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Implementing information security systems ensures confidence in the integrity and accuracy of data in addition to preventing unauthorized access.

Pandemic Influenza – Act Now!

A.V. RISWADKAR AND CLAYTON S. SHOUP

Influenza pandemics have occurred ten times in the past 300 years. While this might rate a pandemic as a low-frequency risk, it is one that is potentially devastating, with many unknown facets. In light of the current global spread of the H5N1 avian flu, many public health experts believe that although the timing and severity of an influenza pandemic may be unknown, a pandemic is inevitable — and possibly imminent.

Pandemic Would Have Wide Impact

Many of these experts fear the widespread impact of such a pandemic. They have resigned themselves to the fact that a pandemic cannot be prevented, and globally, they now are applying considerable energy to developing plans to minimize its impact. With

this in mind, it is time for businesses and individuals to make prudent plans to enhance the resiliency of their businesses and minimize the adverse impact an influenza pandemic would have on their world.

Seasonal Flu vs. Pandemic Flu

Seasonal human influenza is a short-duration, self-limiting infection with typical symptoms of fever and muscle pain — although the illness can be more severe based on virus properties, immunity levels, pre-existing medical conditions, and the age of patients. Most humans, having suffered one bout of seasonal flu, develop some immunity to a closely related flu that occurs the following year. Conversely, humans may not have any natural immunity to a mutated avian flu virus (H5N1), and transmission may result in a pandemic — an outbreak of infectious disease

that affects people across an extensive geographic area with a resulting high death rate.

Without adequate planning and a protection strategy, international travel and the global economy may accelerate the spread of avian flu.

Spread of Bird Flu in Past Decade

Since the early outbreaks of highly pathogenic avian influenza, or bird flu, in China and Hong Kong (1996–97), the deadly H5N1 strain has been detected in waterfowl, parrots, migratory birds, and poultry in more than 60 countries. In addition, over 319 cases of human infections, resulting in 192 deaths, have been reported worldwide, primarily in several Southeast Asian countries.

As of July 2007, Indonesia (102 human cases, including 81 deaths) and Vietnam (95 human cases, including 42 deaths) are the most severely affected countries. Almost all human cases of bird flu involved handling or close contact with infected poultry by the victim. Indonesia reported the only case with possible human-to-human transmission, involving the infection of eight family members. Once the infection is contracted, the fatality rate in humans is a staggering 50 percent to 60 percent. In contrast, the typical seasonal influenza, which affects 10 percent to 20 percent of the population, has a fatality rate around 1 percent.

While new human cases of H5N1 avian flu may have plateaued, the World Health Organization (WHO) and other world health experts believe that the threat is certainly real.

Pandemic Threat

For a pandemic to take place, the virus must undergo several mutation steps, discussed later. Health experts see many similarities between the current bird flu outbreak and the global pandemic of 1918–19 (Spanish flu) that killed an estimated 40 million people.

There have been two other mini-pandemics in the

past century: Asian flu (1957–58) and Hong Kong flu (1968–69). While both were much less severe than the Spanish flu, they still resulted in an estimated one million and up to four million deaths, respectively.

Global Preparedness Plan Is Needed

Experience has spurred WHO to call for a global preparedness plan to address this potential threat. Without adequate planning and a protection strategy, international travel and the global economy may accelerate the spread of avian flu, creating a potential global pandemic.

WHO defines six phases of a pandemic development. According to the WHO classification scheme, we are currently in Phase Three, the “pandemic alert” period, meaning human infections with a new subtype exist, but there has been no human-to-human spread or, at most, rare instances of spread from close human contact. During Phases Four, Five, and Six, the virus would become increasingly adept at human-to-human transmission and spread into the general population beyond localized clusters.

Lower Mortality, Greater Financial Impact Likely

While accurate historic details are not available, the 1918 pandemic produced a very high mortality rate, particularly among the younger population. One theory suggests that older people may have had some residual immunity from earlier pandemics and other flu strains. The extended period of stressful conditions resulting from World War I, general poor health, and lack of good hygienic conditions, medical care, and surveillance may have contributed to the high mortality.

Today’s hygiene and sanitary conditions are much better than they were in 1918. This, coupled with advances in medical care, the availability of antiviral and antibiotic drugs, and present-day vaccine technologies, should dramatically reduce mortality rates. WHO’s global-surveillance and early-alert system also should help in directing a targeted prompt response to limit a virus’s spread. On the negative side, increased global travel and concentration of populations in large urban centers increase the speed at which a virus spreads so rapidly that treating it could overwhelm local medical-care facilities. Global trade and extended supply-chain dependencies could be affected, with a greater financial impact on business and global trade.

Virus Pathogenicity, Mutation, and Survivability

To understand the risk of a global pandemic, we must first understand two important aspects of this infection threat. The first is how the virus may spread and become lethal to humans; the second is how an effective vaccine will be developed and distributed. This will help us understand the importance of coordinated strategy and preparedness planning at the global, national, and organizational levels and also help separate facts from fear and frenzy, thus facilitating the development of a plan for a timely response.

Labeling a Virus

An influenza virus is described by the virus type, subtype, and strain used in the naming convention for viruses. A virus is classified into three major types (A, B, and C) and several subtypes based on the ability of the virus to infect humans, pigs, horses, birds, or more than one type of animal.

A typical virus is enveloped in a layer of lipoprotein (lipid and protein) and glycoprotein (sugar-carbohydrates and protein), which are produced by the previously infected cell or host based on the genetic material of the virus. Three glycoproteins are coded by viral genetic material called hemagglutinin (HA), neuraminidase (NA), and M2. There are H1–H16 immune classes of antibodies for HA and N1–N9 for NA. These immune classes are the basis for naming different influenza virus subtypes and strains, such as H5N1.

Pathogenicity

Pathogenicity refers to the ability of an organism to cause disease in another organism. Most strains of bird flu are considered low pathogenicity avian influenza (LPAI) — except H5 and H7 subtypes, which are highly contagious and have a strong potential to mutate into high pathogenicity influenza (HPAI) that may be pathogenic to humans. All influenza viruses mutate over time by two different processes. One is the normal genetic mutation where small pieces of information are changing at a constant pace and are continually generating very slight changes in the viruses. This process is called antigenic “drift.” Because the human immune response adapts quite easily to these minor changes, no major outbreak of influenza occurs in response to antigenic drift.

Mutation

The second process is called antigenic “shift” and results in gene swapping. When two different strains of a virus co-infect one individual simultaneously, the host may serve as a “mixing bowl” and create a completely new influenza strain through reassortment of the components of the two original strains. This normal change in flu strains occurs routinely every few years but leads to more severe disease symptoms.

Historically, pandemics occur every 20 to 30 years. Since the last pandemic was 37 years ago, many experts believe we are probably overdue.

Immune Responses and Survivability

Humans may have natural or vaccine-induced immune responses to cope with the two parental (original) strains; however, if one strain is a human flu and the other an animal (e.g., bird or swine) flu, a different situation can develop. A particularly adverse mix could result in a new strain with both the lethality of a highly pathogenic bird flu strain and the ability to transmit from human to human. In this case, the new strain has the potential to cause a pandemic because humans have never been exposed to the surface antigens of this new strain of animal origin. Since there is no natural immunity to this new strain and it takes some time for a vaccine to be developed, such a disease could spread by person-to-person transmission.

Flu Pandemic Overdue?

Historically, pandemics occur every 20 to 30 years. Since the last pandemic was 37 years ago, many experts believe we are probably overdue. Avian virus strain H5N1 is particularly dangerous because of the highly pathogenic properties of H5, increasing the fear of a pandemic. If H5N1 mutates to a strain that can achieve efficient and sustained spread from human to human, it could rapidly spread to a large population.

Since H5N1 is not a common strain encountered by humans, there will be no natural immunity to the

virus. An effective vaccine cannot be developed until scientists forensically identify the genetic makeup of a mutated human virus strain and develop and mass produce a tailored product. This presents a significant challenge requiring well-coordinated global surveillance and extraordinary cooperation at all levels of government and society.

Virus Epidemiology

Scientists believe the H5N1 virus can survive up to four days at room temperature (72°F, 22°C) and up to a month or longer at temperatures below 32°F (0°C). The agricultural environment, poultry farms, and live-bird markets provide ideal conditions for the virus to survive in contaminated feed, bird droppings, and soil, resulting in the virus traveling from farm to farm with movement of people, vehicles, animals, and contaminated equipment.

Whether you are a global company or a retail business, an avian flu pandemic could affect every part of your business.

The expected route of exposure in humans is inhalation of airborne droplets containing the virus. These droplets may be spread by sneezing and coughing. In addition, the handling of contaminated equipment and contact with an uncooked infected bird can result in infection. The investigations of the human cases of avian flu in Southeast Asia indicate that infected individuals were in close contact with infected poultry or contaminated surfaces.

Vaccine Challenge

The early identification and prompt isolation of the first human-to-human infection is the critical first step in the chain of events that must occur in order to develop an effective vaccine. International sharing of avian flu samples has been developing and must continue, as no one knows where that first human-to-human infection will occur. Another challenge is the possibility of the occurrence of more than one mutated strain that is pathogenic to humans. A large

number of secondary mutations during human-to-human transmission of the virus could also occur. Either event could further complicate the task of cultivating an effective vaccine.

The U.S. Food and Drug Administration (FDA) has recently approved a vaccine for humans based on H5N1 isolated from a Vietnamese patient in 2004. However, the FDA approved this vaccine only as an interim measure. While this prepandemic vaccine may be less than perfect, due to the emerging nature of the genetic makeup of the pandemic virus, it still may provide early limited protection and help buy some time for scientists to develop an effective vaccine tailored to a pandemic strain of the virus.

Development of Vaccine May Be Too Little, Too Late

Depending on the severity and rapidity of pandemic spread, vaccine production capacity, stockpiling, and distribution may fall short of anticipated global needs. If the virus mutates significantly from its 2004 genetic makeup, the currently available vaccine may not be totally effective. Based on current best estimates, it will take more than six months to identify and cultivate a new influenza vaccine. Some antiviral drugs have been effective in treating flu symptoms.

The pandemic spread may come in several waves, each lasting eight weeks or more, with peaks lasting several weeks during each wave. With each wave, more people may develop immunity and the severity of the pandemic will start to taper off.

Business Continuity Planning for a Pandemic

Although an avian flu pandemic is unprecedented, common sense and lessons learned from the Severe Acute Respiratory Syndrome (SARS) outbreak in 2002–2003 may provide some clues for developing business continuity plans.

Infectious disease outbreaks requiring extended quarantine and isolation of large percentages of the population can significantly affect global trade. Whether you are a global company or a retail business, an avian flu pandemic could affect every part of your business. The consequences and impact may range from widespread product and parts shortages due to severe supply-chain disruptions to extended worker absenteeism, illnesses, and even fatalities.

All Businesses Need a Plan

All businesses should have a strategy to reduce a pandemic's impact on employees, customers, suppliers, and other stakeholders and to prepare for an unprecedented business interruption. Impact will differ depending on business type, requiring different priorities and responses.

Information and Guidelines Available

WHO and national health bodies are providing valuable information, including country maps showing the spread of bird flu, targeted actions taken, and any necessary travel advisories. These maps can be valuable resources for understanding the pandemic threat and assessing the threat to your business. They can also help you monitor the progress you make.

Health officials in many countries have released guidelines that will probably be the first line of defense. For example, the United States has issued worker safety guidelines for farm workers and animal handlers, medical and laboratory workers, food handlers, and airline flight crews. New Zealand has published guidelines for businesses to help them develop business continuity plans. Although travel bans are not in effect, recommendations have been issued for travelers going to Southeast Asia to avoid farm areas and live-bird markets.

Plans Must Be Flexible

To survive a pandemic, businesses need a flexible and robust business continuity plan (BCP). A BCP helps establish your response to the adverse consequences immediately following a disaster and short- and long-term actions through the disruption until normal business resumes. Many experts believe that companies without a contingency plan suffer greater losses than businesses with established and up-to-date BCPs.

Most BCPs are based on sudden, short-lasting events like fires, bombs, or terrorist attacks. Because a pandemic's effects are long-lasting — with large-scale absenteeism and disruptions both inside and outside the organization — plans must be adaptable. Business continuity experts are finding that very few businesses are prepared for this risk.

Any plan for handling a pandemic is better than none. Although plans will vary in details, every plan should be adaptable to rapidly changing situations. It should cover prevention and surveillance, prepared-

ness, and response and implementation activities. The level of detail for concrete steps and roles and responsibilities should increase as WHO and national public health bodies provide additional guidance based on pandemic development.

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Specific Issues Relative to Pandemics

When adapting existing BCPs for pandemic influenza, there are specific issues to address. One is minimizing the spread of communicable disease. Some general methods of addressing this issue include teaching employees to use good personal hygiene and appropriate coughing etiquette. For example, encourage the use of hands, tissues, or other means to prevent the spread of aerosol droplets when coughing and sneezing, particularly with those suspected to be ill. Teach employees to dispose of tissues appropriately.

As much as possible, mandate social distancing of three to six feet (one to two meters) for employee interaction. Separating workers by three to six feet or more minimizes the chance of spreading the disease. These simple methods can help prevent the spread of any communicable disease at work and at home.

Along with considering basic disease control, businesses also should form a pandemic flu committee to review specific business vulnerabilities, develop plans, and implement needed changes. This committee would also monitor the pandemic flu situation and provide advice to senior company management on the implementation of continuity planning steps during a pandemic crisis.

The Pandemic Flu Committee

A committee should be developed with the sole purpose of reviewing, planning, and overseeing the company's pandemic flu response. This committee should include representation from all aspects of the business. The team leader should be a person knowledgeable in the business and high enough in the organization to get the job done.

Another important member is a medical advisor who understands the company and the influenza pandemic threat and can provide sound advice regarding issues such as medication stockpiling and proactive employee treatment. A human resource representative can discuss potential impacts to policies and procedures. Members of the engineering, production, and maintenance staffs are critical to provide advice and make decisions on process and scheduling changes that will be necessary if an outbreak occurs. Health, safety, and security officers can provide perspective on closures, evacuation, personal protective equipment, engineering controls, and other measures. Cleaning and janitorial representation is important for implementing proactive sanitation practices and leading discussions on cleaning and sanitation procedures if employees or visitors become ill onsite.

Committee Functions

Once the committee is in place, it is time to review the following vulnerability areas.

Identify Critical Processes and Functions

First, identify and review the critical business functions and processes that must continue for your business to remain viable.

- Determine which processes can operate automatically, which need minimum worker support, and which would have to operate as usual with full worker support.
- Consider whether some processes can be managed remotely, then determine if your IT (information technology) infrastructure will support this.
- For processes that must operate normally with the usual number of employees, consider ways to adjust work schedules in order to minimize employee contact. This may involve adjusting process or shift times.
- Consider ways in which government intervention might suspend or reduce your business, such as the effect government-imposed travel restrictions will have on your business. The effect would likely be greater on the hospitality industry than on a manufacturer with one location.

Evaluate Critical Suppliers and Customers

With the advent of global “just-in-time” business practices, it is important to identify the suppliers that provide critical raw materials, component parts, or services that you need to keep essential processes operating. These supply-chain concerns are not specific to pandemics. These steps would apply to address any number of supply-chain risks. It may be appropriate to evaluate the BCPs of suppliers who provide critical raw materials from facilities that reside in pandemic flu “hot spots,” such as Asia.

- Review your inventory of materials and determine how long critical processes can operate if supply chains are interrupted.
- Review the availability of alternative suppliers in case your regular supplier is unable to meet your needs. It might be appropriate to stockpile a small quantity of the most critical supplies to minimize process shutdown or upset.
- Likewise, it is essential to determine which of your customers consider you a critical supplier so you can focus resources on their support. Which processes must function to meet your customers’ needs? Do these processes match those identified as critical earlier?
- Prior communication and coordination with both suppliers and customers is the key to assuring a stable supply chain during a pandemic.

Identify Essential Employees or Expertise

Identifying the critical employees or expertise that must be protected and maintained to continue your business is crucial.

- Determine ways to protect critical employees through isolation, remote work, or medical intervention, such as vaccination, to keep them available to support the business.
- Review core skills and backup possibilities, such as cross training to spread expertise.
- Consider the availability of temporary workers, such as retirees, contractors, or special employment agencies, to support business processes.

- Establish and test remote working arrangements for certain employees or business functions to assure they will operate effectively when needed. If remote working arrangements figure prominently in your plans, review your current IT and telecommunications systems in light of the projected need to handle the increasing remote work. At least one national telecommunications firm is recommending that its customers implement infrastructure changes well before the pandemic occurs.
- Consider adjusting best practices or your business culture to encourage telephone or video conferences rather than face-to-face meetings.
- Examine travel plans as they relate to government or WHO travel warnings and adjust as appropriate. This may involve restricting travel to certain areas or eliminating travel altogether for short intervals during pandemic waves.
- If your company has expatriate employees, consider the viability and methods of supporting them during a pandemic outbreak.

Review Sick Leave and Other Human Resources Policies

You may need to readjust human resources policies in advance of a pandemic.

- Review your current sick leave and disability policies, as well as any government-mandated leave policies.
- When a pandemic takes place, four types of employees will emerge:
 - those who are healthy and willing to work;
 - those who are healthy but afraid to come to work for fear of acquiring the disease;
 - those who are ill and need to stay at home to recuperate; and
 - those who are ill but come to work because of a sense of duty, monetary need, or other reason.
- Adjust your human resources policies and best practices to encourage healthy employees to come to work and ill employees to stay home. You may need to adopt a carrot-and-stick approach — such as salary continuance to enable ill workers to stay at home and disciplinary actions when ill employees come to work.
- Look for opportunities for healthy employees to work remotely if they have sick family members or are genuinely concerned about getting sick.
- Consider ways to monitor the timing of employee return to work after illness to prevent infection of healthy workers.

Review Physical and Security Considerations.

Facility layout, physical process, and workstation arrangements may affect the spread of disease.

- Review the physical layout with an eye toward promoting social distancing (three to six feet) to minimize potential infections. Consider staggering lunch times or work shifts to reduce worker density in cafeterias, break rooms, and the general work area.
- The U.S. Occupational Safety and Health Administration (OSHA) suggests that work areas be classified as high, medium, and low exposure, depending on the chance of infection and interaction with others. For example:
 - High exposure work areas expose workers directly to the pandemic-virus-infected or potentially infected individuals and are located in places such as research laboratories and health-care facilities.
 - Medium exposure work areas expose workers to a high frequency of contact with customers or co-workers and occur in industries such as banking, hospitality, and retail.
 - Low exposure work areas require that workers have a minimum level of contact with customers or co-workers and include places such as a typical office or manufacturing setting.

You can apply the analysis of exposure level to your decision-making process regarding the ap-

appropriate use of engineering controls or personal protection equipment. OSHA's Web site contains information on suggested control measures for each exposure level.

- Post signs at building entrances outlining company policies about the presence of ill employees and visitors. Unlike the relatively easy process of ascertaining victims of SARS, screening individuals entering the building will not likely identify potential flu sufferers.
- Consult with the maintenance and janitorial staff and develop plans to clean and sanitize work areas to minimize spread of disease (for example, if an employee becomes ill).
- Maintain an inventory of disinfection materials, possibly even facial tissues, to support employees' personal hygiene efforts.

Develop Communication and Education Packages

Consistent communication and employee education will help support your efforts to manage the pandemic flu threat within your business.

- Your communications package should include:
 - a discussion of the pandemic flu threat and steps the business is taking to protect employee health and the business;
 - special sick leave or "working ill" policies and expectations;
 - general information on pandemic flu, such as the signs and symptoms, treatment options, and support mechanisms for obtaining appropriate medical care;
 - cleaning and disinfection tips and other ways

Exhibit 1

World Health Organization Classification of Pandemic Stages

Pandemic Phase	Stage	Action Plan
1	No new influenza strains, low risk of human cases.	Develop BCP plans and communicate them to employees and stakeholders.
2	New virus strains in animals, no human cases, higher risk in humans.	Review existing BCP plan to consider vulnerability for communicable disease and pandemic.
3	Human infection with new strain, but no human-to-human transmission.	Review current plan and policies and adjust as needed to adapt to pandemic threat, including issues such as adequacy of infrastructure and remote operation options. Monitor government public-health information sources for new pandemic information. Plan employee education about the plan. Conduct BCP tests or drills and adjust as needed based on results.
4	Small clusters of infection, but no or limited human-to-human transmission.	Monitor government information sources for new information. Begin employee education and implement selected BCP components, such as hygiene, vaccination, and remote operations.
5	Larger yet localized clusters that suggest human-to-human transmission.	Implement BCP in geographic areas affected by the influenza clusters. Place other areas on standby alert.
6	Increased and sustained human-to-human transmission.	Fully implement BCP in all areas. Monitor government sources for information and restrictions on travel, commerce, and other areas and implement or adjust BCP components as appropriate.

to assure cleanliness of all facilities; and

- a description of methods that will be used to communicate important operational information to workers.
- Begin communication immediately by acknowledging the pandemic issue and outlining the game plan the company is following to evaluate and address the threat. Existing suppliers, such as health insurance providers, wellness program managers, or janitorial firms, may be able to assist you in the development of certain aspects of your educational program.

Match BCP Steps With the Stage of the Outbreak (Pandemic Phases)

Once all aspects of the business threat of pandemic flu have been reviewed and plans established, be ready to implement specific plan features at the appropriate time. Exhibit 1 shows the WHO-identified stages of a pandemic, with some possible action plan considerations for your pandemic BCP activities. This should provide a basic roadmap so an organization can plan responses consistent with WHO pandemic stages.

According to the WHO classification, we are currently in Phase Three, “pandemic alert” period (human infection with new strain but no human-to-human transmission). At this stage, businesses should be reviewing their existing BCP plans in light of potential pandemic threat.

Failure to Plan Is Planning to Fail

Developing robust business continuity plans is a prudent measure for any business, even if a pandemic does not occur. If you already have business continuity plans in place, this is the time to update the applicable scenarios for this potential threat. Once the pandemic reaches Phases Four and Five, with the avian flu virus increasingly becoming adapted to human-to-human spread, the window to plan and act may be very small.

The time to plan is right now. Will you be ready?

Resources

World Health Organization, “Epidemic and Pandemic Alert and Response (EPR),” <http://www.who.int/csr/>

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