

**Avian Influenza Video Presentation Transcript**  
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Hi, I'm Brian Labus, Senior Epidemiologist with the Southern Nevada Health District, and I'm here to give you a short presentation on avian influenza.

Influenza typically causes an illness consisting of a fever and either a cough or sore throat and there are three different strains that cause different types of illness in two different organisms. Influenza A mainly affects humans and animals and can be a moderate to severe illness. This is the type of influenza that we think of causing the most illness during the winter. Influenza B occurs just in humans and is a more mild illness and does circulate every single year but the symptoms people see are typically much less severe than that with influenza A. Influenza is a rare disease and is something that we don't routinely see around the world.

This is what the influenza culture looks like if you zoom in with an electron microscope and if you look at any one of the particles you see these little spikes all over the top and these spikes are surface proteins which allow the virus to invade different cells in the human body. Now there are two different types of proteins on the surface; the first is called Hemagglutinin (H) and the second is called Neuraminidase (N). These are important not just how the virus infects certain cells in the human body but we use them to characterize the different types of strains that are circulating each year. Now if you look at an influenza virus and you look at the name it typically has a long descriptive name, like this: A/Vietnam/1194/04 (H5N1). The first part of the name is the genetic materials the A, B, or C strain we mentioned earlier. After that we have the Hemagglutinin and Neuraminidase giving it a type, in this situation it's an H5N1. Now this information in the middle refers to specifics about that strain including the geographic origin, the strain number, and the year which it was isolated. It just serves as a laboratory reference from when we found this particular virus that we're looking at. Now there are three different influenza viruses recommended in the H5N1 proposed vaccine for avian influenza and each of these strains were isolated in Southeast Asia; two in Vietnam and one from Hong Kong; A/Vietnam/1194/04 (H5N1), A/Vietnam/1203/04 (H5N1), and A/Hongkong/213/03 (H5N1). We talk about the name the letter at the beginning is called a Type, the H5N1 designation or the Hemagglutinin (H) or Neuraminidase (N) designation or whatever the numbers may be is called the Subtype, and the

third part is called the Antigenic Characterization. These different pieces become important for laboratory testing because some tests differentiate between influenza A & B, some will give you a Subtype, and advanced testing will give you the Antigenic Characterization, which is important in vaccine production and predicting what strains of influenza we're going to see circulating around the world.

In terms of transmission cycles, influenza normally transmits from bird to bird just like it does in humans; birds spread influenza to other birds. As part of this, migratory birds such as ducks can become infected with the flu virus. But a lot of these migratory birds have absolutely no symptoms. The birds travel throughout the world on their normal migration routes and in the bird droppings, which can land on poultry farms there are birds that are exposed to the virus in that way. In chickens this virus is highly lethal and can quickly devastate an entire flock of chickens in a couple of days. In addition to that, there is concern that the farmer could be exposed to the infected chickens or to the droppings on the farm. The farmer becomes infected and then there's concern that that farmer could then spread disease to other people through the respiratory route. People sneeze or cough the virus out and it spreads to other people. In avian influenza we have not seen it spread very easily from person to person. The concern is that the virus will change in some way, allowing it to easily spread from one person to other people, spreading influenza to other people in that area and then being a tourist destination the concern is that any person from one of these areas could hop on a plane and wind up bringing the virus into Las Vegas.

The big concern with the virus is that they change every single year. Normally there are strains that affect birds, pigs, and humans. The bird strains typically stay within birds, the pig strains within pigs and the human strains within humans. These viruses have evolved over thousands of years to match the host species so they typically stay within that species. But the concern is that there will be some sort of change to that virus; say H3N2 for example, which is something we commonly see in the United States from one season to the next. There will be slight changes in the virus which make the vaccine production important because it's going to be a different virus that we see every single year and people will not have any sort of residual immunity to what was previously seen. This is called Antigenic Drift and it's a result of small genetic mutations that happen over time. When the virus copies itself it's not perfect and so there

are always tiny little changes going on and sometimes these changes are significant enough to create a new strain that nobody has seen before.

Another concern is what is called Antigenic Shift. In this situation, pigs often serve as a mixing vessel because animals such as birds, pigs and humans can become infected with multiple strains of the virus at the same time. In this example, a pig could be infected by both a H5N1 strain from a bird and an H3N2 strain from a human and the result is some sort of mixing that gives you a H5N2 strain that nobody has seen before and can easily spread to other species or within a species and could potentially cause high death rates and significant illness throughout the world. It's impossible to know if this is going to happen or what's going to happen when these strains mix so the important thing is to monitor how these things are changing over time.

The concern with avian influenza is that it will jump from bird to human and then spread easily from human to human. As I mentioned earlier, the transmission from bird to human is rare and we have not seen significant human to human transmission. The couple of cases we have investigated have also been exposed to birds so it's very hard to say that there has been prolonged transmission from human to human.

One concern is that you will have some sort of small antigenic drift within the bird and now that new strain in birds can easily jump to humans and then cause significant disease and spread easily throughout the world. But at this point in time, that is not what we've seen with avian influenza. The cases we have seen so far have been isolated in Southeast Asia in Thailand, Vietnam, Cambodia, and Indonesia. Human cases have not been identified outside of this region. Bird cases have been identified either in migratory birds or local birds that have had interaction with migratory birds throughout other parts of Asian and Eastern Europe. There have been no cases reported outside of any of these areas. The virus has not been isolated in North or South American and there have been no infections of wild bird populations or domestic bird populations in this part of the world.

The World Health Organization when looking at the spread of disease describes the world wide outbreak of influenza as a pandemic and gives six different categories to describe where we are in terms of pandemic influenza. At this point in time we are at phase three, which is considered the pandemic alert period. There is no or very limited human to human transmission of the virus, we're not seeing it spread easily from person to person and there is no reason to think that it's going to cause a major outbreak at this time. But, it could easily change

and move us up to an easier way to spread virus from human to human and we would then move up the scale, up through six which is the full pandemic phase when there is a worldwide outbreak of disease. It's impossible to know whether we're going to move up very quickly or down very quickly. Just as easily as the virus appears it could disappear. We have no way of predicting where these things are going to happen or what sort of viruses are going to be circulating.

The focus is really on surveillance then, detecting what's happening and understanding. It's kind of like predicting winter. You know that it's going to come, but you're not sure exactly when and how bad it's going to be. It could be a really mild season or it could be a really horrible winter. We have no way of knowing that in advance.

So at the national level the big picture response is really focused on three different areas. The first is on pharmaceuticals, developing a vaccine for H5N1 and manufacturing and stockpiling antiviral drugs, which would provide some protection and help prevent the spread of disease.

Another part of this is once those vaccines and antivirals are produced, there needs to be a distribution plan so we can get these medicines and vaccines out to the population. The final part of this is to perform human and animal surveillance, to look for the disease in both the animal population, the migratory bird population, domestic bird population and in humans. Locally, our focus has been on the last two parts of this program. We do not produce the vaccine or do any sort of manufacturing of antivirals but we'd be responsible for distributing these things to the local population if a major outbreak were to occur. Anything stockpiled by the federal government would be sent to the states to then be distributed to the local populations. We've been working on plans to distribute these and have been testing these plans to see how many people we can vaccinate and how quickly we can hand out antivirals in case of an emergency.

The other important thing that we do at the local level is to perform surveillance. Mainly we look at human cases at the Clark County Health District. We're responsible for tracking all cases of human influenza whether they're caused by avian strains or the normal strains we see each year. In addition, we send samples on for testing at the state and CDC labs to see exactly which strains are circulating and get a better picture of exactly what's going on with influenza each season.

Animal surveillance is being performed by the state and nationally, but by other organizations. They are responsible for tracking the migratory bird populations and have been

working with hunters in conjunction with the hunting season, swabbing ducks and seeing what sort of viruses are being found there and getting a better picture of if the virus is showing up in the United States. So there is constant surveillance to look for any changing in the viruses we normally see or any introduction of new viruses.

That wraps up our presentation on avian influenza. If you're interested in more information about avian flu, follow the links provided on this website to other local, state and federal resources.