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MASTER OF MILITARY STUDIES

TITLE: Lessons from the 1918 Influenza Pandemic: Using Historical Examples to Inform the Department of Defense's Response to the Next Pandemic

SUBMITTED IN PARTIAL FULFILLMENT
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MASTER OF MILITARY STUDIES

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Executive Summary

Title: Lessons from the 1918 Influenza Pandemic: Using Historical Examples to Inform the Department of Defense's Response to the Next Pandemic.

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Thesis: Pandemic influenza has had an impact on militaries and societies in the past, and will again, because the virus remains endemic worldwide and mutates rapidly, negating human immunity. Based on the lessons from the 1918 pandemic and the US *National Strategy for Pandemic Influenza*, the Department of Defense (DOD) should expand its implementation plan in order to enforce containment of a future pandemic and respond to humanitarian assistance needs of partner nations.

Discussion: The influenza pandemic of 1918 was the deadliest single event in human history. Not only did an influenza virus kill more people than World War I, but also that year most of the American soldiers who died did so from influenza instead of combat action. The way the virus killed and the reaction that mortality and morbidity had on the armies of WWI and populations around the world provide clear warnings for a future pandemic. A future pandemic of similar magnitude to 1918 would be the most devastating natural disaster yet seen because even a similar percentage of deaths would yield a greater number due to population increase. Experts believe that a 1918 like pandemic can and will occur again.

Of the many lessons that the effects of the 1918 pandemic provide, most of these have been recognized and planned for with the exception of two. The foremost of these lessons is that because influenza is an airborne pathogen strict quarantine is the most effective method available to check its spread through the entire human populations. Second, chronologically, considerable humanitarian relief and disaster assistance efforts will necessarily follow the type of social, economic, and infrastructure collapse that will plague the hardest hit areas during and after a pandemic.

Current US Policy begins with the *National Strategy for Pandemic Influenza*. The National Strategy identifies the criticality of quarantine both domestically and surrounding an international outbreak, and acknowledges the importance of relief efforts for affected peoples. The *National Strategy for Pandemic Influenza Implementation Plan* promulgated by the Homeland Security Council to the executive departments and agencies identifies objectives and delineates areas of responsibility. The *National Strategy for Pandemic Influenza Implementation Plan* tasks the DOD with assisting partner nations but limits this to military-to-military assistance. The plan identifies the need to provide support to civil authorities but limits this to within the United States. The follow on directive, the *Department of Defense Implementation Plan for Pandemic Influenza*, draws from the key goal of quarantine identified in the National Strategy but limits this to assisting with securing US borders and falls short of providing mechanisms such as no-fly zones to enforce international containment as near as possible to the origin of an outbreak.

Conclusion: The influenza pandemic of 1918 was the most rapidly lethal pandemic in history and provided lessons that should inform current policy. The National Strategy presents clear guidance on the priorities of protecting the United States through isolation and supporting allied and partner nations in the event of the next pandemic. In order to maintain a credible readiness, DOD should seek to align the DOD Plan with the broader goals of the National Strategy.

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THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE CORPS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

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Preface

The inspiration for this research project began upon reading about the demise of the military theorist Carl von Clausewitz. Cholera cut short his life and work on his tome of military theory, *On War*. The same pandemic also changed the course of war and history in Europe in the early 1830s. I realized at that point that the footnotes of disease casualties present throughout military history were not just coincident background noise used to describe the character of war at the time, but were clues to a tangible expression of the chaotic and violent nature of war present through all time.

I decided to take on this project from the perspective of the military professional knowing that professionals in medicine and science have committed much effort within their disciplines. In the education of military leaders, troop welfare is a constant theme and an important responsibility. If, however, knowledge and concern about public health ends there, then future commanders will fail to both anticipate and prepare to respond to the very real horrors that pandemic disease will visit upon their forces and the world.

I would like to acknowledge the constant guidance of my mentors on this project, Dr. Jonathan F. Phillips, and Mr. Wade Townsend, DHS. I would also like to thank CMDR Russell Evans, USN who provided the sounding board that focused my general interest into a pursuable project, and for pointing me towards the ideal mentors. My conference group advisers, Dr. Richard DiNardo and Dr. Francis Marlo taught me to look at history from the right direction, and how to apply those thoughts beyond the battlefield. Andrea Hamlen and Stase Rodebaugh from the Leadership Communication Skills Center have been an invaluable resource in honing my writing skills in preparation for this challenge. The patience and encouragement of my wife Jody has enabled my success in this and all things.

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INTRODUCTION

The mention of death in the year 1918 usually invokes images of trench warfare and the carnage of World War I. However, more people died that year in Europe and around the world from Spanish influenza¹ than died in combat action in any single year in human history.

According to US Northern Command (USNORTHCOM), and based on current models of historical information, a modern pandemic could cause between 200,000 and 2 million American deaths.² Influenza viruses continue to circle the globe and constantly evolve to render current immunities obsolete. No event, infection, nor war throughout history has devastated human life within a single year as effectively as the Spanish influenza of 1918.³

The example of pandemic influenza during WWI illustrates a continuing relationship up to that point between warfare and disease. It was a near universal rule prior to the 20th century that disease created more casualties than actual combat.⁴ Disease, even affected the study of military theory such as when Carl von Clausewitz died of cholera at the age of 51, before he could finish *On War*. The Polish revolt against Russia and the French Revolution set the stage for a pan-European war. The cholera epidemic, however, spread from Russia to Poland and finally to Western Europe, and likely ended the war before it could begin.⁵

Scientists agree that the question of the next deadly pandemic is a factor of when, not if, it will occur. Pandemic influenza has had an impact, and will again, because the virus remains endemic worldwide and mutates rapidly. Based on the lessons from the 1918 pandemic and the US National Pandemic Strategy, the Department of Defense (DOD) should expand its implementation plan in order to enforce containment of a future pandemic and respond to humanitarian assistance needs of partner nations. A case study specific to the 1918 pandemic

yields several lessons learned that can inform modern day policy on infectious diseases of operational significance.⁶

PANDEMIC CASE STUDY: INFLUENZA, 1918-20

The history of the 1918 influenza pandemic is essentially an overlap and interrelation of the largest war to that point and the most intense pestilence of all time. Appendix A provides a timeline of events, which illustrates the breadth and depth of the destruction influenza caused around the world. The pandemic, as the name suggests, swept the globe, not just once but three times, first intensifying, and then later becoming less severe. Some explanation is required in order to understand how the virus was able to infect and behave in different ways from one pandemic wave to the next.

Many years after the pandemic, scientists designated the 1918 influenza as the H1N1 antigen type.⁷ The naming convention describes the structure of virus's outside coating. Different numbers can follow the H (Hemagglutinin) or the N (Neuraminidase) indicating each unique strain. The structure of the virus coating is the part of influenza that interacts with the human immune system. If a person's immune system recognizes the virus from previous exposure to that antigen type then the body will attack the infecting particle. Changes in the coating thus allow the virus to infect a previously immune person because the immune system no longer recognizes the virus as a disease-causing agent. In contrast, the genetic material inside the virus controls how the virus behaves once it has bypassed the immune system and infected a person's cells.⁸

Genetic material inside influenza also changes over time, and much more rapidly than in most viruses. Most organisms including humans and most viruses replicate themselves using deoxyribonucleic acid (DNA). DNA uses self-correcting error-detection mechanisms that slow

the rate of genetic change during reproduction. A few viruses, such as influenza, reproduce themselves with ribonucleic acid, which lacks error-reducing mechanisms. For this reason, influenza mutates and evolves quickly, causing different severities of symptoms between waves of the same pandemic.

A mild form of H1N1 first appeared in early spring 1918, but it was the second wave of in August 1918 that circulated the most lethal strain.⁹ It nearly subsided in spring 1919, but again caused many deaths in January and February 1920.¹⁰ World War I and the influenza did not just overlap in an additive fashion, but reacted with each other in a deadly synergy that altered and intensified the effects of the other. Some epidemiologists believe that the living conditions of the war and especially of trench warfare in France created an ideal environment for the mutation of influenza into a deadly strain. Once the disease reached epidemic proportions, its many effects sapped resources of all types from the war effort.¹¹

As demonstrated in 1918-20, the virus can rapidly vary in its effects and lethality it exhibits once it infects. The virus can also change on a seasonal scale the way it appears to the human immune system. Because of the virus's very rapid mutability, the human immune system cannot recognize the changed virus from prior exposure. This loss of previously gained immunity leads to worldwide pandemics because nearly all individuals will become susceptible.¹²

Three important aspects of 1918 influenza influenced its impact on individuals: how quickly it spread, how quickly it killed, and whom it killed. Acute Respiratory Distress Syndrome (ARDS) was a human immune system response that attacked the victims' lung tissues along with the virus and contributed to killing within days. This cause would be nearly as deadly today because death could occur very quickly after the onset of symptoms. Military leadership

should take great concern with this particular complication, because of the main demographic affected by ARDS. Young adults comprised the majority of those serving in the US military. It was the young adults whose immune systems were strong, in which the immune system destroyed the lungs while trying to destroy the virus. However, some causes such as bacterial pneumonia might be treatable today with antibiotics. An unknown percentage of complications and deaths were from viral pneumonia. Many more deaths were from secondary infection, but some of those were viral infections. Even if the secondary infection following a similar outbreak today resulted from bacteria then the results may still prove catastrophic especially if the secondary infections were from an antibiotic resistant strain of some bacteria like staphylococcus.¹³ Another example that illustrates the possible lethality of a similar pandemic in modern time is how quickly the virus overcame individuals. In some cases, the progression of symptoms was so rapid that a person could die within the same day in which he first noticed that he was ill.¹⁴ With a progression of symptoms that leads to death so quickly these victims would likely not seek help quickly enough to obtain care even in a modern, developed nation. The point is that many of the deaths in 1918 were from the virus itself, or from secondary causes that may be just as incurable today for various reasons. Influenza has a two to three day incubation period.¹⁵ Therefore, with rapid air travel, people can infect others before they show any outward signs of illness. Influenza sufferers in the military who did not succumb to ARDS often contracted secondary infections such as pneumonia.¹⁶ The prevalence of ARDS and its secondary complications in military age males combined for a deadly impact on the US military.

At the height of the pandemic, sickness had a terrible effect on the service members. The chaplain of the fighting New York 69th stated that almost every soldier in the unit was suffering from the infection.¹⁷ The official casualty reports omit much of the impact because many of

those sickened did eventually survive, though they were unable to work. They were, however, a drain on logistics without contributing to the campaign for some duration.¹⁸ According to the Office of the Surgeon General, "Many soldiers with flu never went to sick call . . . as men clung to their places in the ranks until pneumonia developed."¹⁹ This is an important point that directly relates to modern command culture and climate. Medical care, however advanced, is useless if not sought. Service members may elect not to seek care if they do not realize how serious the disease is until it is too late. Despite the industrial scale of the destruction caused from weapons of war in WWI, influenza killed more Americans than all other causes combined.²⁰ Loss of this magnitude can weigh heavily on effectiveness of units and the minds of commanders.

The effects of influenza on individuals aggregated in combat and in garrison and greatly affected tactical units and their commanders. Marines of the First Aviation Force documented the direct operational effect of disease on their piece of the war effort in 1918. Twenty-one Marines and four Officers died of the influenza epidemic that completely crippled unit operations in October 1918.²¹ The toll of the disease was too much for some concerned commanders to bear. US Army camp commander, Colonel Charles Hagadorn first saw the flu killing his men at Camp Grant, Illinois, after only a month in command.²² The toll from the flu quickly reached 525, and the pandemic depressed Hagadorn to the point that he killed himself.²³ Commanders were not the only ones affected by the sickness of others. Once the deadly strain of influenza began to cross the Atlantic back to the United States, worry over the epidemic at home affected the morale of the deployed troops.²⁴ This might have a heightened effect in the digital age where the news from the home front will follow the twenty-four hour news cycle.

Disease can be, and nearly was, catastrophic to more than a few ships at sea in 1918. Not only were ships isolated, without outside help, but also the lack of normal social distancing

caused the disease to spread rapidly to passengers and crew.²⁵ Ships of all kinds not only suffered the effects, but also served to continue the worldwide pandemic. It is possible to quarantine ships from each other and from ports, but the people on board a single ship will breathe each other's air for the duration of the voyage. The troop ships in particular transported the disease in its latest forms in both directions. Soldiers arrived in the theater of war just as influenza was sapping their fighting strength. Troop ships from the US delivered 1,700 new influenza cases to Brest, France in September 1918.²⁶ These sick soldiers, far from helping the war effort, immediately absorbed needed resources. When ships from America that were especially quick in crossing the Atlantic landed in Europe, those infected but not yet symptomatic soldiers would spread the virus more quickly and broadly.²⁷ These unit level factors combined to limit the effectiveness of entire armies on both sides of the conflict.

The effects of pandemic influenza in 1918 certainly increased the suffering that WWI inflicted. Influenza may well have changed the outcome and duration of the struggle. American Expeditionary Force (AEF) medical inspector, Hans Zinsser, wrote that typhus and other historical plagues had determined the outcome of more wars than Napoleon, Hannibal, or Caesar.²⁸ Military medical historian, Carol R. Byerly points out that since both sides suffered with influenza at various times it could not have affected the overall course of the war nor its result.²⁹ This argument does not take into account the timing of war. A pandemic that occurs during a major offensive will have a greater effect, especially at the tactical level, on the attacking side than a pandemic of similar intensity during an operational pause or sustained defensive operations. The reason for this disparity of effects is twofold. For example, a sick soldier can more effectively participate in the battle from a static firing position, than he can advance towards the enemy. Once a soldier needs evacuated to medical care, this action will

require fewer resources from an established defensive position than if litter bearers must retrace the line of advance of the attacking unit.

The pandemic had an effect on all of the forces in the conflict at the operational level. In June 1918, Great Britain contended with 31,000 influenza cases of its own.³⁰ More important than the pure numbers of casualties, however, was the timing of the heaviest of losses. According to the documentary, *Influenza 1918*, influenza removed so many men from action that entire war-plans had to be changed. Generals put detailed operational plans on hold because there were not enough healthy soldiers to execute them.³¹

The Germans felt the full force of the 1918 influenza, which they called Flanders' Fever, at the worst possible time with respect to their plans.³² Germany's leading general, Erich von Ludendorff said, "It was a grievous business...having to listen every morning to the chiefs of staff's recital of the number of influenza cases, and their complaints about the weakness of their troops."³³ He attributed the troops' poor morale and diminished strength to the flu, which he blamed for the failure of the July offensive. Ludendorff's generals also lamented the fact that the mortality rate had an effect, but in some cases, the morbidity rate could be more troublesome to an army on the move. When a soldier died, that man ceased to be of help to his unit, but he also ceased to be a burden. The sick, on the other hand, required care at the cost of men and material that commanders could have used for other military purposes.³⁴ The July operations were to be Germany's last great offensive and its last real chance of victory.³⁵ The offensive might have won the war if it were not for the effects of influenza.³⁶ The primary effects of disease, such as sickness and death in the ranks, produced second order effects on the military operations and the societies that supported them on both sides of WWI. These higher order effects may yield even more clues to the effects of future pandemics upon populations.

In addition to its impact on the war, the 1918 pandemic plagued populations around the world. In the US, the disease compromised the ability of the population to support its own functions as well as the war effort. The 1918 pandemic killed more people than had been felled in any single year of the Black Death.³⁷ In fact, it may have infected 20-40% of the population of the earth, and killed an estimated 40 million worldwide.³⁸ In Western Samoa, 20% of the total population died in less than two months. The consequence of such a rapid concentration of death was that many people simply starved to death when they were unable to procure food for themselves. No one was available to distribute food.³⁹

Additional non-disease deaths caused by the second order effects of a pandemic could actually be worse today due to new vulnerabilities in society such as the increased reliance upon infrastructure services to meet daily needs. Logistic chains are intentionally lean and rely more heavily than ever upon a complex web of critical infrastructure. In addition to the sheer number of people sickened and killed during the 1918 pandemic, the concentration of deaths during a short time for each community increased the impact. Because so many people were sick all at the same time basic services and functions of community life often stopped all together.⁴⁰ The history of many local governments in the US shutting down can be found in the court records, or lack thereof during periods of 1918.⁴¹ Lack of information though telling in retrospect led to speculation at the time of the pandemic.

The New York Times ran several stories in late June 1918 about an influenza epidemic in the German army and speculated about the degree to which it was affecting its ability to fight. In this case, the second order effect is the ability of the German army to fight while the third order effect is the speculation by the enemy press about its ability to fight. US President Woodrow Wilson prevented such supposition with respect to the American forces, and the War Department

issued reports in order to keep the public ignorant of the epidemic in the AEF.⁴² The official denial in the media that there was an issue actually worsened the spread of the pandemic.⁴³

The assumption by those in western societies that this type of information control could not happen in the digital age would be a fallacy of mirror imaging. There are countries today in which government-controlled media outlets could withhold information much as the US government did in 1918.⁴⁴ Perhaps China would again try to hide a domestic outbreak as it arguably did with avian flu in 2003.⁴⁵ Such control of information would cause a delay in needed actions to limit the spread of infection. The governments of 1918 had logical reasons to want to control information about the pandemic. Knowledge of sickness in the ranks may have further effects on the support of an operation on the home front. Information or rumors of US forces spreading a pandemic to a foreign population in an operating area could prove disastrous to ongoing operations and international relations.⁴⁶

Fear had a significant impact on the population of the US during the pandemic because distrust and terror follow fear.⁴⁷ Fear led people to question the origin of the pandemic, and accusations flew about who had brought the sickness. The reaction to 1918 influenza can give clues to public reaction to modern disease events because while diseases may vary, public reaction remains more predictable.⁴⁸ The head of the health and sanitation section of the Emergency Fleet Corporation in 1918, Lieutenant Colonel Philip S. Doane argued that German agents would have little difficulty intentionally spreading influenza in public places. He reasoned that the German military had used biological warfare in the past and would not hesitate to use similar tactics on the US. Doane's supposition topped page one of the *Philadelphia Inquirer*, and yields three potential lessons.⁴⁹ First, it would indeed be possible for an agent of an enemy nation, or non-state group to inflict disease on US forces, or those of US allies.

Second, an enemy nation or non-state group could manipulate the world media and thus populations with rumors similar to those advanced by Doane. Finally, making accusations in the media without scientific proof could erode the credibility of public officials.

Rumors about US forces or those of US partners bringing viruses into an area would have the potential for significant harm. Armies often bring disease to the theater of operation. US forces have earned blame on occasion for spreading infection to a host population. It is important to understand the effect of the information on the public, true or otherwise.⁵⁰ Governments and non-state actors may disseminate false information about the spread of a disease either to help their cause or perhaps simultaneously to hurt the cause of the US and its allies. In an environment of limited facts where rumors will produce powerful responses, commanders must leverage information operations in order to manage fear both within the military and in the surrounding population. President Wilson's attempt to limit information about the disease in 1918 produced more harm than good. Similar actions to keep the population ignorant could be more damaging today.

When the US Army at home needed medical care in response to the 1918 pandemic, it stretched thin the medical support structure. At the same time that the ships filled with war wounded returned to the US, the pandemic also exploded in the military training camps.⁵¹ In the fall of 1918 the toll became more than the US population could bear. On 26 September 1918, the US Army Provost Marshal General responded to the severe burden paid by the population in supporting the war effort and canceled the draft. The October draft would have inducted 142,000 men.⁵² This decision by the US Army shows the impact that a disease at home can have on the decisions that military and political leaders make with regard to support for military operations.

Carl von Clausewitz said that war remains always an instrument of policy. When considering the political nature of war, it is important for the commander to know not only how an illness will affect the force or that of the enemy, but also how it will affect political leadership and that of allies.⁵³ In addition to changes in policy, the pandemic affected politics and political leaders on both sides. Prince Maximilian of Baden, appointed premier by the Hohenzollern dynasty in extremis, spent two weeks in bed with the flu. Princess Blucher, an English diarist living in Germany, said the world waited on word from Prince Maximilian, but he lay in bed with a high fever. Prince Maximilian's *aide de camp* attempted, with mixed results, through the leader's illness to get the prince to answer pressing questions.⁵⁴ The influence of the pandemic continued beyond the end of hostilities in WWI.

After WWI, the flu had significant impact on the American delegation to the Versailles peace conference and the effectiveness of Wilson's staff. The President, his advisor Colonel House, and many others fell ill from influenza. Doctors made 125 sick calls to the American delegation in a single day during this third wave of the disease.⁵⁵ This sickness by Wilson at Versailles may have influenced the outcome of the treaty.⁵⁶ President Wilson's physician, Dr. Grayson diagnosed him with influenza at Versailles.⁵⁷ This may have been more than a temporary setback for the President's health and that of his political agendas. In his memoirs of the peace conference, the United Kingdom's Prime Minister Lloyd George outlined Wilson's nervous breakdown during the conference. George was not the only prominent figure that noticed the impact that health issues had on the President. US President Herbert Hoover expressed the opinion that Wilson's illness in April 1919 caused a permanent change in him.⁵⁸ Influenza affected not only the political leadership of the US but also the US election process.

The sickness among voters as well as quarantine measures affected the congressional election on 5 November 1918. Candidates were unable to campaign effectively in advance of the election. One candidate who did not make any speeches prior to the election was Albert B. Fall who won his Senate seat with only a 4% margin.⁵⁹ Fall lost two children to influenza prior to the election. The personal loss may have garnered him sympathy from voters who could relate to his suffering. Another Senate race directly attributed to influenza was that of Henry Ford who lost by a slim margin in Michigan. Over four thousand people were unable to cast their ballots in Michigan because they were sick with influenza. These sick voters included over one thousand employees of the Ford Motor company who were absent from both work and the ballot box.⁶⁰

The Democrats lost a net five Senate seats in the 1918 elections and thus their majority. These results were significant because with a newly won majority in the US Senate, the Republicans were able to appoint Henry Cabot Lodge to chair the Senate Foreign Relations Committee. Lodge was a strong and ultimately successful opponent of President Wilson's attempts to ratify the Treaty of Versailles. The failure of the Versailles treaty may have set the conditions that led to WWII.⁶¹ While the pandemic of 1918 had direct effects on WWI and ripple effects on the interwar world and WWII, these events and reactions to them provide lessons for future conflict and policy.

LESSONS LEARNED: THEN AND NOW

Complacency about influenza existed in 1918, as a matter of perception based more upon the relation of morbidity to mortality than the actual total effect of the pandemic. Influenza may be ideally suited to generate complacency because of the way it behaves within the human population. Influenza recurs every year, and most of the people infected survive. It seems not to matter to public perception that the low death rate coupled with the high infection rate produces a

high total number of deaths. A comparison between two infections exhibiting a differing relation of these rates is helpful for illustration. Historian Alfred W. Crosby describes an example in which yellow fever kills 5,000 people out of 10,000 who contract it in a single city. People in distant cities would begin to panic. On the other hand, Crosby contends that if millions of people, spread throughout the country, contract influenza and 50,000 of them die, public fear would actually be less.⁶² Public health education during a pandemic would help to address the misperception about the actual impact of the disease.

The complacency about disease in the army in WWI was mostly on the part of commanders. Army doctors were well aware that they would face medical challenges ahead because armies at war had always fostered disease.⁶³ Medical officers' recommendations regarding the location of new army camps and other health care issues, did not always rank at the top of the general command's priorities.⁶⁴ As early as 1898, the US Army knew that camp location could play a role in soldier health. The Army started to place camps in the sand hills of the south rather than on the coastal plain. These practices as well as catchment areas around US Army facilities prevent the spread of popular diseases to the troops. Despite the success of such measures, transportation infrastructure and availability of land took precedence during WWI⁶⁵ Crowding in camps and on ships caused the rapid spread of disease.⁶⁶ Crowding could prove an issue for current commands such as the Marine Corps, which prides itself on austerity and may be tempted to get by with more troops than other services in living quarters.⁶⁷ Once the pandemic began to affect the force, commanders had to choose between combat necessity and the quality of medical care. The simplest example of the tradeoffs came in the form of forces used for medical evacuation. Four stretcher-bearers were the best and fastest method of medevac possible on the 1918 battlefields, but three men carrying a sick man in a blanket kept an

additional man at the front. The blanket method put the sick man at risk of further injury and delayed treatment markedly.⁶⁸

While throughout history disease had always killed more soldiers than combat, commanders expected WWI to be different because of technology. Technology had increased the effectiveness of weapons and medicines alike, but these advances did not tip the scales from their historical balance. Tremendous breakthroughs in medicine and science leading up to WWI gave both officers and the public greater confidence in the health of the military than was warranted.⁶⁹ This statement of overconfidence and complacency could as easily refer to the next great pandemic.

Medical technology has improved since WWI, but unless commanders keep wise council, the force will suffer. John McCombs, staff member with United States Pacific Command, referring to effects of a pandemic on modern deployed military forces warned that, "Commanders not paying attention to the health of the force can expect losses of 40-60%."⁷⁰ This prediction serves to illustrate the operational impact that can visit upon a commander.

Despite the continued technological advancement since WWI, it would be arrogant to think that these advances mean that a major pandemic event could not happen again. The trench warfare conditions of WWI may have quickened the mutation and spread of the disease, but these are not the only conditions that could produce similar results. People living and working today in close contact with birds in Southeast Asia, for example, could facilitate the mutation and transmission of new strains of highly pathogenic avian influenza, also called H5N1, or bird flu. This disease remains endemic in Vietnam and threatens to spawn the next deadly pandemic. The greatest risk from the Southeast Asian region is the possibility that a highly lethal H5N1 could recombine with a highly transmissible H1N1 inside the body of a person who is sick with both

viruses.⁷¹ Once an avian influenza that is easily transmissible between humans crosses the species barrier from birds then the results could be much worse than in 1918.⁷² Currently less than 1000 people have ever contracted H5N1 from birds, but more than half of those have died as a result. While the next pandemic may be born on the farm instead of a front line trench, the need to contain the outbreak still exists.

As with any easily transmitted virus that cannot be cured, or effectively treated, the best way to stop the spread of the 1918 pandemic was through quarantine. Quarantine was a common protective measure early in American history.⁷³ During the smallpox epidemic of 1759-60 towns enforced quarantines to isolate them from infection. During the 1775-82 smallpox epidemic President George Washington and the doctors of the Continental Army understood the need to prevent the spread of disease to the troops by limiting their potential for exposure.⁷⁴ Government and military leaders were less effective in implementing these public health controls in 1918. Technology facilitated ease of travel and thus greater contact between people who would have otherwise been isolated.

There were several examples in 1918 of increased person-to-person contact increasing the spread of influenza. The first is the Liberty Loan Drive and its parade in Philadelphia, Pennsylvania. Two-hundred-thousand people packed the city's streets on 28 September 1918, to watch the two-mile long opening parade.⁷⁵ Events like these caused an explosion in the disease. This contributed to deaths the month following the parade where the daily death rate peaked at over 700.⁷⁶ US agencies have incorporated the lessons of the Philadelphia liberty loan parade into plans to protect the US. Deployed commanders will, however, face a significant challenge when trying to convince a local leader to cancel an important event. Examples of disproportionate consequences from disregarding the lessons of social distancing abound. Camp

Lewis, Washington reported 173 influenza cases on 20 September. A formation and parade on the base drew a crowd of 10,000 civilians on 23 September 1918. On 25 September 1918, the pandemic exploded in Seattle.⁷⁷

People in cities often poses greater immunity to familiar diseases than rural dwellers but a novel strain will have a greater affect upon urbanites. Because they live closer together, urban populations will transmit sickness more rapidly to each other, and thus a higher proportion of them will be sick at the same time. Because city dwellers rely on more services than those people living in rural areas not only will the rate of sickness be higher so will the impact of that rate upon the population.⁷⁸ For the same reasons, the US Army and Navy suffered the effects of influenza sooner and with greater intensity than the country at large during WWI.⁷⁹ Weather may have contributed to the intensity of the spring 1918 wave in the army. Living in temporary camps in southern states during the winter and spring of 1918 also exposed soldiers to colder than average temperatures.⁸⁰ The disproportionate effect of influenza on the military was also likely due in part to over-crowding, which is still a concern today with multiple people sharing communal living quarters in camps and on ships.

Troop ships, among other types, carried influenza back and forth across the Atlantic Ocean in 1918.⁸¹ Ships of war and commerce continue to play a role in spreading diseases of operational significance.⁸² Jet aircraft do the same, but with much greater rapidity. During WWI, it was not politically possible to enforce a maritime quarantine in order to fight the spread of disease. The need for troops and supplies at the front was just too great. The chief surgeon of the New York Port of embarkation said that despite ships arriving with flu cases aboard "we can't stop this war on account of Spanish or any other kind of influenza."⁸³ Based on the lessons of past outbreaks, the US is more willing to enforce quarantine domestically today. In 2009,

authorities denied the USS Boxer permission to put into port in Hawaii because crewmembers tested positive for swine flu.⁸⁴ The current military objective to pivot to the Pacific, and the development of sea basing concepts of force employment, will place US forces within a region likely to produce the next pandemic. Quarantining the Pacific or any region of the world for the good of the entire human population will present significant challenges.

Officials in the early 20th century were not ignorant of the need for quarantine, but their recommendations often fell short of convincing leadership to take action. The same challenges may be present today. In October 1918, United States Public Health Service, Surgeon General Blue sent telegrams to state health officials and advised all officials with the authority to act that they should fight the pandemic threat by closing all public gathering places. He reiterated that mitigation would be effective against the spread of the disease.⁸⁵ This council still applies today, but how can officials hope to convince a population that is deeply religious that the best way to stay healthy is not to gather for worship?

The exercise of religion sometimes comes at cross-purposes with public health. In Russia in November 1918, a medical officer of the 339th US army infantry discovered that members of a funeral party for influenza victims would all kiss the same artifact. The worshipers thought that participation in the ritual would prevent their contracting the disease.⁸⁶ In August 1957, during an influenza pandemic, pilgrims spread the disease to West Africa after contracting it on a trip to Mecca.⁸⁷ When people feel that they have a pressing duty to travel abroad and violate recognized control measures then the US may bar the return of those citizens.

Second order effects of influenza in 1918 included the perceptible slowing of military operations. Additional deaths due to battle injury also occurred because the medical system could not care for them in addition to the many that were sick with influenza.⁸⁸ In a modern

pandemic influenza would cause the health care system of a developing nation to disintegrate. A pandemic form of influenza transmits itself quickly from person to person; the number of people and the area affected will quickly grow over a short time. A future pandemic could affect the population as severely as a biological terror attack. For some bio-terror pathogens, such as Anthrax, only those exposed to the original dispersed agent would become ill because the disease would not be rapidly transmissible between people.⁸⁹ In addition to the healthcare system, other critical infrastructure networks around the world will prove vulnerable to the higher order effects of the next pandemic.

In the state of Pennsylvania on 7 October 1918, Bell Telephone Company experienced an absentee rate of over 850. The company barely maintained the capacity to service emergency calls, and all other customers went without access to electronic communication.⁹⁰ It is likely that the effect of a similar pandemic upon emergency services would be greater today than it was in the early 20th century. The impact of a widespread lack of service would also be more damaging in the modern-day US because of a greater reliance on infrastructure for survival than was common in 1918.

Impacts of disease at the peak of the deaths during the 1918 pandemic began to unravel the very fabric of society. While 1918 USA may look far different in many ways from the USA of today, there are elements that which have not changed to better national pandemic preparedness. In fact, they many have resulted in less preparedness. Unlike in 1918, people today keep less food on hand and prepare less food in their homes. Alterations in living habits over the last century mean that it will be harder for Americans to function and obtain the necessities of life once an outbreak begins. As the effects of a pandemic become apparent, people will begin to avoid contact with each other for fear of infection. In-person, contact will

tend to be both rare and brief.⁹¹ Conditions faced in the US in 1918 provide applicable examples of some of the conditions that US forces may encounter when called to operate in areas of the developing world during a pandemic or its aftermath. While this effect may present itself universally, some lessons from 1918 in the US will be more applicable to an overseas intervention and response. Many immigrants to the US did not speak English and were ignorant of public health practices. Immigrants also lacked confidence in political and medical officials because of racial and religious prejudices.⁹² This example may provide some insight into a US force operating within a pandemic stricken people overseas. The realization of these social factors will aid the DOD in implementing policy to defend the US and assist other nations through the next pandemic.

CURRENT STRATEGY AND IMPLEMENTATION OF POLICY

In the president's letter at the beginning of the 2005 *National Strategy for Pandemic Influenza*, US President George W. Bush said, "Together we will confront this emerging threat and together, as Americans, we will be prepared to protect our families, our communities, this great Nation, and our world."⁹³ The reference in the letter to protecting the world gives notice to the US executive departments with an overseas mission to prepare for the next pandemic. The National Strategy calls for preparation and response with the aim of mitigating, delaying, or eliminating the transmission of pandemics to the US homeland.⁹⁴ History has shown that quarantine is the most effective means to stop, or at least slow, the spread of a pandemic. The National Strategy goes on to give notice, domestically and to the international community, that containing a pandemic is a global duty. The responsibility falls on individuals and nations alike to prepare and plan to limit the spread of disease.⁹⁵ The National Strategy recognizes this possibility and provides clear intent. Containing an outbreak outside of the border of the US is

the most effective way to protect the American people.⁹⁶ It is safe to assume that many possible parties may not effectively quarantine a pandemic, and then nations with the resources to defend themselves from this threat must do so. The National Strategy goes on to list a continuum of actions to facilitate this and specifies that, as a public health intervention, quarantine authority may be necessary.⁹⁷ This guidance feeds into a more detailed National Plan to implement the policy.

The implementation plan for the National Strategy, officially named the *National Strategy for Pandemic Influenza Implementation Plan* states that a main pillar of the strategy is response and containment.⁹⁸ Response follows preparedness and detection. Effective implementation of the response goal will certainly require application of DOD capabilities overseas. Referring to international efforts, the National Plan specifies the importance of both international response and containment. Humans are universally susceptible to pandemic influenza, and for this reason, all populations are at risk from an outbreak. The strategy to prevent, retard, and mitigate the spread of a pandemic influenza outbreak to the US may require an international effort.

The National Plan calls for further action requiring broad coordination. The National Plan presses international establishments to agree upon protocols and definitions to support the containment strategy. It also calls for international containment and response, triggered by a universal epidemiological standard.⁹⁹ This containment response could quickly become an issue for the US military. An international body, such as the United Nations (UN) through the World Health Organization, may recommend that a nation take decisive action to contain an outbreak to within its own borders. If a nation suffering an outbreak disagrees with sound recommendations or simply refuses to comply then the UN Security Council may resolve to compel such action.

Forward deployed forces must anticipate the possible future need to enforce a blockade with the purpose of quarantine in response to the outbreak of a pandemic. Currently available mechanisms to enforce quarantine could include such strategies as no-fly zones and interdiction of sea lines of communication. The National Plan identifies responsible agencies for a series of enabling tasks. DOD's role during a flu pandemic centers upon four objectives: disease surveillance, military-to-military assistance to partner nations, protection and treatment of US forces and dependents, and support to US civil authorities.¹⁰⁰ The role that the US Military could play in quarantine enforcement overseas as it relates to preventing or slowing the spread of the pandemic could easily fit into this list. Military-to-military assistance may be an appropriate starting point for a cooperative partner nation, but should not be an end unto itself. This type of assistance will also fail to address the inaction of non-cooperative nations. The guidance from the National Plan should more directly inform DOD's role in pandemic response.

In response to specific tasking within the National Plan, DOD published the *Department of Defense Implementation Plan for Pandemic Influenza*. In this August 2006 document, the Secretary of Defense selected USNORTHCOM as the coordinating command in the global response to pandemic influenza.¹⁰¹ This role places the commander of USNORTHCOM in the role of supported commander among all regional combatant commands.¹⁰² Regional combatant commands, through the Joint Chiefs of Staff, implement this policy within respective areas of responsibility, to include addressing integration of pandemic influenza prevention, preparedness, response, and recovery in appropriate plans and orders.¹⁰³ The documents mostly take the form of classified and unclassified contingency plans (CONPLANs). Many of the unclassified documents are also not available for public release. USNORTHCOM released a redacted version of CONPLAN 3591-09, which deals primarily with the DOD role in assisting domestic

response efforts under applicable law. This plan recognizes that the US Department of State (DOS) retains the leading federal role for international response. Under the National Plan, the US federal government's domestic response falls to the US Department of Health and Human Services (HHS) and the US Department of Homeland Security.¹⁰⁴ The DOD Plan references training to quarantine enforcement only in assistance to US civil authorities as a task to DOD.¹⁰⁵ There may be an emergent need for quarantine enforcement of foreign ports or borders either with or without a foreign government's approval.

RECOMMENDED CHANGE #1: INTERNATIONAL QUARANTINE

IMPLEMENTATION AS A DOD ROLE

The National Strategy correctly identifies early quarantine as a critical response to an emergent pandemic. The National Plan calls for an international containment strategy, but DOD implementation plan falls short of this goal. The National Plan charges the DOS with leading international pandemic preparation. DOS may face significant challenges of willingness and ability of nations to comply with appropriate protocols, and should collaborate with DOD in the implementation phase of any response.

During the 1918 pandemic, strict quarantine effectively prevented the disease on some islands, such as American Samoa. American Samoa suffered no deaths while the death rate on Western Samoa, where quarantine was not enforced, reached 25% of the population. Commander John M Poyer, Governor of American Samoa, caused some political tension when he ordered complete quarantine on all ships originating from Apia and all of Upolu.¹⁰⁶ The disruption of trade and mail communication aggravated the New Zealand administrator. In addition to resistance from official channels, individual violations made quarantine more difficult. Not only did authorities have to watch and control official ports, but also they had to be

concerned with the danger of small crafts coming ashore at random places in the night.¹⁰⁷ In the case of American Samoa, resistance from neighboring states and individuals increased the difficulty of quarantine though leadership and the population were committed. In cases where governments lose the control or lack the will needed to implement strict measures, capabilities beyond those organic to the DOS must quickly fill the gap.

The DOD should clearly identify its expected actions should a nation with the potential to infect all of humanity be either unable or unwilling to take effective responsible containment actions. The primary basis of authority for reacting to isolate the threat of an international pandemic would be an inherent right of individual or collective self-defense. *Article 51* of the *UN Charter* references the right of member nations to defend themselves and each other. The exact language of *Article 51, UN Charter* anticipates armed attack but the right is just as applicable in the case of a high-consequence biological threat.¹⁰⁸ In the case of pandemics, the lack of action to stop the spread of disease is functionally no different from the threat posed from the intentional action to begin the spread of disease, such as the employment of a biological weapon of mass destruction. The US would not hesitate to take swift action to prevent a biological threat by intentional action. The same should be true for intentional inaction in the case of pandemic quarantine with UN Security Council approval if international negotiations fail to resolve the threat.

The US National Command Authority may call upon DOD and quickly shift operational focus towards containment of an emerging outbreak due to the speed of the initial spread of disease. National Strategy and its follow-on National Plan provide details on domestic response, and the DOD must extrapolate and apply this guidance to likely international events and needs. Examples specified in the domestic response also serve to inform operational commanders with

the assistance that other supported countries will need. In addition to initial containment, partner nation, civilian authorities, and militaries will likely request assistance much the same as in a US domestic response. In some areas of the world, the more rapid disintegration of local infrastructure systems will magnify the need for external assistance.

RECOMMENDED CHANGE #2: INTERNATIONAL RELIEF AS A DOD ROLE

The DOD should adjust its DOD Plan to place a greater priority on planning and training for the anticipated international humanitarian assistance and disaster relief (HA/DR) needs of partner nations. US government agencies under the direction of the DOS are working to prepare partner nations to deal with the next pandemic. In January 2006 DOS, HHS, US Agency for International Development, and the US Department of Agriculture sent a combined team of experts to Turkey to learn how the US can help the Turkish government combat avian influenza.¹⁰⁹ These types of preparatory steps are important, but may prove inadequate when the infrastructure and social systems of a country quickly break down under the strain of a pandemic.

In 1918, influenza wiped out entire villages in remote areas, while critical infrastructure strained and failed in more developed cities. During a pandemic of similar proportion to the 1918 pandemic, mortuary affairs will strain to keep up with the body count, and sick people will wait helplessly for either intervention or death.¹¹⁰ On 29 September 1918, a doctor at Fort Devens, Massachusetts, described a scene that would have benefited from external assistance even though all 50,000 inhabitants of the camp began the year as able-bodied young adults. The camp experienced over 100 deaths per day, which overran the supply of coffins and the capacity of the morgue.¹¹¹ Current preparation accounts for the most likely and most often occurring scenarios but does not adequately address a repeat of the worst-case scenario.

Recognizing the scale of potential disaster effects expected, the DOD will need to address not only HA/DR, but a host of potential higher order effects of the next pandemic. It has been clear throughout history that disease often accompanies and follows war.¹¹² The DOD already anticipates that disease could ignite conflict. A fictional vignette in MCDP-3 exemplified this recognition. The story set in a future 2017-18 West Africa depicts simultaneous malaria and HIV epidemics as the catalysts for war.¹¹³ Internal groups within an infected country may clash over the distribution of medicine, vaccine, or other necessities of survival. Neighboring competitors may take advantage of a disease-induced decrease in a country's military readiness and launch operations in disputed territory.

CONCLUSION

Military leaders today should not view the 1918 pandemic as a historical fluke, but as a valuable predictive lesson about the effects of disease on militaries and whole populations. The ubiquitous nature of influenza can cause a dangerous complacency, but should instead remind leaders and policy makers that the world remains perhaps one mutation away from viral disaster. Influenza has the power to consume critical resources from critical areas such as the military and infrastructure.¹¹⁴ Beyond these obvious effects, influenza has the power to tear at the very connecting fibers of military and social systems. US Policies are in place that address a myriad of anticipated needs that will follow the next pandemic. There are, however, lessons that demand greater attention and priority to achieve adequate preparation. The next revision of the DOD Plan should contain greater emphasis on international quarantine enforcement as the best method to protect the homeland. The DOD Plan should also anticipate that partner nations will likely require a DOD response similar to US domestic assistance, but potentially greater in scope and duration. While scientists, medical officers, and public health professionals will continue to

fight the war against disease, US Military Commanders must plan for the historically predictable impacts of the next global pandemic on their forces and the populations they endeavor to defend.

Appendix A¹¹⁵
Timeline of the 1918 Influenza Pandemic¹¹⁶

- February 1918 -Influenza first appeared in San Sebastian, Spain.
- 4 March 1918 -Influenza first appeared in Camp Funston, Kansas and dozens more camps.
- April 1918 -8 Million influenza cases were ongoing in Spain.
(origin of the term Spanish Flu)
-Influenza in France sickens British, American, and French Troops.
- May 1918 -King George V of England was sick with influenza.
-The British Navy was unable to sail for 3 weeks due to 10,313 influenza cases.
- June 1918 -Influenza reached a peak in England with 31,000 cases.¹¹⁷
-Influenza appeared in China and Japan.
- July 1918 -Influenza (Flanders's Fever) stunted German offensive battle plans.
- Summer 1918 -First wave of influenza subsided briefly before lethal second wave.
- August 1918 -Influenza spread through Indian Subcontinent, China, Japan, Southeast Asia, Caribbean, Central America, and South America.
-Influenza first arrived in Boston, Massachusetts.
-The hospital at Camp Jackson, SC, admitted 4,807 soldiers with influenza.
- September 1918 -Influenza deaths at Camp Devens, Boston, MA exceed 100 per day.
-The hospital at Camp Jackson, SC, admitted 9,598 soldiers with influenza.
-1700 influenza infected troops arrived via ship in Brest France.¹¹⁸
- 11 September 1918 - Influenza arrived in Philadelphia, PA.
- 18 September 1918 -Philadelphia, PA city government institutes a public campaign against coughing, sneezing and spitting.
- 20 September 1918 -Philadelphia, PA, 200,000 people attended a liberty loan drive.
-Camp Lewis, Washington reported 173 influenza Cases.¹¹⁹
- 21 September 1918 -Philadelphia, PA, influenza became a reportable disease.
-*Philadelphia Inquirer* reported the discovery of Pfeiffer's Bacillus, thought (wrongly) at the time to cause influenza.

- 23 September 1918 -10,000 civilians gather for a formation and parade at Camp Lewis, Washington.¹²⁰
- 25 September 1918 -Seattle experienced a large number of influenza cases.¹²¹
- 26 September 1918 -The US Army Provost Marshal General canceled the October draft.¹²²
- October 1918 -Influenza prevented 1st Marine Aviation Force from conducting operations.¹²³
-United States Surgeon General directed state health officials to close all public gathering places to prevent the spread of influenza.¹²⁴
- 1 October 1918 -Philadelphia, PA, experienced 635 new cases of influenza.
- 3 October 1918 -Philadelphia, PA, all schools, churches, and gathering places are closed.
- 5 October 1918 -Pigs catch influenza from humans at Cedar Rapids Swine Show.
- 1-7 October 1918 - American Expeditionary Force (AEF) reported 16,000 new influenza cases.
-New influenza cases in the United States reach 200,000.
- 7 October 1918 -Bell Telephone in Pennsylvania reduced capacity to emergency calls only because hundreds of employees missed work due to influenza.¹²⁵
- 10 October 1918 -Philadelphia, PA, 759 people die of influenza adding to the 11,000 in the previous 30 days.
- 13 October 1918 -Influenza killed 1,101 soldiers at Camp Sherman Ohio since 27 Sept 1918.
- November 1918 -Influenza arrived in Alaska, USA
-Influenza spread at religious services for those who had died during the pandemic.¹²⁶
- 11 November 1918 -Since 26 October 1918 444 AEF soldiers die of influenza, compared to 90 AEF soldiers killed, captured or wounded during the same period.
- 1919 -The *Annual Report of the Surgeon General of the United States* summarized that individuals who had contracted the first wave of influenza and recovered seem to be more immune to the second wave.
- April 1919 United States President Woodrow Wilson caught influenza.¹²⁷
- Spring 1919 The second wave of the pandemic subsided.¹²⁸

February 1920

The third and final wave of deadly pandemic claims more victims before disappearing.¹²⁹

Endnotes

- ¹ The name Spanish Flu became popular, not because it originated in Spain, but likely because Spanish newspapers were the only media reporting the cases, which were prevalent throughout Europe and the world in 1918. This clarification is from: John M. Barry, *The Great Influenza: The Epic Story of the Deadliest Plague in History* (New York: Viking, 2004), 171.
- ² USNORTHCOM. *CONPLAN 3591-09: USNORTHCOM, Response to Pandemic Influenza* (Peterson AFB, CO: Headquarters US Northern Command, 2009), 6.
http://www.dod.mil/pubs/foi/operation_and_plans/Other/10_F_0279USNORTHCOM_CONPLAN3591_09USNORTHCOM_Response_to_Pandemic_Influenza.pdf
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- ⁴ "Method of Handling Influenza Epidemic at a Camp," 30 September 1918, MDWW, Vol. I, 1000-1003.
- ⁵ Peter Paret, ed., *Makers of Modern Strategy: From Machiavelli to the Nuclear Age* (Princeton, Princeton University Press, 1986), 197.
- ⁶ Crosby, 211.
- ⁷ Carol R. Byerly, *Fever of War: The Influenza Epidemic in the U.S. Army during World War I* (New York: New York University Press, 2005), 182.
- ⁸ Barry, 103-6.
- ⁹ Crosby, 203.
- ¹⁰ Crosby, 203.
- ¹¹ Byerly, 72.
- ¹² Crosby, 30.
- ¹³ Barry, 251-2.
- ¹⁴ *Influenza 1918*, DVD, Directed by Robert Kenner. (1998; Hollywood, CA: Paramount Entertainment in association with PBS Home Video, 2006).
- ¹⁵ Crosby, 104.
- ¹⁶ Crosby, 32.
- ¹⁷ Crosby, 157.
- ¹⁸ "Day Logue," 1918, Russell, B. Cook, Archives and Special Collections Branch, Library of the Marine Corps, Collection 230 Folder 2 4A33/PB#36.
- ¹⁹ Office of the Surgeon General, Medical Department of the U.S. Army, Vol. 6, pp 362-63.
- ²⁰ Byerly, 132.
- ²¹ Edward C. Johnson, Lieutenant Colonel, *Marine Corps Aviation: The Early Years 1912-1940*, ed. Graham A. Cosmas (Washington, DC: History and Museums Division Headquarters U.S. Marine Corps, 1977), 24.
- ²² Crosby, 224.
- ²³ Crosby, 224.
- ²⁴ Byerly, 118.
- ²⁵ Crosby, 121.
- ²⁶ Crosby, 134.
- ²⁷ Crosby, 135.
- ²⁸ Byerly, 4.
- ²⁹ Byerly, 98.

³⁰ *Influenza 1918*, DVD, Directed by Robert Kenner. (1998; Hollywood, CA: Paramount Entertainment in association with PBS Home Video, 2006).

³¹ *Influenza 1918*

³² Crosby, 26.

³³ Crosby, 27.

³⁴ Crosby, 160.

³⁵ Barry, 172.

³⁶ Crosby, 27.

³⁷ The Black Death is a term used to describe the Bubonic Plague, which killed approximately half of the population of Europe in the mid-fourteenth century.

³⁸ U.S. Department of Homeland Security, *The Prioritization of Critical Infrastructure for a Pandemic Outbreak in the United States working Group: Final Report and Recommendations by the Council* (Washington, DC: National Infrastructure Advisory Council, January 2012), 44.

³⁹ Crosby, 235.

⁴⁰ Byerly, 80.

⁴¹ Dr. Jonathan Phillips (Professor of Military History, Marine Corps University)

conversation with Major Kevin S. Grindel January 3, 2013.

⁴² Byerly, 72.

⁴³ Barry, 462.

⁴⁴ Barry, 459.

⁴⁵ On 9 April 2003, *The Guardian* newspaper reported that a Chinese doctor accused the government in Beijing of underreporting the number of cases of Severe Acute Respiratory Syndrome (SARS), and thus the seriousness of the outbreak.

<http://www.guardian.co.uk/world/2003/apr/09/sars.china>

⁴⁶ John McCombs (J57 - Pandemic Influenza, Infectious Diseases and Biological Threats Strategic Response Plans and Future Engagements, Strategic Planning and Policy Directorate at U.S. Pacific Command) Phone Conversation, October 3, 2012.

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⁴⁸ McCombs, Phone Conversation, October 3, 2012.

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- 69 Byerly, 182.
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- 79 Crosby, 56.
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- 81 Crosby, 29.
- 82 Dr. Phillips, Conversation, February 20, 2013.
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- ¹⁰⁷ Crosby, 236-8.
- ¹⁰⁸ "Charter of the United Nations," 26 June 1945, United Nations Documents, Chapter VII Article 51, <http://www.un.org/en/documents/charter/chapter7.shtml>.
- ¹⁰⁹ U.S. Department of State, US Avian Influenza Team to Turkey (Washington, DC: U.S. Department of State, 13 January 2006).
- ¹¹⁰ Byerly, 80.
- ¹¹¹ Kolata, 14.
- ¹¹² Barry, 6.
- ¹¹³ MCDP 3, 120.
- ¹¹⁴ Byerly, 103.
- ¹¹⁵ Gina Kolata, *Flu: The Story of the Great Influenza Pandemic of 1918 and the Search for the Virus that Caused it* (New York: Farrar, Straus, and Giroux, 1999, 9-80.
- ¹¹⁶ Unless otherwise end-noted source of timeline material was: Kolata, 9-80.
- ¹¹⁷ *Influenza 1918*, DVD, Directed by Robert Kenner. (1998; Hollywood, CA: Paramount Entertainment in association with PBS Home Video, 2006).
- ¹¹⁸ Crosby, 134.
- ¹¹⁹ Crosby, 92.
- ¹²⁰ Crosby, 92.
- ¹²¹ Crosby, 92.
- ¹²² Crosby, 49.
- ¹²³ Edward C. Johnson, Lieutenant Colonel, *Marine Corps Aviation: The Early Years 1912-1940*, ed. Graham A. Cosmas (Washington, DC: History and Museums Division Headquarters U.S. Marine Corps, 1977), 24.
- ¹²⁴ Crosby, 74.
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127 Crosby, 192.
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