Zoonotic Disease in Ohio: Surveillance, Preparation, and Response

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Preface

“…between animal and human medicine there are no dividing lines – nor should there be…”

- Rudolf Virchow
Abstract

This paper examines the state of public health preparation and response capacity to zoonotic infectious disease in the state of Ohio. A comprehensive literature review of zoonotic disease emergence and re-emergence, the National Veterinary Stockpile (NVS), the One Health Initiative, emergency response, and Ohio policy was performed in conjunction with telephone interviews. This study shows that responsibilities and systems integral to disease preparedness, such as sentinel surveillance and reporting, vary significantly between two key departments: the Ohio Department of Health (ODH) and the Ohio Department of Agriculture (ODA). Consistency and standardization of agency, mirroring the One Health Initiative, must be developed at all levels of animal and human public health in order to deal with emerging and re-emerging zoonotic disease.
Introduction

The global emergence of the Pandemic H1N1 2009 virus, otherwise known as the Swine Flu, has opened the eyes of the general public, as well as the public health world, to the threat of zoonotic pathogens. Zoonoses, diseases that can cause infection in both humans and animals, have become household names, and in many locations, have become public health problems (Kahn, 2007; World Health Organization, 2010). In the past decade, some of the most renown of these threats included the West Nile Virus, Creutzfeldt-Jakob disease (more commonly known as “Mad Cow Disease”) and Avian Influenza (American Veterinary Medical Association, 2008). In a time when chronic disease such as diabetes, heart disease, and cancer continue to dominate health concerns and medical costs in America, the growing threat of zoonotic pathogens must be taken just as seriously (Centers for Disease Control and Prevention, 2010).

A collaborative effort between human and animal health resources, at all levels, is needed. As the world becomes more connected, and thus smaller, the spread of zoonotic disease will only increase (Kahn, Kaplan, & Steele, 2007). This is problematic to the United States in particular because of the lack of unified sentinel surveillance and overall collaboration between human and animal health agencies. Currently, the One Health Initiative has begun a movement focused on fixing that problem by promoting the collaboration of animal and
human healthcare professionals to deal with the threat of zoonotic disease (American Veterinary Medical Association, 2008).

Are we prepared?

The quest for knowledge on the subject of preparedness for zoonotic diseases veers off in several different directions. These directions include the emergence and re-emergence of zoonotic disease, the One Health Initiative, emergency response for incidents involving animal and human health, the usefulness of the National Veterinary Stockpile, and the local public health response to an epidemic involving zoonotic disease. This paper will discuss and analyze each of those five topics in order to assess whether or not Ohio is prepared for an epidemic of zoonotic infectious disease.

The One Health Initiative’s primary goal is to “promote, improve, and defend the health and well-being of all species” through the collaboration and utilization of all professional areas involved in animal and human health (Kahn, Kaplan, & Monath, 2010). Though the recent outbreaks of Avian Influenza and Pandemic H1N1 2009 have showcased routes of animal to human disease transmission, there still does not appear to be strong evidence of an active cooperation between human and animal health fields (World Health Organization, 2010). The One Health movement aims to fix the lack of collaboration by bringing the two fields of animal and human health together as well as the rest of the public health sector to address the threat of disease in all forms of life (American Veterinary Medical Association, 2008).
In addition to the One Health ideals, infectious disease is an important concern within the emergency preparedness sector of the public health field. This is evident at the highest levels of government organization through the National Response Framework (NRF), which is one of the most comprehensive plans for emergency preparedness in the United States. It is designed to coordinate national efforts in the event of natural or manmade disasters including animal or human related disease emergencies (Federal Emergency Management Agency, 2010).

Within the National Response Framework, there is mention of separate incident plans for outbreaks of disease in animals and humans. These emergency response plans are found in Emergency Support Function 8 (United States Department of Agriculture, 2009). This portion of the framework discusses the role of emergency medical services for human health as well as for animal health in the agricultural realm. It however does not acknowledge the connection between animal and human health.

Further plans and response for animal disease response at the national level can be found through the United States Department of Agriculture’s National Veterinary Stockpile, which was developed in response to Homeland Security Presidential Directive 9 in 2004 (Myers, 2008). The main reason behind the creation of the National Veterinary Stockpile was to establish protection against the top 17 most dangerous diseases that could threaten the country’s food supply and overall animal health. It was also a direct response to the
growing concern towards bioterrorism after the September 11th 2001 terrorist attacks (Myers, 2008; United States Department of Agriculture, 2009).

Since it first became operational in 2006, no scholarly research has been conducted on the efficacy and adequacy of the National Veterinary Stockpile. In fact, the only website that provides any substantial explanation of the National Veterinary Stockpile is the United States Department of Agriculture’s very own Animal and Plant Health Inspection Service website, www.aphis.usda.gov/ (United States Department of Agriculture, 2009). As of fall 2009, there was no reference concerning the National Veterinary Stockpile on the Ohio Department of Agriculture’s website, www.agri.ohio.gov/, and the Ohio Department of Health’s website, www.odh.ohio.gov/ (United States Department of Agriculture, 2009; United States Department of Health, 2009).

At the local and state level, in the event of a major outbreak involving a zoonotic pathogen, there should be similar plans and preparation in place comparable to the National Veterinary Stockpile. According to the United States Department of Agriculture, each state should have its own plans that work in line with the National Veterinary Stockpile (Myers, 2008; United States Department of Agriculture, 2009). This means that along with the provided federal assistance from the National Veterinary Stockpile, each state should have its own emergency plan that is independent and not completely reliant upon the National Veterinary Stockpile.

As seen through Ohio’s two major public health oriented agency websites, the diversion of cooperation between the human and veterinary medical worlds
has left a great vulnerability and lack of knowledge on the issue of zoonotic disease. Even at the national level, the separation between human and animal health is seen within the National Veterinary Stockpile as it is largely referred to as a means to provide safety to our food supply rather than a tool to prevent disease in human health.

The emergence of diseases such as Pandemic H1N1 2009 has provided the opportunity for public health professionals to test their preparation and plans. The effectiveness of things like the National Veterinary Stockpile and state level sentimental surveillance will be analyzed to see if we are prepared and whether the public health field needs to strive to practice policy that is advocated by the One Health Initiative.
Statement of Purpose

The purpose of this case study is to investigate whether or not the various statewide public health agencies truly follow and understand the interconnected nature of zoonotic disease in the state of Ohio. The level of preparedness of the state of Ohio state was evaluated through several components including a vast literature review of the following topics: emergence and re-emergence of zoonotic disease, the implementation of ideals associated with One Health Initiative, emergency response preparation and planning for incidents involving animal and human health, implementation and efficacy of the National Veterinary Stockpile, and how local public health would respond to an epidemic involving zoonotic disease. The literature review was then supplemented through semi-structured telephone interviews.
Literature Review

A comprehensive literature review was performed of the following categories according to research discovery needs: emerging and re-emerging zoonotic infectious disease, the One Health Initiative, emergency response for animal and human health, the National Veterinary Stockpile, and how local and state public health would respond to an epidemic involving zoonotic disease.

The National Veterinary Stockpile (NVS) and the One Health Initiative, to the best of our knowledge have had no significant forms of research done on their current status and usage. While there are likely some closed federal documents regarding the NVS not available for public consumption, there is very little publicly or academically written on it or the progress of policies advocated by the One Health Initiative within individual state public health agencies.

Emerging and Re-emerging Zoonotic Disease

Zoonotic diseases are pathogens including bacteria, viruses, and fungi that can infect both humans and animals (World Health Organization, 2010). Naturally they are all around us, whether we come across them by accident or by just living out our everyday lives. The transmission of zoonotic disease between species has been a prominent fixture in both human and animal health for thousands of years. More precisely, the interspecies transmission of disease between people and animals has been prolific ever since human beings gave up their nomadic ways and began to domesticate animal life (Kahn, Kaplan, & Steele, 2007).
Right now, approximately 75% of newly recognized human diseases and
60% of all human pathogens are considered to be zoonotic such as Salmonella
and E. coli; according to a study done by the American Veterinary Medical
Association’s One Health memorandum (American Veterinary Medical
Association, 2008; Kahn, 2007; Centers for Disease Control and Prevention,
2010).

Some of the most notorious disease outbreaks of all time were the result
of zoonotic pathogens. Perhaps the most widely known of these pathogens was
the plague, which is scientifically known as _Yersinia pestis_. This disease spread
throughout Europe during the dark ages and killed millions of people throughout
several centuries (Kahn, Kaplan, & Steele, 2007; National Research Council,
2008). Poor sanitation and lack of modern medical technology were some of the
most obvious reasons that the plague was so devastating throughout Europe.
However, the most significant reason for the spread of the plague was not the
lack of modern advancements, but was rather a result of an animal source. It was
discovered over time that rats spread the disease through infected fleas as well
as the rats themselves (National Research Council, 2008; World Health
Organization, 2010).

As time progressed on from the plague pandemic in the dark ages, so did
advancements in disease discovery and prevention. During the 19th century, a
physician by the name of Rudolf Virchow popularized the connection and
importance of disease transmission between humans and animals (Kahn,
Kaplan, & Steele, 2007). It was Rudolf Virchow who is credited with the term
“zoonosis” to describe pathogens capable of infecting both humans and animals. Virchow is also associated with many of the advancements in agricultural health and comparative medicine. To sum up his vision and work, he stated: “between animal and human medicine there are no dividing lines – nor should there be (Kahn, Kaplan, & Steele, 2007).” Despite major technological advancements in medicine and health, those words could not be any truer today.

Over the course of the next century and beyond the days of Virchow, the efforts taken by him and others toward collaboration between human and animal health diminished. Fortunately, several decades following the time of Virchow, people such as Calvin W. Schwabe kept alive ideas such as One Medicine, which would in turn become the foundation for movements such as the One Health Initiative. (Kahn, Kaplan, & Steele, 2007).

The One Health Initiative

The One Health Initiative is a movement started in 2007 by the American Veterinary Medical Association (AVMA). In April of 2007, the AVMA established the One Health Initiative Task Force to study and promote collaborative health goals for all animal species (American Veterinary Medical Association, 2008). The stated goal of the One Health Initiative is:

“…to promote, improve, and defend the health and well-being of all species by enhancing cooperation and collaboration between physicians, veterinarians, and other scientific health professionals and by promoting strengths in leadership and management to achieve these goals (Kahn, Kaplan, & Monath, 2010).”
The ideals presented by the One Health Initiative are in response to the growing threat of zoonotic diseases that has accounted for 75% of infectious diseases that affected humans over the last 3 decades (American Veterinary Medical Association, 2008).

While the One Health Initiative does not necessarily have regulatory power such as the Centers for Disease Control and Prevention, it can promote policy change in areas of human and animal health (Kahn, Kaplan, & Monath, 2010). Currently in 2010, the One Health Agency is still in its infancy, but is endorsed by groups including the American Medical Association, the American Veterinary Medical Association, and the Centers for Disease Control and Prevention among many others (Kahn, Kaplan, & Monath, 2010).

The One Health Initiative in its present form serves as a call to action for all of public health. The final report by the One Health Initiative Task Force entitled “One Health: A New Professional Imperative” is the only major defining document to establish their status and goals (American Veterinary Medical Association, 2008). This document outlines areas where there currently is integration among human, animal, and environmental health as well as areas where integration is still needed. The Center for Disease Control and Prevention’s National Center for Zoonotic Vector-Borne and Enteric Disease and the United States military are among those groups recognized for having some existing One Health attributes such as some form of sentinel surveillance or monitoring (American Veterinary Medical Association, 2008; Kahn, Kaplan, &
Monath, 2010). Unfortunately, according to the One Health Initiative, the list of areas that need integration dwarfs those that are currently integrated.

The One Health Initiative provides several ways in which ‘One Health’ can be achieved. They suggest that a collaboration mirroring ‘One Health’ is needed at local, national, and global levels in order to protect against threats to our global food system, water supply, and our health (American Veterinary Medical Association, 2008). While the One Health Initiative Task Force provides several recommendations for success, they admit that achieving ‘One Health’ is dependent upon the participation of government agencies, academic institutions, and the private sector (American Veterinary Medical Association, 2008; Kahn, Kaplan, & Monath, 2010).

Some of the key recommendations for achieving ‘One Health’ include joint educational efforts between human and veterinary medical schools, cross-species sentinel surveillance and control efforts, collaborative research in cross-species disease transmission, and providing informative publications to the media as well as the general public (Kahn, Kaplan, & Monath, 2010).

Since the 2008 report, “One Health: A New Professional Imperative,” there have not been any official releases or reports made available via the One Health Initiative’s website regarding progress of the initiative (Kahn, Kaplan, & Monath, 2010). However, the official website for the One Health Initiative, www.onehealthinitiative.com, is regularly updated with upcoming events and publications of One Health related activity (Kahn, Kaplan, & Monath, 2010).
Past and Present Emergency Response for Epi-zoonotic Disease

In the late 1960’s, the complacency towards the interconnected nature of human and animal health reached its peak when the Surgeon General of the United States of America, William H. Stewart proclaimed that:

“It was time to close the book on infectious disease and pay more attention to chronic ailments such as cancer and heart disease (Gibbs, 2005).”

Around the same time as the Surgeon General’s address, Small pox, among other infectious diseases, was on the brink of eradication as a viable human threat (American Veterinary Medical Association, 2008; National Research Council, 2008).

After several decades of complacency towards zoonotic disease, outbreaks of the West Nile Virus, Avian Influenza and Pandemic H1N1 2009 have prompted the attention all public health in America (American Veterinary Medical Association, 2008). Perhaps the biggest wake up call was the September 11th 2001 terrorist attacks. Shortly after those attacks, the mailing of letters filled with Anthrax brought a reality to the threat of biological attacks. Since then, the need for sentinel surveillance and emergency response planning for disease has been major priority in the United States (Ashford et al., 2003).

Currently, the ongoing threat of the Pandemic H1N1 2009 flu virus has brought about a real test to public health emergency response regarding the threat of zoonotic disease. For almost a year, this phase 6 pandemic has required public health agencies throughout the word to create and provide public
service announcements, immunizations, and surveillance programs (World Health Organization, 2010).

This pandemic began in the spring of 2009, when the first cases of Pandemic H1N1 2009 started to infect people in central Mexico and bordering states such as Texas and Arizona (American Veterinary Medical Association, 2010). According to the Centers for Disease Control and Prevention, the 2009 H1N1 flu virus consists of several different strains of flu DNA including those of swine influenza viruses, avian influenza viruses, and human influenza viruses (American Veterinary Medical Association, 2010). Despite the genetic structure of the virus being identified there was and still is a considerable amount of confusion regarding H1N1.

An example of the initial confusion was how the Egyptian government reacted during the first outbreaks of H1N1 in the first weekend in May of 2009. They had required that all swine in the country must be slaughtered as a precautionary measure to prevent the spread of the swine flu (Ahmed, 2009). Despite the fact there had not yet been even one confirmed case of the swine flu in Egypt, this slaughter still took place. However, it did not go on without protest from the swine farmers in Egypt and elsewhere (Ahmed, 2009).

By mid-summer, the swine flu was starting to be referred to by its true scientific name, influenza A H1N1 (American Veterinary Medical Association, 2010). It would later be recognized by the World Health Organization as a stage six pandemic, which is also what the Spanish Flu of 1918 was considered to be.
During the fall of 2009, people across America waited in line for the newly released H1N1 vaccine (Laris, 2009). It would probably be safe to say that the majority of Americans at that time still had some kind of misconception regarding the H1N1 whether it was the safety of eating pork products or other possible routes of transmission (American Veterinary Medical Association, 2010).

Even with the large amount of new knowledge gathered since the initial outbreaks, there still seems to be a lot of confusion. Not only is the misconception regarding the safety of eating pork hurting the swine industry, it is also calling into question the ability of organizations like the Centers for Disease Control and Prevention’s ability to prepare for and handle outbreaks of any infectious disease. The next section looks at public health’s ability to handle an outbreak of disease in animals.

*The National Veterinary Stockpile*

The National Veterinary Stockpile (NVS) came about as a result of Homeland Security Presidential Directive 9 (Myers, 2008). The presidential directive instructed the Secretary of Agriculture to develop the NVS in conjunction with federal, state, local governments, and even private sector resources. The primary motive behind the creation of the NVS was to establish protection against the top 17 most dangerous diseases that could threaten the country’s food supply and to serve as a national resource for states in the event of an epi-zoonotic event (Myers, 2008; United States Department of Agriculture,
2009). It should be noted that at the national level through the Centers for Disease Control and Prevention, there is the Strategic National Stockpile that serves the same purpose as the NVS, but for human disease outbreaks (Federal Emergency Management Association, 2010).

The National Veterinary Stockpile is designed to be able to deploy within 24 hours of an outbreak. The contents of the NVS include animal vaccines, antiviral medications, personal protective equipment and other veterinary resources needed contain and stop further spread of disease. In comparison, the CDC’s Strategic National Stockpile is capable of being deployed within 12 hours and contains primarily human medicines and health materials (Myers, 2008; United States Department of Agriculture, 2009.)

With respect to the National Veterinary Stockpile, the United States Department of Agriculture (USDA) is responsible for the developing plans and procedures for dealing with major veterinary emergencies (Myers, 2008). The USDA states that it is responsible for exercising plans to test levels of preparedness, work with states prior and during the event of a veterinary emergency, and to make improvements with any plans surrounding the NVS (United States Department of Agriculture, 2009).

The role of each state is to develop plans to utilize the NVS in the event the state’s resources are not capable of handling a situation (Myers, 2008). When in need, a state must request the NVS, in which it will then be deployed from undisclosed locations throughout the country. Once the NVS is received by the state requesting it, they are responsible for the management distribution of
NVS materials throughout the state. Individual states are responsible for conducting their own training exercises to test their level of readiness (Myers, 2008).

To date, there has only been one official documented deployment of the NVS. It took place in April of 2007 in West Virginia where there was an outbreak of low pathogenic Avian Influenza. According to the United States Department of Agriculture it was considered a successful deployment (United States Department of Agriculture, 2009). Aside from that one official deployment in 2007, practice exercises are planned to continue to take place throughout the country (Myers, 2008; United States Department of Agriculture, 2009).

The websites for the Ohio Department of Agriculture and the Ohio Department of Health did not provide explanations for the National Veterinary Stockpile or any other plans for future outbreaks of currently unrecognized zoonotic threats. Only plans for the Pandemic H1N1 2009 virus and generalized pandemic flu preparation were found on the Ohio Department of Health’s website, www.odh.ohio.gov (Ohio Department of Health, 2010). The same applied to the Ohio Department of Agriculture’s website, www.agri.ohio.gov/, which contained even less with regard to public health or zoonotic infectious disease preparedness. However, just like the Ohio Department of Health’s website, the Ohio Department of Agriculture’s website provided links to the same informational sites such as http://flu.ohio.gov regarding pandemic flu (Ohio Department of Agriculture, 2010).
Plans and policies for zoonotic disease in Ohio

Ohio’s plans and policies for zoonotic diseases are divided between the Ohio Department of Agriculture (ODA) and the Ohio Department of Health (ODH). The ODA made available a “Fact Sheet” entitled “How Ohio Would Respond to an Outbreak of Avian Influenza in Birds” (www.ohiopandemicflu.gov/docs/ODA-FS-Response.pdf). While it specifically describes how the ODA would handle an outbreak of avian influenza, it inadvertently describes how they would handle any given zoonotic disease.

If there were an outbreak of avian influenza in Ohio, the Ohio Department of Agriculture would work with the United States Department of Agriculture under a plan called the “Animal Disease Incident Plan” (Ohio Department of Agriculture, 2006). The Animal Disease Incident Annex is part of a larger plan in Ohio called the State of Ohio Emergency Operations Plan.

Under this plan, the ODA is in charge of quarantining locations of operation as well as the disposal of animals during the epi-zoonotic event. This plan discusses all of the management responsibilities during an emergency for all state-level organizations that would be involved in an animal disease outbreak. The stated goal of this plan is to:

“coordinate state and federal efforts to prevent, stop and eliminate the spread of animal disease, and minimize the human and economic impact of the disease (Ohio Department of Agriculture, 2006; United State Department of Agriculture, 2008)."
In the event of an emergency, the “Animal Disease Incident Plan” establishes a unified command system, which directs all involved agencies within the state of Ohio (Ohio Department of Agriculture, 2006). Some of the agencies or organizations that could be involved include: the Ohio Department of Health, the Ohio Environmental Protection Agency, the USDA’s Animal and Plant Health Inspection Service, and even the Ohio State University College of Veterinary Medicine. The protocol for this annex all follows the National Incident Management System\(^1\) (NIMS) (Ohio Department of Agriculture, 2006).

The Animal Disease Incident Annex will establish special animal disease teams for public information, surveillance, decontamination, law enforcement, disposal, quarantine, and recovery (Ohio Department of Agriculture, 2006). The people involved and the annex itself regularly practice and test the functionality of the plan through both training exercises and real life challenges.

\(^1\) The Federal Emergency Management Agency describes NIMS as a guide for all levels of government and the private sector to “prevent, protect against, respond to, recover from, and mitigate” for any emergency incidents the country might face (Federal Emergency Management Association, 2010).
Methods

Design

Semi-structured\(^2\) telephone interviewing was conducted to explore how current strategies, plans, and agencies within Ohio would be able to handle an epi-zoonotic event utilizing the National Veterinary Stockpile and implementation of One Health ideals. Analysis of the scientific literature, agency documents, research, and media information was performed to further evaluate the implementation of the One Health Initiative and the National Veterinary Stockpile in Ohio. Wright State University’s Institutional Review Board reviewed and approved this study before data collection began (See Appendix B).

Sample / Setting

The state of Ohio was chosen as the setting for a case study for investigating what a state is capable of when confronted with outbreaks of zoonotic diseases. Ohio was selected for two significant reasons. First, Ohio is the state in which the principal investigator resides and therefore provides a limited sample that is of great interest. The second, Ohio is fairly representative of a wide variety of states; rural economies dependent on agriculture and heavily populated metropolitan areas.

A vast search of the literature was undertaken to clarify the history and progress of One Health concepts with respect to preparedness for zoonotic disease throughout the country (or globally). This literature search consisted of

\(^2\) Semi-structured interviews follow a framework or guide of potential questions and themes that allow for the new questions to be asked (Food and Agriculture Organization of the United Nations, 2010).
scientific journals, websites of the United States Department of Agriculture, the World Health Organization, and several of Ohio’s own various health or animal related agency websites. All of this data was content analyzed to characterize the current situation regarding the status of One Health-related policies in Ohio, the status of the National Veterinary Stockpile, and emergency preparedness activity in Ohio related to zoonotic disease including reporting, sentinel surveillance, and emergency response.

Another valuable source of information was current news media. Over the course of the study, the outbreak of the Pandemic H1N1 2009, otherwise known as the “swine flu” began. It gave a real time, real life view of an epi-zoonotic event in action at the local and national level. The literature and media provided a timely opportunity for the primary investigator to observe how animal and human health agencies really handled a phase 6 pandemic of zoonotic origin (World Health Organization, 2010).

A semi-structured questionnaire was formulated based on a brief overview of the National Veterinary Stockpile and One Health Initiative. These questions were necessary to seek information from officials directly involved in the preparedness for zoonotic disease outbreaks in the state of Ohio. The general theme focuses on the National Veterinary Stockpile and how Ohio would handle situations that might require it. The questions were also designed to cover basic One Health concepts such as human and veterinary medical collaboration within the state of Ohio. The final question of the interview asks the interviewee for any additional contacts that might be helpful for further considerations.
The initial pool of potential interviewees was chosen from the Ohio Department of Agriculture’s website (http://www.agri.ohio.gov/divs/regrogs.asp), which was searched for potential candidates to be chosen for inquiry. Divisions, email addresses, and phone numbers were found upon a search on the Ohio Department of Agriculture’s website. However, there were no names attached to the positions.

The following divisions were contacted: the Administrative Office, Agro Bio-Security Offices, the Agricultural Security Area Program, the Animal Industry Program, the Animal Disease Diagnostic Lab, the Communications office, the Enforcement Division, the Food Policy Council, the General information section, the Food Safety Division, and the Meat Inspection Program. They were all contacted by email with the email address of each title.

A search on the Ohio Department of Health’s website and the American Veterinary Medical Association website lead me to State Public Health Veterinarian for Ohio. According to research of the National Veterinary Stockpile, the State Public Health Veterinarian would be the person most likely involved with dealing with an epi-zoonotic disease within a given state (United States Department of Agriculture, 2009). Upon contact with the Ohio Department of Health’s Public Health Veterinarian, I was given an additional contact who was also a Veterinarian within the Ohio Department of Health.

To establish communication with each of these people or programs an introductory e-mail was sent per the request/suggestion of the Wright State University Institutional Review Board. This e-mail included a brief introduction of
the principal investigator, an explanation of the research being done (See Appendix B) and served as a cover letter (or letter of consent) because the surveys/interviews were to be conducted over the telephone. The e-mail also included further contact information, such as phone numbers and e-mail addresses for the Institutional Review Board, the principal investigator, and the faculty advisor to the principal investigator of the research.

Data Collection

Introductory e-mails were sent out to twelve individual e-mail addresses, which were located at the Ohio Department of Agriculture and Ohio Department of Health. For all, but one of these attempts, there was either no response or an e-mail saying they will be forwarded to the appropriate individuals. The only direct contact and direct response was from the State Public Health Veterinarian.

Five other responses were received from the e-mails and they all provided a similar responses saying the message would be forwarded to appropriate individuals. All of these e-mail messages were forwarded to either the State Public Health Veterinarian or the State Veterinarian from the Department of Agriculture.

Upon contact with the State Public Health Veterinarian, another Public Health Veterinarian within the Ohio Department of Health was also contacted. In all, only three representative participants of the Ohio Department of Agriculture and Ohio Department of Health willing to participate in the surveys. The span of the attempted time period was approximately one month.
For those three individuals who gave consent to be interviewed, the telephone interview for each individual consisted of the presentation of a hypothetical scenario involving an outbreak of a zoonotic disease that infects multiple species of animals including humans. (See appendix C for the actual scenario and questions asked to each individual.) The answers, which were received over the telephone by the interviewee, were typed on an open Microsoft Word blank template for the questions. The files were then saved onto disk and printed to hard copy.

After the telephone interview process was completed, additional resources that were suggested by the interviewees were examined. The only significant document or piece of information not found through the earlier literature review was the Ohio Disease Reporting System (ODRS), which was recommended in an interview. It was then looked at during the literature review. The rest of the recommendations were sites including the Ohio Department of Health and Ohio Department of Agriculture websites.

It should also be noted that the only participants that were contacted through the telephone were individuals who agreed to participate through e-mail. The remaining eleven individuals total who either did not respond to the introductory e-mail or who told the principal investigator they were going to forward it, were no longer contacted by email or telephone contact.
Data Analysis

Once all subjects were contacted through the telephone survey, the analysis of their responses was triangulated with the content analysis of state websites, literature review and publicly made media documentation. Further analysis and review of Ohio’s agency published information and all available information from the United States Department of Agriculture’s website regarding the National Veterinary Stockpile were reviewed. In this process, One Health related documents were also reviewed for comparison to official policy and implementation in Ohio.

This paper finds that the three people who were interviewed were sufficient despite the very small number for a data sample. Essentially, the low participation and availability of participants served as a direct indication of what the current status of the integrated concept of One Health is presently in Ohio. It also helps to show how the implementation and involvement of individuals is rather low with regard to the National Veterinary Stockpile in the state of Ohio.

The data was evaluated and presented in such a way to illustrate whether Ohio has plans and policies that are integrated similar to those promoted by the One Health Initiative by using comparison charts of the various answers for survey questions. A final evaluation of the status of One Health related protocols in addition to recommendations for improvement were made based upon the literature reviewed.

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3 Triangulation: the comparison of two or more sources of data to determine if there is a convergence, difference, or potential combination (Creswell, 2009).
Results

The following tables will describe how respondents answered each question during the successful telephone interviews. One respondent preferred to write back the answers through e-mail. Each of the five questions will be represented in separate tables with the corresponding answer from each interviewee's reply. Each question is presented in the order it was asked during the phone interviews and e-mail interview. The answers are presented as a summarization of the notes taken during the interviews. (See appendix C for a full template of the scenario and survey questions.)

The sixth question that asked “Whom would you suggest I speak with to get more information regarding Ohio’s preparedness for an epi-zoonotic event?” is not included in the results table because it was only used for the purpose of finding further participants or information.
Table 1

1.) Which state agency is best equipped to handle this problem?

<table>
<thead>
<tr>
<th>State Animal Health Veterinarian</th>
<th>State Public Health Veterinarian</th>
<th>Public Health Veterinarian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ohio Department of Agriculture</td>
<td>Ohio Department of Health</td>
<td>Ohio Department of Health</td>
</tr>
</tbody>
</table>

The Ohio Department of Agriculture in as the lead agency if animals are getting sick/dying and the Ohio Department of Health is lead agency if it’s a human outbreak of some kind.

Each agency should support one another and works in a unified structure.

A unified command Structure between Ohio Department of Health and Ohio Department of Agriculture would be in place as well as activation of Ohio’s EMA (emergency management agency).

There would be a joint effort between the Ohio Department of Agriculture and Ohio Department of Health.

The Centers for Disease Control and Prevention, United States Department of Agriculture and Department of Health would also be involved.
Table 2

<table>
<thead>
<tr>
<th>2.) Are you aware of the National Veterinary Stockpile?</th>
<th>- If so, would it be useful in this scenario?</th>
<th>- And how would you initiate and use the National Veterinary Stockpile?</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Animal Health Veterinarian Ohio Department of Agriculture</td>
<td>State Public Health Veterinarian Ohio Department of Health</td>
<td>Public Health Veterinarian Ohio Department of Health</td>
</tr>
<tr>
<td>-Yes</td>
<td>-Yes</td>
<td>-Yes</td>
</tr>
<tr>
<td>-Yes</td>
<td>-probably not, but depends on type of disease. Quarantine would be most useful if it were flu</td>
<td>-The NVS would be requested through the State Veterinarian through the Ohio Department of Agriculture and the Governor’s Office. The Ohio Department of Health’s Stockpile might also be used, but would be the choice of the Ohio Department of Health</td>
</tr>
<tr>
<td>-The health department would release stockpiles for first responders, MDs, DVMs, etc.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 3

3.) Is there a surveillance system in place that monitors zoonotic disease among both humans and animals?
   - If so, how does one access it?
   - Is it used regularly?

<table>
<thead>
<tr>
<th>State Animal Health Veterinarian</th>
<th>State Public Health Veterinarian</th>
<th>Public Health Veterinarian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ohio Department of Agriculture</td>
<td>Ohio Department of Health</td>
<td>Ohio Department of Health</td>
</tr>
</tbody>
</table>

- No. However, the Ohio Department of Agriculture does disease surveillance. It goes on every day for things such as avian influenza. There are monthly and weekly samples of poultry checked. If human's interaction with a species causes illness it is checked out.

- No

- Yes

- No, both animals and humans have independent systems. There is the Ohio Disease Reporting System, which covers humans and has some zoonotic disease, but not dual reporting for animals and humans

- Can only access monthly summaries through the Ohio Department of Health, but much is kept hidden from non-essential health personal.

- Yes

- Yes

- Yes, but they are separated by agency and not one single system.

- Reports through Ohio Department of Health or the CDC are often available, but complete data is not made public.

- Yes
Table 4

4.) Are there plans in place for such an event?
   -If so, do you they include interagency cooperation and preplanning?

<table>
<thead>
<tr>
<th>State Animal Health Veterinarian</th>
<th>State Public Health Veterinarian</th>
<th>Public Health Veterinarian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ohio Department of Agriculture</td>
<td>Ohio Department of Health</td>
<td>Ohio Department of Health</td>
</tr>
<tr>
<td>-Yes</td>
<td>-Yes</td>
<td>-Yes</td>
</tr>
<tr>
<td>-Preplanning is in place through Emergency Support Function 8 of the National Response Framework between departments of agriculture and health for unified command</td>
<td>-Both the Ohio Department of Health and Ohio Department of Agriculture have detailed disease response plans that are filed with the state Emergency Management Agency.</td>
<td>-Interagency plans between the Ohio Department of Agriculture and Ohio Department of Health. Other groups could potentially be involved.</td>
</tr>
</tbody>
</table>
### Table 5

<table>
<thead>
<tr>
<th>Agency/Position</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Animal Health Veterinarian Ohio Department of Agriculture</td>
<td>Depending on situation would have to contact the United States Department of Agriculture’s Animal and Plant Health Inspection Service to initiate the National Veterinary Stockpile procedures. There would also be interagency work done with the Ohio Department of Health to deal with the particular situation if it was a dual threat to humans and animals.</td>
</tr>
<tr>
<td>State Public Health Veterinarian Ohio Department of Health</td>
<td>Ohio is a local rule state so local health departments would have first jurisdiction to protect health of residents and responders. Ohio Department of Health and Ohio Department of Agriculture would coordinate a response together to help local public health departments.</td>
</tr>
<tr>
<td>Public Health Veterinarian Ohio Department of Health</td>
<td>The Ohio Department of Health would work alongside the Ohio Department of Agriculture at which ever capacity is needed for the particular illness.</td>
</tr>
</tbody>
</table>

Zoonotic Disease in Ohio
Discussion

The result of both the research of Ohio disease policies and the telephone interviews suggest that the state of Ohio does not use its human and animal health agencies in a truly collaborative manner to address the threat of zoonotic infectious diseases. There are several aspects of the surveillance, emergency response plans, and agreements between human and animal health related agencies that are even counterproductive to one another. These aspects include separate disease reporting systems by agency, differing disease concerns by agency, and a lack of overall collaboration between human and animal health agencies that is promoted by the One Health Initiative.

Whether diseases are classified as zoonotic or as only affecting humans, they do not stay within the boundaries set by the reporting systems of government agencies. This could be problematic for Ohio due to the separation of disease surveillance between animal and human health entities. For example, the current public health threats of Avian Influenza H5N1 and the more recent Pandemic H1N1 2009 have shown that pandemic human disease concerns are largely related to diseases originally coming from animals (American Veterinary Medical Association, 2010).

Many of the diseases that the Ohio Department of Health monitors are zoonotic according to the State Public Health Veterinarian (Table 3). Despite the relationship zoonotic disease has with animal life, there is no official joint reporting system between the Ohio Department of Health and the Ohio Department of Agriculture (or any other animal related agency).
The only functional reporting system that comes close is the Ohio Disease Reporting System (ODRS). While the ODRS reports some zoonotic diseases it is not a true collaboration between human and animal health as it only focuses on cases of human infection (Ohio Department of Health, 2009). This discrepancy illustrates a weakness in sentinel surveillance and the need for unified disease surveillance that the One Health Initiative is trying to promote.

In contrast to the Ohio Department of Health, the Ohio Department of Agriculture has a similar sentinel surveillance system to the ODRS that is concentrated on disease in animals only. For example, the State Animal Health Veterinarian noted that in particular the ODA conducts regular tests for Avian Influenza (Table 3). In addition to Avian Influenza, if there was human interaction with infected animals, then human health would also be evaluated and the Ohio Department of Health would be notified (Table 3). However, despite recognition of potential human health threats from zoonotic diseases, there is still no official collaborative reporting system for such a scenario between ODA and any human health counterpart according to the State Animal Health Veterinarian of the ODA (Table 3).

There are some aspects in which the Ohio Department of Agriculture and Ohio Department of Health are in agreement. Respondents from ODA and ODH were knowledgeable about the National Veterinary Stockpile (Table 2). The general concept of how it is initiated was unanimously agreed upon, but the State Public Health Veterinarian from ODH did not agree that it might be the best method for use in the hypothetical scenario seen in Appendix B (Table 2).
Quarantining was suggested as a possible alternative strategy depending on which type of disease may be present (Table 2).

When asked which agency in Ohio was best equipped to handle an epi-zoonotic event, the State Animal Health Veterinarian from the Ohio Department of Agriculture responded that the ODA is in charge if the outbreak of disease that occurs is in animals and would likely be responsible (Table 1). Likewise, in the event of a major outbreak of human illness, the State Animal Health Veterinarian said would be the primary responsibility of the Ohio Department of Health. All three of those interviewed agreed that ultimately a unified command structure would handle such a situation as it is explained in available state documentation (Table 1).
Conclusion

This study shows that responsibilities and systems integral to disease preparedness in Ohio including sentinel surveillance and reporting vary between the two keys departments: the Ohio Department of Health (ODH) and the Ohio Department of Agriculture (ODA). At the moment, there is not a cooperative sentinel disease reporting system that reports diseases for both humans and animals. Like reporting systems, emergency response plans for each agency are separate. Whether ODH or ODA acts is dependent upon whether it is a major human or animal incident. Since approximately 75% of newly recognized human diseases and 60% of all human pathogens are considered to be zoonotic, disease surveillance and emergency response planning must not be organized in such a dichotomized and separate fashion (American Veterinary Medical Association, 2008; Kahn, 2007; Centers for Disease Control and Prevention, 2010).

The state of Ohio could significantly improve efficiency with respect to all disease if they worked on a common integrated One Health type of approach towards emergency preparation, sentinel surveillance, and response capacity to epidemic and pandemic of disease. With such an approach, the state of Ohio would be more prepared for the expanding scenarios involving both human and animal health.
Policy Recommendations

Physicians and Veterinarians in municipalities ideally should be reporting disease into the same databases. As mentioned in the literature review, similar systems are already in place on a global scale that pulls information together and provides early disease event detection.

One system in particular, the Global Early Warning System (GLEWS), does this for zoonotic diseases as well as exclusive animal diseases. GLEWS could be used a template of how the United States and even Ohio could model a sentinel surveillance and monitoring system. GLEWS works by coordinating and combining information from groups around the world including World Health Organization, the Food and Agriculture Organization of the United Nations and the World Organization for Animal Health, and many other international sources (World Health Organization, 2010). The same model could be applied in the United States as it could combine the separate surveillance systems by state or county.

Ohio or any state could put something together similar to GLEWS. Under such a system, each state’s respective animal and human departments should report to a single national entity that consolidates the information. This system would work similarly to how the Centers for Disease Control and Prevention currently does now, except it would collect information about all diseases. This would consolidate information instead of having several different reporting systems (that vary by agency).
Public health agencies at all levels of government would benefit from the use of such a system; as it would promote One Health ideals on both sides of the isle in the human and animal health world. Increased knowledge and awareness of how disease spreads between the human population, agricultural animals, and even our companion animals would likely improve measures of prevention, preparation, and emergency response towards disease. It would also help to bridge the education and health risk communication gap between an average citizen, their physician, and their veterinarian.

**Limitations**

Finding individuals to discuss these issues was a difficult task for several reasons. Since there is no one single position that directly oversees the topic of zoonotic disease, the primary investigator sought out those who would logically be involved with such issues as animal health and the National Veterinary Stockpile in the State of Ohio. In the end, only three individuals were able to provide any information on those subjects.

One individual of the three whom were surveyed preferred to answer the questions through email, which turned out to provide a more thorough and concise description when compared to the notes taken by the principal investigator whom was not experienced in interviewing techniques. Collecting information through e-mail might have been a better way to increase survey participation, since participants could respond when it was more convenient for them. However, one disadvantage of using e-mail questionnaires would be the
inability to ask any follow up question that might arise through the course of the interview.

Further limitations of this study included gathering information from a small sample as well as from having to use specific agencies. In a study of this nature it is not useful to have random sampling because only key informants from specific agencies would have relevant information to share, as there are certain individuals who are relevant as well as others who are not. A specific level of expertise or association was required for all interviewees, which limited the sample size even more. The sample must also have been from one state, Ohio. The sample size also revealed that too few people are involved in sentinel disease reporting, surveillance and response in Ohio.

Since there are no significant studies on either the effectiveness of the National Veterinary Stockpile or the progress of the One Health Initiative in any state, there was no baseline to compare to the State of Ohio. Both the NVS and the One Health Initiative are relatively new, so most information regarding their purpose and progress is disseminated by them, rather than from academic or public journals or the media. This could have biased the information that each source made available. Again, too few people are engaged in this endeavor in the state of Ohio to be effective.

For future studies, a more thorough investigation could be done on the state level progress of both the NVS and the One Health Initiative if more than one state was examined. As the NVS matures, it will ideally encompass and promote further development for many of the goals outlined by the One Health
Initiative. As states begin to implement the NVS into public health emergency response plans, they will also be acknowledging the threat of disease from animal sources and thus the interconnected nature of animal and human health. Additionally, as time passes, states and their personnel would likely be more acclimated to these relatively new policies and movements.
Works Cited


from


USDA - APHIS - Animal Health Monitoring & Surveillance - National Surveillance

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http://www.journals.uchicago.edu/doi/abs/10.1086/318509.


http://www.springerlink.com/content/3395557882h55575/.


Appendix A

Hello,

My name is Erik Balster and I am a graduate student in the Public Health program at Wright State University. I am writing you today because I am currently working on my culminating experience project and would greatly appreciate if you could answer a couple questions through a brief phone interview.

For my project entitled “Epi-zoonotic Events: Preparedness at the State Level,” I am taking a look at the preparedness of state governments and agencies to address an “epi-zoonotic” event such as a true variant of the “swine flu,” H1N1, that could readily jump across species from animals to humans and vice versa.

Your participation in the phone interview as well as answering these questions is completely voluntary. Your responses to all questions I ask will be kept anonymous, unless you choose otherwise. There are no known risks to this study, and participation will not receive any direct benefits for participating. You are free to decline to be in this study and may withdraw from it at any point during the phone interview. This phone conversation and Q&A should take no longer than 10 minutes.

If you have questions about this research study, or have any other concerns, you can contact myself, or my faculty advisor with the contact information provided below.

If you have any have general questions about giving consent or your rights as a research participant in this research study, you can call the Wright State University Institutional Review Board at 937-775-4462.

If you would like a copy of the final study or results of this study, you can contact my faculty advisor or myself. It is estimated that these results will be available on or after October 30th, 2009.

Erik Balster, student and principal investigator
Email: balster.8@wright.edu
Phone: 937-830-0642

Dr. Mark Gebhart, Faculty Advisor
Email: mark.gebhart@wright.edu
Office Phone: (937) 775-1320
Wright State University – Department of Emergency Medicine
3139 University Blvd., Suite 205, Dayton, Ohio 45420
Appendix B

Hello,

My name is Erik Balster and I am a graduate student in the Public Health program at Wright State University. I am currently working on my culminating experience project and would greatly appreciate if you could answer a couple questions.

For my project, I am taking a look at the preparedness of state governments and agencies to address an “epi-zoonotic” event such as a true variant of the “swine flu,” H1N1, that could readily jump across species from animals to humans and vice versa.

Your participation in answering these questions is completely voluntary. Your responses to all questions I ask will be kept anonymous, unless you choose otherwise. There are no known risks to this study, and participants will not receive any direct benefits for participating. This conversation and Q&A should take no longer than 10 minutes.

Thanks for agreeing to participate!

For my questions, I would like to propose to you a made up scenario in which a zoonotic epidemic were to occur somewhere here in Ohio.

Scenario:
Hypothetically, a herd of swine in northwestern Ohio have been diagnosed as harboring a highly infectious zoonotic strain of H1N1 that causes severe illness in humans, swine, as well as speculation that there is a potential threat to avian populations in the immediate area. Many farmers and their families have come down with fevers, severe dehydration and 4 hospitalizations have been required. On these same farms, there has also been a high amount of sudden death in many of the poultry (avian) population on these farms.

Questions:
1.) Which state agency is best equipped to handle this problem?
2.) Are you aware of the National Veterinary Stockpile?
   - If so, would it be useful in this scenario?
   - And how would you initiate and use the National Veterinary Stockpile?
3.) Is there a surveillance system in place that monitors zoonotic disease among both humans and animals?
   - If so, how does one access it?
   - Is it used regularly?
4.) Are there plans in place for such an event?
If so, do you they include interagency cooperation and pre-planning?

5.) Please elaborate on what your agency/position would be responsible for in this type of situation.

6.) Whom would you suggest I could speak with to get more information regarding Ohio’s preparedness for an epi-zoonotic event?
Appendix C

Public Health Competencies

My culminating experience provided a confirmation of many public health competencies that were achieved through completion of the masters program and of this culminating experience. The first competency was achieved through acknowledging the gap between human and animal health, which defined a public health problem. From that point I needed to determine the uses and limitations to quantitative and qualitative approaches of this problem. Since there is not a tremendous amount of quantitative data in regard to policy and surveillance practices within the state of Ohio, I needed to define important variables, identify relevant and appropriate data from information sources, and evaluate the integrity and comparability of data from various sources. Upon finding several sources of literature and data from local, state, and national sources I was able to interpret information regarding risks and benefits to the community as a whole from the various approaches of research. Through the use of data collection processes including information technology applications and computer systems I was able to collect, summarize and interpret information relevant to the issues of zoonotic disease preparation and surveillance. Upon reading through the various literature sources I needed to be able to identify, interpret, and judge the implementation public health laws, regulations, and policies related to specific programs. From there I was able to decipher the feasibility and expected outcomes of each policy option of policies and groups such as the National Veterinary Stockpile and the One Health Initiative.
This presentation illustrates how media, advanced technologies and various networks were used to communicate information regarding the topic of zoonotic disease preparation, surveillance, and response. Through this media I needed to present the information to both a professional and lay audience. That was in part completed through the ability to listen to others (professors, teachers, and mentors) in an unbiased manner while respecting points of view with respect to my project.

This project has ultimately lead to the understanding of the importance of the diverse public health work force in the world of zoonotic disease. This is especially evident in the realization of the role of government in the delivery of community health services with respect to zoonotic disease. It also allowed for an understanding of the historical development and interaction of public health in animal and human health entities. By analyzing the diversity of the public health workforce, all of the basic public health sciences were required to truly analyze the prevention of zoonotic disease.

Finally, through this project, I learned to identify the limitations of research in public health and the policy surrounding it. This helped to develop a personal commitment to rigorous critical thinking and established the importance of observation of the real life implementation of public health policy in order to truly understand the nature of how policy works in action. Ultimately, these competencies will help in future endeavors of developing, implementing and monitoring of public health policy and implementation.
DATE: August 14, 2009

TO: Erik Balster, PI, Student
SOM
Mark Gebhart, Ph.D., Faculty

FROM: B. Laurel Elder, Ph.D., Chair
WSU Institutional Review Board

SUBJECT: SC# 3955
'Epi-zoonotic Events: Preparedness at the State Level'

This memo is to verify the receipt and acceptance of your response to the conditions placed on the above referenced human subjects protocol/amendment.

These conditions were lifted on: Aug 14, 2009

This study/amendment now has full approval and you are free to begin the research project. If this is a VA proposal, you must still receive a letter of approval from the Research and Development Committee prior to beginning the research project. This implies the following:

1. That this approval is for one year from the approval date shown on the Action Form and if it extends beyond this period a request for an extension is required. (Also see expiration date on the Action Form)

2. That a progress report must be submitted before an extension of the approved one-year period can be granted.

3. That any change in the protocol must be approved by the IRB; otherwise approval is terminated.

If you have any questions concerning the condition(s), please contact Robyn Wilks, IRB Coordinator at 775-4462.

Thank you!

Enclosure
Zoonotic Disease in Ohio

Title: 'Epi-zoonotic Events: Preparedness at the State Level'

Principal Investigator: Erik Babler, Ph. Student
Mark Gebhart, Ph.D., Faculty

Department: SOM

Expedited Category: 6, 7

The Institutional Review Board has approved the use of human subjects on this proposed project with conditions previously noted. The conditions have now been removed.

REMINDER: FDA regulations require prompt reporting to the IRB of any changes in research activity, changes in approved research during the approval period may not be initiated without IRB review (submission of an amendment), and prompt reporting of any unanticipated problems (adverse events).

Signed Chair, WSU-IRB

Expeditied Review Date: July 24, 2009
IRB Meeting Date: August 17, 2009

This approval is effective only through: July 24, 2010
To continue the activities approved under this protocol you should receive the appropriate form(s) from Research and Sponsored Programs (RSP) two to three months prior to the required due date.
If you do not receive this notification, please contact RSP at 775-2425.
Hello,

My name is Erik Balster and I am a graduate student in the Public Health program at Wright State University. I am writing you today because I am currently working on my culminating experience project and would greatly appreciate if you could answer a couple questions through a brief phone interview.

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Erik Balster, student and principal investigator
Email: balster.8@wright.edu
Phone: 937-830-0642

Dr. Mark Gebhart, Faculty Advisor
Email: mark.gebhart@wright.edu
Office Phone: (937) 775-1320
Wright State University – Department of Emergency Medicine
3139 University Blvd., Suite 205, Dayton, Ohio 45420

WSU-IRB
APPROVED 8/16/09
GOOD THRU 7/31/10