish” Influenza Pandemic,” *Bulletin of the History of Medicine* 76 (2002): 105-115.

Chart 4: **1918 Spanish Influenza - Second Wave, October-November 1918**
Influenza and Pneumonia Cases and Deaths



1918	12-Oct	19-Oct	26-Oct	2-Nov	9-Nov	16-Nov	23-Nov	30-Nov
SF - Cases	531	4,233	8,682	7,164	2,229	600	164	57
SF - Deaths	-	130	552	738	414	198	90	56
Phila. - Deaths	2,635	4,597	3,021	1,203	375	164	103	93
Army Deaths	36	98	972	2,444	6,170	5,559	2,624	1,183

(source: Alfred W. Crosby, *America's Forgotten Pandemic, The Influenza of 1918* (New York: Cambridge University Press, 1989): 59, 86, 114.)

V. World War II to the Present: Disease as Debilitant

World War II inaugurated a new era, when disease was no longer the serious killer of armies, but rather the great debilitant with endemic maladies. The combination of geography, climate, and combat operations rendered certain theaters in WW II veritable havens of disease. Today a detailed coding system categorizes the myriad disease subtypes. In general, these were dysentery, cholera, Hepatitis A and B, malaria, beriberi, dengue fever, scrub typhus, leishmaniasis, and the infamous “jungle rot.”⁸⁵

The Army’s battle against malaria in particular during World War II is a case study in the development and adoption of multiple methods to combat a disease short of a cure. Malaria was by far the greatest casualty producer and struck troops in all theaters, though obviously far more serious in certain areas. Malaria averaged 19.43 cases per 1,000 in the Army worldwide between 1942 and 1945. The South West Pacific Area (SWPA) had the highest number of cases, but China, Burma, India (CBI) experienced the worst overall rate at 98.46.⁸⁶

The key to conquer malaria in the Army during WW II was atabrine. Quinine, a known antidote, had been a rare commodity before the war. Germany developed atabrine as a synthetic substitute, and the U.S. began production under license in 1931. Atabrine became even more significant after the Japanese captured Java, the sole source of quinine for decades, in February 1942. A microcosm of America’s industrial base, U.S. monthly production rose to 100 million tablets in 1943 and to 400 million tablets per month in 1944.⁸⁷

Specified regimen to combat malaria added controversy. First, extant medical literature provided little material on atabrine. The Office of Scientific Research and Development, a federal agency created by Executive Order in June 1941, commenced large-scale research in 1942.⁸⁸ Unfortunately, the field Army was already prejudiced based on negative experiences to date throughout the North African and Mediterranean Theaters of Operation (NATO and MTO), and on Guadalcanal in the Pacific, principally due to side effects. Other issues were troop discipline to take atabrine as directed, initial prescription of insufficient dosages, and serious relapses by soldiers taken off atabrine when moved to rear/rest areas. Field experience and research results revealed these shortcomings, and the need for the continued presence of certain atabrine levels in the

⁸⁵Freda Brinson, “WW II Military Health in the Pacific,” December 1, 2013, American Academy of Professional Coders (AAPC), <http://news.aapc.com/index.php/2013/12/wwii-military-health-in-the-pacific/> (accessed September 2, 2014).

⁸⁶W. Paul Havens Jr., M.D., ed., *Internal Medicine in World War II, Vol. 2: Infectious Diseases*, Medical Department of the United States Army in World War II Series (Washington, D.C.: Office of the Surgeon General, 1963), 451-53; Tables 55 through 59 inclusive, which tabulate “attack rates” of the various strains of malaria in Army troops by area and year from 1942 to 1945, 456-58; and Tables 61 through 65 which document the deaths, 460-62.

⁸⁷Eric Bergerud, *Touched with Fire: The Land War in the South Pacific* (New York: Viking Press, 1996), 92.

⁸⁸See Leo B. Slater, *War and Disease: Biomedical Research on Malaria in the Twentieth Century* (New Brunswick, NJ: Rutgers University Press, 2009), 3-4, 8-13 for details on the interagency effort.

blood for effective suppression. Early experience also revealed an array of side effects. Many of these were unique to a very small number of soldiers. The most prevalent side effect remained skin yellowing; gastrointestinal upset usually left in time.⁸⁹

Malaria was a scourge for most of the war. Unlike the earlier fight against yellow fever, large-scale efforts to eradicate mosquitos and/or breeding grounds were not realistic options. The use of DDT in CBI around camp perimeters and buildings did contribute to reduced outbreaks in CBI by February 1944 and especially 1945.⁹⁰ The Army developed strict programs of troop discipline with continual supply of proper dosages of atabrine. Nonetheless, malaria remained a major cause of non-battle casualties throughout the war. Moreover, a certain strain had “remarkable relapsing tendencies” and medical professionals could not determine a relapse rate with any precision.⁹¹

During the Korean War from July 1950 to July 1953, disease accounted for 65.49 percent of all hospital admissions in theater. That number is 373 percent of the wounded and 386 percent of the non-battle injuries.⁹² The Vietnam War confirmed the trend with a wide range of infectious diseases. In 1967 alone, 70.6 percent of hospital admissions were due to disease, compared to 15.6 percent battle injuries and 13.8 percent non-battle injuries. An analysis of malaria rates in 1965-69 shows a dramatic, statistically significant spike starting in September 1965, peaking at ca. 90 cases per 1,000 in November 1965. There were highs of ca. 50 per 1,000 in April and June 1966, with averages between 20 and 30 in 1968-69. The Army suffered 40,414 malaria cases with seventy-eight deaths between 1965 and 1970.⁹³ Service-wide statistics were 65,053 total and 124 deaths.⁹⁴

Operations in Southwest and South-Central Asia from the Persian Gulf War of 1990-91 to current operations in Afghanistan and Iraq again demonstrated the existence of numerous infectious diseases. However, advanced medical knowledge with prescribed regimens mitigated, but did not eliminate, many of the familiar scourges. The predominant ailments to date have been diarrheal and acute upper respiratory infections. Medical professionals have studied a wide array of infectious diseases in four categories,

⁸⁹Havens, ed., *Infectious Diseases*, 465-77, 484-87.

⁹⁰Charles F. Romanus and Riley Sunderland, *The China-Burma-India Theater: Time Runs Out in CBI*, The U.S. Army in World War II Series (Washington, D.C.: CMH, 1959), 93.

⁹¹Havens, ed., *Infectious Diseases*, 488-89.

⁹²Frank A. Reister, *Battle Casualties and Medical Statistics: U.S. Army Experience in the Korean War* (Washington, D.C.: U.S. Army Medical Department (AMEDD), n.d.), 5. Statistics cited are adaptations for this study. Available at <http://history.amedd.army.mil/booksdocs/korea/reister/reister.html>

⁹³Brig. Gen. Andre J. Ognibene and Col. O'Neill Barrett, Jr., *Internal Medicine in Vietnam*, vol. 2: *General Medicine and Infectious Diseases* (Washington, D.C.: U.S. Army Office of the Surgeon General & Center of Military History (CMH), 1977; reprint ed., 1989), adapted from Chart 1, Chart 13, and Table 40. Available at <http://history.amedd.army.mil/booksdocs/vietnam/GenMedVN/default.html>

⁹⁴Cirillo, “Two Faces of Death,” 129.

all with greater prevalence in theater than in the USA.⁹⁵ The VA currently recognizes nine infectious diseases related to military service in theater from 1990 to the present.⁹⁶

Deployments to the African continent potentially open a new array of challenges. Established methodologies and troop discipline remain key, but each environment remains unique. American troops in the Rwanda AO in 1994-97 for Operation Support Hope had to protect against typical infectious diseases, from familiar vectors, in an environment with hot and cold humidity, but also other local animals. Pre-deployment necessitated certain immunizations and malaria medication. A major factor was potable water, of which deploying troops were frequent and major producers.⁹⁷

⁹⁵Committee on Gulf War and Health, *Gulf War and Health, vol. 5: Infectious Diseases* (Washington, D.C.: National Academies Press, 2006), 61 and Box 2.2, “Infectious Diseases That Are Endemic in Southwest and South-Central Asia and Have Long-Term Adverse Health Outcomes.” Aside from the date of publication eight years ago, some details for OEF and OIF are not available in a public forum.

⁹⁶U.S. Department of Veterans Affairs, Public Health, Infectious Diseases and Gulf War Veterans, available at http://www.publichealth.va.gov/exposures/gulfwar/infectious_diseases.asp

⁹⁷U.S. Army Research Institute of Environmental Medicine and Walter Reed Institute of Research, *Sustaining Soldier Health and Performance in Operation Support Hope: Guidance for Small Unit Leaders*, USARIEM Technical Note 94-3 (Fort Detrick, MD: U.S. Army Medical Research, Development, Acquisition and Logistics Command, 1994), 1-2. Available at https://www.researchgate.net/publication/235020354_Sustaining_Soldier_Health_and_Performance_During_Operation_Support_Hope_Guidance_for_Small_Unit_Leaders?ev=prf_pub_bmark

VI. Conclusion

This report does not prescribe the actions to take in the case of an epidemic or pandemic such as the growing outbreak of Ebola, but rather provides insights and lessons learned from the U.S. Army's experience battling previous outbreaks, and the outcomes achieved. The answer was never simply to "find a cure." Rather, the Army orchestrated concerted efforts in vaccinations, preventive drugs, medicines to facilitate recovery, comprehensive sanitation measures, and other preventive medicine (PM) measures. The response included specialized medical research and development, collective unit measures, and individual Soldier discipline.

The last century alone of American military experience has showcased the importance of both pre-deployment planning and preparation and thoughtful, careful reassessment during ongoing operations. Contemporary publicity has focused heavily on terrorist threats wielding chemical, biological, radiological, nuclear, and high-yield explosives (CBRNE) weapons. The 2014 Ebola outbreak has raised acute, sometimes vociferous concerns on pandemics. Scientists and medical professionals have known and recognized for some time that disease in nature and human accident constitute far greater risks statistically, compounded by the combination of natural evolution and unique, specific aspects of the world in the twenty-first century.⁹⁸

⁹⁸For example, see Brenda A. Wilson, "Global Biosecurity in a Complex, Dynamic World," *Complexity* 14, no. 1 (2008), Table 1 on 72, 78-81. Available at <http://onlinelibrary.wiley.com/doi/10.1002/cplx.20246/pdf>

Appendix – AMEDD references

Appendix to Pandemic Study: Highlights from *Military Preventive Medicine: Mobilization and Deployment*, 2 vols., Textbooks of Military Medicine Series (Washington, D.C.: Walter Reed Army Medical Center Borden Institute, 2003-5). Available at
<http://www.cs.amedd.army.mil/borden/Portlet.aspx?ID=14419d2d-ae71-4409-ac21-c32592c5f515>
<http://www.cs.amedd.army.mil/borden/Portlet.aspx?ID=232d8377-6616-4557-81f2-219f8f9b8a42>

The series in general is highly specialized, focusing on military medical education.

Volume 1 consists of four sections with thirty chapters. These provide an historical overview of Military Preventive Medicine, a discussion of national mobilization and training, deployment preparations, and sustainment issues.

- Chapter 3, "The Historic Role of Military Preventive Medicine and Public Health in U.S. Armies of Occupation and Military Government," pp. 59-77 briefly reviews Army experience during the Mexican War of 1846-48; the Spanish-American War of 1898-99 and subsequent missions in Cuba, Puerto Rico, and the Philippines; the American Expeditionary Force (AEF) in Europe during WWI; and experience during and after WW II in Italy, Germany, Okinawa, Japan, and Korea.

- Chapter 4, "Preventive Medicine in Military Operations Other Than War," pp. 79-103 covers humanitarian efforts at home, i.e. current defense support of civil authorities (DSCA), from smallpox vaccination of western Indian tribes in 1832 to Hurricane Andrew relief in 1992. The chapter also reviews a wide range of overseas efforts from the construction of the Panama Canal to the most recent efforts with Iraqi Kurds and Haitian refugees. This chapter has an impressive, comprehensive coverage. There are well-known examples such as the Vietnam War and various interventions in Latin America. As well, one can read of the Army's assistance to devastated areas in Eastern Europe after WW I, including an emerging Soviet Russia.

- Chapter 5, "Conserving the Fighting Strength: Milestones of Operational Military Preventive Medicine Research," pp. 105-25 examines the subject with a focus on outbreak investigation teams and overseas research labs. Case studies include the little-known 1942 outbreak of leptospirosis, known as Fort Bragg fever, the well-known battle against malaria, and the development of water purification techniques.

Volume 2 has continuous pagination from Volume 1, adding another four sections with nineteen chapters, numbered 31 to 49. The text focuses heavily on infectious diseases, including chapters on arthropod, i.e. mosquito and other insect vectors; animal to human diseases; and diseases controlled by vaccination. The discussion is detailed and specialized.

- Chapter 40, "Principles of Infection Control and Prevention during Military Deployment," pp. 1249-66 provides concrete recommendations such as occupational health on deployment, three levels of infection control, and handling methodologies whether linen or human remains. There is an example table for Ebola symptoms.

- Section 7, "Preventive Medicine Efforts Following Disasters," consisting of Chapters 41 to 47, deals specifically with disaster relief efforts, the role of the U.S. military, public health aspects, etc. For example, Chapter 41, "The Challenge of Humanitarian Assistance in the Aftermath of Disasters," pp. 1269-87 analyzes different approaches to disaster relief based on past experience. The analysis considers type, consequence, and magnitude of the disaster; and challenges to deliver humanitarian assistance, e.g. population vulnerabilities, international legal ramifications, and security threats.

There are two additional volumes in the Series entitled *Medical Aspects of Harsh Environments*.

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USAWC STRATEGY RESEARCH PROJECT

**AVIAN INFLUENZA PANDEMIC MAY EXPAND THE
MILITARY ROLE IN DISASTER RELIEF**

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This SRP is submitted in partial fulfillment of the requirements of the Master of Strategic Studies Degree. The U.S. Army War College is accredited by the Commission on Higher Education of the Middle States Association of Colleges and Schools, 3624 Market Street, Philadelphia, PA 19104, (215) 662-5606. The Commission on Higher Education is an institutional accrediting agency recognized by the U.S. Secretary of Education and the Council for Higher Education Accreditation.

The views expressed in this student academic research paper are those of the author and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government.

U.S. Army War College
CARLISLE BARRACKS, PENNSYLVANIA 17013

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 15 MAR 2006		2. REPORT TYPE		3. DATES COVERED 00-00-2005 to 00-00-2006	
4. TITLE AND SUBTITLE Avian Influenza Pandemic May Expand the Military Role in Disaster Relief				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Frank Sherod				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army War College, Carlisle Barracks, Carlisle, PA, 17013-5050				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT See attached.					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES 28	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

ABSTRACT

AUTHOR: Colonel Frank William Sherod II

TITLE: Avian Influenza Pandemic May Expand The Military Role in Disaster Relief

FORMAT: Strategy Research Project

DATE: 15 March 2006 WORD COUNT: 8,002 PAGES: 28

KEY TERMS: Pandemic, Avian Influenza, Military Support to Civil Authority, Posse Comitatus

CLASSIFICATION: Unclassified

Recent involvement by the U.S. military with hurricane relief and comments by the President on expanding the DOD's role in disaster relief indicates increased missions for an already stretched military. The next national disaster facing the U.S. could be an influenza pandemic. The bird flu virus H5N1 currently threatening Asia and Europe can potentially mutate into a deadly human influenza pandemic with global consequences. The last major flu pandemic in 1918 killed 50 million people worldwide and 600,000 in the U.S. alone. The United States is not prepared for a human pandemic and the military will have a significant role in any national response. While some departmental level planning has been accomplished recently, interdepartmental coordination and clear identification of the lead federal agency is still lacking. This project explains possible effects of a pandemic on the U.S. and current responsibilities of federal departments involved in disaster relief. Analysis is presented on the evolving role the DOD plays should this event become reality and finally recommends preparations that should be accomplished to prepare the nation for this very real threat. An ad-hoc approach to a pandemic will have severe negative and far reaching affects on our nation and must be avoided.

AVIAN INFLUENZA PANDEMIC MAY EXPAND THE MILITARY ROLE IN DISASTER RELIEF

The role of the United States military in disaster relief operations both internationally and domestically is increasing. In the wake of Hurricane Katrina in the United States gulf coast region, the President of the United States indicated the U.S. military will have an increased role in domestic disaster relief operations. This responsibility primarily belongs to the Department of Homeland Security at the federal level but recent comments by some national leaders suggest that this could change. Based on unique command and control capabilities and other resources that can be mobilized quickly to respond to a disaster, putting the Department of Defense in charge of domestic disaster relief, at first glance, makes sense to many people.

There is no doubt that military assets will be used in the future for domestic disaster relief. The Asian Bird Flu has the potential to lead to a human influenza pandemic that could have staggering affects on the United States and the world. The military's role in an event of this magnitude will be significant and raises many questions. Issues such as local, state, federal and interagency responsibilities as well as lead agency control will be critical. What legal authority and limitations the military has with regard to the Posse Comitatus Act must be reviewed and clarified. And what other effects a disaster relief of this magnitude would have on the military must be explored.

This paper will examine what the potential effects of a human influenza pandemic might be on the United States and what the scope of the disaster response would entail. We will review current roles and planning that is underway, review national documents that have been recently published on a pandemic response, and potential military roles that must be addressed to make a coordinated federal response effective. Changes to current U.S. policy and law may be required. Recommendations for changes in disaster relief operations as well as planning and preparations that must be initiated now will be presented.

The Influenza Pandemic of 1918

A pandemic is an event that occurs over a wide geographic area and affects an exceptionally high proportion of the population.¹ Outbreaks of "the flu" are common and happen every year. "Seasonal outbreaks are caused by subtypes of influenza viruses that already circulate among people whereas pandemic outbreaks are caused by new subtypes that have not circulated among people..."² In the United States alone, 36,000 deaths are attributed to influenza annually.³ When influenza turns into a global pandemic the impacts normally become much more serious with high levels of illness, death, and disruption to economic and societal

systems. There have been a number of influenza pandemics during the 20th century. The most notable and deadly influenza pandemic on record occurred in 1918. Coming at the end of World War One, this pandemic killed an estimated 40 million people worldwide and 675,000 people in the United States alone. Additionally 43,000 United States service members mobilized to fight in World War One died due to the influenza pandemic.⁴ This strain of influenza was very contagious and infected over 28 percent of the U.S. population. This fact, combined with no anti-viral medications available during the time period, produced a mortality rate in the United States of 2.5 percent, several times greater than the average mortality rate.⁵ Unlike most influenza pandemics that effect very young and very old populations the most, this pandemic's highest death rate was in the 15-34 year old age group. The death rate for this group was 20 times higher in 1918 than in previous years due to the pandemic. Why this unusual age group was most affected is still unknown today. During the peak of the infections, more than 10,000 deaths occurred per week in many major American cities. The impact was so great it caused the life expectancy in the United States to drop by 12 years.⁶

The U.S. population in 1918 was much less concentrated (more rural), less mobile, and on a war footing, and therefore much more inclined to listen to guidance from the state and federal government than could be expected in today's modern society. These and other factors will present significant challenges for the United States when the next influenza pandemic occurs.

The Avian Influenza "Bird Flu" H5N1

There is a wide variety of influenza viruses. Type A influenza viruses are categorized into sub-types based on changes to proteins on the surface of the virus itself. Hemagglutinin (HA) subtypes have 16 variations and Neuraminidase (NA) variations have six different strains. These H and N subtypes combine in various forms to make many types of avian influenza.⁷ Additionally, influenza A viruses can change over time by either a gradual mutation or what is called a reassortment of one or more of its gene segments between viruses.⁸ The key point is that this ability of the virus to change could produce a virus that is very susceptible to human transmission.

The H5N1 influenza strain is extremely contagious and lethal in birds. Since the emergence of the strain in 1997 hundreds of millions of birds have died or been destroyed, to limit its spread in Asia and Eastern Europe. Although originally thought to be not transferable to humans, there have been a number of cases of humans contracting H5N1. These cases have been almost exclusively the result of handling or direct exposure to infected birds. So currently

the ability of humans to catch the virus from birds is not high and the ability of humans to pass the virus to other humans is very low. The sobering fact is that in the 169 documented cases of human H5N1 to date, 91 deaths have occurred.⁹ Asia has been hit hardest by the H5N1 virus with human deaths being reported in Cambodia, China, Indonesia, Thailand, and Vietnam. H5N1 deaths have also been confirmed in Turkey and Iraq.¹⁰ Many other Asian countries have now reported H5N1 in bird populations. As well, countries throughout Europe such as Great Britain, Germany, Romania, Greece, Turkey and now Russia are reporting cases of H5N1 as the virus appears to be spreading by birds on migratory routes.¹¹ As the avian H5N1 becomes more widespread, contact with humans increases thereby increasing the potential for H5N1 to mutate into a form that is more easily passed between humans.

The World Health Organization (WHO) breaks down global pandemics into six phases:

- Inter-pandemic Period
 - Phase 1 – No new influenza virus subtypes detected in humans
 - Phase 2 – No new subtypes in humans, however, circulating animal virus poses a substantial risk of human disease
- Pandemic Alert Period
 - Phase 3 – Human Infections with a new subtype but no new human-to-human spread
 - Phase 4 – Small clusters with limited human-to-human transmission suggesting virus is not well adapted to humans
 - Phase 5 – Larger clusters but human-to-human transmission is still localized suggesting virus is becoming more adapted to humans – substantial pandemic risk
- Pandemic Period
 - Phase 6 – Pandemic – increased and substantial transmission in the general population¹²

We are currently in the phase three alert period for the H5N1 virus. Because H5N1 has not been identified in humans before the current outbreak, there is very little human immunity for this strain. Although the severity of the next influenza pandemic cannot be determined until it emerges, a mutated virus that is easily spread between humans coupled with a high mortality rate is cause for serious concern.

Primary Means to Combat Pandemic Influenza

Although there is no cure to prevent a pandemic, since the devastation of 1918, a number of methods to combat its effects have been developed. The HHS Pandemic Influenza Plan, published in November 2005, describes a number of response actions which include: surveillance measures, the use of antiviral drugs and vaccine, public health measures, healthcare and emergency response, and public communications.

Surveillance of populations will aid in the early identification of human to human spread of the influenza. This will aid clinical evaluation of the pandemic strain of influenza and help local, state, and federal officials take necessary action to contain the spread of the pandemic.

A vaccine is defined as a living or dead virulent organism that is administered to produce or artificially increase immunity to a particular disease.¹³ Vaccines will be a key component of pandemic response as a measure to prevent the spread of the virus. However, a vaccine for a novel pandemic flu strain cannot be mass produced until the virus presents itself and can be studied and broken down. Despite work by scientists at the National Institutes of Health, predictions say the process to develop a vaccine will likely take six to nine months.¹⁴ Only then can an effective vaccine be mass produced – leaving populations unprotected during the early stages of the pandemic.

Antiviral drugs do not prevent infections but lessen the severity of influenza in the body and will be a key treatment during a pandemic particularly in the early stages until a vaccine is available. The two classes of antiviral drugs target hemagglutinin (HA) and neuraminidase (NA) inhibitors respectively. The H5N1 strain has already shown resistance to HA antivirals, leaving the NA inhibitors of oseltamivir (Tamiflu TM) and zanamivir (Relenza TM) as showing benefit in fighting H5N1 viral effects. Production of these antiviral drugs is limited and there is currently no production within the United States. There are a number of antiviral initiatives under way. Generic production is increasing in several countries which will increase overall availability but all U.S. government planning assumptions indicate the demand for antiviral drugs will far exceed on hand quantities. U.S production of oseltamivir is being pursued by HHS to help improve our national posture.¹⁵ The federal government also maintains the Strategic National Stockpile (SNS) of emergency medical supplies which includes antiviral drugs. Even after increasing stockage levels at the end of 2005, quantities in the SNS will treat less than two percent of the U.S. population.¹⁶ The President and Congress are both serious about increasing our preparedness in this area and have approved funding of increases of antiviral drugs to the range of seven percent¹⁷ coverage with more increases likely. In addition to the SNS, the Department of Defense (DOD) has begun to stockpile antiviral medications to cover

military needs and ensure timely distribution to priority populations based on DOD national security priorities.¹⁸

Public health measures will be an important component of pandemic flu containment. Measures including the use of personal protective equipment such as gloves, masks and hand hygiene, cleaning and disinfecting of common surfaces, and handling of pandemic flu patients must all be addressed. Actions such as canceling public events and activities that put people in close quarters such as school, church, or mass transit will all have to be evaluated for impacts on public health. Control measures such as isolation and quarantine may also be useful tools in slowing the spread of a pandemic and fall within the realm of public health measures.¹⁹

Healthcare response is another area critical to pandemic response. The ability to surge healthcare services, particularly ICU beds and ventilation services for treatment of pneumonia, will be key. HHS is developing a mass casualty capability that is deployable and targeted to augment organic hospital capacity. A pandemic could quickly become a catastrophic incident with mass fatalities. The ability to transport, process, store and make final disposition of deceased victims will likely overwhelm local capabilities. State and federal augmentation for mortuary services will likely be required.²⁰

Finally a public communications campaign that raises awareness and keeps the population accurately informed of pandemic issues is critical. HHS has the federal lead for pandemic information and has developed a Communications and Public Outreach Strategy for Pandemic Influenza. This plan focuses on public information and enabling state and local authorities to communicate effectively with their populations using a variety of means. Intergovernmental coordination at the federal level is also addressed as a key component for a successful communications campaign.²¹

Potential Impact of an Influenza Pandemic Outbreak in the United States

The Department of Health and Human Services (HHS) is reluctant to fix casualty figures for a future pandemic based on the number of variables involved. Just during an annual influenza season, the impact on the United States correlates to approximately 36,000 deaths, 226,000 hospitalizations, and direct health care costs between \$1B and \$3B.²² These are normally low figures based on some type of immunity built up in the human population for various strains already in circulation. Deaths attributed to seasonal influenza are primarily related to aged populations that have reduced immunity or some other progressed/terminal illness and in many cases leads to pneumonia which becomes terminal. Pandemic influenza would be a new strain with little or no human immunity in the human population possibly leading

to more serious morbidity and mortality rates than seasonal influenza. HHS estimates an influenza pandemic similar in scope to 1918, without intervention measures applied against it could result in 1.9 million American deaths, 10 million hospitalizations, and hundreds of billions of dollars in health related costs throughout the course of the pandemic that could last over a year.²³ These numbers are driven by modern trends such as more population in urban areas, increased aging population, and global travel which could lead to significantly more people affected than in past pandemics. Global travel alone will dramatically change the way a pandemic will spread. Pandemic influenza is easily transmitted between people and can be transmitted by people that do not yet show symptoms making it possible for nearly simultaneous outbreaks to occur globally.²⁴ The pandemic could be spread globally in months or even weeks. With these estimates, health care systems could easily become overloaded. Couple this with many health care providers, first responders, and emergency service providers as victims of the pandemic themselves and you have public systems that will begin to break down.

Possible Affects of Pandemic on the U.S. Military

The pandemic of 1918 caused 43,000 deaths in the U.S. military. In the U.S population approximately one in twenty persons between the ages of 18 to 50 (prime service age) died in a span of 10 weeks because of the pandemic.²⁵ While advances have been made in medical treatment and prevention of influenza, the military will suffer serious effects during the next pandemic along with the general population. Many military activities take place in close quarter areas. Person to person contact is increased in barracks housing, troop formations, on board ships and aircraft and other military activities which help spread the virus. A high percentage of service members in specific units could be affected simultaneously, degrading combat readiness. A pandemic could have significant impact on combat readiness of Soldiers to the point of restricting military operations. Other effects include: overwhelming of the military health care system, restriction of individual and unit movements, and the diversion of manpower from military missions to disaster relief missions.

The military has had good success with its sustained flu vaccine program over many years for the prevention of annual influenza epidemics in military populations, but the introduction of a new or novel flu strain would mean no immunity in all humans and a higher incident rate of influenza. With a vaccine not available for at least six months after a pandemic is identified, the military's use of antiviral drugs to treat flu victims will be crucial to maintaining combat readiness. Prioritization for these treatments within the DOD has been identified in guidance from the Assistant Secretary of Defense.

Current Federal Roles in National Emergency Response

The federal government has a large role in national emergency response. This role continues to evolve and expand since the watershed events of September 11, 2001. By executive order, President Bush established the Homeland Security Council (HSC) and the Assistant to the President for Homeland Security. The Office of Homeland Security which evolved into the Department of Homeland Security was also established. These federal organizations now have significant responsibility for federal response to manmade and natural disasters.

Interagency coordination will be critical due to the number of federal departments and agencies involved with pandemic planning and response. Other critical organizations in a pandemic response that will be discussed here are the Department of Health and Human Services and the Department of Defense.

Department of Homeland Security (DHS) Role

The Department of Homeland Security (DHS), created by Congress with the Homeland Security Act of 2002, "is responsible for coordinating federal operations within the United States to prepare for, respond to, and recover from terrorist attacks, major disasters, and other emergencies."²⁶ DHS began reorganizing the 22 agencies directed to be combined into one organization focused on homeland security. The effectiveness of this process has been the subject of numerous debates. Improvements in effectiveness have been made but diversity of missions and cultures have proved to be significant issues with synergizing these functions. In addition to the internal challenges of major reorganization, DHS has the challenge of coordinating federal emergency responses involving assets of many departments and agencies. Interdepartmental coordination is difficult for established organizations, let alone a new department in the throws of getting established. The Homeland Security Presidential Directive - 5 (HSPD-5) signed in February 2003 clearly identifies the Secretary of Homeland Security as the principle federal official for coordinating federal resources

utilized in response to or recovery from terrorist attacks, major disasters, or other emergencies if and when any one of the following four conditions applies: (1) a Federal department or agency acting under its own authority has requested the assistance of the Secretary [of Homeland Security]; (2) the resources of State and local authorities are overwhelmed and Federal assistance has been requested by the appropriate State and local authorities; (3) more than one Federal department or agency has become substantially involved in responding to the incident; or (4) the Secretary [of Homeland Security] has been directed to assume responsibility for managing the domestic incident by the President.²⁷

There are a number of organizations within DHS that will play a role in a pandemic response. Although the Federal Emergency Management Agency (FEMA) focuses on natural disasters, FEMA's core competencies of preventing loss of life and coordinating federal resources during disasters give them a role in DHS response to pandemic. The Coast Guard will have an interdiction role in preventing banned products associated with limiting the spread of pandemics, specifically enforcing the USDA ban on birds and bird products from countries that have documented cases of H5N1 Avian Influenza. Immigration and Customs Enforcement (ICE) will limit the spread of the pandemic through tightened immigration and customs measures. The Bureau of Customs & Border Patrol has the tough task of securing the nation's borders to limit the spread of the virus via illegal entry into the country. Illegal immigrant routes on the southern border with Mexico lead to population centers in southern California and could exacerbate spread of the pandemic in the United States.

HSPD-5 directed the Secretary of Homeland Security to develop and administer a National Response Plan (NRP) as a guiding framework for federal preparation, prevention, response and recovery for domestic incidents of any type. The NRP was coordinated with and signed by all cabinet members and published by DHS in December 2004.²⁸ HSPD-5 also directed the Secretary of Homeland Security to develop and administer a National Incident Management System (NIMS). The NIMS can be viewed as the implementing instructions for the NRP. It provides the structure, mechanisms, and operating policy for federal government departments and agencies to use for management of domestic incidents, regardless of the cause, complexity, or size.²⁹ The NIMS was published on 1 March 2004 by DHS. Hurricane Katrina was the first large domestic incident that should have tested the NIMS.

Other actions DHS has taken to prepare for national incident response include standing up the Homeland Security Operations Center (HSOC) to coordinate with other operation/command centers to be the focal point for federal incident management information. The HSOC operates on a 24 hour basis and is staffed full time by members of approximately 40 departments and agencies. The HSOC also fuses many intelligence products into its functions to provide complete situational awareness,³⁰ but does not exercise any decision authority over ongoing actions. These actions should improve DHS response as the federal lead in the event of a pandemic.

Department of Health and Human Services (HHS) Role

With the Secretary of Homeland Security in charge of coordinating federal agency response, the Secretary for Health and Human Services has the lead for all health and medical

issues relating to a major disaster or emergency.³¹ This is obviously a large portion of the total federal response to a pandemic. The HHS Secretary has the authority to declare a public health emergency under the provisions of Public Health Service Act.³² HHS coordinates externally with the World Health Organization and other international organizations on pandemic planning, information sharing and response. HHS also coordinates internally with state and local governments to incorporate plans and response actions.

In conjunction with DHS, HHS manages a large stock of medicines and medical supplies called the Strategic National Stockpile (SNS). HHS was charged by Congress in 1999 to develop and maintain the SNS to protect the public in the event of a national health emergency of such significance that local supplies are depleted.³³ The SNS is configured into push-packages that can be deployed to affected areas in 12 hours and follow up packages for deployment in 24 to 36 hours. Influenza anti-viral stocks in the SNS have recently been increased but still can only service one to two percent of the U.S. population.³⁴

HHS has a host of subordinate organizations playing a role in pandemic preparedness and response. Several with prominent roles are addressed below. HHS uses the Center for Disease Control and Prevention (CDC) to implement the HHS Pandemic Influenza Plan, raise public awareness, conduct laboratory development and testing, and conduct surveillance activities to limit the spread of pandemic. CDC will also make recommendations on use of the SNS and administer controls on quarantines for HHS in the event they become necessary during a pandemic. HHS is directing efforts at the National Institutes of Health for the development and testing of a vaccine for the H5N1 virus strain.³⁵ The Food and Drug Administration, another HHS agency, approves testing procedures and drugs such as vaccines and anti viral medication for human use and has worked closely with other agencies to fast track pandemic related issues.³⁶

Department of Defense Roles

The DOD can leverage tremendous assets in support of domestic disaster relief but is normally in a supporting role. Commitments vary widely depending on the nature of the disaster and the preparedness of the states involved. As an example the U.S. military had a large role in Hurricane Katrina relief operations. At its peak, approximately 72,000 service members assisted in this effort. Other assets included 346 helicopters, 76 fixed-wing aircraft, 21 ships, amphibious landing crafts, satellite imagery, construction support and mortuary teams. Thousands of Gulf coast residents were rescued and evacuated by military forces. Additionally, over 30 million meals ready-to-eat and 10,000 truckloads of ice and water were delivered to the region³⁷.

Because the magnitude of the hurricane was so large and first responders at the local and state levels were overwhelmed, the federal response was even more critical. With the problems encountered between all levels of government and the various federal agencies involved, the President suggested the Department of Defense (DOD) may be required to take a leadership role in disaster relief operations.³⁸

DOD has an improved structure for supporting disaster relief with an Assistant Secretary for Homeland Defense who is the department's POC for support to civil authorities, emergency preparedness, and domestic crisis management.³⁹ Northern Command (NORTHCOM), the newest unified command in the DOD, was created in 2002 to focus on defense of the homeland and civil support.⁴⁰ NORTHCOM does not have forces permanently assigned, but as a combatant command receives forces to accomplish missions that are assigned by the Secretary of Defense. The Assistant Secretary of Defense for Health Affairs (ASD/HA) also has a leading role within DOD during pandemic planning and response.

Missions DOD will be required to execute in the event of pandemic are far reaching. Previous DoD guidance on pandemic planning focused on Force Health Protection (FHP). Updated guidance from ASD/HA expands planning direction to include Defense Support to Civil Authorities (DSCA) and support to Humanitarian Assistance and Disaster Relief (HA/DR) operations.⁴¹ A recent Chairman of the Joint Chiefs of Staff (CJCS) Planning Order directed combatant commands to conduct execution level planning for DOD's response to a pandemic. Potential missions the combatant commanders were directed to include in planning are:

- Augment public health and medical services
- Provide logistic support and distribution of commodities to quarantined and / or isolated persons
- Provide manpower and security support to points of distribution and ports of entry
- Provide subject matter experts, manpower, and technical assistance to augment mortuary affairs operations
- Provide transportation support
- Provide continuity of government
- Augment communications for local, state, tribal and federal communications resources for interoperability
- Provide base and installation support to other local, state and federal agencies
- Ensure protection of defense industrial base, critical infrastructure and mission assurance

- Provide military assistance to civil disturbance for restoration of civil order as it relates to quarantine and isolation enforcement⁴²

DOD recently began maintaining its own stockpile of antiviral drugs and vaccine to support military requirements in the event of a pandemic. Once complete, the stockpile will contain sufficient quantities of anti-viral treatments to treat priority requirements until a pandemic vaccine is available to military forces.

Expanding the role of federal military forces will have second and third order effects that must be weighed carefully. The impact of stretching the force by committing more manpower to disaster support during a time of war, legal implications for the force, increased budget costs, and the impact on public perception of the military must all be considered.

Impact of the Posse Comitatus Act on Military Response to Pandemic Support

The ramifications of any new mission for the U.S. military in support of disaster relief within the borders of the United States requires close study based on the 1878 congressional act commonly referred to as “Posse Comitatus”⁴³

The Latin term posse comitatus translated means “the power of the county”⁴⁴ and in this context, relates to the power of a local county sheriff to form a posse of armed men to expand the size and capability of local law enforcement officials to assist with the enforcement of laws. During civil war reconstruction, the U.S. Army stationed in the southern states was commonly used to enforce reconstruction policy and local laws. The act was initially passed as reconstruction ended, to prevent the common practice of the Army being used to conduct domestic law enforcement.⁴⁵

Because Posse Comitatus is a legislative act and not a constitutional amendment its principle of preventing the federal military from being used for law enforcement actions can be undermined by subsequent laws passed by Congress. In the first half of the 20th century federal troops were used to end the Chicago riots of 1919 and the Truman administration ended a railroad workers strike when he temporarily nationalized the railroads and placed them under the control of the Corps of Engineers. The 1947 National Security Act that created the Department of Defense contains an updated and reinforced reference to Posse Comitatus limiting the role of the armed forces in law enforcement.⁴⁶

The examples of exceptions to the principle of the act are numerous and varied in scope.⁴⁷ The Air Force and Navy have been used in the war on drugs, immigration control, and tariff enforcement to interdict smugglers beyond U.S. borders. Federal forces have been used to quell civil disturbances when requested by a state governor or when a state is unable to protect

civil rights and/or property. When the President declares a major natural disaster he may use military forces and support on an emergency basis to preserve life and property such as Hurricane Andrew relief operations in Florida. Several exceptions have been granted to support the war on terror. After approval of the President, The Secretary of Defense can use federal forces, in the event of a terrorist attack involving weapons of mass destruction, nuclear material, or chemical and biological weapons. The President may also use federal forces in the execution of his duties to maintain transportation, education, commerce and civil rights. These exceptions are not part of U.S. Code but are broadly addressed as executive powers in Article II of the U.S. Constitution. Examples of these exemptions include using federal troops for desegregation of southern schools in the 1960's and use of over 10,000 troops to provide security for the 1996 Olympics in Atlanta. These examples are not all inclusive but clearly show there have been significant exceptions made to the original intent of the Posse Comitatus Act.

Posse Comitatus does not apply to National Guard forces while they are under the control of the governors of their respective states. Therefore, these forces may participate in law enforcement activities (and other duties) while in a "state control" status. Title 32 of the U.S. Code details state control of National Guard forces.⁴⁸ The President also has the power to federalize National Guard forces placing them under the control of the federal government. Once National Guard forces have been federalized they are subject to the same Posse Comitatus restrictions as active duty federal forces.

The trend in use of federal military for domestic purposes has risen significantly over the last thirty years. This use has led to more conflicts with the Posse Comitatus statutes as written and more exemptions being made by the legislative and executive branches. The debate over this use of federal forces has almost entirely been in the academic arena. There has been no public or political outcry of misuse of the military. In most cases where there has been public attention it has been focused on the impediments to allowing more force to be used in relief operations. It must be stated however, that a large majority of federal military support to civil authorities has been relief operations where the military is viewed as a savior and not to law enforcement operations where the federal military could be viewed as an enforcer with negative implications for DOD.

With the use of executive authority over the military and the exemptions to Posse Comitatus enacted by Congress, there is an apparent shift of power from the legislative to executive branch during times of crisis. This could create potential political hurdles for the President in pushing for the Department of Defense to take a leading role in disaster relief operations. It may be viewed as an attempt to consolidate more power in the executive branch

of government and Congress may be unwilling to further modify Posse Comitatus. During a pandemic, the military will likely perform many roles including some law enforcement missions. Clear definition of what actions are authorized by the military to support the federal response is crucial.

Current Actions Underway to Prepare For a Pandemic

The Federal government is now engaged in preparing the U.S. for the next pandemic. In 2004 and 2005 there were several national policy documents developed and published that set the course for federal response to national domestic emergencies starting with the National Incident Management System (NIMS) published by DHS in March 2004. Then the National Response Plan (NRP) was published in December 2004. Both of these documents lay out national priorities and provide specific guidance on roles and responsibilities for federal agencies. Although these documents are published, the effectiveness of the national response to hurricane Katrina indicates a coordinated implementation of the guidance is still to be realized.

In November 2005, in conjunction with a presidential visit to the Department of Health and Human Services, the Homeland Security Council published the National Strategy for Pandemic Influenza. The strategy focuses solely on national preparation, monitoring and response to pandemic influenza.⁴⁹ At the same time HHS rolled out their Pandemic Influenza Plan. This document contains extensive information on pandemic influenza and great detail on roles and responsibilities during a pandemic. It contains many detailed supplements providing guidance to state and local authorities as well as information on vaccine and antiviral drug distribution plans. The HHS Pandemic Influenza Plan is also synchronized with the World Health Organization (WHO) Preparedness Plan that was published in May 2005.⁵⁰ In addition to published documents on pandemics, HHS and CDC have posted a number of internet websites that provide great information for both public education as well as more detailed and technical information for health care and science professionals.⁵¹

Another action being taken by HHS is state wide summits conducted in each state, hosted by the HHS Secretary and Governors to raise awareness among state and local leaders, emergency service chiefs, business executives and other public agencies on planning and response to a pandemic. Outreach to the international community is also underway with a team of pandemic experts from USDA, US-AID, HHS, and DOS deployed to Turkey in January 2006 to capture lessons learned and determine how the U.S. can assist Turkey in their fight against Avian Influenza.⁵²

On 1 November 2005, the President requested \$8.1B in emergency funding from Congress to prepare the U.S. for a pandemic. The request includes funding for development and purchase of vaccine and antiviral drugs, detection and containment of outbreaks, international activities, and preparation of all levels of government to respond.⁵³ As an example, contracts have been awarded to several vaccine companies to speed the development of cell-culture technology production of vaccines to be used as an alternative to egg based vaccine production that is a 60 year old technology. The fiscal year 2006 portion of the request for \$3.8B was authorized by House Resolution 2863 on 30 December 2005. Also in December of 2005, the Homeland Security Advisor and members of the cabinet conducted an executive level tabletop exercise to address interagency coordination in planning and response to a pandemic. An outcome was the need to exercise plans at local, state and federal level to ensure compatibility. So there is plenty of action at the federal level.

The Homeland Security Council is also pushing ahead with publishing the National Implementation Plan for Pandemic Influenza. The implementation plan follows up on the national strategy with detailed guidance on interagency coordination and actions to be accomplished in the event of a pandemic. Coordinating officers detailed from stakeholder departments and agencies to the HSC have been drafting the plan since the end of 2005. It is expected to be signed by cabinet members and published in March 2006.

DOD activity on pandemic preparedness has significantly increased over the last six months. Starting with the publishing of the DOD Strategy for Homeland Defense and Civil Support in June 2005, the department is reshaping the way it supports domestic crisis. All combatant commanders are completing execution level planning for DOD response to pandemic influenza based on a Chairman, JCS planning order published in November 2005. Plans will be coordinated between combatant commands and submitted for CJCS review by February 2006. The Assistant Secretary of Defense for Health Affairs (ASD/HA) published updated guidance on 25 January 2006 to all services on pandemic preparedness and response.⁵⁴ This document provides excellent detail on planning assumptions and responsibilities broken down by the phases of a pandemic. DOD is taking aggressive action to stockpile its own anti-viral drugs and vaccine in the event of a pandemic. Stockage levels are being increased to meet potential needs and detailed coordination meetings between the Joint Staff, Services, TRANSCOM and the Defense Supply Center Philadelphia (DSCP) have been completed with regard to distribution of DOD stocks and N-hour sequences.⁵⁵ DOD's Implementation Plan for Pandemic Response is currently in staff review with the Services, Joint Staff, and OSD with a target date of 31 March 2006 for signature by the Secretary of Defense.

Interdepartmental partnerships have been established with DOD, DHS, HHS, DOS and the Veterans Administration. In fact DOD and HHS have a signed interagency support agreement dealing with shortfalls in critical medical materials.⁵⁶

Other departments are also taking action in their respective areas to ensure a coordinated response. As an example the USDA is updating its ban on poultry and poultry products from countries affected with H5N1 Avian flu. This action began back in February 2004 and is modified as H5N1 continues to spread across Europe, Asia and Africa.⁵⁷ Each federal agency will be required to have its own supporting plan to the National Implementation Plan for Pandemic Influenza once it is published in 2006.

Summary - Conclusions

A flu pandemic will happen again and will affect the United States. The H5N1 Avian influenza virus currently circulating in bird populations in Asia, Europe, and now Africa is spreading at an increasing rate. While human cases of the virus remain limited in number and only to people in direct contact with sick birds, the mortality rate for humans who contract the virus is over 50 percent. If the virus is able to mutate and becomes easily spread between humans a pandemic with staggering affects across the globe is possible. Depending on the morbidity and mortality rates of the virus strain, the impacts on the U.S. health care system and population in general could be debilitating. Affects on the military will be significant and preparation must be completed in order to maintain combat readiness as well as maintain forces that can assist with the disaster response.

Much work has been done in the last six months. A national strategy has been developed and published. Planning is underway in agencies across the federal government and many leaders are taking the threat of a pandemic seriously. Significant funding for preparation has been requested by the President and approved by Congress. Many physical preparations, coordinated by HHS, to increase the Strategic National Stockpile of medicines are underway and some coordination between federal agencies is ongoing. The Department of Homeland Security is making improvements in its organizational structure as well as its ability to coordinate federal actions. However, recent reports on Hurricane Katrina response underscore that much work is still required for DHS to be effective at interagency coordination and direction. The report by the HSC also brings back the recommendation that DOD should be placed in charge of disaster relief under certain circumstances.⁵⁸

HHS, the lead for all health related issues during a pandemic, is taking an active role in preparing the nation. I believe the HHS understands that pandemic influenza is its "Hurricane

Katrina” on a larger scale and is taking extensive action to be ready. The state by state meetings with the HHS Secretary, governors and state responders is an outstanding method to get state and local governments energized on this threat. Its work with CDC, FDA, DOD and other agencies on the development of vaccine and the stockpile of required treatments and equipment is impressive.

Homeland Security Presidential Directive 5 (HSPD-5) published 28 Feb 2003 gives clear guidance and direction. It makes the Homeland Security Advisor responsible for interagency policy coordination on domestic incident management. It defines roles and responsibilities and directs interagency cooperation. However, cooperation does not equal directive authority and assigning responsibility for action without granting the requisite authority to carry it out is problematic. The NIMS and NRP have been published by DHS and provide a framework for operations during an incident of national significance but need to be further refined to make them more effective. A willingness by other departments and agencies to “buy-in” to this interagency process is also required.

DOD resources that can be used in a federal response to a pandemic are significant. The extent to which those assets are employed will be scrutinized at many levels. Changes in structure and the creation of NORTHCOM have postured the department to respond better to support a domestic incident of national significance. DOD is taking action to prepare specifically for a pandemic. These actions have grown from the internal view of force health protection to the myriad of support missions DOD units may be called on to execute. Detailed planning at OSD, Joint Staff and combatant commands will enable a quicker and more effective response to assigned missions. Creation of the DOD stockpile of antiviral and vaccine drugs with detailed prioritization for issue based on the developing situation is a significant step to ensuring the continued readiness of our military force. DOD is involved in some interagency coordination, particularly with HHS and DHS. Continued improvements are required in this arena to ensure a seamless federal response. Posse Comitatus restrictions should be considered with planning military missions during a pandemic. The statute is designed to prevent federal forces from directly conducting law enforcement tasks within the United States. However, with the number of exemptions currently found in the U.S. Code and the desire of the legislative and executive branches to have the military significantly involved in support to civil authorities during disaster relief, it is unlikely that military roles will be limited during a pandemic. The HSC after action report for Hurricane Katrina contains eleven recommendations concerning DOD. One recommendation states that DOD should assume a federal leadership role when dealing with catastrophic relief efforts which is a departure from published guidance giving DHS this leading

role. This unsettled issue must be analyzed and decided long before the next incident of national significance is upon us.

Although some preparation to respond to a pandemic had been in the works, the events of Hurricane Katrina, and its aftermath, clarified the need for federal government agencies to get serious about this different, but potentially devastating threat. The level of preparatory action since Katrina indicates departments and agencies are now serious about their own pandemic preparedness.

Recommendations

HHS must continue to partner with world and regional health organizations such as the WHO, the United Nations, and the European Union. Support to WHO Global Surveillance Laboratories will help halt the spread of bird flu and give us our best early information on a pandemic that begins in another part of the world. HHS should continue to increase the amount of antiviral drugs in the SNS. The Pandemic Response Plan puts the U.S. target at 25% of the population. But organizations such as the Infectious Diseases Society of America (IDSA) and the Society for Healthcare Epidemiology of America (SHEA) advocate a 40% level ideally.⁵⁹ Increasing the SNS level to 40% now will offer the U.S. population more protection in the early stages of a pandemic, reduce scrambling to obtain more doses once the pandemic begins, and will help stimulate domestic production of these medications.⁶⁰ HHS is involved with some coordination at the federal level but should increase its interagency leadership on health issues of pandemic response. The HHS Pandemic Response Plan does not list “coordinate information sharing with other federal agencies” as a task until Phase 6 of a pandemic.⁶¹ This needs to be a core task conducted during all phases of pandemic planning.

Most of the technical issues of pandemic planning, preparation and response are now being adequately addressed at the departmental level. Departments and agencies are actively involved with their own internal planning and state and local governments are being brought into medical preparations of the national response plan. However interagency coordination needs to be improved. Not enough information sharing is taking place across the federal government. As the HSC continues to develop the National Implementation Plan for Pandemic Influenza some improvement at the action officer level can be observed but more needs to be accomplished. If this process is not improved during the planning and preparation phase, the response phase of the pandemic will be fragmented and the American people will suffer in the end.

We as a government cannot figure out who is going to be in charge of a national pandemic response after it starts or worse yet, when it become a catastrophic event. Based on

the federal response to Hurricane Katrina, President Bush indicated he wants Congress to consider placing the Department of Defense in charge of disaster relief operations.⁶² The Federal Response to Hurricane Katrina Lessons Learned report published in February 2006 also recommends that in some cases DOD should be the lead in federal response to a catastrophic incident. These statements run counter to all recently published strategy and implementing policy on disaster relief and the role of DHS. DHS has clearly been identified as the lead federal agency for incidents of national significance and should be allowed to develop that capability. It does not make sense to develop a national response system and then change the leadership organization when a worst case situation is at hand. DHS is just three years old and has not matured as an agency to the point it can maximize the effectiveness of the many disparate functions it now controls. The larger organizational question is whether DHS should be responsible for such a wide variety of missions or should it shed functions such as disaster relief that are not specifically related to security of the homeland. Regardless of that debate, DOD should not be given the lead role for disaster relief, but use its significant resources, as directed by the President, to support relief efforts as appropriate. DOD must maintain focus on its prime mission of national defense. Clear command and control relationships must be decided at the executive level then enforced across all departments to coordinate the federal response. Much of this structure has already been laid out in the NRP and the NIMS and needs to be enforced at the executive level.

The Posse Comitatus Act will not prevent the military from participating or even playing an expanded role in disaster relief. However, for clarity and unity of command the code should be rewritten so there is no doubt about the role of the Department of Defense, its federal forces and reserve forces before the next disaster hits. There should be a clear legislative and executive definition of what limits will be imposed on the use of military forces for domestic law enforcement. The military role should be limited and more precisely defined. Clarity of the law in fast moving disaster relief operations is critical.

The Department of Defense should take action to improve its response in future disaster relief operations. The recently published Strategy for Homeland Defense and Civil Support⁶³ lays out a good strategy and core concepts for civil support. The document should be improved by including more detailed annexes for the types of disasters that DOD is likely to support such as pandemic influenza. These annexes should detail the types of preparations and interagency coordination required to meet each of these varied challenges. Hard trigger events should be developed for some predictable civil support scenarios. This approach is proactive instead of reactive, takes the politics out of the equation, and allows for better interagency planning.

DOD needs to address force composition and consider the increased demand on military forces for disaster relief missions. Factors that must be considered include what percentage of the force should be active or reserve component and to what extent military forces will be used to support security and disaster relief operations. The President's fiscal year 2007 budget calls for reductions in National Guard and Army Reserve forces which equals less force available to Governors to respond to disaster relief missions in a Title 32 status. I recommend the status quo approach to force structure as it leaves adequate forces in place for all missions and avoids a large political battle that will divert focus from preparing for the nation's security threats.

HSC needs to drive the interagency process as directed in HSPD-5 and complete the implementation plan for pandemic influenza. Current departmental levels of activity will cover the major events of a pandemic. But an efficient and effective, coordinated response is still not realized. If the interagency process and clear command and control issues can be resolved before the next pandemic, the American people will be the beneficiaries.

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"Whoever, except in cases and under circumstances expressly authorized by the Constitution or Act of Congress, willfully uses any part of the Army or the Air Force as a posse Comitatus or otherwise to execute the laws shall be fined under this title or imprisoned not more than two years, or both."

The Air Force was added to the original act in 1956. The Marine Corps and Navy are not listed in the act itself but are subject to it by DoD Regulation 32 C.F.R. Section 213.2, (1992).

⁴⁴ Craig T. Trebilcock, Major, US Army Reserve, "The Myth of Posse Comitatus," *Journal of Homeland Security* (October 2000): 1.

⁴⁵ Trebilcock, 1.

⁴⁶ National Security Act, U.S. Code, Title 10, Section 375, (1947)

"Sec. 375. Restriction on direct participation by military personnel. The Secretary of Defense shall prescribe such regulation as may be necessary to ensure that any activity (including the provision of any equipment of facility or the assignment or detail of any personnel) under this chapter does not include or permit direct

participation by a member of the Army, Navy, Air Force, or Marine Corps in a search, seizure, arrest, or other similar activity unless participation in such activity by such member is otherwise authorized by law”.

⁴⁷ Trebilcock, 2-3.

These examples of exceptions are found in various sections of U.S. Code, Title 10, Sections 371-381; U.S. Code, Title 10, Sections 331-334; The Stafford Act, U.S. Code, Title 42, Section 5121; U.S. Code, Title 10, Sections 382 and 831.

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THE MILITARY RESPONSE TO PANDEMIC: THE NEW GLOBAL THREAT

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

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1. REPORT DATE (00-MM-YYYY) 28-01-2009			2. REPORT TYPE Strategy Research Paper		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE The Military Response to Pandemic: The New Global Threat					Sa. CONTRACT NUMBER	
					Sb. GRANT NUMBER	
					Sc. PROGRAM ELEMENT NUMBER	
					Sd. PROJECT NUMBER	
6. AUTHOR(S) Colonel Pietro Tornabene, International Fellow - Italy					Se. TASK NUMBER	
					Sf. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Colonel Roberto Nang Department of Command, Leadership, and Management					8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army War College 122 Forbes Avenue Carlisle, PA 17013					10. SPONSOR/MONITOR'S ACRONYM(S)	
					11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT DISTRIBUTION A: UNLIMITED						
13. SUPPLEMENTARY NOTES Only a work of the United States Government is not subject to copyright. Based upon the nature of a particular student-author's employment, a paper may not be a work of the United States Government and may, in fact, be protected by copyright.						
14. ABSTRACT The more we develop, the more people gather in enormous urban conglomerates, the more we become intertwined in a complex society characterized by large availability of means of transportation, and the more the disruptive effects of a global plague stemming from an unknown infection will be. It is necessary to address this new type of menace in order to know the enemy we face, and once known, find feasible, acceptable, and suitable course of actions to defeat it or, at least, minimize the undesirable effects to our complex society. To fight this kind of "war" is not only the duty of a few researchers or doctors. The Army, as the ultimate bulwark between order and chaos when a threat becomes disruptive for the entire society, has a big role to play in order to assure order, deliver goods and medicines, control the stream of infected people, and maintain open vital communication's routes. The threat of pandemic does not find place in the "The Spectrum of Conflict," and requires new tasks to be accomplished by the Armed Forces. This paper has been developed to address this kind of problem.						
15. SUBJECT TERMS Influenza, Microbes, Menace, Army, Training, Preparedness						
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON	
a. REPORT UNCLASSIFIED	b. ABSTRACT UNCLASSIFIED	c. THIS PAGE UNCLASSIFIED			19b. TELEPHONE NUMBER (include area code)	
			UNLIMITED	27		

USAWC STRATEGY RESEARCH PROJECT

THE MILITARY RESPONSE TO PANDEMIC: THE NEW GLOBAL THREAT

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ABSTRACT

AUTHOR: Colonel Pietro Tornabene
TITLE: The Military Response To Pandemic: The New Global Threat
FORMAT: Strategy Research Project
DATE: 28 January 2009 WORD COUNT: 5,510 PAGES: 27
KEY TERMS: Influenza, Microbes, Menace, Army, Training, Preparedness.
CLASSIFICATION: Unclassified

The more we develop, the more people gather in enormous urban conglomerates, the more we become intertwined in a complex society characterized by large availability of means of transportation, and the more the disruptive effects of a global plague stemming from an unknown infection will be. It is necessary to address this new type of menace in order to know the enemy we face, and once known, find feasible, acceptable, and suitable course of actions to defeat it or, at least, minimize the undesirable effects to our complex society. To fight this kind of “war” is not only the duty of a few researchers or doctors. The Army, as the ultimate bulwark between order and chaos when a threat becomes disruptive for the entire society, has a big role to play in order to assure order, deliver goods and medicines, control the stream of infected people, and maintain open vital communication`s routes. The threat of pandemic does not find place in the “The Spectrum of Conflict,” and requires new tasks to be accomplished by the Armed Forces. This paper has been developed to address this kind of problem.

THE MILITARY RESPONSE TO PANDEMIC: THE NEW GLOBAL THREAT

So the Lord said: 'I will wipe out from the earth the men whom I have created, and not only the men, but also the beasts and the creeping things and birds of the air, for I am sorry that I have made them.'

—Genesis 6, 7¹

In the last years, the appearance of incurable diseases, previously unknown, with disgusting symptoms has called for a reflection on the dangers that seemed buried in history.

Ebola, HIV, SARS, and Avian Flu are scary words that recall the spectrum of incurable diseases. The mind goes to the past diseases that have plagued human societies and it is horrified for the unforeseeable consequences on our complex society. How would we react to a pandemic disease able to kill 10—20 percent of the population? Would society remain intact or would it be disrupted? Who would maintain order? What would be the role of the Armed Forces and the Army in particular?

We are part of the bio-ecological system and even if our science and technological development assure us a clear victory on the invisible enemies of the human body, we cannot escape the limits of the ecosystem,² and the more

...we win, the more we drive infections to the margin of human experience, the more we clear a path for possible catastrophic infection.³

Pandemic diseases have been common in the past and claimed a recurrent heavy toll on the humans. The last pandemic occurred just *yesterday*, in 1918-1919, called *Spagnola* (Spanish flu), and claimed a staggering number, between 20 to 100 million human lives,⁴ more than the grand total of military and civilian deaths of the entire World War I (about 18.5 million) in four years of fighting.⁵

The future has a name and this name is “globalization”. You can be an enthusiast or a stalwart opponent of it, but it is undisputable that

... the present and future state of globalization will be a major determinant of the shape and nature of world politics, and governmental attitudes to it will in turn be major determinants of strategy and defense policy⁶.

Internet, technology, economy, and social relationships have already integrated the world into a single interwoven organism. As an *organism* the globalized world pays particular attention to its “physiology.” This is clear when an epidemic occurs. The population that faces an epidemic behaves as a single ecological unit and the epidemic, in an ecological sense, acts as a force of natural selection, killing some people with certain genes but sparing people with others. An epidemic, also, links separate populations into a single evolutionary unit. A pandemic is an epidemic that occurs simultaneously in many different parts of the world. From an ecological perspective, a pandemic temporarily connects many, perhaps even all, humans into a single ecological and evolutionary unit.⁷

If it is true, that globalization has forced the international community to rethink the concept of National Interest to include the notion of “Collective Security,” the same is true for the health of the system. Today a health problem in any part of the world can become a problem for the system as a whole. The dramatic increase in worldwide movement of people and goods due to wars, trade, and travel exposes *everyone* to the emerging global threat of infectious diseases. We give to the microbes new homes in tires, tanks, containers, trucks and airplanes that go back and forth to every corner of the world. Furthermore, urbanization and global climate change pose additional problems. In 1900 only five cities in the world had populations larger than one million; by the year 2020, there will be twenty-five megacities with more than twenty million people

and scores of cities with more than a million.⁸ The crowded conditions in urban regions favor the transmission, both directly and indirectly, of pathogenic microbes from person to person. The rise of temperature due to the combustion of fossil fuel and the increasing deforestation, have significantly increased the range in which insect vectors can live and breed. Such climate changes could alter precipitation patterns which could alter vegetation patterns and, in turn, alter the distribution of animal species that are vectors of a wide range of infectious diseases.

In the modern “global village” people, vectors, and microbes, as well as medicines, medical information, and evildoers can travel around the globe with great frequency and ease. The potential for an epidemic of infectious disease that can become a pandemic is real and perhaps unavoidable. Especially influenza has the potential for pandemic spread and leads to intriguing ethical, legal, and organizational questions about public intervention to avoid a situation that could severely disrupt trade, economics, travel, and personal liberty. The nature of the menace is so threatening that it needs to be addressed not only with Public Health interventions but also with all the state’s means including the Military Force.

In this study, we explore the nature of pandemic disease as a menace for the international system. We begin by describing what is a pandemic and the threats it poses to the international system when associated to particular diseases. We briefly expound on the impact of infectious diseases in history, then we Infer what type of “side” consequences can spur the outbreak of a pandemic disease (above all the stigmatization of persons, communities, and ethnic groups). Finally, we identify the possible role of the Armed Forces, and the Army in particular, in facing a pandemic

disease in order to assure order, deliver goods and medicines, control the stream of infected people, and maintain open vital communication`s routes.

Pandemic, Endemic and the Influence of Disease in History

A pandemic disease, called also just “pandemic,” is a disease prevalent over a whole area or country.⁹ This is the definition you can find in a dictionary, but is it satisfying? No, because it does not account for an important characteristic that a pandemic disease must possess: to be infectious. It is better to turn to the World Health Organization that identifies three essential prerequisite for the start of a pandemic:

- A novel type of disease must be transmitted to humans;
- The infectious agent must be able to replicate in humans and cause disease;
- The infectious agent must be efficiently transmitted from one human to another; efficient human-to-human transmission is expressed as sustained chains of transmission causing community-wide outbreaks.¹⁰

Following these characteristics, a disease or condition is not a pandemic merely because it is widespread or kills many people; it must also be infectious. Cancer is not a pandemic because, even if it is widespread, it is not infectious.

Moreover, it is necessary to make a distinction between pandemic, epidemic and endemic. The term epidemic refers to any disease that occurs suddenly among people in a particular region,

it affects or tends to affect a disproportionately large number of individuals within a population, community, or region at the same time.¹¹

Conversely, endemic:

Are diseases which exist in particular localities or among certain races. Some diseases, which are at times epidemic over wide districts, have a

restricted area where they are always endemic, and from which they spread.¹²

The adaptation of an infectious agent, that we can call *germ* or *parasite*, and host (a human, animal or, generally speaking, a complex biological entity) goes through stages called epidemic, endemic, and symbiotic. A germ entering a virgin population (i.e. one that is unfamiliar and has few defenses against it) often causes acute disease in people of all ages. The survivors are usually left with improved defenses against reinfection. The disease eventually becomes endemic, a widespread, lower grade infection or routine childhood disease. With further adaption by germ and host comes symbiosis, in which parasite and host sustain mutual tolerance (mutualism) or even mutual benefit (commensalism).¹³ A pandemic is an epidemic that occurs simultaneously in many different parts of the world.

Many diseases have caused pandemics, and in the past humankind has experienced pandemic of smallpox, plague, cholera and others. Most of these diseases came from other species, smallpox probably from dogs and cattle, tuberculosis from cattle and birds, AIDS probably from African monkeys.¹⁴ Today, the most worrying disease able to begin the next pandemic is influenza. The flu virus has many varieties, many reservoirs (such as swine and fowl) that can exchange it, and a spectacular ability to mutate and baffle human immune defenses. The last deadly pandemic faced by humankind was the Spanish Flu, which occurred in 1918-1919, comparable to the Black Death in the fourteenth century.

In this study, we will concentrate on pandemic influenza to analyze the threat it poses to contemporary society and to devise the most appropriate responses to address this potentially destructive menace effectively. However, before analyzing the

nature of the threat the flu poses to our society, it is important to understand how disease and parasitism play a pervasive role in life and in history. Viruses have depleted the native populations of entire countries and have posed the basis for dramatic changes in their economic and religious life, affecting the course of history.

Disease has been a concealed companion of every war and until recent time the real demanding killer of war was not war itself but the host of diseases that were the unerring mates of it. Two examples are telling on this subject: during the First World War some 113,000 American soldiers died, 51,000 in battle, 62,000 from disease,¹⁵ and during the Civil War about 600,000 American soldiers died, 207,000 in battle, 392,000 from disease.¹⁶

In the Bible, there are indications of the influence of disease in war.¹⁷ How vulnerable a population could be to a sudden eruption of unfamiliar infection is illustrated by what happened in Athens during the Peloponnesian War in 430-429 B.C. Thucydides has left a detailed clinical description of the epidemic that did so much to demoralize the Athenians and killed off about a quarter of the Athenian land Army.¹⁸ An outbreak of dysentery weakened the Prussian force invading France in 1792 and helped to convince their leaders to turn back after losing the battle of Valmy, thus saving the French Revolution.¹⁹ The conquest of the Aztec Empire was due to the most powerful ally of Hernan Cortez: smallpox!²⁰

When black slaves revolted in Haiti, in the early years of the nineteenth century, to put down the revolt, Napoleon sent over 27,000 French troops (1802). When the French came in contact with the yellow fever virus transmitted by mosquitoes, they fell ill and died from the infection. The huge loss influenced the decision not to risk the even

larger numbers of troops necessary to protect other French territories in the New World and was one of the major considerations leading Napoleon to negotiate the sale of the Louisiana Territory to the United States.²¹ These are a few examples that compel us to see a more complex view of history that takes account of diseases as a component of the life of societies along with their political, social, and economic activities.

The comprehension of the remedies to put in place to cope with the menace carried out by the diseases to a society needs an understanding of the differences between an outbreak of a familiar disease amid an experienced population and the ravages of the same infection on a community lacking acquired immunities. At this point, we need to analyze what role disease and parasitism play in life.

All animals are dependent for their nourishment on other biological elements (vegetables or other animals), and human beings are no exception. At biological levels there is astounding parallel between the visible world of the “macrobes”, where some animals feed themselves with others, and the invisible world where microbes feed on other microbes. Microbes are viruses, bacteria, or multi-celled creatures that find a source of food on a host creature and act as microparasites. The successful search for food on the part of one organism can become for its host, a nasty infection or disease.²² Some microparasites provoke acute disease and either kill their host after only a brief period of time, while there are other microparasites that achieve more stable relations with their host, establishing a relationship called symbiosis.

In the world of the “macrobes” something similar happens and some animals act as plunderers killing the prey, as wolves or lions do, or act as parasites exploiting the ability to find nourishment within a host. Man is not an exception, and in his history he

has acted as plunderer or parasite. Usually, he acted as a parasite with his similar beings, exploiting the abilities of others to work and producing wealth. The first civilizations were built by rulers, who decided to take part of the harvest for the need of the upper class of the nobles, priests, and soldiers, leaving the people with enough food to sustain the lower classes indefinitely, establishing a social symbiosis.

Like the societies of the “macrobes,” inside the human body, white corpuscles fight and phagocyte enemy microbes responsible for infectious diseases. The microbes that they cannot phagocyte, are able to absorb the nourishment of the human body, behaving, sometimes as a plunderer, killing the host body, or as a parasite living in the host body and leaving him enough nourishment to live together indefinitely in symbiosis.

When the parasite is able to live indefinitely with the host body a sort of equilibrium is found, and in our body there are traces of this kind of equilibrium.

In the intestine exists an abundant intestinal flora, fruit of this equilibrium that is of mutual benefit for the body and for the microbes that act as parasites.

The problems arise when an infesting agent not recognized by the body alters the balanced or calm equilibrium and gives way to unrestrained reactions that can cause the death of the body. This situation is common when the infesting agent achieves a “leap” of species or of “environment.” Every species and every environment have and work in dynamic equilibrium with intertwined and complex relations that allow the system (species and environment) to perform normally.

It is necessary to be aware of this precarious equilibrium to avoid what already happened in the world of the “macrobes” when different civilizations at different stages of development (in disequilibrium) met each other with the annihilation of the weakest.

Our unrelenting quest for resources, along with the tremendous increase in contacts due to the cheap availability of the means of transportation, and the globalized nature of the contemporary world makes the human community particularly prone to the menace of a new devastating plague carried out by an unknown infectious element that sleeps somewhere in the darkness of some far away deposit of natural resources or in the depth of an unexplored forest.²³

The Nature of the Menace

Among the known diseases that can cause a pandemic, of relevance for this study are those that have high contagiousness and an ability to spread among the human population in short time. The most threatening disease with these characteristics is influenza. It is a disease that already has a high genetic unpredictability in the causing virus,²⁴ a high speed of transmissibility, every year appears as a pandemic, and is quite dangerous, claiming every year 36,000 deaths per year in the United States.²⁵

Pandemic flu, or pandemic influenza, is a global outbreak of flu that occurs when a new flu virus appears in people, causes serious illness, and spreads easily from person to person. On average, pandemics occur about every 30 or 40 years²⁶ (the last pandemic occurred in 1968) and the next is conservatively expected to cause between 2 and 8 million deaths.²⁷

The Institute of Medicine (IOM) has noted three essential prerequisites for an influenza pandemic:

- (1) The identification of a novel viral subtype in animal populations such as swine or poultry, (2) viral replication causing disease in humans, and (3) efficient human-to-human transmission. The species “jump” from animals to humans could occur through a process known as “reassortment.” If a person is exposed to both animal and human viral infections, “the genetic mixing” could lead to a strain that is

transmissible from human to human, sometimes in ways that are highly resistant to vaccination or antiviral treatment.²⁸

The flu virus has many varieties and many biological reservoirs (such as swine and birds) that allow it to mutate and evolve in order to baffle the human defenses and to generate trouble.²⁹ Because influenza is not considered eradicable,³⁰ the faster we change the environment around us, the faster we force the evolution of the viruses that find niches in the animals that surround us, and the faster new types of infections will reach us.

The outburst of a pandemic with high lethality is a menace not only to public health, but for the system itself, demanding strategies to:

- Prevent and control transmission in birds and other animals;
- Put in place state and local preparation measures;
- Devise biomedical measures to prevent and control the pandemic;
- Manage legal issues in pandemic prevention and control;
- Address the need for integration and communication across various fields of medicine;
- Coordinate public and private sectors;
- Carry out military policies to properly address mass mobilization and area control.³¹

The SARS, severe acute respiratory syndrome, epidemic of 2003 has been the first harbinger of future events that might be catastrophic for the global system as we know it today. SARS has been successfully addressed, for now, but continues to be a future pandemic menace. It was a menace of global magnitude that demonstrated that effective surveillance and a prompt, appropriate response are critical to containing an

outbreak.³² Effective surveillance and appropriate responses could raise questions about the role of national sovereignty in an increasingly interconnected world and could call on all the energy of the World Health Organization, the international scientific community, and the civilian and military authorities as well.

The Role of the Armed Forces

Illness, death, lost of sources of revenues, disrupted commerce, social unrest, and widespread complaints are the consequences of a pandemic.

Politics needs to keep time with the biological development of the disease. Selfishness, reticence, and economic miscalculations, until now, have created obstacles in fighting emerging diseases, and have dampened the efforts put in place by dedicated organizations to fight them. The nature of the threat is so awesome that it is necessary to be ready to fight the incoming pandemic with rigorous scientific approach, and *the leveraging of all instruments of national power*³³ including the Armed Forces.

An epidemic exerts immense political and social pressure for swift, decisive, visible response. When this response is perceived as insufficient, the public can react with rage, without regard to the negative effects of the government's wrong or misguided actions. A sense of rage can easily take the form of stigma toward individuals, ethnic minorities, places, etc. This problem needs to be addressed at the very beginning, first with police resources but if it reaches overwhelming proportions, then, to the Armed Forces. Officials have an obligation to take steps to mitigate the suffering consequent to stigmatization, being aware of the irrationality that underlies the behavior of human beings, and of the inequity of ethnic stereotyping. The army is the best national resource to discourage hate crimes, prevent the stigmatization of specific

people or places as “contaminated” or unhealthy, bolster the ability of individuals and the large community to rebound from unpredictable and traumatic events; and provide food and materials to those who need it.

The Armed Forces, and the Army in particular, are exercised to act in very difficult situations, and their self-sufficient, trustworthy nature as an organization are precious characteristics that are vital in such a situation, where maintaining essential functions and services is critical.

Along with the legal measures to put in place to face nearly every facet of pandemic preparedness, it is necessary to be prepared to use the army in duties that can be expected to reduce the risk of animal-to-human transmission of disease; to prevent or control the spread of infection; to impose voluntary or mandatory quarantine and/or isolation measures, travel limitations, trade restrictions, border closures, and surveillance/detection activities (when necessary).

Each of these interventions, while potentially beneficial to the society, also imposes a burden on at least some of its members in the form of economic disadvantage, loss of political power, or sacrifice of human rights. To render these burdens more bearable to the people, it is necessary that these activities should be performed by a trusted and fair organization such as the Army.

Moreover, if these measures are to be effective, they should be imposed early in the course of a pandemic, before it can be scientifically ascertained whether they are actually warranted.³⁴ Local police and public health laws are not sufficiently robust to meet this daunting challenge.

Pandemic preparations can be viewed as an insurance policy, an investment accumulated over time, in anticipation of an eventual crisis. Conducting planning and preparedness exercises to strengthen the response to a broad range of possible public health emergencies, should involve the military along with the local and state institutions.

The occurrence of an epidemic of epizootic foot-and-mouth disease (FMD) (*Aphthae epizooticae*) in United Kingdom in 2001 was a first glimpse of things to come. Only with the use of the Royal Army, was the United Kingdom able to cope with the spread of this disease, and with a well devised plan of containment, control and destruction of the affected animals carried out by the Army, the United Kingdom was able to succeed in defeating a disease that was bound to destroy the entire cow stocks of the country.

As in the United Kingdom case, control of animal population is critical. When pandemic influenza begins, a critical early strategy is to try and control animal populations and to try and limit the disease's ability to "jump" species. A lot of the biological mixing that occurs with the flu occurs with the cohabitation of pigs and/or birds and humans (this is common not only in China and in many Southeastern Asian countries but in other countries as Indonesia, West Africa and North West Pakistan).³⁵ There is a lot of avian spread of respiratory disease: first transmitted by migrating wild birds between each other and then to large domesticated poultry farm populations by wild birds and then between the many, many birds (chickens and turkeys) in large poultry farms. To diminish the risk it will be necessary to separate animals from humans through infection control and disinfection, and to manage deceased and exposed

animals. This is a critical factor not only for the directly affected countries but is also important for every country as well, in order to prevent world-wide spread of the disease. Even in the United States with its robust Public Health agencies and its trusted Department of Agriculture, this issue is very difficult to be sorted out.³⁶ The numbers of animals to control can be staggering and impossible to deal for every civilian organization and it is likely that the Army will be employed to:

- eliminate large numbers of exposed animals;
- provide burial or elimination of the bodies of the suppressed animals;
- put in place aggressive policies of culling those animals who may have been infected;
- and assure control of geographical areas affected by the disease.³⁷

This is just an example of the employment of the Armed Forces. The needs of homeland security require extraordinary efforts for rapid-reaction forces to be ready for emergency response. Even if a strategy for pandemic influenza already exists, it is critical to analyze what could be key contributions of the military.

The U.S. National Strategy for pandemic influenza is based on three pillars: preparedness and communication, surveillance and detection, response and containment.³⁸ In each of these camps the military can offer their invaluable contribution.

Preparedness and Communication. In the field of preparedness, the military can offer their contribution developing efficient mechanisms for mobilization and fast transfers of resources (human and equipment) into municipalities where they are needed and assuring the fast delivering of reserve resources to jeopardized areas. In a

scenario built on the possible impact of a pandemic, the public would react with a widespread sense of vulnerability, social hysteria, and social disruption causing panic mass migrations using cars to move away from the affected area with the likely result of complete traffic gridlock in busy city streets or major arterial highways. In this situation the only way to reach the people in the affected area would be by air and the railway. Helicopters could intervene efficiently, but their limited load capacity will have difficulty with the large amount of materials and medicines needed. The railway is a better way to deliver large amounts of materials at low cost. Preparing some military units to manage and to deal with the railways are critical tasks to accomplish in order to be prepared in the occurrence of a pandemic. The railway net is widespread enough to reach every corner of the country and has a big potential to funnel whatever is needed in an affected area. In addition, some train convoys can be easily transformed as “mobile hospitals” in order to give specialized care to the needy.

Management of Risk Communication and Health Information dissemination must be seen as critical factors to accomplish in order to avoid social hysteria and public irrationality or overreaction. The official communication, normally, comes out as a trickle and is outpaced by the media information with little interest in sorting “noise” from critical information.³⁹ An effective system of public communication, reliable in the flow of information and with regularly scheduled updates could be put easily in place by military specialized units utilizing dedicated TV and radio channels, as well as high-tech outreach such as the internet, to broadcast reliable and up-to-date information. The ultimate aim is to create an informed and involved public able to help solve the problem

and at ease with its political and community leaders. To reach mutual confidence is the basis for any effective action to cope effectively with the disease.

Surveillance and Detection. Constant monitoring of the “hot spots” where a new virus can develop, detailed testing and screening, fever monitoring, reporting and monitoring trends for a large population are responsibilities carried out by the World Health Organization (WHO) and the US military, with its invaluable contribution through the US Military Influenza Surveillance Network that includes sites outside the United States.⁴⁰ The US Army Center for Health Promotion and Preventive Medicine (USACHPPM), the US Center for Disease Control, and State Public Health Departments all have good surveillance systems with good synchronizations with each other.⁴¹ Nevertheless, it is necessary to expand virologic and disease surveillance in order to close gaps in the current geographical coverage for early warning of the emergence of variants and animal strains with pandemic potential. Better integration of human and animal influenza surveillance is essential for understanding and preparing for threats to human health posed by animal influenza viruses.⁴²

Response and Containment. The best response to a pandemic influenza is vaccination. In order to avoid the collapse of the existing medical infrastructures, a mass campaign of vaccination using mobile centers of vaccinations could be managed by military. The military will be involved to deal with unrest among the population striving to get vaccination, and to maintain good order and discipline for the people waiting for their turn. Customized railway trains can be used as hubs from which these mobile centers can radiate.

To prevent the spread of infection across borders, restrictions and controls will be enforced on the people and merchandise entering back and forth between borders. The sheer large numbers of people and merchandise to control will require the employment of the Army in activities of police control to be performed along with the existing agencies at present in charge of these kinds of activities.

The potential for a mass outbreak of disease raises the specter of civil confinement to separate those who are infected from those who are healthy and could require mandatory measures to be accomplished only through the use of military force. Furthermore, it may be necessary to quarantine a geographic area, a task needing to be accomplished with exclusive recourse to military force. In case of civil confinement, the problem to provide the necessities of life such as safe food, water, and medicine arises. This problem can be addressed by establishing “logistic pipelines” big enough to satisfy the population’s needs. Once again, the railway is a critical infrastructure that can efficiently address all the necessary needs.

The challenges of a pandemic are so daunting that the employment of the Armed Forces will be required since the first stage of its occurrence could cause the civilian authorities to be overwhelmed. It happened in the past in the occurrence of painful disasters such as 9/11 and Hurricane Katrina. These situations call for a temporary exception to the caveats of the Posse Comitatus Act, the 130-year-old federal law restricting the military’s role in domestic law enforcement. Furthermore, the fact that terrorist organizations can resort to the use of dangerous pathogens able to generate a pandemic underlies the necessity to be ready to deploy the troops on behalf of

homeland security and to prepare the military force for multiple, simultaneous mass casualty incidents.⁴³

All plans are, more or less, worthless when the time comes to apply them because all plans cannot properly foretell specific and unexpected exigencies that always seem to occur. What it is important is not any one specific plan, but that all the responsible agencies are able to communicate and get to know each other and become familiar with each other's capabilities so that the team can train and exercise synergistically together. The exercises will make the organizations, and the people inside them, aware of the potential difficulties in applying the plan and will force them to find solutions to overcome all the shortcomings.⁴⁴

Drawing smart plans is important, but it is not sufficient. Training is what *is* really important. The military needs to be aware of the indispensable role they will be called on to perform in the occurrence of a pandemic, and the Armed Forces need to train units for this specific task along with the other actors of the different departments involved. What it is requested is a truly civilian-military interagency effort to be carried out on behalf of the entire society. Pandemic simulation exercises should be developed for civilian and military planners, and in the course of running the simulations, the civilian and military players should trade places.⁴⁵

Conclusion

In today's information-saturated environment, outburst of a disease in a remote area that has little Public Health or Epidemiological support can easily become a problem for more distant and advanced 1st-world countries and can cause panic due to sensationalized media headlines. Public panic and loss of confidence in public safety

can lead to population demands that are not helpful, with no real practical basis for the demands, but which could then overwhelm Healthcare and Public Works Systems. Furthermore, a deadly pathogen nurtured in geographically distant places can be quickly transported to our industrialized countries and can spring a new disease, with pandemic characteristics, with sudden urgency and devastating Public Health consequences.

In both cases, every effort should be put in place in order to assure the public that *every* element of power (included the military) is committed to protect the society. The military, as the ultimate bulwark between order and chaos is able to face this new kind of menace, and with its unparalleled logistic capabilities and case management capacity, can properly assure order and discipline, efficient delivery of goods and medicines, control the stream of infected people, and maintain open vital communication's routes. The Armed Forces are already involved with their laboratory and epidemiological expertise in an effective surveillance effort for new influenza viruses and their associated morbidity and mortality.⁴⁶ This is not enough, to be prepared for the next pandemic, it will be necessary to commit all national resources available with the same intent with which the human society has been involved to fight the macroparasitism of the man-on--man (armies, international organizations, and all the structures built to lessen the international violence). We must be aware that an invisible enemy is somewhere in the world and it is developing to start a disruptive attack, perhaps the most disruptive that humankind has ever faced.

The military is ready to give its invaluable contribution in order to mitigate suffering, give help, and reassure people. Its units can deliver adequate human and

material capabilities to cope with the threat, serving the country in silence and with professionalism. Even if a natural-occurring threat of pandemic does not occur in the “The Spectrum of Conflict,” the Armed Forces must become involved and should be made ready to succeed with planning and training now. It is necessary to move from a framework to an action plan, taking advantage of bio-terrorism planning and to address all the issues related to this new fruit of the volatile, uncertain, complex, and ambiguous modern environment.

Endnotes

¹ *The Catholic Study Bible* (New York: Oxford University Press, 1990), 10.

² Laurie Garrett, *Coming Plague* (New York: Penguin Books, 1994), 6.

³ Ibid.

⁴ The first significant attempt to quantify the death toll came in 1927. An American Medical Association sponsored study estimated that 21 million died. When today’s media refers to a death toll of “more than 20 million” the source is this study. But every revision of the deaths since 1927 has been upward. The U.S. death toll was originally put at 550,000. Now epidemiologists have settled on 675,000 out of a population of 105 million. Worldwide, both the estimated toll and the population have gone up by a far greater percentage. In the 1940s Macfarlane Burnet, the Nobel laureate who spent most of his scientific life studying influenza, estimated the death toll at 50 to 100 million. John M. Barry, *The Great Influenza* (New York: Penguin Books, 2004), 396-397.

⁵ Peter Simkins, Geoffrey Jukes, & Michael Hickey, *The First World War. The War to End all Wars* (Osceola, WI: Osprey, 2003), 337.

⁶ Geoffrey Till, “New directions in Maritime strategy?,” in *Readings in the Theory of War and Strategy* (Carlisle Barracks, PA: U.S. Army War College, Department of National Security and Strategy, 2008 vol.II), 107.

⁷ Rob DeSalle, “Epidemics and Pandemics” in *Epidemic! The World of Infectious Disease*, ed. Rob DeSalle (New York: The New Press, 1999), 153.

⁸ Rob DeSalle, “Epidemics and Pandemics” in *Epidemic! The World of Infectious Disease*, 154.

⁹ Voice “Pandemic” in *Webster NewWorld Dictionary*, Third College Edition (New York: MacMillan, 1994), 975.

^{10a} WHO Consultation on Priority Public Health Interventions Before and During Influenza Pandemic. Executive Summary” in *Epidemic! The World of Infectious Disease*, ed. Rob DeSalle (New York: The New Press, 1999), 145.

¹¹ Voice “Epidemic” in *Webster’s New Explorer Encyclopedic Dictionary* (Springfield, MA: Federal Press Street, 2006), 611.

¹² Voice “Endemic” in *Black’s Medical Dictionary*, 41st Edition (London, UK: A & C Black Publishers Limited, 2005), 233.

¹³ Arno Karlen, *Man and Microbes* (New York: Touchstone, 1996), 17.

¹⁴ Arno Karlen, *Man and Microbes*, 11.

¹⁵ Voice “World War I” in *The Oxford Companion to United States History* (New York: Oxford University Press, 2001), 845.

¹⁶ Allan R. Millett & Peter Maslowski, *For the Common Defense* (New York: The Free Press, 1994), 238.

¹⁷ 2 Kings 19, 32-35: ³² ‘Therefore, thus says the Lord concerning the king of Assyria: He shall not reach this city, nor shoot an arrow at it, nor come before it with a shield, nor cast up a siege-works against it. ³³ He shall return by the same way he came, without entering the city, says the Lord. ³⁴ I will shield and save this city for my own sake and for the sake of my servant David.’ ³⁵ That night the angel of the Lord went forth and struck down one hundred and eighty-five thousand in the Assyrian camp. Early the next morning there they were, all the corpses of the dead. *The Catholic Study Bible*, 400.

¹⁸ William H. McNeill, *Plagues and Peoples* (New York: Anchor Press, 1976), 105.

¹⁹ William H. McNeill, “Infectious Alternatives” in, *What if?: The World’s Foremost Military Historians imagine What Might Have Been*, ed. Robert Cowley (New York: Berkeley Books, 2000), 2.

²⁰ William H. McNeill, *Plagues and People* (New York: Anchor Press, 1976), 2.

²¹ Michael B.A. Oldstone, *Viruses, Plagues, & History* (New York: Oxford University Press, 1998), 5.

²² William H. McNeill, *Plagues and Peoples*, 6.

²³ Rising food prices are pushing people, unable to afford basic supplies, especially communities in Central Africa, to turn to the forests for food. In doing so, hunters expose themselves to hidden dangers-microscopic pathogens living in the blood of forest animals. Most of the viruses are harmless, but some are potentially deadly when passed to humans. Scientists point out there is nothing new about these viruses. What is new is the frequency of people’s contact with them and how easily they can now be spread around the world. “Tracking deadly viruses’ spread from animals to humans,” in CNN.com/world <http://www.cnn.com/2008/WORLD/africa/12/08/pip.zoonotics/index.html?iref> (accessed Dec. 10, 2008).

²⁴ A virus (from the Latin virus meaning toxin or poison) is a sub-microscopic infectious agent that is unable to grow or reproduce outside a host cell. Viruses infect all cellular life. It is about 100 times smaller than bacteria (unicellular microorganisms). The term is applied to a group of infective agents which are so small that they are able to pass through the pores of collodion filters. Voice "Virus" in *Black's Medical Dictionary*, 763.

²⁵ Influenza (Flu) Prevention, USACHPPM (US Army Center for Health Promotion and Preventive Medicine), <http://chppm-www.apgea.army.mil/news/influenzaWebsite/index.htm> (accessed October 5, 2008).

²⁶ Ibid.

²⁷ *The Threat of Pandemic Influenza*, Workshop Summary prepared for Forum on Microbial Threats Board on Global Health, ed. Stacey L. Knobler, Alison Mack, Adel Mahmoud, and Stanley M. Lemon (Washington, D.C.: National Academies Press, 2005), xii.

²⁸ Lawrence O. Gostin, "Public Health Preparedness and Ethical Values in Pandemic Influenza" in *The Threat of Pandemic Influenza*, 358.

²⁹ Arno Karlen, *Man and Microbes* (New York: Touchstone Book, 1996), 8.

³⁰ *The Threat of Pandemic Influenza*, 30.

³¹ Ibid., xii.

³² Joel C. Gaydos, "Rapporteur's Challenge" in *Strengthening Influenza Pandemic Preparedness through Civil-Military Cooperation*, ed. J. Neville and O.I. Kisilev (Fairfax, VA: IOS Press, 2005), vii.

³³ *National Strategy for Pandemic Influenza* (Washington, D.C.: Homeland Security Council, 2005), 2.

³⁴ *The Threat of Pandemic Influenza*, 46.

³⁵ Interview on the 16th December 2008 with Jose L. Sanchez, Influenza Team Leader, of the Armed Forces Health Surveillance Center.

³⁶ Interview on the 16th December 2008 with Joel C. Gaydos, Military Health System Coordinator for Emerging Disease Programs, and Jose L. Sanchez, Influenza Team Leader, of the Armed Forces Health Surveillance Center.

³⁷ Lawrence O. Gostin, "Public Health Preparedness and Ethical Values in Pandemic Influenza" in *The Threat of Pandemic Influenza*, Workshop Summary prepared for Forum on Microbial Threats Board on Global Health, 357-368.

³⁸ *National Strategy for Pandemic Influenza*, 3.

³⁹ Monica Schoch-Spana, "Strategies to Remedy Panic in a Pandemic: Lessons from Biodefense" in *The Threat of Pandemic Influenza*, Workshop Summary prepared for Forum on Microbial Threats Board on Global Health, 351.

⁴⁰ L.C. Canas and N.J. Cox, "Influenza Surveillance: Civilian-Military Cooperation in the United States and Considerations for Worldwide Improvement" in *Strengthening Influenza Pandemic Preparedness through Civil-Military Cooperation*, 68.

⁴¹ Interview on the 16th December 2008 with Jose L. Sanchez, Influenza Team Leader, of the Armed Forces Health Surveillance Center.

⁴² L.C. Canas and N.J. Cox, "Influenza Surveillance: Civilian-Military Cooperation in the United States and Considerations for Worldwide Improvement" in *Strengthening Influenza Pandemic Preparedness through Civil-Military Cooperation*, 70.

⁴³ "Pentagon to Detail Troops to Bolster Domestic Security," Washington Post, December 1, 2008. <http://ebird.osd.mil/ebfiles/e20081201642701.html> (accessed Dec. 10, 2008).

⁴⁴ Interview on the 16th December 2008 with Joel C. Gaydos, Military Health System Coordinator for Emerging Disease Programs, of the Armed Forces Health Surveillance Center.

⁴⁵ Joel C. Gaydos, "Rapporteur's Report" in *Strengthening Influenza Pandemic Preparedness through Civil-Military Cooperation*, 106.

⁴⁶ Joel C. Gaydos, "Rapporteur's Challenge" in *Strengthening Influenza Pandemic Preparedness through Civil-Military Cooperation*, vii.

