

Twenty-first century emergency response efforts of the Commissioned Corps of the US Public Health Service

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ABSTRACT

The impact of the Commissioned Corps of the US Public Health Service (Commissioned Corps) on the health and safety of the nation spans more than two centuries. The public health efforts of the highly qualified health professionals of this often-underreported uniformed service include fighting threats like the great flu pandemic of 1918, the anthrax attacks, Ebola, and natural disasters such as Hurricanes Maria, Irma, and Katrina. As we near the first quarter of the twenty-first century, it is important to take a snapshot of the critical contributions and response efforts the Commissioned Corps has made in the first 18 years of the twenty-first century. Today, the Commissioned Corps faces new challenges in the form of emerging diseases and a rapidly growing opioid epidemic, but under the guidance of the US Surgeon General, it remains vigilant and fully capable of minimizing any public health threat it encounters.

Key words: Ebola, Zika, Hurricane Maria, Commissioned Corps, Public Health Service

The Commissioned Corps of the US Public Health Service (Commissioned Corps), one of the seven uniformed services of the United States, is composed of highly skilled health professionals who rapidly mobilize in response to national and international health emergencies. The impact of the Commissioned Corps on the health and safety of the United States has spanned more than two centuries, and as we near the first quarter of the twenty-first century, it is important to note some of the critical contributions and response efforts this dedicated uniformed service has

made in the first 18 years of the twenty-first century. This article highlights such efforts and offers snapshots of Commissioned Corps deployment actions from 2001 to 2018.

The Commissioned Corps traces its roots back to the eighteenth century when in 1798 President John Adams signed, "An act for the relief of sick and disabled Seamen."¹ It was the first public health law of the United States designed to erect hospitals and provide medical care for sick seamen. President Adams's act established the Marine Hospital Service (MHS) and led to the construction of marine hospitals throughout the eastern United States, with locations in port cities such as Boston, Massachusetts; Charleston, South Carolina; and Norfolk, Virginia. In 1870, a bill passed which reorganized the MHS so that it would function under the direction of a single supervising surgeon.² Although the origins of the Commissioned Corps date back to 1798, Congress formally authorized its creation in 1889, and the first supervising surgeon, Dr. John Maynard Woodworth, adopted a uniformed military structure for MHS medical personnel.³ Under Dr. Woodworth's leadership, physicians were required to serve as needed at various hospital locations, thereby creating a mobile workforce of health professionals. Dr. Woodworth's efforts laid the groundwork for the present-day Office of the Surgeon General, the US Public Health Service and its Commissioned Corps.⁴

EARLY ACCOMPLISHMENTS

In the eighteenth century, Dr. Woodworth's uniformed health professionals addressed threats to the nation's health which centered on infectious

diseases like smallpox and yellow fever. Such diseases caused public terror, economic disruptions, and deaths. During the nineteenth century, soldiers in the American Civil War were more likely to die from endemic diseases than on the battlefield, as nearly 400,000 soldiers died from disease.⁵ The uniformed members of the MHS, the precursor to the Commissioned Corps of the US Public Health Service, played an essential role in protecting the country's merchant seamen, members of the US Navy, and the nation's public health.⁶ MHS utilized surveillance and quarantine activities to limit the spread of infectious diseases, and advocated for the National Quarantine Act of 1878⁷ which gave the MHS the authority to retain ships with contagious passengers on board.⁸ By the twentieth century, the MHS had grown to become the Commissioned Corps and its officers continued to address important challenges like the great flu pandemic of 1918, polio, and plague.

The twentieth century saw a decline in deaths from infectious diseases, mainly due to the discovery of antibiotics, vaccinations, and improvements in sanitation and hygiene.⁹ However, public health concerns like smoking, HIV, and AIDS demanded the attention of the US Public Health Service. Throughout the twentieth century, under the leadership of the US Surgeon General, the Commissioned Corps served to reduce health risks, prevent disease, and educate the public on these health matters. An important landmark effort of the twentieth century was the Healthy People Initiative, which was launched in 1979 with the publication of *Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention*, setting national objectives for the achievement of healthy lifestyles in America within a decade.¹⁰ Note, a Healthy People report has been issued for every decade since the initial launch in 1979. The initiative has helped to curb tobacco use, increase the quality and years of healthy life, decrease HIV diagnoses, and improve consumer food safety practices.

TWENTY-FIRST CENTURY ACCOMPLISHMENTS

9/11 terrorist attacks

The twenty-first century, presented the Commissioned Corps with unprecedented challenges.

In its more than 200-year history, the Commissioned Corps had never witnessed an act of terrorism as deadly as the September 11, 2001 terrorist attacks.¹¹ On that day, two hijacked airplanes were deliberately flown into the twin towers of the World Trade Center in New York City (NYC). Nearly 400 NYC emergency response personnel lost their lives because of the attacks¹² and approximately 3,000 people were killed, and 6,000 injured in the destruction.¹³ Within a few hours of the attacks, Commissioned Corps officers were deployed to operate four medical treatment sites near Ground Zero, which provided medical and mental health services to emergency responders.¹⁴ Commissioned Corps officers with expertise in forensics supported the NYC Medical Examiner's Office while other officers conducted epidemiologic surveillance and environmental testing.¹⁵ The Commissioned Corps provided services at Ground Zero for several weeks and supported the Federal Emergency Management Agency's Emergency Support Team, the Federal Bureau of Investigation's Strategic Intelligence and Operations Center, and the Homeland Defense Emergency Support Team in Washington, DC.¹⁵ In the weeks following the attacks, Commissioned Corps officers also reported to the National Naval Medical Center in Bethesda, Maryland, to backfill US Navy medical personnel involved in relief efforts; staged a medical unit at the US Capitol during the President's address to Congress; and performed disease monitoring in NYC. Table 1, Commissioned Corps deployment assignments during 9/11 terrorist attacks, highlights key deployment efforts.

Anthrax attacks

A week following the 9/11 terrorist attacks, residents in Florida, Connecticut, NYC, and Washington, DC received letters through the US Postal Service that were laced with anthrax, marking the first significant bioterrorism event in the United States.¹⁶ By the time the anthrax investigations concluded, the terrorizing letters had claimed the lives of five Americans and sickened 17 others. Two of the letters were addressed to Senator Patrick Leahy of Vermont and Senator Tom Daschle of South Dakota.¹⁷ Within a few hours

Temporary duty assignment	Number of Commissioned Corps officers deployed
Mental health support for rescue workers	19
Forensics support for NYC Medical Examiner	15 (dental officers)
Collecting and collating antemortem records and postmortem records	18
Liaisons to FEMA Emergency Support Team, FBI Strategic Intelligence and Operations Center, Disaster Field Office and OEP Emergency Operations Center	65
Support for NYC Department of Health	2 (medical officers)
Support aboard USN Comfort when stationed in NYC	3
Backfill of National Naval Medical Center for Navy personnel	43 (physicians, nurses, pharmacists)
Disaster Medical Assistance Team for Pentagon support	35
Capitol during President's address to Congress	25
Disease outbreak monitoring	50 (medical epidemiologists)
Five medical support teams for five clinics	325
<i>Note.</i> Adapted from Satcher (2002). ¹⁴	

after the letter to Senator Daschle was discovered, the Commissioned Corps was directed to assist in the medical evaluation of Senate personnel and to provide antibiotics.¹⁴ In response, the Commissioned Corps performed 7,000 nasal swabs, dispensed antibiotics to congressional staff and to more than 11,000 US postal workers, investigated positive cases of anthrax, and worked with congressional leaders to coordinate response efforts.¹⁴ Table 2 illustrates key

Temporary duty assignment	Number of Commissioned Corps officers deployed
Capitol Hill congressional leadership on anthrax issues/ response coordination	1 (Deputy Surgeon General)
Performed 7,000 nasal swabs, documented 37,000 patient visits to provide antibiotics	325 (mostly physicians, pharmacists, and nurses)
Gave support to HHS Command Center and the Office of Homeland Security	36
Investigated all possible cases of anthrax	No data
Congressional testimony on Risk Communication and Bio-terrorism	1 (US Surgeon General)
<i>Note.</i> Adapted from Satcher (2002). ¹⁴	

Commissioned Corps deployment assignments during the anthrax attacks.

Hurricanes Katrina and Rita

On August 28, 2005, an unprecedented mandatory evacuation of New Orleans, Louisiana was issued by Mayor Ray Nagin to mitigate harm due to the potential destructive forces of a tropical cyclone that had grown into a massive Category 5 hurricane named Hurricane Katrina. The storm made landfall on August 29, 2005, causing nearly \$81 billion in damages and 1,833 deaths.¹⁸ The consequences of Hurricane Katrina necessitated a quick emergency response from the Commissioned Corps. This response was challenged and had to be rapidly escalated when Hurricane Rita made landfall on September 24, 2005. Hurricane Rita entered the Gulf Coast and hit land between Texas and Louisiana, resulting in 62 deaths and nearly \$10 billion in damages.¹⁸ To address the effects of the two storms, the Commissioned Corps carried out its largest deployment to date: It strategically deployed 2,119 (35 percent) of its 6,122-active duty Commissioned Corps officers to the Gulf Coast region between August 26 and November 7, 2005.¹⁸ As shown

in Table 3, locations of Commissioned Corps officer deployment locations in response Hurricanes Katrina and Rita, Commissioned Corps officers deployed to areas directly affected by the hurricanes and served on a total of 2,372 missions. Of officers deployed to the Gulf Coast, 81 percent served on teams that rendered direct services to affected communities.¹⁸

The Commissioned Corps provided critical engineering and environmental health services to the affected communities, provided medical care to residents throughout the region, and augmented the efforts of state health officials. Hurricane Katrina indiscriminately ravaged New Orleans, as lower income communities were some of the most disaster-impacted areas, especially in the city's Lower Ninth Ward neighborhood. Many of the residents in income-challenged areas required special needs, shelter, and long-term assistance. In 2007, Commissioned Corps officers from the Black Commissioned Officers Advisory Group (BCOAG) organized outreach activities to leverage humanitarian support for the long-term recovery of the New Orleans community. BCOAG members have expanded the mission to include participation of Commissioned Corps officers from other professional groups as well as civilian volunteers,

which enabled BCOAG to continue supporting New Orleans's recovery efforts for over a decade.

Haiti earthquake

On January 12, 2010, a 7.0-magnitude earthquake occurred near Port-au-Prince, Haiti triggering two 6-ft tsunamis. The aftermath of the earthquake was harrowing, as the geological phenomenon resulted in \$14 billion in damages, millions of displaced residents, and more than 200,000 deaths.¹⁹ The seismic event devastated the infrastructure of Haiti, leaving behind inadequate sanitation and water supplies, which were major priorities following the disaster. The Commissioned Corps was among the first groups of health responders to reach Haiti. Within 36 hours of the event, it dispatched emergency response teams to address the health needs of disaster victims and took on the vital responsibility of performing water contamination testing to ensure the availability of potable water for internally displaced people. The Obama administration declared the Haiti recovery a priority and over the course of several weeks, the United States committed monetary and humanitarian assistance, and disaster support toward the relief efforts.¹⁹ During the response effort, HHS medical teams performed approximately 161 surgeries, and the Commissioned Corps helped to care for more 30,700 patients. At this time of crisis when an unprecedented degree of international cooperation was needed, the Commissioned Corps stood at the front of the emergency to save an indeterminable number of lives.

Zika virus

The first confirmed mosquito transmitted cases of the Zika virus within the United States were documented in 2016 in the state of Florida.²⁰ The Florida State Government along with the CDC released public service announcements that highlighted symptoms of the virus—fever, rash, headache, joint and muscle pain, and red eyes—and cautioned pregnant women about the dangers of Zika for unborn children. The CDC reported that infection of the Zika virus during pregnancy was especially detrimental to expectant mothers, as it could cause microcephaly

Table 3. Key Commissioned Corps Hurricane Katrina/Rita deployment locations (2,119 officers)

Mission location	Number of missions
Louisiana	814
Mississippi	453
Washington, DC/Maryland	283
Texas	184
Georgia	43
Total	1,777
Secretary's emergency response teams, national, regional headquarters, local operations centers	595
Total	2,372

Note. Adapted from Office of Inspector General analysis of Corps administrative data (2006).¹⁸

or other severe fetal brain defects.²¹ Out of approximately 1,000 births in 2016 recorded in the CDC Zika Pregnancy and Infant Registry, 51 had a Zika-associated birth defect.²² Between 2015 and 2018, the CDC reported 5,700 symptomatic Zika virus disease cases in the United States involving travelers, local mosquito-borne transmissions, and transmissions via sex and other routes.²³ The Zika virus was also determined to cause Guillain-Barré syndrome, a rare autoimmune disorder that can lead to paralysis, which can lead to respiratory failure and death if not treated aggressively.²³ As part of the HHS Zika response, Commissioned Corps officers conducted surveillance, vector control, and participated in health communication activities throughout the United States and its territories.²⁴ As shown in Table 4, Commissioned Corps officers served in 29 states and 13 countries in response to the Zika outbreak. Today, public health concerns about the Zika virus remain, as there is no specific curative treatment or vaccine for the virus.

2014 Ebola outbreak

In 2014, an unprecedented Ebola outbreak began, and the Ebola virus made its way into the continental United States for the first time. The outbreak began in West Africa, affecting populations in Guinea, Sierra Leone, and Liberia, and eventually spread to multiple countries including Nigeria, Senegal, Spain, Mali,

the United Kingdom, Italy, and the United States.²⁵ Between 2014 and 2016, the Ebola virus disease (EVD) resulted in 28,616 reported cases and more than 11,300 deaths.²⁵ Historically, the mortality rate associated with some strains of EVD is upward of 80 percent, placing it among the world's most horrific diseases. In response to the severity of the disease, President Barack Obama declared the epidemic a risk to national security and committed to sending 3,000 troops to Liberia to support the EVD response efforts, which included the US Army and Commissioned Corps personnel.²⁶ The Commissioned Corps and the Department of Defense demonstrated their logistical and engineering expertise with the construction of an Ebola treatment facility (ETF) in Monrovia, and the highly skilled officers of the Commissioned Corps which included clinicians, infection control officers, laboratorians, and administrative staff provided high-level care for EVD patients at the ETF.²⁷ The ETF, known as the Monrovia Medical Unit (MMU), was designed to contain and combat the spread of Ebola but also functioned as a campus of care that included family visitation centers for the ill.²⁶ The MMU was staffed by approximately 70 Commissioned Corps officers and functioned as a 25-bed hospital to provide direct medical care for national, international, nongovernmental, and United Nations personnel.²⁷ Overall, as noted in Table 5, the Commissioned Corps deployed approximately 300 officers to staff the MMU in support of the EVD response efforts in West Africa.²⁸ By March 2015, the MMU had admitted and cared for over 36 patients from nine nations.²⁹

In addition, other Commissioned Corps officers engaged in domestic security measures and trainings to strengthen national security and Commissioned Corps personnel stationed at US quarantine stations;

Table 4. Commissioned Corps Zika deployment efforts

Number of assignments	Number of officers
29 states and territories, 13 countries	114
<i>Note.</i> Adapted from Reed (2016). ²⁴	

Table 5. Commissioned Corps response to Ebola in Monrovia (September 2014 to May 2015)

Duty	Number of officers	Officer categories
Direct patient care for Ebola, malaria, other illnesses	~300	Medical, nurses, pharmacists, health safety officers, behavioral health providers
Other services: administration, logistics, planning		
<i>Note.</i> Adapted from Lushniak (2015). ²⁷		

they trained US Customs and Border Protection officers to recognize Ebola symptoms in arriving airline passengers.³⁰ The domestic Ebola response effort revealed significant gaps in the US healthcare system and its Quarantine capacity, as it lacked adequate space to monitor individuals who may have been exposed to Ebola.³¹ A \$20,000,000 hospital preparedness program grant awarded to the University of Nebraska Medical Center/Nebraska Medicine in Omaha, Nebraska for a training, simulation, and quarantine center was earmarked to close the gap, and provide simulated clinical training to federal responders like the Commissioned Corps and the National Disaster Medical System (NDMS).³¹ The quarantine center now has the capacity to simultaneously accommodate 20 individuals at the university's medical center.³¹ The Ebola epidemic was one of the most significant public health responses to an infectious disease in recent US history, and just as the Commissioned Corps protected the public's health in the eighteenth century, it continued those efforts during the Ebola outbreak. For its extraordinary and heroic efforts, President Barack Obama awarded the Commissioned Corps with the Presidential Unit Citation.

2017 Hurricanes Maria and Irma

The brutal 2017 hurricane season devastated areas of the continental United States and its territories, which included parts of Texas, Louisiana, Florida, the US Virgin Islands, and Puerto Rico. Other states affected by the hurricane season were South Carolina and Alabama, but arguably the area worst hit was Puerto Rico, which was affected by two major hurricanes within a 1-month period. Both storms hit Puerto Rico in September 2017. First, a Category 5 hurricane named Irma, considered the most powerful Atlantic hurricane on record, skimmed Puerto Rico and left more than 1 million residents without electricity.³² Irma spared Puerto Rico a direct hit but killed three people in Puerto Rico and at least 12 throughout the Caribbean Islands. However, in less than 4 weeks, Puerto Rico received no such mercy from Hurricane Maria.³³ On September 20, 2017, before Puerto Rico could recover from the effects of

Irma; Maria made a direct hit to the US territory, increasing the number of residents without power to approximately 3 million.³⁴ Maria, a Category 4 hurricane with winds near 155 mph, was the first of its kind to make a direct hit on the island in 85 years, which officially killed 64 people and displaced thousands more.³² Maria decimated the island's infrastructure with flooding, wrecked homes and businesses, disrupted cell phone coverage, and compromised water supplies. After Hurricane Irma, Commissioned Corps officers aided with emergency department augmentation, patient reception, and treatment and evacuation for more than 200 dialysis patients from Saint Thomas,³⁵ potentially saving countless lives from life-threatening medical disruptions.³⁶ The Trump administration responded to the catastrophic effects of Maria in part by deploying Commissioned Corps officers to provide support at medical stations in the US Virgin Islands of St. Thomas and St. Croix, and to staff medical stations in Puerto Rico capable of caring for up to 250 patients.³⁷ Two of the medical stations were on the southern side of the Puerto Rico in the city of Ponce, and provided inpatient services, acute care, and pharmaceutical services. Commissioned Corps officers traveled to local villages via vehicles and helicopters to care for sick and injured patients.³⁸ Officers assisted local hospitals and health centers, and along with the NDMS, provided care for more than 1,000 people affected by the storm.³⁷ Table 6 highlights the efforts of the Commissioned Corps and the NDMS during the hurricane response efforts.

Commissioned Corps officers were available to care for patients flown via helicopter to the US Naval Ship Comfort, participated in operations to triage wounded civilians, and distributed public information and pharmaceutical services in rural communities.⁴⁰ In collaboration with the Puerto Rico State Guard, the National Guard, Department of Defense, and the Federal Emergency Management Agency, Commissioned Corps personnel contributed to one of the most complex public health operations to restore and promote the health of Puerto Rico, as officers provided acute care to nearly 200 people in need of food, water, and medical assistance in the rural community of Barrio Rancheras.⁴⁰ In total, the Commissioned

Table 6. Commissioned Corps/National Disaster Medical System (NDMS) hurricane response efforts (as of September 26, 2017)

Activity	Number of officers	Officer categories
Provided care at temporary medical sites in St. Croix and St. Thomas, and US Virgin Islands	500 (Commissioned Corps and NDMS)	Medical, nurses, pharmacists, health safety officers, behavioral health providers
Additional activities: provided care at two Federal Medical Stations with 250 patient capacity. Deployed to Puerto Rico, US Virgin Islands, and Texas to assist with 2017 hurricane relief efforts (includes Hurricane Harvey).	1,450 Commissioned Corps	
<i>Note.</i> Adapted from US Department of Health and Human Services (2017). ³⁹		

Corps, NDMS, Veterans Administration, and the Office of the Assistant Secretary for Preparedness and Response had more than 36,000 patient encounters and evacuated nearly 800 patients to facilities that could provide adequate care.³¹

Twenty-first century preparedness

Research and medical advancements of the past have vastly improved the care of service members, public health knowledge, and approaches to health threats. However, key elements of public health, which include quarantine, sanitation, surveillance, vaccination, and response, are as important today as they were in the eighteenth and nineteenth centuries. The charge to protect America from disease, promote healthy practices, and improve the public’s health for the betterment of all Americans remains a challenge, as the boundaries of disease and health concerns have expanded and are capable of penetrating national boundaries in mere hours. For more than 125 years, the Commissioned Corps has adapted to the intellectual and physical demands associated with fighting diseases and advancing the public’s health and has proven its ability to meet the challenges of the twenty-first century.

Today, Commissioned Corps officers continue to face public health challenges in the form of emerging diseases, globalization, preventable chronic diseases, extreme weather events, a rise in foodborne illnesses, and substance use disorders. These challenges require Commissioned Corps officers to maintain situational awareness and preparedness in daily operations,

such as monitoring the nation’s food supply to ensure its safety in a globalized market and responding to foodborne outbreaks involving contaminants like *Listeria* and *Escherichia coli*. Also, under the Surgeon General’s leadership, the Commissioned Corps is fighting the rise of another epidemic, opioid overdose, and overprescribing. Drug poisoning has been the leading cause of injury death among adults since 2009 and surpassed gun-related deaths in 2010.⁴¹ In 2016, more than 42,000 Americans died from opioid overdose.⁴² In 2018, Surgeon General Jerome Adams called on the Commissioned Corps to promote the use of naloxone, a lifesaving medication that can reverse the effecting on an opioid overdose.⁴³ In the Commissioned Corps’ storied history, it has fought plagues and chronic diseases, and today the Surgeon General is working on initiatives to advance the public’s health by ending the opioid epidemic. The Office of the Surgeon General has proposed a \$1.7 million effort to ensure the Commissioned Corps is well prepared for critical outbreak and disaster deployment efforts, and the funding will provide training opportunities to optimize response efforts for future public health threats.⁴⁴

In its effort to continue advancing public health in the twenty-first century, the Commissioned Corps should continue to battle on all fronts. It has been 100 years since the Commissioned Corps safeguarded the nation’s health against the 1918 influenza pandemic, about 17 years ago it deployed in response to the unprecedented 9/11 terrorist attacks, and fewer than 5 years ago it confronted the Ebola crisis. To better

prepare for emerging public health emergencies, the White House is proposing establishing a Reserve Corps similar to other uniformed services, that would mobilize, and back-fill critical positions left vacant during deployment of active duty Commissioned Corps officers.⁴⁴ The Commissioned Corps is currently fully capable of minimizing any public health risk that it encounters, but the addition of a Ready Reserve component might be the critical component needed to ensure that the Commissioned Corps remains vigilant and prepared for its next response effort. It would be irrational to ignore the likelihood that the next threat to the health, safety, and well-being of Americans is just around the corner; fortunately, it seems the Commissioned Corps understands there is no room for complacency.

DISCLAIMER

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any agency of the US Government.

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