

Master of Public Health Field Experience Report

PUBLIC HEALTH PREPAREDNESS FOR PANDEMIC INFLUENZA IN RILEY COUNTY, KANSAS

by

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MASTER OF PUBLIC HEALTH

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Abstract

Influenza viruses are constantly changing, which requires on-going characterization to provide early identification of emerging strains with pandemic potential. A close second to surveillance in prioritization is the ability of a public health system to respond to a developing pandemic. This report provides a detailed report on specific capabilities and capacities in public health preparedness within Riley County. The capabilities, capacities, and assessments within this report are in the context of an influenza pandemic. A variety of sometimes overlapping emergency standards, response capacities, and evaluation tools are in use within the nation. When appropriately used, these standards and measures can provide key insight across the nation into the strengths and weaknesses of the local public health system.

Riley County's recent local public health system assessment acknowledged a strength in disease identification, epidemiology, and investigation. Additionally, local emergency response agencies have shown great capabilities and capacities in preparing for and responding to daily emergencies. Information sharing, emergency operations coordination, and public information and warning capabilities recently received a favorable evaluation. The broader Riley County public health system, however, may be much less prepared and capable than those commonly identified as core emergency response agencies (police, fire, emergency medical services, and emergency management). Interagency communication and coordination are especially in need of development. If the local public health system is unable to respond as necessary to a complex public health emergency, such as an influenza pandemic, the local infrastructure may fail. Well-developed public health preparedness in advance of these public health emergencies are key to the success of the jurisdiction.

This report summarizes observations of local public health agencies, some past agency responses, and some assessment of agency preparedness with a brief assessment on Riley County's potential vulnerability to an influenza pandemic. This paper summarizes recommendations to: (1) develop a public health vulnerability analysis addendum to Riley County's Hazard Analysis, (2) complete the systematic review developed herein, (3) evaluate the Riley County Health Department Public Health Emergency Preparedness program with available standards and measures, and (4) pursue medical surge planning with key stakeholders.

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List of Acronyms and Initialisms

ASPR	Assistant Secretary for Preparedness and Response	HAvBED	Hospital Available Beds for Emergencies and Disasters
BARDA	Biomedical Advanced Research and Development Authority	HSPD	Homeland Security Presidential Directive
BEPHI	Bureau of Epidemiology and Public Health Informatics (KDHE)	ILI	Influenza-like Illness
BOCC	Board of County Commissioners	JIC	Joint Information Center
BOH	Board of Health	K.A.R.	Kansas Administrative Regulations
BRFSS	Behavioral Risk Factor Surveillance System	KDA	Kansas Department of Agriculture
BRI	Biosecurity Research Institute (KSU)	KDHE	Kansas Department of Health and Environment
CDC	Centers for Disease Control and Prevention	KS-CRA	Kansas Countermeasure Response Administration
LHD	Local/County Health Department	KSU	Kansas State University
DHHS, HHS	U.S. Department of Health and Human Services	LPHSA	Local Public Health System Assessment
EIS	Environmental Impact Statement	MFD	Manhattan Fire Department
EMS	Emergency Medical Services	MRHC	Mercy Regional Health Center
EOC	Emergency Operations Center	NA, N	Neuraminidase
EOP	Emergency Operations Plan	NACCHO	National Association of County and City Health Officials
EPA	Environmental Protection Agency	NBAF	National Bio and Agro-Defense Facility (KSU)
ESF	Emergency Support Function	NEHCC	Northeast [Kansas] Healthcare Coalition
ESF-8	Emergency Support Function 8 - Health and Medical Services	NREVSS	National Respiratory and Enteric Virus Surveillance System
FEMA	Federal Emergency Management Agency	NRP	National Response Plan
FMD	Foot and Mouth Disease	NPI	Non-pharmaceutical Intervention
GDP	Gross Domestic Product	PAHPA	Pandemic and All-Hazards Preparedness Act
HA, H	Hemagglutinin		

PAHPRA	Pandemic and All-Hazards Preparedness Reauthorization Act	RCEOP	Riley County Emergency Operations Plan
P&I	Pneumonia and Influenza	RCFD #1	Riley County Fire District #1
PIO	Public Information Officer	RCHD	Riley County Health Department
PHAB	Public Health Accreditation Board	RCPD	Riley County Police Department
PHEP	Public Health Emergency Preparedness	RNA	Ribonucleic Acid
PPHR	Project Public Health Ready	SARI	Severe Acute Respiratory Illness
Pott. Co.	Pottawatomie County	SNS	Strategic National Stockpile
RCEM	Riley County Emergency Management	TCL	Target Capabilities List
RCEMS	Riley County Emergency Medical Service	VDL	Veterinary Diagnostic Lab (KSU)
		WHO	World Health Organization

CHAPTER 1 - RECENT HISTORY OF PANDEMIC PREPAREDNESS

Oftentimes, the most significant and ever-present threat to the health of an individual, as well as the collective health of the public, comes from the smallest forms of life on this planet. The earth contains a complex ecosystem with microscopic pathogens that may at any time cause serious disease or illness: viruses, bacteria, protozoa, and fungi. These organisms are constantly developing capacities and mechanisms to better infect, grow, and evade detection within the human body. Of particular global focus are a set of RNA viruses known as influenza viruses. Influenza viruses, largely due to their mutation and reassortment rates, make them an ever-evolving enemy. This feature allows for the increased likelihood of a worldwide outbreak, or pandemic, which has the potential to cause a massive impact on the public health system and economy.

Experts agree that another influenza pandemic is inevitable; it will not be a question of *if*, but *when*. This report focuses on the mitigation potential of public health preparedness activities in advance of an influenza pandemic in Riley County, Kansas.

1.1 PANDEMIC INFLUENZA

Influenza (flu) viruses are highly contagious pathogens of the respiratory tract that are easily spread from person-to-person throughout all populations. Once contracted, the host often develops mild to severe illness within a few days. To further complicate the problem, there are three genera of influenza which are present in the world (Influenzavirus A, Influenzavirus B, and Influenzavirus C) which are further divided into serotypes according to combinations of viral surface proteins (World Health Organization Media Center, 2014). These surface proteins, hemagglutinin (HA, H) and neuraminidase (NA, N), are divided into subtypes by distinctions between each glycoprotein: 16 H subtypes (H1-H16) and 9 N subtypes (N1-N9). The type A virus is the most virulent, most mutable (largely due to zoonotic transmission) influenza species and has been the only influenza species known to cause pandemics (World Health Organization Media Center, 2014). Many virus subtypes may circulate in a given season that, once identified and assessed by prevalence, may have seasonal prophylaxis (vaccines) developed¹ to combat dominant strains; vaccine efficacy often wanes when dominant subtypes become less dominant.

¹ Type C influenza cases are far less frequent and are not included within seasonal vaccines.

Influenza results in an estimated three to five million cases of severe illness and 250,000 to 500,000 deaths.

Pandemics occur when a previously nonexistent, or novel, virus strain suddenly mutates into a new strain due to antigenic shift. This often occurs after the pathogen's transmission is between two different species. This novel virus will create widespread global outbreaks in a relatively short period, assisted by global travel and shipping networks. Additionally, pandemics have a wavelike tendency of prevalence that exists in 6 to 8 week periods. The widespread and wavelike nature of this public health emergency will make mobilization of resources difficult due to the many sites and instances of emergency.

1.1.1 Diagnostic Definitions

As confirmation of a specific disease or pathogen is not always possible (or cost-effective), it has become necessary to make some diagnostic assumptions based on patient symptoms. One such generalization of patients is for those exhibiting symptoms within a broadly defined category of influenza-like illness (ILI); cases requiring hospitalization further classify as a severe acute respiratory infection (SARI). Clinical presentations of influenza infection do not easily distinguish from other respiratory conditions. Cases identified as ILI and SARI may not necessarily always indicate influenza but may serve to identify influenza trends in lieu of other data. Although the specific conditions required to meet the definition of ILI and SARI vary within global regions, the Centers for Disease Control and Prevention (CDC) have defined a specific set of conditions for use within the United States (Influenza Division (CDC), 2013):

Influenza-Like Illness (ILI) Case Definition

No other known cause of illness,

Fever (temperature of 100 °F [37.8 °C] or greater),

Cough, and/or

Sore Throat

Severe Acute Respiratory Illness (SARI) Case Definition

ILI Case Definition

Hospitalization Due to Illness

Clinical laboratories confirm influenza cases via influenza tests conducted in routine diagnostics. The following diagnostic tests may confirm infections due to influenza (Influenza Division (CDC), 2013):

- Viral culture isolation,
- Direct fluorescent antibody assay (DFA),
- Indirect fluorescent antibody assay (IFA),
- Reverse transcription polymerase chain reaction (RT-PCR), or
- Rapid influenza diagnostic test (RIDT).

1.2 INFLUENZA SURVEILLANCE

1.2.1 National Surveillance Strategies

Collaborative efforts make the national influenza surveillance system possible between the Epidemiology and Prevention Branch in the Influenza Division of the CDC and its many state, local, territorial, and private entities supporting public health surveillance. As shown within the CDC Overview of Influenza Surveillance in the United States, there are five (5) categories of influenza surveillance in place (Influenza Division (CDC), 2013): Virological Surveillance, Outpatient Illness Surveillance, Mortality Surveillance, Hospitalization Surveillance, and Summary of the Geographic Spread of Influenza. Together, these categories of influenza surveillance provide an accurate understanding of influenza activity within the nation and can serve to identify emerging pandemic strains.

1.2.1.1 Virological Surveillance

The CDC receives data reports on specimens taken for respiratory illness from approximately 85 World Health Organization (WHO) Collaborating Laboratories and 60 National Respiratory and Enteric Virus Surveillance System (NREVSS) laboratories across the United States (Influenza Division (CDC), 2013). Data for each specimen includes its confirmation disposition (positive or negative), influenza A subtype (H1 or H3; WHO laboratories, only), age/age group of the patient, and basic epidemiologic information from the patient. This WHO and NREVSS laboratory data is summarized within the CDC's weekly influenza surveillance report, FluView.

Starting in 2007, identification of a novel strain of Influenza A within capable laboratories has become a nationally notifiable condition, including non-human subtypes as well as unsubtypable strains. Rapid reporting of atypical strains is key to effective public health response to a potential emerging pandemic.

1.2.1.2 Outpatient Illness Surveillance U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet) receives data of influenza confirmations or presumptions following patient visits to healthcare providers (Influenza Division (CDC), 2013). ILINet consists of more than 2,900 outpatient healthcare providers within all 50 U.S. states, Puerto Rico, and the U.S. Virgin Islands with more than two-thirds of those providers providing weekly reports. The percentage of ILI cases reported to public health across the state arises by taking the total state population as a weight. Averaging non-influenza weeks² for the previous three seasons with the addition of two standard deviations results in the development of a national baseline. In the same manner, states grouped within the existing Homeland Security Regions afford data to develop regional baselines; Kansas is within Homeland Security Region VII. This ILI data has been adapted to the ILI Activity Indicator Map, which allows for a visual representation of ILI activity (over 10 levels of severity) by influenza season week.

Due to the increased national focus on influenza from the 2009-2010 influenza season, the CDC provided another means for obtaining surveillance information for ILI within the nation. Using the existing Behavioral Risk Factor Surveillance System (BRFSS), the world's largest on-going telephone health survey (more than 400,000 adults interviewed each year), the CDC added additional modules to the survey to obtain data on ILI rates and vaccination rates for adults and children (Centers for Disease Control and Prevention, 2010). The availability of data provided by many states within the BRFSS modules contributed to successful surveillance.

1.2.1.3 Mortality Surveillance Two systems are in use for surveillance on influenza-associated deaths (Influenza Division (CDC), 2013): 122 Cities Mortality Reporting System and Influenza-Associated Pediatric Mortality Surveillance System. The 122 Cities Mortality Reporting System obtains data from vital statistics offices receiving death certificates with public health

² Non-Influenza Weeks: periods of two or more consecutive weeks below 2% of the season's total specimens obtained which test positive for influenza.

considerations and provides the Epidemiology and Prevention Branch with the number of deaths with a listed contributing cause of death from pneumonia or influenza. This percentage of deaths due to pneumonia and influenza (P&I) is compared to seasonal baselines to provide additional surveillance data for influenza. An “epidemic threshold” for P&I deaths is made statistically significant as identified to be at least 1.645 standard deviations above the seasonal baseline.

Influenza-associated deaths in children (persons less than 18 years) became a nationally notifiable condition, received by the CDC, in 2004. This system may receive information on any child death with a laboratory confirmation of influenza.

1.2.1.4 Hospitalization Surveillance

Hospitalizations due to ILI (further defined as SARI cases) are among the more reliable indicators of influenza activity, as patients are more likely to have a laboratory confirmation of influenza following diagnostics. The Influenza Hospitalization Surveillance Network (FluSurv-NET) receives case reports following review of hospital laboratory and admission databases for confirmed cases of influenza (Influenza Division (CDC), 2013). The network covers over 70 counties participating voluntarily in the ten Emerging Infections Program states (CA, CO, CT, GA, MD, MN, NM, NY, OR, and TN) as well as three additional states (MI, OH, and UT). As Kansas and the remaining thirty-six states do not provide data to this system, FluSurv-NET makes national estimations by comparisons with adjacent participating states.

1.2.1.5 Summary of the Geographic Spread of Influenza State and Territorial health agencies report estimations for geographic spread of influenza activity throughout their jurisdictions with weekly State and Territorial Epidemiologists Reports (Influenza Division (CDC), 2013). These reports identify jurisdictional influenza prevalence within five (5) levels of activity (Influenza Division (CDC), 2013):

- **No Activity:** no new laboratory-confirmed cases of influenza and no reported increase in ILI cases.
- **Sporadic:** small numbers of laboratory-confirmed influenza cases but no significant increase in ILI cases.
- **Local:** small outbreaks or regional increases in laboratory-confirmed influenza or general increases in ILI cases.

- **Regional:** significant regional activity of laboratory-confirmed influenza cases and ILI cases within at least two but less than half of the regions within the jurisdiction.
- **Widespread:** significant activity of laboratory-confirmed influenza cases and ILI cases within at least half of the regions within the jurisdiction.

1.2.2 Kansas Surveillance Strategies

The Kansas Department of Health and Environment (KDHE) is poised at the junction between local surveillance efforts and national surveillance strategies, often sending data directly to the CDC while also receiving pertinent reports from the CDC for use in surveillance efforts. KDHE's *Bureau of Epidemiology and Public Health Informatics* (BEPHI) assumes the function of liaison to the CDC as well as overseer of local public health disease investigation. Per Kansas Administrative Regulation (K.A.R.) 28-1-2, KDHE is to be notified within a critically defined timeframe when certain infectious diseases are diagnostically confirmed. KDHE receives a multitude of disease reports, which route to the BEPHI or the Bureau of Disease Control and Prevention, as appropriate.

On March 5th, 2012, KDHE made available a new electronic disease surveillance system to the state of Kansas (Smith, 2013). This system, dubbed EpiTrax, replaced the prior KS-EDSS system as an “open-source, highly configurable, comprehensive surveillance and outbreak management application designed for public health.” The system connects local, state, and federal public health agencies into a network to support the identification, investigation, and mitigation of communicable diseases and environmental health hazards. Electronic laboratory reporting from physicians and local laboratories allows for significantly higher confidence in investigation necessity and supports local investigators in making appropriate decisions in management of patient care while preventing unnecessary morbidity and mortality that may result from slow or ineffective investigations. EpiTrax allows both state and local partners to enter pertinent patient health and demographic information, disease epidemiology, clinician findings, and laboratory results to develop case files that encompass the entire public health investigation.

1.3 STRESS TO THE SYSTEM

Four influenza pandemics have occurred within the last one hundred and twenty-five years: 1889 Russian Influenza Pandemic (H2N2 suspected), 1918 Spanish Influenza Pandemic (H1N1), 1957 Asian Flu (H2N2), 1968 Hong Kong Flu (H3N2), and 2009 Swine Flu Pandemic (H1N1). Each pandemic has resulted in millions of deaths and has brought acute stresses on critical infrastructures and systems as well as the economy following workplace absences (public health and medical surges) and reduction in provision of goods and services. Potentially high proportions of illness in a short period of time (such as 25-30% of U.S. population) and death could cause a loss from 1 to 4.25% of national gross domestic product (GDP)(U.S. Department of Health and Human Services, 2012).

The acute nature of these public health emergencies makes the burden to public health and critical infrastructures even more taxing. Following a 2012 U.S. Department of Health and Human Services (DHHS, HHS) review of the 2009 H1N1 Influenza Pandemic, several critical aspects of stress to the public health and medical systems were noted(Office of the Assistant Secretary for Preparedness and Response, 2012):

- monitoring stress of public health and medical systems were challenging at a national level,
- the pandemic did not fully test the healthcare system's ability to address a medical surge (via the national bed tracking systems and other means), and
- more complete medical surge guidelines and standards for healthcare providers are needed, with considerations toward resource constraints.

1.4 PUBLIC HEALTH PREPAREDNESS AND RESPONSE STRATEGIES

The 2009 H1N1 influenza pandemic allowed for the exercise of contemporary public health emergency preparedness and response plans following the increased national focus on preparedness initiated by the terrorist attacks on the World Trade Center on September 11, 2001, as well as subsequent attacks using biological agents and prevalence of avian influenza (H5N1) (Office of the Assistant Secretary for Preparedness and Response, 2009, p. 1). These events allowed for high-level policymaking in which comprehensive plans have been developed and

updated by the efforts of the White House, Homeland Security Council (HSC), DHHS, and the CDC, among many other federal, state, and local entities.

1.4.1 National Public Health Preparedness Strategies

1.4.1.1 Public Health Emergency Preparedness Capabilities (CDC) and Healthcare Preparedness Capabilities (ASPR)

A further result of planning activities at the federal level, the CDC published a March 2011 document: Public Health Preparedness Capabilities: National Standards for State and Local Planning. In quick succession, the Assistant Secretary for Preparedness and Response (ASPR) published in January 2012: Healthcare Preparedness Capabilities: National Guidance for Healthcare System Preparedness. Together, these documents explicitly define public health preparedness and relevant standards for public health and healthcare preparedness programs, respectively. These documents further allow for deliverable measures to support the Public Health Emergency Preparedness (PHEP) and the Hospital Preparedness Program (HPP) cooperative agreements, respectively. The PHEP and HPP capabilities, often containing similar and linked measures, provide an extensive list of standards and measures that are critically important to emergency preparedness and response.

Originally set in place as competitive grant funding for bioterrorism preparedness, the current status of PHEP grant funding follows an allocation formula based on an all-hazards preparedness approach. This PHEP funding is awarded to all U.S. states, eight freely associated territories, and four directly funded localities: Chicago; Los Angeles County; New York City; and Washington, D.C. (Office of Public Health Preparedness and Response, 2011). A visual representation of awardees is within Figure 1, below, with Kansas being the darkened state in the middle, four markers in place for localities, and a listing of the freely associated territories. Cooperative agreements provide grant funding in which awardees are required to attempt to complete annual preparedness deliverables within their jurisdiction. Local PHEP grant funding (as grant subawardees) allows for employment (partial to full salary) of public health professionals at local health departments; when funding is insufficient, other agency personnel assume the PHEP functions. The state (grant awardee) sets forth work plan deliverables for these

PHEP Coordinators, or other agency personnel, to meet in order for the state to accomplish broader preparedness deliverables.

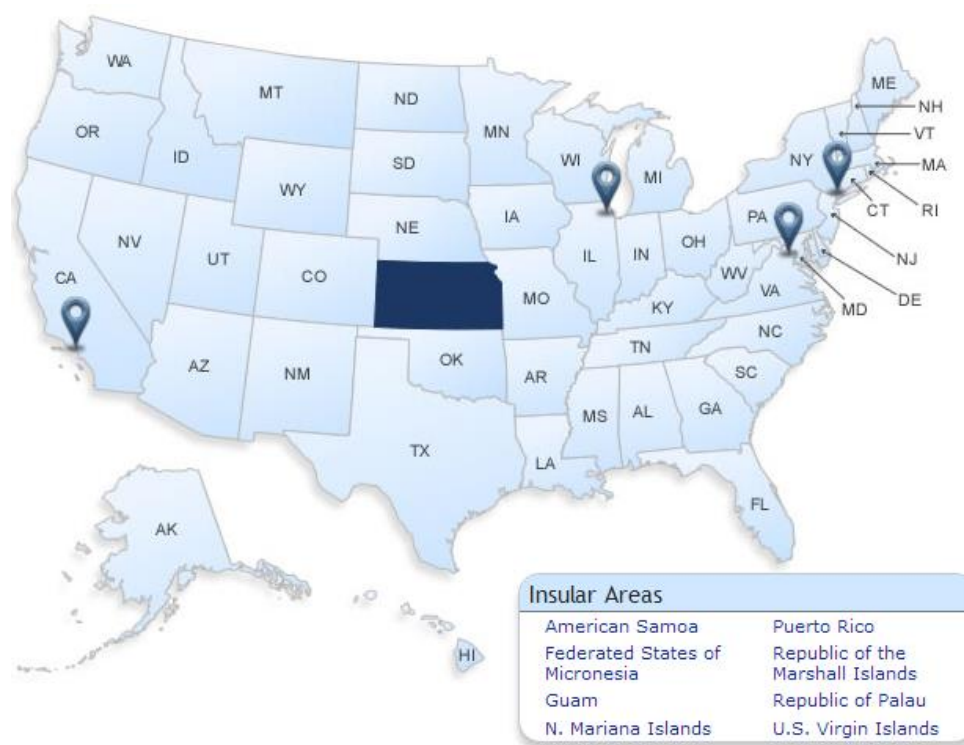


Figure 1: Federal Public Health Preparedness Awardees
(Centers for Disease Control and Prevention, 2014)

Federal grant administrators developed the PHEP deliverables from the CDC's Public Health Preparedness Capabilities, a set of fifteen specific categories of actions that directly support public health preparedness activities. These capabilities are further grouped into the following categories (Office of Public Health Preparedness and Response, 2011): Biosurveillance, Community Resilience, Countermeasures and Mitigation, Incident Management, Information Management, and Surge Management.

Biosurveillance

Public Health Laboratory Testing
Public Health Surveillance and Epidemiological
Investigation

Community Resilience

Community Preparedness
Community Recovery

Incident Management

Emergency Operations Coordination

Information Management

Emergency Public Information and Warning
Information Sharing

Countermeasures and Mitigation

Medical Countermeasure Dispensing
Medical Material Management and Distribution
Non-Pharmaceutical Interventions
Responder Safety and Health

Surge Management

Fatality Management
Mass Care
Medical Surge
Volunteer Management

As federal funding allocations continue to decline, awardees and subawardees alike continue public health preparedness with fewer and fewer available resources.

1.4.2 National Pandemic Influenza Strategies***1.4.2.1 National Strategy for Pandemic Influenza and Implementation Plan (Bush Administration)***

Completed in 2005, the National Strategy for Pandemic Influenza (National Strategy) was one of the first comprehensive programs within the United States with aims to address the threat of pandemic influenza (U.S. Homeland Security Council, 2005). The document outlines the national strategy for preparation, surveillance, and response to a developing pandemic within the United States. The document also outlines the vulnerabilities and opportunities present within all levels of government, the private sector, and of individual citizens to inform the nation of ways in which to prepare for or respond to a pandemic. As a follow-up to this document, the Bush Administration provided the detailed Implementation Plan for the National Strategy for Pandemic Influenza which describes “more than 300 critical actions” to assist Federal departments and agencies in preparation for a pandemic influenza event (U.S. Homeland Security Council, 2006). To review progress made, the Homeland Security Council prepared an assessment of progress in the year following publication of the Implementation Plan, a One Year Summary. This document allowed federal preparedness efforts to course correct where necessary, and to prioritize perceived gaps in capabilities. These efforts set the standards for national pandemic preparedness planning.

1.4.2.2 Pandemic Influenza Plan (DHHS)

Alongside the development of the National Strategy, the DHHS developed the HHS Pandemic Influenza Plan in 2005. This plan contains important planning considerations which are consistent with the recently produced World Health Organization (WHO) international guidance and considerations as well as the federal National Response Plan (NRP)(U.S. Department of Health and Human Services, 2005). The HHS Pandemic Influenza Plan consists of three parts: (1) Strategic Plan, (2) Public Health Guidance for State and Local Partners, and (3) HHS Agencies' Operational Plans. The Strategic Plan contains governmental considerations and planning assumptions for preparation and response to pandemics and identifies key roles of federal agencies during a pandemic. The Public Health Guidance provides recommendations to state and local public health and medical agencies, as frontline responders, in order to improve surveillance, diagnosis, reporting, and response in the event of a pandemic. The remaining Operational Plans prioritized efforts within time and financial constraints.

1.4.2.3 Pandemic and All-Hazards Preparedness Act (109th Congress), Pandemic and All-Hazards Preparedness Reauthorization Act (113th Congress)

Further Federal preparedness efforts led to the development of the Pandemic and All-Hazards Preparedness Act (PAHPA, Public Law No. 109-417), which was passed by Congress and signed by President Bush in December 2006 and amended the prior Public Health Service (PHS) Act (Office of the Assistant Secretary for Preparedness and Response, 2013). The PAHPA, like the PHS Act before it, afforded the DHHS authority to lead Federal public health and medical activities for preparedness and emergency response needs. The Act allowed for the development of medical countermeasure distribution systems and the Biomedical Advanced Research and Development Authority (BARDA) as well as to support the needs of Emergency Support Function (ESF)-8 – Public Health and Medical Response.

In March 2013, Congress passed the Pandemic and All-Hazards Preparedness Reauthorization Act (PAHPRA, Public Law No. 113-5), which was signed by President Obama (Office of the Assistant Secretary for Preparedness and Response, 2014). The PAHPRA built upon national health security efforts by the DHHS and led to the authorization of funding for public health and medical programs such as the Public Health Emergency Preparedness (PHEP) Cooperative agreement and the Hospital Preparedness Program (HPP). The PAHPRA amended

the existing Public Health Service Act to empower state health departments as well as the U.S. Food and Drug Administration.

1.4.2.4 Strategic National Stockpile

Originally developed in 1999 as a pharmaceutical cache, the Strategic National Stockpile (SNS) was repurposed in 2003 to be a source of medicines and supplies to supplement and resupply state and local inventories following exhaustion of their supplies (Association of State and Territorial Health Officials (ASTHO), 2012). The development of BARDA within the DHHS in 2006 followed the development of national preparedness plans for pandemic influenza. BARDA facilitated the stockpiling of influenza vaccines of circulating strains, such as the H5N1 Influenzavirus A strains present within Asian poultry and wild birds (Iskander, Strikas, Gensheimer, Cox, & Redd, 2013). Current SNS caches contain ample influenza antiviral medications to provide emergency prophylaxis to 25% of the US population as well as assets, such as ventilators, and personal protective equipment, such as particulate respirators. Authority to disperse medical materials rests with both the Kansas Department of Health and Environment or the Kansas Department of Emergency Management, either jointly or independently, as needed and prioritized by.

1.4.3 Kansas Pandemic Influenza Strategies

1.4.3.1 Kansas Pandemic Influenza Preparedness and Response Plan (KDHE)

The Kansas Department of Health and Environment maintains the Biological Incident Annex (Attachment 1) to the Kansas Response Plan; this annex is also called the Kansas Pandemic Influenza Preparedness and Response Plan. Similar “biological incident annexes” are available at the local level for most jurisdictions. The Response Plan provides an overview of statewide, regional, and local strategies to support influenza response and reduce influenza-related morbidity, mortality, and disorder within the state (“Kansas Pandemic Influenza Preparedness and Response Plan (Attachment 1),” 2014). The Response Plan also identifies planning assumptions and considerations important for preparedness activities, to include projections of the effects of a pandemic within the state and nation. The Response Plan further identifies response actions associated agencies with designated responsibilities throughout the course of a pandemic. KDHE annually updates with revised plans produced each January and

containing revisions from pertinent events within the state and nation. Comments on the use of this plan within the 2009 H1N1 Influenza Pandemic events are within Chapter 3 - Local Perceptions on Preparedness.

CHAPTER 2 - FIELD EXPERIENCE

2.1 SUMMARY

The Wildcat Region (which includes Geary, Pottawatomie, and Riley counties) has an increased focus toward addressing an acute stress to the public health system following a large accident, disease outbreak, or mass fatality incident. These “medical surge” scenarios are a priority for prevention due to the potential magnitude of their effects. Throughout the fieldwork assignment at the Riley County Health Department, the study performed highlights the county’s capacity to prepare for and respond to a medical surge within the public health system. This study was in the context of Riley County with state and national considerations.

2.2 GOALS

Short Term: To develop a report by end of summer 2014 that communicates medical surge vulnerabilities of Riley County, outline current capacities (resources) and capabilities (evaluations) within the jurisdiction, and summarize any recommendations for improvement.

Long Term: Countywide improvement in preparedness to respond to a large-scale public health emergency, in particular to respond to pandemic influenza.

2.3 LEARNING OBJECTIVES

Established learning objectives ensured the activities performed maintained relevance to the Masters in Public Health program while gaining a deeper understanding of public health practice. The objectives and completion status, listed below, have a more detailed analysis provided within this section.

1. **(Completed)** Understand the breadth of public health agencies within Riley County and collaborating jurisdictions
2. **(Completed)** Understand existing emergency standards and evaluation tools applicable to public health emergency preparedness and response
3. **(Unable to Execute)** Determine applicabilities of Riley County's Hazard Vulnerability Analysis within context of field work
4. **(Completed)** Be familiar with Riley County response capacities in comparison to similar jurisdictions and in contrast to dissimilar jurisdictions
5. **(Completed)** Apply MPH curricula topics to activities throughout field work

2.3.1 Local Public Health Agencies (Completed)

It is important to note that a majority of the agencies associated with the public health system do not view themselves to be within the public health system. While outwardly not identified to be a public health agency (unlike local health departments), each agency is an integral part of the system (see Figure 2). The public health system represents a substantial fraction of state, local, and private agencies in any given community. Other local collaborations have served to better identify agencies that participate within the local public health system. Two such collaborations are the Riley County ESF-8 meetings and the Wildcat Region PHEP. This section will provide a deeper understanding of the local public health system in place within Riley County.

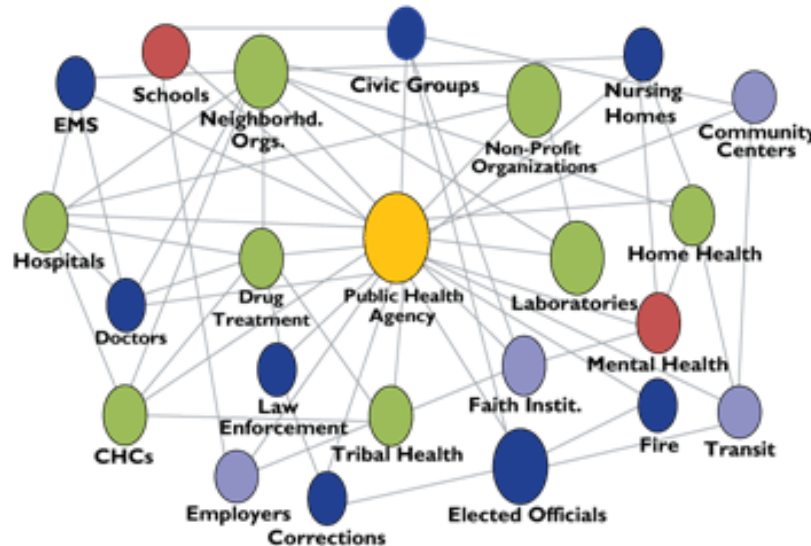


Figure 2: Agencies within the Public Health System

(Centers for Disease Control and Prevention, 2014)

2.3.1.1 Riley County Local Public Health System Assessment

Riley County evaluated the county's public health system for its effectiveness within the dimensions of the 10 Essential Public Health Services. The Riley County Board of County Commissioners (BOCC), as the county's Board of Health (BOH), commissioned the Local Public Health System Assessment (LPHSA) via the Riley County Health Department and managed by EnVisage Consulting, Inc., a local consulting firm. The LPHSA, performed on June 11, 2014, convened a diverse and interdisciplinary set of local agencies. Four (4) teams evaluated

the public health system (not the Riley County Health Department), with each assessing the delivery of the Essential Public Health Services using measures associated with their assigned services. Although, the LPHSA results are currently undergoing analysis, a great success of the process was a broader understanding by a majority of the agencies present of their role within the public health system. While local health and medical agencies were involved in the assessment, many agencies not typically associated with public health are integral to the process and the system. A sample of those integral agencies not outwardly described as a part of public health are:

- Manhattan Area Chamber of Commerce
- Unified School District (USD) 383
- Riley County Community Corrections
- League of Women Voters (Manhattan/Riley Co.)
- Riley County Police Department
- Flint Hills Breadbasket

2.3.1.2 Riley County Emergency Support Function 8

Each local jurisdiction has a set of critical emergency support functions (ESFs) that follow federal definitions of capabilities to support critical infrastructure. ESF-8 consists of key public health and medical agencies within Riley County that each has primary or support roles for emergency health and medical operations, to include mass fatality management, environmental health, epidemiology and surveillance, and the like. This collaboration of agencies has distinct roles in public health emergency operations for preparedness, mitigation, response, and recovery actions. The inaugural Riley County ESF-8 Agencies Meeting convened in April 2014 with subsequent meetings held semi-annually.

2.3.1.3 Wildcat Region Public Health Emergency Preparedness

The Wildcat Region formed in the late 1980's as one of the Kansas Department of Health and Environment's current fifteen Public Health Regions, each grouped by geographic location and existing intergovernmental relationships. The Wildcat Region holds monthly public health emergency preparedness meetings with key authorities in public health. These open meetings are comprised of the Health Department Directors and local preparedness personnel (PHEP Coordinators and associates) for Geary, Pottawatomie, and Riley Counties as well as the Fort Riley Department of Public Health. The primary focus of these meetings is to support the completion of the local health department and Wildcat Region work plans, as subawardees of the state cooperative agreements with federal partners. Second to work plan deliverables, the

Wildcat Region PHEP collaboration has aims in improving public health preparedness within the jurisdiction.

2.3.2 Public Health Emergency Standards and Evaluation Tools (Completed)

There are no direct standards to evaluate local public health entities, but many standards and evaluation systems are in existence. Of those available, the most widely used standards and evaluation systems are the CDC Public Health Preparedness Capabilities, FEMA Target Capabilities List and Core Capabilities, Project Public Health Ready criteria and Public Health Accreditation Board measures. The CDC Public Health Preparedness Capabilities guide local health department and hospital preparedness work plans from state health departments while FEMA capabilities guide local government and local emergency management agencies. Project Public Health Ready directly evaluates local health department preparedness while Public Health Accreditation Board measures evaluate local health department population services within their jurisdiction.

2.3.2.1 Target Capabilities List and Core Capabilities (DHS, FEMA)

Following the attacks on 9/11, subsequent anthrax attacks, the events of Hurricane Katrina, and other national emergencies, the federal government has developed a variety of preparedness and response strategies. In December 2003, President Bush issued Homeland Security Presidential Directive (HSPD)-8 - National Preparedness to establish the National Preparedness Guidelines (the Guidelines) (U.S. Department of Homeland Security, 2007). The Guidelines, produced in 2007, were the start of a national focus toward identifying a capabilities-based approach for national, all-hazards preparedness, to include the National Planning Scenarios, Target Capabilities List (TCL), and Universal Task List. The National Planning Scenarios are a list of specific and likely disasters to assist planning and exercises, while the Target Capabilities List and Universal Task List identify broad preparedness and response capabilities and their included functions. The TCL included a detailed list of thirty-seven preparedness capabilities that provide the national preparedness framework.

In gaining feedback on national preparedness efforts, the 2011 State Preparedness Report supported the realignment of the thirty-seven capabilities within the TCL down to thirty-one core capabilities, distinct critical elements necessary for the National Preparedness Goal (also

developed in 2011). This realignment was necessary since certain overlaps were determined to exist within the TCL, while other capabilities were determined to be absent. The resulting core capabilities crosswalk to the TCL denotes target capabilities associated with the new core capabilities (or no associations). This realignment assisted in the development of the separate, but linked, Public Health Preparedness Capabilities by the CDC.

2.3.2.2 Project Public Health Ready (NACCHO)

Project Public Health Ready (PPHR), like the aforementioned CDC and FEMA programs, is a public health preparedness program developed in 2004 by the National Association of County & City Health Officers (NACCHO). PPHR is used to determine capability-based approaches to the evaluation of a local health department's capacities and capabilities in planning for, responding to, and recovering from public health emergencies (National Association of County & City Health Officials, 2014). PPHR, like PHAB, allows for local health departments to receive recognition (similar to accreditation) by meeting criteria set in place to support the protection of the public health system.

2.3.2.3 Public Health Accreditation (PHAB)

The Public Health Accreditation Board (PHAB) was formed in 2007 as a non-profit entity to implement and oversee the accreditation of state and local public health departments (Public Health Accreditation Board, 2013). PHAB standards and measures, developed by an interdisciplinary team of subject matter experts, undergo frequent revision to provide a framework for outlining excellence in the public health field. Alongside agency administration, jurisdictional assessments, and delivery of public health services, standards and measures are available for public health preparedness capabilities. Agencies meeting the public health preparedness standards and measures have succeeded in those public health preparedness categories.

2.3.2.4 Public Health Preparedness Capabilities (CDC)

The aforementioned CDC document, Public Health Preparedness Capabilities: National Standards for State and Local Planning, created national standards to support capability-based planning to better identify gaps in preparedness while providing guidance in the selection of jurisdictional priorities and planning for capacity building (Office of Public Health Preparedness

and Response, 2011). The CDC developed Public Health Preparedness Capabilities, in part, by cross-walking existing PPHR and PHAB measures with FEMA Target Capabilities List and Core Capabilities. These standards not only provide the means from which state and local grant awardee contract deliverables are developed, but they also describe the critical capabilities and functions from which successful public health preparedness and response activities originate.

Each PHEP capability consists of specific functions, which directly support the achievement of the capability, with each function further consisting of tasks which allow for achievement of the function. Included with each function are resource elements that are indicated as being priority or recommended physical resources or systems, divided into three categories (Office of Public Health Preparedness and Response, 2011): Planning, Skills and Training, and Equipment and Technology. Many of the capability functions have CDC-defined performance measures to evaluate achievement of the function; annual Performance Measure Specifications and Implementation Guidance documents provide information on recently added, recently updated, and recently removed performance measures that are in place for the current budget period. Additionally, several evaluation tools for specific capabilities are available within the Performance Measure Specifications and Implementation Guidance documents.

2.3.3 Riley County Hazard Vulnerability Analysis (Unable to be Performed)

The current Hazard Analysis for Riley County does not provide an assessment for vulnerability to pandemic influenza or any other pathogen viewed to be of risk to cause outbreaks. The Hazard Analysis, completed in January 2012, only gauges the vulnerabilities due to a select few biological agents, such as rinderpest or anthrax. The biological agents present within the Hazard Analysis are pathogens of high profile but low risk for outbreak. A recommendation will be made within FY2015 for Riley County Emergency Management to accept an addendum hazard vulnerability analysis that will be more applicable to the actual public health risks to the jurisdiction.

2.3.4 Riley County Response Capacities (Completed)

Involvement of the Riley County Health Department within the Riley County Emergency Operations Center (EOC) as a function of ESF-8, assisting in the development of the Riley County Emergency Operation Plan (EOP, RCEOP) ESF-8 Annex, and participation within the

Northeast [Kansas] Healthcare Coalition (NEHCC) has allowed for an adequate comparison and contrast of local response capacities with similar jurisdictions. It is important to note that these observations have been completely subjective, as objective comparisons are difficult to obtain.

Further detail on completion of this objective is available within 2.4.2 Riley County Public Health Response Capacities, below.

2.3.5 MPH Curricula Topics (Completed)

(see Chapter 4 -Core Competencies and MPH Curricula)

2.4 ACTIVITIES PERFORMED

A set of activities developed at the outset of the field experience aim to meet the aforementioned objectives. As the field experience continued, updating of these activities occurred with several new activities added along the way. Activities listed below include their completion statuses with a more detailed analysis provided within this section.

1. **(Completed)** Compile a list of key public health stakeholders to be affected by a medical surge; evaluate by agencies involved in emergency capacity
2. **(Completed)** Determine Riley County public health response capacities
3. **(Partially Completed)** Evaluate Riley County by available capability standards
4. **(Partially Completed)** Assess Riley County vulnerability to medical surge
5. **(Recently Added, Partially Completed)** Perform systematic review on basis of research question: *How would improved public health preparedness reduce burden to the public health and healthcare systems following an increase in influenza-like illness in Kansas?*

2.4.1 Emergency Support Function 8 Agency Listing (Completed)

Development of contact lists for ESF-8 agencies occurred by the resolution of this fieldwork assignment. These contact lists provided assistance in determining agencies for response consideration as well as supporting work for the PHEP Coordinator. These lists developed over the course of the fieldwork assignment with discovery of agency information.

A list of core agencies that are key to ESF-8 is compiled within Appendix B -ESF-8 Contact Lists (see Table 1). A list of support agencies for ESF-8 (as currently identified) is compiled within Appendix B -ESF-8 Contact Lists.

2.4.2 Riley County Public Health Response Capacities (Completed)

2.4.2.1 Riley County Emergency Support Function 8 Activities

The Riley County Health Department is the Primary and Coordinating Agency for ESF-8. This tasks RCHD with taking on a liaison role between health and medical response agencies as well as providing support and guidance to those agencies in preparedness and response activities. In reviewing and updating the RCEOP, the ESF-8 Annex proved to be a valuable document outlining the capabilities and capacities for local public health and medical emergency response. The ESF-8 Annex provides an overview of emergency operations under the responsibility of health and medical entities and maintains a list of agency responsibilities in fulfilling those actions.

Riley County emergency response agencies seem to perform excellently within their own defined response areas. Additionally, Riley County Emergency Medical Services (RCEMS), Manhattan Fire Department (MFD), Riley County Police Department (RCPD), and Riley County Emergency Management (RCEM) (to include Riley County Fire District #1) have developed strong relationships over the years and often respond to typical emergencies as a joint task force with each agency providing its own unique assistance. Emergency response in Riley County does not always properly utilize some agencies or personnel critical in response, including the Health Department, Riley County Coroner, and local clinicians, among many others. This is a difficult culture to overcome and wrought with substantial obstacle to preparedness efforts, especially for public health and pandemic preparedness efforts.

It is of the author's opinion that Riley County is at the average level or slightly above average in response capacity, due to the availability of resources within Manhattan for emergency services. The Riley County Emergency Manager (and RCEM by extension) collaborates well within the county and with adjacent jurisdictions, an attribute that is not present within many other jurisdictions.

2.4.2.2 Northeast [Kansas] Healthcare Coalition

The Northeast Healthcare Coalition (NEHCC) organized in 2013 as a national effort to provide regional bridges between local planning and response and the equivalent statewide planning and response (Office of the Assistant Secretary for Preparedness and Response, 2010,

p. 134). The NEHCC, along with other regions' coalitions, brings together public health and medical entities to collaborate on preparedness efforts. Coalition meetings are a great forum of discussion and allow for a limited understanding of other public health preparedness efforts within the region. The healthcare coalitions operate similar to local ESF-8 structures, but are more advisory in nature³.

2.4.3 Evaluation of Riley County Capabilities (Partially Completed)

Objective evaluations are typically time- and cost-intensive. Additionally, many evaluations and assessments on preparedness and response capabilities require an exercise or actual incident to view functions performed (see 2.3.2 Public Health Emergency Standards and Evaluation Tools for applicable standards). The desired evaluation of Riley County for this fieldwork assignment would have originated within the CDC Public Health Preparedness Capability 10 – Medical Surge. No PHEP performance measures yet exist for the Medical Surge capability. After-action reporting from an October 2013 preparedness exercise and the June 2014 LPHSA are limited evaluations of Riley County capabilities.

2.4.3.1 Evaluation of Riley County EOC (2013 KDA FAD Exercise)

Select Riley County agencies participated within a functional (operational) exercise, RIP STOP 2013, in October 2013 that allowed for the testing of some capabilities. This exercise was a follow-up to a February tabletop exercise and is a part of a series of Kansas Department of Agriculture (KDA)-sponsored exercises for statewide capacity building. The KDA organized the exercise exercise, based on the scenario of a widespread outbreak of foot and mouth disease (FMD), to include federal and state partners as well as the adjacent Pottawatomie County (Pott. Co.) and Kansas State University (KSU). The exercise had primary foci on restricted and permitted movement of livestock in the event of disease outbreak.

During the two-day exercise, the Riley County EOC activated and organized with ESFs pertinent to the capabilities evaluated. Throughout the duration of the exercise, exercise artificialities may have inhibited proper responses by the EOC. In a majority of local incidents

³ Discussions are taking place at this time to determine the necessity and extent of any operational capacities of healthcare coalitions. As the coalitions are not official entities or extensions of state or local agencies, their operational capacities currently only exist in liaison and resource provision activities.

and disasters, responses at the local level with emergency managers identify operational objectives and organizing response; once resources exhaust at the local level, state assistance becomes awarded, followed by federal assistance. For agricultural emergencies (and few other major national emergencies), this response scheme is drastically different, as the KDA (or other state/federal agency in other major national emergencies) is in command of the incident and establishes objectives for the local responders. As this scheme is uncommon to emergency responses, local objectives were not provided in a timely manner, in which case the EOC identified its own objectives to address the exercise scenario injects.

In the months following the exercise, KDA produced an exercise after-action report. This after-action report may serve as an evaluation of some identified capabilities. A summary of the after-action report's findings specific to Riley County operations is as follows:

Operational Communications

- (Positive) Communications within the EOC were excellent
- (Positive) Information sharing was accomplished between response agencies (KSU, Pott. Co., Fort Riley)
- (Negative) Riley County did not provide a liaison to KDA's Incident Command (not requested)
- (Negative) Information sharing tools not properly utilized (or not utilized at all) to support situational awareness

Operational Coordination

- (Positive) ESFs were well represented within EOC and responded based on activation procedures
- (Positive) Utilization of KDA and KSU liaisons supported situational awareness
- (Positive) Riley County GIS provided excellent mapping, as requested
- (Negative) EOC lacks capabilities and capacities, in part due to the limitations of the EOC's housing facility

Public Information and Warning

- (Positive) EOC established a Joint Information Center (JIC) amongst local public information officers (PIOs) which supported timely public information and warning

Summary

This evaluation was favorable for Riley County, in regards to communications and information sharing (ESF-2 and PHEP Capability 6), emergency operations coordination (ESF-5 and PHEP Capability 3), and public information and warning (ESF-15 and PHEP Capability 4). This exercise did not significantly evaluate Riley County's capabilities in response to disease outbreak or a medical surge.

2.4.3.2 Local Public Health System Assessment

The June 2014 LPHSA provided an excellent evaluation of Riley County's public health system (see 2.3.1.1 Riley County Local Public Health System Assessment for more details on the assessment). Each team facilitating the assessment moderated a group of local public health agency representatives (20-35 per team) who collaboratively evaluated the effectiveness of the Riley County public health system to deliver the 10 Essential Public Health Services. The Essential Services group into three (3) Core Public Health Functions (as seen in Figure 3): Assessment, Policy Development, and Assurance.

Figure 4 provides a summary of results from the LPHSA. Each Essential Service has a set of Model Standards outlining functions critical to the delivery of the Essential Service. Following discussion on the Essential Service and the Model Standard itself, participants were asked to evaluate Riley County's activity in performing service-specific functions by providing an assessment response option (with associated quantity of activity) : Optimal Activity (76-100%), Significant Activity (51-75%), Moderate Activity (26-50%), Minimal Activity (1-25%), and No Activity (0%).

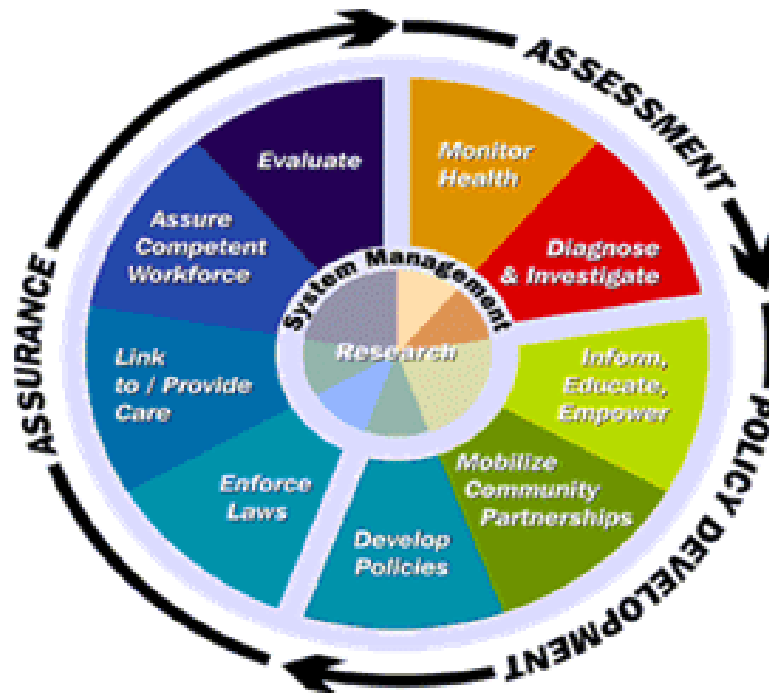


Figure 3: The 10 Essential Public Health Services
(Centers for Disease Control and Prevention, 2014)

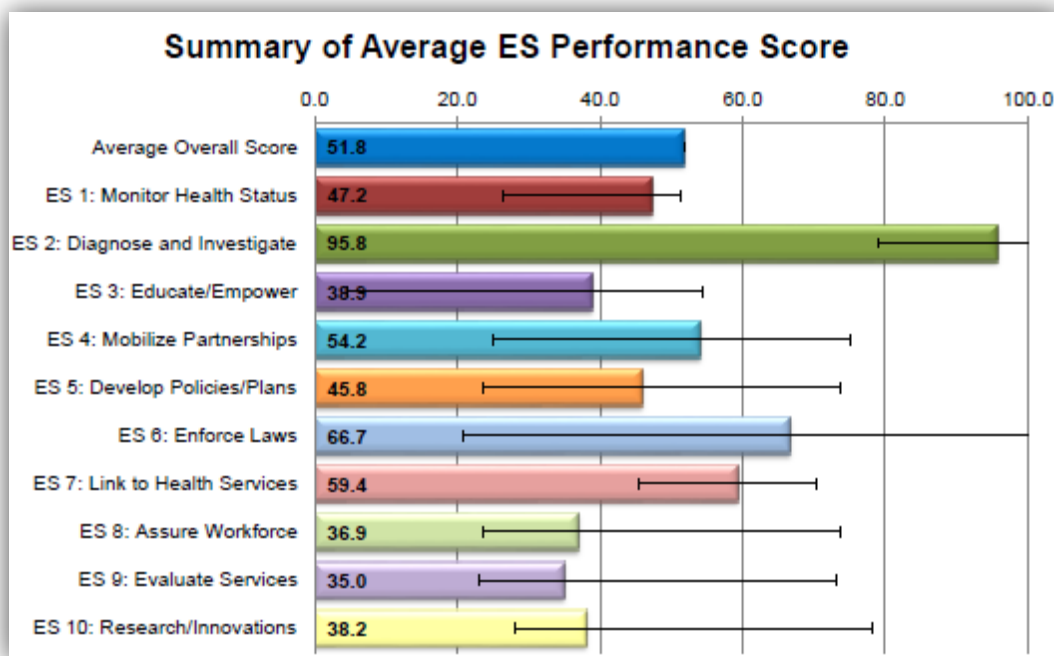


Figure 4: Performance Scores by 10 Essential Public Health Services
(EnVisage Consulting, Inc., 2014)

The preliminary results from the LPHSA indicate significant gaps in the delivery of the *Essential Services* within Riley County; overall scores were only slightly above 50% of activity. The following Essential Services indicated only moderate activity (26-50%) to deliver services: ES-1 – Monitor Health Status, ES-3 – Educate/Empower, ES-5 – Develop Policies/Plans, ES-8 – Assure Competent Workforce, ES-9 – Evaluate Services, and ES-10 – Research/Innovation. The following Essential Services indicated significant activity (51-75%) to deliver services: ES-4 – Mobilize Partnerships, ES-6 – Enforce Laws, and ES-7 – Link to Health Services. The only Essential Service to show optimal activity (76-100%) was ES-2 – Diagnose and Investigate.

This may provide a fair assessment of public health preparedness in Riley County. The author views the public health workforce to be somewhat ill prepared as a unit (not just RCHD) to prepare for and respond to emerging public health issues (ES-8) with identified gaps in planning and local public health authorities (ES-5). Additionally, the performance assessments (and discussion notes) specific to interagency communication and collaboration showed significant gaps: **interagency communication and coordination may be the area in most need of improvement**. The LPHSA, however, showed a tremendous positive response for the Riley County public health system's ability to diagnose and investigate health problems/hazards (ES-2); disease identification, epidemiology, and investigation may be strengths within Riley County.

2.4.4 Assessment of Riley County Vulnerability to Medical Surge (Partially Completed)

The assessment of Riley County's vulnerability to a medical surge was more difficult to accomplish than originally assumed. A sudden influx of patients to a medical facility because of disease outbreak, mass trauma incident, or other significant event can cause disruption and even arrest of the provision of services. This is a significant issue to public health planning, as a medical surge may happen at any time. Although the wide variety of potential sources which may cause a medical surge are known, the means of which to dampen the effects to an individual facility, let alone the public health system, are difficult to identify and are even more complicated to prepare for and mitigate.

From a subjective viewpoint, Riley County is significantly vulnerable to medical surge. The following considerations support this viewpoint:

- The Wildcat Region (Geary, Pottawatomie, and Riley Counties) has an atypically mobile population due to student and military housing and activity between jurisdictions;
- Riley County's population significantly grows as a result of signature events;
 - More than **12,000 per game** in basketball home game attendance (K-State Athletics, 2014b),
 - Approximately **50,000 per game** in football home game attendance (K-State Athletics, 2014a),
 - Approximately **50,000 per day** in Country Stampede attendance (4 days) (Country Stampede, 2014),
 - **Unknown attendance** in Fake Patty's Day (**may be 10,000-50,000 persons**),
- K-State's Biosecurity Research Institute (BRI) and Veterinary Diagnostic Lab (VDL) may potentially increase risks to public health by providing research or analysis on pathogens which may become freed from containment (National Bio and Agro-Defense Facility (NBAF) development notwithstanding);
- No system is currently in place to support the use of alternate care sites; and
- Lack of coordination, education, and training for identification and response to medical surge events within public health system, as identified within 2.4.2.1 - Riley County Emergency Support Function 8 Activities.

Interviews conducted on key stakeholders provide insight on perceptions of Riley County's vulnerability to medical surge following the events of the 2009 H1N1 Influenza Pandemic; these interviews are within Chapter 3 -Local Perceptions on Preparedness.

2.4.5 Systematic Review of Research Question **(Partially Completed)**

A research question guides the systematic review within this report as well as to guide the development of this report. Although the systematic review would be too time-intensive for this fieldwork assignment, the research question is useful for a future systematic review in order to determine relevance and quality of literature used and was a formal statement of the purpose of the study. A research question has the following components:

- **Population(s) of interest:** the jurisdiction being evaluated within the systematic review or population samples or populations directly applicable to the jurisdiction of the study;

- **Intervention(s) in use:** therapies, prevention strategies, or response strategies used to prevent/improve adverse health outcomes; and
- **Desired outcome(s):** end results of studies which support findings of literature review.

The research question was determined to be:

How would improved public health preparedness reduce burden to the public health and healthcare systems following an increase in influenza-like illness in Kansas?

where *public health preparedness* would entail the development of partnerships or relationships within the public health system, provision of health/medical/human resources, and prophylaxis of the population in advance of an influenza pandemic, and

where the *public health and healthcare systems* are to include medical care, emergency services, primary care facilities, and other entities concerned with threats to the health of the population (public health). The public health entities of interest in this study are to be medical care, emergency services, and health departments, and

where a *burden* to the public health and healthcare systems would be an acute stress on public health and medical services following an incident or disease outbreak, and

where *influenza-like illness* (ILI) would be the medical diagnosis of possible influenza or other illness causing common symptoms. A pandemic influenza, diagnosed as influenza-like illness, is the stress of interest to public health in this report.

Following the development of the research question, the development of a systematic review project was assisted by guidance from Sargeant et al. Using methods within *A Guide to Conducting Systematic Reviews in Agri-Food Public Health*, a list of search terms was developed for the systematic review (Sargeant, Del, Amezcua, Raj, & Waddell, 2005). The search terms in use were both general and specific terms to support appraisal of literature which appropriately met the population(s) of choice, intervention(s) in use, and desired outcome(s) (see Appendix D - Search Terms for Systematic Review) (Sargeant et al., 2005). Using these search terms, a search strategy developed in order to maintain specificity of returned articles throughout use of multiple databases. To keep track of database searches and results, a template developed to ensure reproducibility of searches (see Appendix E -Search Strategy Template for Systematic Review).

Lastly, a tool, developed for the field experience, assessed literature adherence to the research question as well in the extraction of useful data (see Appendix F -Assessment and Extraction Tool for Systematic Review). This tool successfully evaluated literature obtained with

the aforementioned search strategy for its relevance to the research question. Literature deemed to appropriately fall within the bounds of the research question provided comparable data for analysis within the systematic review. This final portion of the research review projected a need of much more time than available for the fieldwork assignment. A successful systematic review may follow the groundwork laid herein.

2.5 PRODUCTS DEVELOPED

At the outset of the field experience, a set of products projected for completion at the end of the fieldwork assignment. The products and their completion statuses follow below, with a more detailed analysis provided within this section.

1. **(Completed)** List of public health stakeholders to be affected by a medical surge; categorization by agencies able to respond to public health emergency
2. **(Partially Completed)** Evaluation of Riley County by pertinent capability standards; crosswalk overlapping standard sets
3. **(Completed)** MPH Report on Riley County's vulnerability to medical surge and the available public health response capabilities; include recommendations for improvement planning
4. **(Recently Added, Partially Complete)** Systematic review of literature pertaining to a medical surge caused by increases in influenza-like illness in Kansas

2.5.1 Categorized List of Public Health Stakeholders in Riley County (Completed)

See 2.4.1 Emergency Support Function 8 Agency Listing for work performed. A list of core agencies that are key to ESF-8 is compiled within Appendix B -ESF-8 Contact Lists (see Table 1). A list of support agencies for ESF-8 (as currently identified) is compiled within Appendix B -ESF-8 Contact Lists (see Table 2).

2.5.2 Evaluation of Riley County by Pertinent Standards (Partially Completed)

This activity is partially completed since objective evaluations are typically time- and cost-intensive. Additionally, many evaluations and assessments on preparedness and response capabilities require an exercise or actual incident to view functions performed. The desired evaluation of Riley County for this fieldwork assignment would have originated within the CDC Public Health Preparedness Capability 10 – Medical Surge. Unfortunately, no PHEP

performance measures exist for the Medical Surge capability. See 2.3.2 Public Health Emergency Standards and Evaluation Tools for applicable standards and 2.4.3 Evaluation of Riley County Capabilities for assessments performed and descriptions on evaluated capabilities.

2.5.3 Systematic Review of Research Question (Partially Completed)

Although the systematic review was too time-intensive to complete during this fieldwork assignment, the research question is useful for a future systematic review in order to determine relevance and quality of literature used and was a formal statement of the purpose of the study. Several products followed development of the systematic review:

See Appendix D -Search Terms for Systematic Review

See Appendix E -Search Strategy Template for Systematic Review

See Appendix F -Assessment and Extraction Tool for Systematic Review

CHAPTER 3 - LOCAL PERCEPTIONS ON PREPAREDNESS

During the course of the fieldwork, several key public health figures provided insight on their experiences and perceptions on the 2009 H1N1 Influenza Pandemic. The events of the 2009 global H1N1 outbreaks were the focus of these interviews, due to their recent occurrence as well as the potential stress to the public health system that could occur with such events. The three persons interviewed were Michael McNulty, Homeland Security Coordinator for the Kansas Department of Health and Environment (KDHE); Michelle Rutherford, Assistant Director of Riley County Emergency Medical Services (RCEMS); and Cary Herl, Medical Director of the Riley County Health Department (RCHD) and local physician with the Candlewood Medical Group as well as Mercy Regional Health Center (MRHC). Each person had a unique role and perspective on the outbreaks.

KDHE has been involved in pandemic planning since 2006, to include some exercises prior to 2009 (see 1.4.3.1 Kansas Pandemic Influenza Preparedness and Response Plan (KDHE)). The version of the plan in use for the H1N1 events addressed “worst case scenarios such as the 1918 influenza pandemic,” indicated McNulty. This is common with emergency plans since many plans account for “highest impact [incidents] and not necessarily highest risk incidents” (i.e., anthrax over influenza). This resulted in interventions that were “drastic measures.” Local (Riley County) responses indicated little to no pandemic preparedness planning or exercises had taken place prior to the 2009 outbreaks.

KDHE’s new state health officer, Dr. Jason Eberhart-Phillips, was hired in March 2009, just prior to the first confirmed April reports of H1N1 in Kansas (Kansas Department of Health and Environment, 2010). Initial actions by KDHE were to activate a branch within the state’s Incident Command to support disease containment operations. Local actions were of lesser extent, with few response actions taken. “Cases were treated as regular influenza,” said Herl. Rutherford added that EMS providers were “more vigilant about identifying patients with symptoms conclusive of flu” as well as situations where airborne virus was suspected present. Subsequent responses were less hectic as the heightened awareness “frenzy” from the media dissipated. KDHE maintained emergency operations until the outbreaks ceased in February 2010.

The newly envisioned electronic system for statewide medical material logistics, the Kansas Countermeasure Response Administration (KS-CRA), rushed into development in order to track and inventory vaccines, medical materials, and SNS supplies. The first field-testing of this system began shortly after the initial outbreaks. This allowed the state to release medical materials to local jurisdictions; Riley County received SNS supplies in May 2009. Herl stated vaccinations began earlier than in prior seasons and were “provided as soon as received.” KDHE was able to foster good partnerships with pharmacies who, in turn, worked with both insured and uninsured populations via different methodologies; McNulty noted that working with pharmacies to assist in the provision of antivirals to un- and underinsured populations was of the most significant impact to reducing public health burden. SNS medical countermeasures in use were antivirals (3/4 from state cache and 1/4 from the CDC) and medical countermeasure provisions were N95 respirators.

Internal briefings within KDHE were difficult, as communications attempted to reach the very many KDHE employees within the nine offices across the state, six satellite offices, and in the field. Communications to the public were also insufficient, as noted by both McNulty and Herl. The development of the KS Public Health Calls addressed this issue. The Public Health Calls started with local health departments and transitioned to hospitals and then others for situation reports (daily at height of outbreak cases). McNulty noted this to be “an opportunity to encompass the vast reach of public health.” Internal communications improved across the agency because of the issues present during the H1N1 outbreaks.

Overwhelmingly, persons interviewed indicated that the pandemic events did not pose a significant stress to the system (i.e., no significant medical surge events following influenza cases). “The outbreaks were not very bad,” said Herl, “so not much chance to learn lessons.” McNulty added that KDHE annual revisions of the Response Plan attempted to “improve scalability of response operations” designated within the plan; overhaul of the plan followed the influenza pandemics.

CHAPTER 4 - CORE COMPETENCIES AND MPH CURRICULA

4.1 CORE COMPETENCIES

4.1.1 Biostatistics

There were no opportunities within the context of the fieldwork assignment to utilize biostatistics methods, although simple statistical methods have been in use throughout employment. The core curriculum Biostatistics course was more than sufficient in preparing me for descriptive or inferential means of identifying statistically significant data trends. With the increased focus on collaborative efforts in epidemiology and surveillance within the Wildcat Region, there will be future opportunities to utilize these skills.

4.1.2 Environmental Health Sciences

As the lead investigator for Elevated Blood Lead cases in children and adults, there has been much opportunity to educate clients in the toxicological aspects of lead exposure as well as the health outcomes following development of elevated blood lead. Clients are educated in means to reduce lead exposure as well as treatments to mitigate harm.

Public interest following open burnings within the area have allowed for presentations to the Board of County Commissioners (BOCC), as well as the development of press releases, to educate the public on air quality and adverse effects following air pollution. These presentations have included information on assessments methods and regulations in place and in force by KDHE and the Environmental Protection Agency (EPA), to include environmental impact statements (EIS).

4.1.3 Epidemiology

Although the localities do not typically perform epidemiological calculations (generally performed by state epidemiologists), standard reports of disease prevalence and incidence are easily created using the KDHE EpiTrax system. This system allows for the development of reports providing information and filtering by any data category which may be entered (age, gender/sex, disease, date condition reported to public health, etc.). There may be future opportunities to utilize these skills following the increased focus in epidemiology and surveillance within the Wildcat Region.

Appropriate conclusions made center on risk of infection by diseases identified to be of significant risk, such as Middle East Respiratory Syndrome and measles, which were determined to be of low risk to the local population.

The Riley County Health Department has focused multiple discussions on the dissemination of epidemiological data. For instance, information disseminated to providers may not be appropriate to be disseminated to the general public, as there may be misconceptions on the meanings and interpretations of the data (i.e., giving disease). The evaluation of epidemiology and surveillance data for public health use and dissemination to the public will be a focus of the newly developed RCHD Epi Team.

4.1.4 Health Services Administration

During fieldwork and employment at the Riley County Health Department, there have been many instances to observe the many roles and responsibilities within the public health workforce. With collaborations such as the Wildcat Region PHEP, the Public Health Advisory Council, and the Local Public Health System Assessment, there are varieties of public health stakeholders within the public health system. The collaborative efforts have provided an excellent opportunity to observe the many dimensions of public health.

Monthly public health calls within Kansas, facilitated by the KDHE, as well as administrative discussions from KDHE and the Kansas Association of Local Health Departments (KALHD) have provided excellent forums for understanding the broader demographic and legal/ethical components of public health. Being a part of the Health Department has allowed the opportunity to view the administrative efforts within public health.

4.1.5 Social and Behavioral Sciences

Social and behavioral theories are useful in understanding reports from the Behavioral Risk Factor Surveillance System (BRFSS) as well as other health indicator and health outcome assessments on the population. These have been useful in additional endeavors such as smoking cessation. Underserved and indigent populations are primary populations of interest served by the Health Department. Services provided to these clients often entail education on social and behavioral factors that contribute to the health of individuals.

4.2 EMPHASIS AREA COMPETENCIES

4.2.1 Pathogens/Pathogenic Mechanisms

The understanding of different pathogenic mechanisms has been of benefit in discussing disease risk to the jurisdiction. It has also assisted in the understanding of prevention, disinfection, and treatment of specific diseases.

4.2.2 Host Response to Pathogens/Immunology

There have been many opportunities to discuss the merits of vaccination as they pertain to immune response and risk of disease. The recent resurgence of measles within the United States has offered the opportunity to observe the importance of vaccination as well as the detriments for unvaccinated populations.

4.2.3 Environmental/Ecological Influences

An excellent example of environmental/ecological influences on disease epidemiology would come from local tularemia (*Francisella tularensis*) cases. Actual tularemia rates are often under-reported since they often infect animals and reporting systems for animal cases (as well as ease of diagnosis) is not as robust as the EpiTrax system for human cases. The understanding of the underlying prevalence and influences of the environment/ecosystem are integral in projecting actual tularemia rates. These influences are also important in food defense and food safety as enteric disease outbreaks are often preventable with the proper methods.

4.2.4 Disease Surveillance/Quantitative Methods

Disease surveillance and epidemiological methods in place at KDHE and the EpiTrax system manage and quantify disease risks and disease prevalence within the jurisdiction. Patient data entered allows for determinations of relative risk between populations using a data analysis function of EpiTrax.

4.2.5 Effective Communication

This competency has been widely utilized within the employment and fieldwork assignment at the Health Department. Many public health and preparedness presentations have been made by the author to the Northeast Region within the NEHCC (as Planning Chair) and locally within the Health Department, ESF-8 Agencies Meeting, BOCC/BOH meetings, and at

KSU. These presentations have involved public health preparedness needs, environmental health concerns, infectious disease risks, and the like. There have been many opportunities to evaluate these competencies as this may be the most important competency to be learned.

CHAPTER 5 - CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

Influenza viruses are constantly changing, which requires constant characterization to provide early identification of emerging strains with pandemic potential. This inhibition of surveillance is also complicated since influenza reporting by public health entities and healthcare providers is voluntary; influenza viruses, other than any identified emerging strains, are not reportable within current Kansas statutes and regulations. Additionally, influenza surveillance methods cannot accurately determine the number of people ill due to influenza during influenza seasons, but surveillance may help determine demographic and geographic trends in influenza activity. National surveillance is made possible by use of a complex network of eight complementary surveillance systems within five categories and obtaining reports from more than 145 laboratories, 2,900 outpatient healthcare providers, vital statistics offices in 122 cities, and influenza surveillance coordinators and epidemiologists from all state, local, and territorial health departments.

This report provides a detailed report on specific capabilities and capacities in public health preparedness within Riley County. The capabilities, capacities, and assessments within this report are in the context of a threat following an influenza pandemic. This report provides observances on local public health agencies, some past agency responses, and some beliefs on agency preparedness. This report also identifies existing emergency standards, response capacities, and evaluation tools in use within the nation. Finally, the report offers a brief assessment on Riley County's vulnerability to medical surge following outbreaks of pandemic influenza.

Resultant of the Local Public Health System Assessment, a strength within Riley County is in its disease identification, epidemiology, and investigation. Additionally, local emergency response agencies have shown great capabilities and capacities in preparing for and responding to public health emergencies, with capabilities tested favorably for information sharing, emergency operations coordination, and public information and warning. The author, however, views the broad Riley County public health system as much less prepared and capable than those core agencies. Interagency communication and coordination are especially in need of development as well as exercising in accordance with existing plans. If the local public health

system is unable to respond as necessary to a complex public health emergency, such as an influenza pandemic, the local infrastructure may fail. Well-developed public health preparedness and self-efficacy in advance of these public health emergencies are key to the success of the jurisdiction.

5.2 RECOMMENDATIONS

The current Riley County Hazard Analysis does not adequately address public health risks to the jurisdiction. Although important, it would not be appropriate to request a new analysis since the current document is approximately two years old. The author recommends that Riley County Emergency Management accept an addendum public health vulnerability analysis, once completed, to convey the more likely public health risks to the jurisdiction. The author will pursue this as a 2014-2015 objective and will develop the necessary hazard vulnerability analysis for biological events in need of attention.

The partially complete systematic review may be of quality and applicability to the county, region, or any other appropriate jurisdiction. The author recommends that the systematic review, if relevant and applicable, continue as outlined by Sargeant et al and by a team of at least two individuals to prevent unnecessary bias.

Opportunity exists to perform a thorough evaluation of the Riley County public health system (or primarily the Riley County Health Department) by the standards and evaluation tools presented within this report. The author recommends that the CDC Public Health Preparedness Capabilities guide preparedness planning and administration within the Riley County Health Department; any relevant evaluations may follow, as available, using the annual budget period Performance Measures and Guidance documents. The author further recommends that the Riley County Health Department consider using the NACCHO Project Public Health Ready as a framework for the development of a quality Public Health Emergency Preparedness program.

The assessment of Riley County's vulnerability to a medical surge was more difficult to accomplish than originally assumed. A sudden influx of patients to a medical facility because of disease outbreak, mass trauma incident, or other significant event can cause disruption and even arrest of the provision of services. This is a significant issue to public health planning, as a medical surge may happen at any time. The author recommends that the Riley County Health

Department pursue medical surge planning appropriate to the jurisdiction, to include alternate care site facility considerations, staffing of alternate care sites, medical material and medical countermeasure stockpiling needs, and standard operating guides with associated attachments to support medical surge responses. This planning should be in direct collaboration with Riley County Emergency Medical Services and Mercy Regional Health Center (Via Christi).

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APPENDIX A - KANSAS REPORTABLE DISEASES FORM

Obtained from Kansas Department of Health and Environment's Disease Reporting for Health Professionals webpage (2014): http://www.kdheks.gov/epi/disease_reporting.html

REPORTABLE DISEASES IN KANSAS for health care providers, hospitals, and laboratories (K.S.A. 65-118, 65-128, 65-6001 - 65-6007, K.A.R. 28-1-2, 28-1-4, and 28-1-18. Changes effective as of 4/28/2006)

 - Indicates that a telephone report is required by law within four hours of suspect or confirmed cases to KDHE toll-free at 877-427-7317


 - Indicates that an isolates must be sent to: Kansas Health and Environmental Laboratories
6810 SE Dwight Street, Topeka, KS 66620
Phone: (785) 296-1633

Acquired Immune Deficiency Syndrome (AIDS)

Amebiasis

Anthrax 

Arboviral disease (including West Nile virus, Western Equine encephalitis (WEE) and St. Louis encephalitis (SLE)) - indicate virus whenever possible


Botulism 

Brucellosis

Campylobacter infections

Chancroid

Chlamydia trachomatis genital infection


Cholera 

Cryptosporidiosis

Cyclospora infection

Diphtheria

Ehrlichiosis

Escherichia coli O157:H7 (and other shiga-toxin producing *E. coli*, also known as STEC) 

Giardiasis

Gonorrhea

Haemophilus influenza, invasive disease

Hantavirus Pulmonary Syndrome

Hemolytic uremic syndrome, postdiarrheal

Hepatitis, viral (acute and chronic)

Hepatitis B during pregnancy

Human Immunodeficiency Virus (HIV) (includes Viral Load Tests)

Influenza deaths in children <18 years of age


Legionellosis


Leprosy (Hansen disease)



Listeriosis

Lyme disease

Malaria


Measles (rubeola) 


Meningitis, bacterial 

Meningococcemia  

Mumps 

Pertussis (whooping cough) 

Plague (*Yersinia pestis*) 


Poliomyelitis 

Psittacosis



Q Fever (*Coxiella burnetii*) 

Rabies, human and animal 

Rocky Mountain Spotted Fever


Rubella, including congenital rubella syndrome 

Salmonellosis, including typhoid fever 

Severe Acute Respiratory Syndrome (SARS)  

Shigellosis 

Smallpox 

Streptococcal invasive, drug-resistant disease from Group A *Streptococcus* or *Streptococcus pneumoniae* 

Syphilis, including congenital syphilis

Tetanus

Toxic shock syndrome, streptococcal and staphylococcal

Transmissible Spongiform Encephalopathy (TSE) or prion disease (includes CJD)

Trichinosis

Tuberculosis, active disease  

Tuberculosis, latent infection

Tularemia

Varicella (chickenpox)

Viral hemorrhagic fever 

Yellow fever

In addition, laboratories must report:

- Viral load results of reportable diseases
- ALL blood lead levels, as of 12/2002 (KCLPPP/ABLES)
- CD4+ T-lymphocyte count < 500/ μ l or CD4+ T-lymphocytes <29% of total lymphocytes

Outbreaks, unusual occurrence of any disease, exotic or newly recognized diseases, and suspect acts of terrorism should be reported within 4 hours by telephone to the Epidemiology Hotline: 877-427-7317

Mail or fax reports to your local health department and/or to:

KDHE Office of Infectious Disease Epidemiology and Response, 1000 SW Jackson, Suite 075, Topeka, KS 66612-1274
Fax: 877-427-7318 (toll-free)

APPENDIX B - ESF-8 CONTACT LISTS

Table 1: ESF-8 Core Agencies

Type	Agency	Agency Address	City, State Zipcode	Agency Ph.	Agency Fax
Behavioral Health	Pawnee Mental Health	2001 Claflin Road	Manhattan, Kansas 66502	(785) 587-4310	
City Government	City of Manhattan, City Hall	1101 Poyntz Avenue	Manhattan, Kansas 66502	(785) 587-2404	(785) 587-2409
County Government	Riley County Clerk's Office	110 Courthouse Plaza, Room B118	Manhattan, Kansas 66502		
Emergency Management	Riley County Emergency Management	115 N. 4th St.	Manhattan, Kansas 66502	(785) 537-6333	(785) 537-6338
Environmental Health	Riley County Environmental Health	110 Courthouse Plaza, Room B-212	Manhattan, Kansas 66502	(785) 537-6332	(785) 537-6331
Fire Services	City of Riley Fire Department	902 West Walnut Street	Riley, Kansas 66531	(785) 485-2802	
Fire Services	Manhattan Fire Department	2000 Denison Avenue	Manhattan, Kansas 66502	(785) 587-4504	(785) 587-4513
Fire Services	Riley County Fire District #1	115 N. 4th St.	Manhattan, Kansas 66502	(785) 537-6333	(785) 537-6338
Law Enforcement	Riley County Police Department	1001 S. Seth Child Road	Manhattan, Kansas 66502	(785) 537-2112	
Medical Examiner	KS 21st Judicial District Coroner	1133 College Avenue, Building B	Manhattan, Kansas 66502	(785) 539-5363	(785) 539-4888
Medical, Emergency	Mercy Regional Health Center, Emergency Department	1823 College Avenue	Manhattan, Kansas 66502	(785) 776-3322	
Medical, Emergency	Riley County EMS	2011 Claflin Road	Manhattan, Kansas 66502	(785) 539-3535	(785) 565-6593
Medical, Hospital	Lafene Health Center	1105 Sunset Avenue	Manhattan, Kansas 66502	(785) 532-6544	
Medical, Hospital	Mercy Regional Health Center	1823 College Avenue	Manhattan, Kansas 66502	(785) 776-3322	
Medical, Provider	Candlewood Medical Group	3260 Kimball Avenue	Manhattan, Kansas 66503	(785) 539-0800	(785) 539-0811
Medical, Surgical	Manhattan Surgical Hospital	1829 College Avenue	Manhattan, Kansas 66502	(785) 776-5100	(785) 539-6449
Pharmacy	Barry's Drug Center	414 Poyntz Avenue	Manhattan, Kansas 66502	(785) 776-8833	
Public Safety, Animal	City of Manhattan Animal Control	605 Levee Drive	Manhattan, Kansas 66502	(785) 587-2783	
Public Works	Riley County Public Works	6215 Tuttle Creek Boulevard	Manhattan, Kansas 66503	(785) 537-6330	(785) 565-6286
Special Populations, Children	USD 383, Department of Communications	2031 Poyntz Avenue	Manhattan, Kansas 66502	(785) 587-2000	
Special Populations, College	KSU Division of Public Safety	108 Edwards Hall	Kansas State University, 66506	(785) 532-5856	(785) 532-1981
Special Populations, Elderly	Riley County Council on Aging				
State Government	KS Department of Agriculture	109 SW 9th Street	Topeka, Kansas 66612	(785) 296-3556	
State Government	KS Medical Society	623 SW 10th Avenue	Topeka, Kansas 66612	(785) 235-2383	
Transit	Flint Hills Area Transportation Agency (ATA)	5815 Marlatt Avenue	Manhattan, Kansas 66502	(785) 537-6345	(785) 537-6327
Veterinary, Emergency	Riley County Animal Response Team				
Volunteer, Medical	American Red Cross				

Table 2: ESF-8 Support Agencies

Type	Agency	Agency Address	City, State, Zipcode	Agency Ph.	Agency Fax
City Government	Manhattan City Commission	1101 Poyntz Ave.	Manhattan, Kansas 66502	(785) 587-2404	
Civic Resources	Manhattan Public Library	629 Poyntz Avenue	Manhattan, Kansas 66502		
County Government	Riley County Board of County Commissioners	115 N. 4th St.	Manhattan, Kansas 66502	(785) 565-6202	
County Government	Riley County Clerk's Office	110 Courthouse Plaza, Room B118	Manhattan, Kansas 66502		
County Government	Riley County Counselor's Office	115 N. 4th Street, 3rd Floor West	Manhattan, Kansas 66502		
County Government	Riley County Research and Extension	110 Courthouse Plaza, Room B220	Manhattan, Kansas 66502		
Fire Services	Manhattan Fire Department	2000 Denison Avenue	Manhattan, Kansas 66502	(785) 587-4504	(785) 587-4513
Medical Examiner	Kansas State Veterinary Diagnostic Laboratory	1800 Denison Avenue	Manhattan, Kansas 66506		
Medical, Dental	Dental Associates of Manhattan	1133 College Avenue, Suite D-202	Manhattan, Kansas 66502	(785) 539-7401	
Medical, Dental	Dentistry By Design	1110 Westport Drive	Manhattan, Kansas 66502	(785) 539-2314	
Medical, Dental	Flint Hills Endodontics	1133 College Avenue, Suite D-110	Manhattan, Kansas 66502	(785) 770-3300	
Medical, Dental	Little Apple Pediatric Dentistry, LLC	1133 College Avenue, Suite D-164	Manhattan, Kansas 66502		
Medical, Dental	Manhattan Dental	2745 Pembroke Place	Manhattan, Kansas 66502		
Medical, Dental	Randy Davis Dentistry	1133 College Avenue, Suite A-103	Manhattan, Kansas 66502		
Medical, Dental	The Dental Health Group LLP	1640 Charles Place, Suite 101	Manhattan, Kansas 66502		
Medical, Dental	Tindall Orthodontics	1415 Westport Landing Place	Manhattan, Kansas 66502		
Medical, Emergency	K+STAT Urgent Care	930 Hayes Drive	Manhattan, Kansas 66502	(785) 565-0016	(785) 565-0003
Medical, Emergency	Riley County EMS	2011 Claflin Road	Manhattan, Kansas 66502	(785) 539-3535	(785) 565-6593
Medical, Hospital	Irwin Army Community Hospital	600 Caisson Road	Fort Riley, Kansas 66442		
Medical, Hospital	Lafene Health Center	1105 Sunset Avenue	Manhattan, Kansas 66502	(785) 532-6544	(785) 532-3425
Medical, Hospital	Mercy Regional Health Center	1823 College Avenue	Manhattan, Kansas 66502	(785) 776-3322	(785) 587-5465
Medical, Provider	Candlewood Medical Group	3260 Kimball Avenue	Manhattan, Kansas 66503	(785) 539-0800	(785) 539-0811
Medical, Provider	Flint Hills Community Clinic	401 Houston Street, Suite C	Manhattan, Kansas 66502	(785) 323-4351	(785) 323-4359
Medical, Provider	Manhattan Primary Care	1133 College Avenue, Suite A-211	Manhattan, Kansas 66502	(785) 320-5000	(888) 524-2251
Medical, Provider	Meadowlark Hills Medical Professionals	2121 Meadowlark Road	Manhattan, Kansas 66502	(785) 537-1900	(785) 537-6240
Medical, Provider	Medical Associates of Manhattan	1133 College Avenue, Suite E-110	Manhattan, Kansas 66502	(785) 537-2651	(785) 537-2975
Medical, Provider	Mosier and Mosier Family Physicians LLP	2900 Amherst Avenue	Manhattan, Kansas 66503	(785) 539-8700	
Medical, Provider	Pediatric Associates	1133 College Avenue, Suite B-210	Manhattan, Kansas 66502	(785) 537-9030	(785) 537-3334
Medical, Provider	Primary Care Physicians of Manhattan	1133 College Avenue, Suite C-143	Manhattan, Kansas 66502	(785) 537-4940	(785) 537-0836
Medical, Provider	Stonecreek Family Physicians	4101 Anderson Avenue	Manhattan, Kansas 66503	(785) 587-4101	(785) 587-9090
Medical, Provider	Women's Health Group	1620 Charles Place	Manhattan, Kansas 66502		

Medical, School	Riley County USD 378	117 N. Remmele, PO Box 248	Riley, Kansas 66531	(785) 485-4010	
Medical, Surgical	Konza Oral and Maxillofacial Surgery	1133 College Avenue, Suite C-200	Manhattan, Kansas 66502		
Medical, Surgical	Manhattan Surgical Hospital	1829 College Avenue	Manhattan, Kansas 66502	(785) 776-5100	
Medical, Urology	Associated Urologists, ASC	1133 College Avenue, Suite G-100	Manhattan, Kansas 66502	(785) 587-8710	
Special Pop., Children	Head Start Program	1700 Leavenworth Street	Manhattan, Kansas 66502		
Special Pop., Children	Kansas Department for Children and Families	2709 Amherst Avenue	Manhattan, Kansas 66502		
Special Pop., Children	Manhattan-Ogden USD 383 Communications Office	2031 Poyntz Avenue	Manhattan, Kansas 66502	(785) 587-2000	
Special Pop., College	Kansas State University, Masters in Public Health Program	311 Trotter Hall	Manhattan, Kansas 66506		
Special Pop., Elderly	Autumn Hills	7621 Falcon Rd.	Riley, Kansas 66531	(785) 485-2777	
Special Pop., Elderly	Homecare and Hospice	3801 Vanesta Dr	Manhattan, Kansas 66503	(785) 537-0688	
Special Pop., Elderly	Homestead Assisted Living	1923 Little Kitten Ave.	Manhattan, Kansas 66503	(785) 776-1772	
Special Pop., Elderly	Meadowlark Hills Retirement	2121 Meadowlark Rd.	Manhattan, Kansas 66502	(785) 537-4610	
Special Pop., Elderly	Rehabcare Group	409 W. Barton Rd.	Leonardville, Kansas 66531	(785) 293-5586	
Special Pop., Elderly	Stoneybrook Assisted Living	2029 Little Kitten Ave.	Manhattan, Kansas 66503	(785) 537-1065	
Special Pop., Elderly	Stoneybrook Retirement Community	2025 Little Kitten Ave.	Manhattan, Kansas 66503	(785) 776-0065	
Special Pop., Elderly	Via Christi Village	2800 Willow Grove Rd.	Manhattan, Kansas 66502	(785) 539-7671	
State Gov., Animal Health	Kansas Department of Agriculture	109 SW 9th Street, 4th Floor	Topeka, Kansas 66612-1283		
State Gov., Animal Health	Kansas Department of Wildlife, Parks and Tourism	3705 Miller Parkway, Suite B	Manhattan, Kansas 66503		
State Gov., Epidemiology	Kansas Department of Health and Environment, Infectious Disease Epidemiology and Response Division	1000 SW Jackson Street, Suite 075	Topeka, Kansas 66612		
State Gov., Homeland Security	Kansas Department of Health and Environment, Homeland Security Division	1000 SW Jackson Street, Suite 340	Topeka, Kansas 66612-1365	785-291-3065	785-296-2625
Wildcat, Public Health	Fort Riley Department of Public Health	600 Caisson Hill Road	Fort Riley, Kansas 66442		
Wildcat, Public Health	Geary County Health Department	1212 W. Ash Street, PO Box 282	Junction City, Kansas 66441-0282	(785) 762-5788	(785) 762-1311
Wildcat, Public Health	Pottawatomie County Health Department	320 Main Street, PO Box 310	Westmoreland, Kansas 66549	(785) 457-3719	(785) 457-2144
Wildcat, Veterinary	Fort Riley Veterinary Services	226 Custer Avenue	Fort Riley, Kansas 66442		

APPENDIX C - LOCAL INTERVIEWS

State Department of Health – Homeland Security Operations			
Interviewee	Michael McNulty, Homeland Security Operations Director of KDHE	Date	06/13/2014
<p>My MPH Field Experience Report is over the resilience of the public health and medical system in the face of a burden to the system. Specifically, I am looking into Riley County and Kansas' capabilities and capacities to handle a "medical surge" due to an influenza-like illness. A great example in the recent past is the 2009 H1N1 Influenza Pandemic.</p> <p>I'm going to cover a short set of questions pertaining to response to the 2009 H1N1 Influenza Pandemic. The main purpose for this interview is to understand interventions that were performed during this time that served to reduce the burden to public health and medical services. Please feel free to share any particular thoughts from the events and any lessons learned or best practices following activities.</p>			
Interview Questions			
Prior to Events <i>Where were you working at the time of the outbreaks?</i> <ul style="list-style-type: none"> Op Sect Chief for KDHE during H1N1 <i>How prepared would you say your organization was prior to the outbreaks?</i> <ul style="list-style-type: none"> KDHE/KS have been involved in pandemic planning since 2006; some exercises prior to 2009 Dr. [>] was new to position just a few months prior to events; needed to be brought up to speed Plans as "worst case scenarios" (i.e., 1918) Many plans have highest impact (not necessarily risk) incidents (i.e., anthrax over influenza) KS CRA not quite ready but rushed to development 		Initial Activity <i>How were you notified of the outbreaks?</i> <ul style="list-style-type: none"> Started in April; received SNS in May (until February 2010) <i>What were the initial actions by you or your agency?</i> <ul style="list-style-type: none"> Good partnerships with pharmacies <ul style="list-style-type: none"> Worked with insured AND uninsured by different methodologies Allowed commercial pharmacies to pass along to uninsured Commercial stock available Activated branch within KDHE ICS for disease containment <ul style="list-style-type: none"> Educational campaigns to employers and communities on disease containment 	

<p>Interventions</p> <p><i>Typical interventions are vaccinations, pharmaceuticals, or non-pharmaceutical interventions such as quarantines.</i></p> <p><i>What interventions were provided (or observed) by you or your agency?</i></p> <ul style="list-style-type: none"> • <i>Medical countermeasures (SNS): antivirals (state cache); received ¼ of antivirals from CDC</i> <ul style="list-style-type: none"> ○ <i>Received almost out-of-date antivirals</i> • <i>Medical materials (SNS): respirators,</i> • <i>NPI: commercials and educational campaigns directed toward different audiences</i> <p><i>What interventions do you feel made the most significant impact in reducing the burden to public health and medical services? How so?</i></p> <ul style="list-style-type: none"> • <i>Public Information/education campaigns had the best effectiveness by providing public with tools to prevent disease</i> • <i>Working with commercial pharmacies to get antivirals to un-/under-insured populations</i> <p><i>What interventions did not pan out?</i></p> <ul style="list-style-type: none"> • <i>Could have been better with internal briefings (9 offices across the state; 6 satellites)</i> <p><i>Were there any interventions noticeably missing?</i></p> <ul style="list-style-type: none"> • <i>Isolation/quarantine not utilized (not deemed necessary)</i> 	<p>Conclusions</p> <p><i>Were there any significant lessons learned?</i></p> <ul style="list-style-type: none"> • <i>Plans written as “worst-case scenarios”; activities included were “drastic measures”; interventions needed to be scalable</i> <p><i>Could you briefly describe how preparedness efforts may have changed following the events?</i></p> <ul style="list-style-type: none"> • <i>Improved scalability of response operations</i> <p><i>Have any new plans/policies/procedures been put in place following the events? Any ongoing (i.e., living) documents?</i></p> <ul style="list-style-type: none"> • <i>Many revisions completed; completely overhauled KS Response Plan</i> • <i>Plans looked into for capabilities</i> • <i>KS CRA: continuous updates</i> • <i>KS Public Health Call: started with LHDs and transitioned to hospitals and others for SITREPS (daily at height); opportunity to encompass the vast reach of public health</i>
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Strengths	Weaknesses	Improvements Made	Improvements Needed
<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Minimum order of 100 doses before an order could be made (took time to develop allocations for request) MANY KDHE employees and offices; made communications difficult 	<ul style="list-style-type: none"> AAR: KS Public Health Call was viewed to be very beneficial Better internal (KDHE) communications to allow employees from other branches to be better informed 	<ul style="list-style-type: none"> Public Health Preparedness had many funds provided at the time; seeing PHEP and PH system funds being removed; can affect national responses and can reduce resiliency and capabilities of system
Final Comments			
<ul style="list-style-type: none"> Funding by CDC was provided to assist three phases of H1N1 response in KS <ul style="list-style-type: none"> Phase 1: Medical countermeasure and vaccine distribution Phase 2: Included more activities for spending (disease containment) Phase 3: Implementation of local vaccination campaigns 			

Riley County Health Department – Medical Director			
Interviewee	Cary Herl M.D., <i>Medical Director of RCHD</i>	Date	06/19/2014
<p>My MPH Field Experience Report is over the resilience of the public health and medical system in the face of a burden to the system. Specifically, I am looking into Riley County and Kansas' capabilities and capacities to handle a "medical surge" due to an influenza-like illness. A great example in the recent past is the 2009 H1N1 Influenza Pandemic.</p> <p>I'm going to cover a short set of questions pertaining to response to the 2009 H1N1 Influenza Pandemic. The main purpose for this interview is to understand interventions that were performed during this time that served to reduce the burden to public health and medical services. Please feel free to share any particular thoughts from the events and any lessons learned or best practices following activities.</p>			
Interview Questions			
Prior to Events <i>Where were you working at the time of the outbreaks?</i> <ul style="list-style-type: none"> <i>RCHD (Medical Director), Candlewood Medical Group (primary care), Mercy Regional Health Center (inpatient care)</i> <i>How prepared would you say your organization was prior to the outbreaks?</i> <ul style="list-style-type: none"> <i>Candlewood Medical Group: no policy existed for dealing with a pandemic</i> <i>RCHD: somewhat prepared outbreaks</i> <i>Hospital: somewhat prepared for outbreaks</i> 		Initial Activity <i>How were you notified of the outbreaks?</i> <ul style="list-style-type: none"> <i>There was a heightened awareness at the beginning</i> <i>Notifications came by e-mail or fax for local responses</i> <i>Most influenza patients had H1N1</i> <i>What were the initial actions by you or your agency?</i> <ul style="list-style-type: none"> <i>Few response actions taken; cases treated as regular influenza</i> <i>Vaccinations were started earlier than in prior seasons; vaccinations provided as soon as received</i> 	
Interventions <i>Typical interventions are vaccinations, pharmaceuticals, or non-pharmaceutical interventions such as quarantines.</i> <i>What interventions were provided (or observed) by you or your agency?</i> <ul style="list-style-type: none"> <i>Vaccinations were performed, as available</i> <i>What interventions do you feel made the most significant impact in reducing the burden to public health and medical services? How so?</i> <ul style="list-style-type: none"> <i>What interventions did not pan out?</i> <ul style="list-style-type: none"> <i>Unknown (vaccinations not uncommon)</i> <i>Were there any interventions noticeably missing?</i> <ul style="list-style-type: none"> <i>Communications to providers was poor (both</i> 		Conclusions <i>Were there any significant lessons learned?</i> <ul style="list-style-type: none"> <i>Outbreaks were not very bad, so not much chance to learn lessons</i> <i>Could you briefly describe how preparedness efforts may have changed following the events?</i> <ul style="list-style-type: none"> <i>Have any new plans/policies/procedures been put in place following the events? Any ongoing (i.e., living) documents?</i> <ul style="list-style-type: none"> 	

<i>from KDHE and locally)</i>			
Strengths	Weaknesses	Improvements Made	Improvements Needed
•	•	•	•
Final Comments			
<ul style="list-style-type: none"> • <i>MERS may be a difficult pathogen; H5N1, too</i> • <i>Manhattan's population is dispersed across the Wildcat Region due to Fort Riley and KSU</i> • <i>A biological event would be significant for terrorism due to fears</i> 			

Riley County EMS – Emergency Services			
Interviewee	Michelle Rutherford, <i>Assistant Director of Riley County EMS</i>		Date
07/03/2014			
<p>My MPH Field Experience Report is over the resilience of the public health and medical system in the face of a burden to the system. Specifically, I am looking into Riley County and Kansas' capabilities and capacities to handle a "medical surge" due to an influenza-like illness. A great example in the recent past is the 2009 H1N1 Influenza Pandemic.</p> <p>I'm going to cover a short set of questions pertaining to response to the 2009 H1N1 Influenza Pandemic. The main purpose for this interview is to understand interventions that were performed during this time that served to reduce the burden to public health and medical services. Please feel free to share any particular thoughts from the events and any lessons learned or best practices following activities.</p>			
Interview Questions			
Prior to Events <i>Where were you working at the time of the outbreaks?</i> <ul style="list-style-type: none"> Riley County EMS <i>How prepared would you say your organization was prior to the outbreaks?</i> <ul style="list-style-type: none"> Ready but this tightened the process and changed others 		Initial Activity <i>How were you notified of the outbreaks?</i> <ul style="list-style-type: none"> Mercy Regional Health Center/CDC <i>What were the initial actions by you or your agency?</i> <ul style="list-style-type: none"> Training staff on EMS protocols for preventing disease spread from patients 	
Interventions <i>Typical interventions are vaccinations, pharmaceuticals, or non-pharmaceutical interventions such as quarantines. What interventions were provided (or observed) by you or your agency?</i> <ul style="list-style-type: none"> More vigilant about identifying pts. with symptoms conclusive of flu. <i>What interventions do you feel made the most significant impact in reducing the burden to public health and medical services? How so?</i> <ul style="list-style-type: none"> History taking and identifying suspected cases. <i>What interventions did not pan out?</i> <ul style="list-style-type: none"> For us following procedure/protocol worked well; I don't recall if we had any employees who were sick...maybe one. <i>Were there any interventions noticeably missing?</i> <ul style="list-style-type: none"> None 		Conclusions <i>Were there any significant lessons learned?</i> <ul style="list-style-type: none"> Stay vigilant due to any airborne virus. <i>Could you briefly describe how preparedness efforts may have changed following the events?</i> <ul style="list-style-type: none"> Less intense, less "fear" as media had public in a heightened awareness "frenzy." <i>Have any new plans/policies/procedures been put in place following the events? Any ongoing (i.e., living) documents?</i> <ul style="list-style-type: none"> Not at this time...just standard reminders of doing good hand washing, pt history taking and equipment cleaning. 	
Strengths	Weaknesses	Improvements Made	Improvements Needed
•	•	•	•

APPENDIX D - SEARCH TERMS FOR SYSTEMATIC REVIEW

Population	
General Terms	Specific Terms
1. <i>Kansas</i>	"Riley County", Manhattan
2. <u>unvaccinated</u> , <u>"non-vaccinated"</u>	susceptible
Exclusionary Terms (if needed/identified)	

Intervention (Pandemic Preparedness Activities)	
General Terms	Specific Terms
"public health preparedness"	"pandemic preparedness", "influenza preparedness", "influenza plan", "Public Health Emergency Preparedness" (PHEP)
"healthcare system preparedness"	"Hospital Preparedness Program" (HPP), <u>coalition*</u> , <u>"healthcare coalition*" (HCC)</u>
prophylaxis	<u>"mass dispensing"</u> , <u>"mass prophylaxis"</u> , vaccination, "trivalent influenza vaccine", immuniz*
antiviral*	"neuraminidase inhibitor" (<u>Relenza</u> , <u>zanamivir</u> , <u>Tamiflu</u> , <u>oseltamivir</u> , <u>Inavir</u> , <u>laninamivir</u> , <u>Peramivir</u>), "M2 inhibitor" (<u>Symmetrel</u> , <u>amantadine</u> , <u>Flumadine</u> , <u>rimantadine</u>)
<u>"community partnerships"</u> , <u>"community relationships"</u> , <u>"community preparedness"</u>	"alternate care site", <u>coalition*</u> , <u>"healthcare coalition" (HCC)</u> , <u>"ESF-8"</u> , <u>"ESF 8"</u> , "Medical Reserve Corps" (MRC)
stockpil*	"supply cache", "Strategic National Stockpile" (SNS), <u>"personal protective equipment" (PPE)</u> , <u>mask</u> , <u>masks</u> , <u>barrier*</u> , <u>N95</u>
"non-pharmaceutical intervention*" (NPI)	quarantine*, <u>"travel restrictions"</u> , <u>"restricted travel"</u> , <u>"restricting movement"</u> , <u>"movement restriction"</u> , <u>"social distancing"</u> , <u>hygiene</u> , <u>"respiratory hygiene"</u> , <u>"handwashing hygiene"</u> , <u>"personal protective equipment" (PPE)</u> , <u>mask</u> , <u>masks</u> , <u>barrier*</u> , <u>N95</u>
Exclusionary Terms (if needed/identified)	antibiotic*

Burden (Healthcare System Stress)	
General Terms	Specific Terms
influenza, flu	"influenza-like illness" (ILI), H1N1, pH1N1, "swine flu", H1N2, <u>H2N2</u> , <u>"Asian Flu"</u> , <u>H3N2</u> , <u>"Hong Kong Flu"</u> , <u>H5N1</u> , <u>"bird flu"</u> , <u>"avian flu"</u> , <u>"avian influenza"</u> , H7N7, "RNA virus", Orthomyxoviridae
pandemic, "pandemic influenza"	<u>"1890 influenza pandemic"</u> , <u>"Asiatic Flu"</u> , <u>"Russian Flu"</u> , <u>"Russian Influenza"</u> , <u>"1918 pandemic"</u> , <u>"1918 Spanish Flu"</u> , <u>"1918 Spanish Influenza"</u> , <u>"2009 H1N1 pandemic"</u> , <u>"2009 influenza pandemic"</u>

"novel strain", "emerging pathogen"	"novel virus", "emerging virus", "novel strain", "PB2 protein", hemagglutinin (HA), neuraminidase (NA), "highly pathogenic", viral
"healthcare system stress"	"medical surge", "bed availability", "available beds", "bed-tracking", HAvBED, <u>hospitalization</u> , "hospital admission", "exceeds capacity"
Exclusionary Terms (if needed/identified)	bacterial, influenzae

Outcome (Reduced Burden)	
General Terms	Specific Terms
prophylaxis	vaccinat*, "prevent illness", "prevent disease"
preparedness	<u>"increased surge capacity"</u> , <u>"improved surge capacity"</u> , <u>"increased capacity"</u> , <u>"improved capacity"</u> , <u>"increased capability"</u> , <u>"improved capability"</u> , <u>"memorandums of understanding" (MOU)</u> , <u>"memorandums of agreement" (MOA)</u> , contract, training, exercis*, interoperable
response	"continuity of operations", "situational awareness"
<u>assessments, evaluations</u>	<u>"vulnerability analysis"</u> , <u>"hazard vulnerability analysis" (HVA)</u>
Exclusionary Terms (if needed/identified)	

Underlined terms are synonymous with one another. Orange terms reproduced between interventions.
Care to be taken with truncation (*) when quotation marks in use.

Modified from Sargeant et al. (2005, pp. 58-70).

APPENDIX E - SEARCH STRATEGY TEMPLATE FOR SYSTEMATIC REVIEW

Search #			
Database			
Host System			
Year Restrictions	01/01/2005 -	Other Restrictions	
Search Strategy			
Search Date		Abstracts Returned	

Modified from Sargeant et al. (2005, p. 19).

APPENDIX F - ASSESSMENT AND EXTRACTION TOOL FOR SYSTEMATIC REVIEW

Article #				
Ref ID			Citation	
Source			Study Funding	
Study Design			Extraction Date	
Relevance			Quality	
Relevance Criteria				
Does the abstract describe a primary research study (as opposed to a review)?	<i>Yes</i> <i>No</i>	Yes: A primary research study was performed. No: A review was performed.		
Does the abstract describe community preparedness activities?	<i>Yes</i> <i>No</i>	Yes: The abstract described community preparedness interventions. No: The abstract does not describe relevant interventions.		
Does the abstract describe how community preparedness activities may reduce burden of medical surge from ILI?	<i>Yes</i> <i>No</i>	Yes: There is a connection made between the intervention and outcome of interest. No: No connections are made.		
Quality Assessment Algorithm				
Study Population				
Was the population within the study the population of interest or from a similar jurisdiction?	<i>Yes</i> <i>Similar</i> <i>No</i>	Yes: The population studied was from the jurisdiction of interest. Similar: The population studied had great similarities to the jurisdiction of interest. No: The population studied was dissimilar to the population of interest.		
Was the sample size determined by an adequate methodology?	<i>Yes</i> <i>Partial</i> <i>N/A</i>	Yes: Sample size was determined by by formula or other methodology. Partial: Sample size of study was based on assumption. N/A: No details in text or no method to sample size selection.		
Intervention				
Were the intervention protocols adequately described?	<i>Yes</i> <i>No</i>	Yes No		
Were appropriate controls used?	<i>Yes</i> <i>No</i>	Yes No		
Outcome				

Was an adequate connection made between the intervention and outcome?	Yes No	Yes No
Data Analysis		
Was the statistical analysis appropriate?	Yes No N/A	Yes: Methods were appropriate to study. No: Methods were insufficient. N/A: Statistical analysis not performed
Were confounding factors appropriately considered?	Yes Partial No	Yes: Exclusions, matching, and/or analytical controls were used. Partial: Some controls used but not all identified as important. No: None identified.
Conclusion		
Were the conclusions supported by the results?	Yes No	Yes No
Data Extraction		
Study Population		
Location(s) of study:		
Population(s) used in study:		
Sampling used in study:		
Inclusion/exclusion criteria of study:		
Intervention		
Intervention(s) in use within study:		
Were the intervention(s) in use prior to the study?		
Control(s) in use within study:		
Outcome		
Specific outcome(s) of study:		
Secondary outcome(s) of study:		
Data Analysis		
Method(s) of statistical analysis:		
Confounding factors controlled for in study:		
Results		
Results obtained in study:		

Modified from Sargeant et al. (2005, pp. 78-97).