Some animals, such as pigs, can be infected with influenza viruses normally found in other species. When this happens, these viruses come in close contact and may exchange genetic traits, creating new strains.

As we entered the new millennium, a wide variety of diseases began to emerge. The threat of a pandemic influenza was ever present. The entire world, however, was focused on avian influenza (bird flu), also known as H5N1, which was present primarily in Asia. This particular influenza strain was extremely pathogenic, resulting in death in >60% of infected patients. However, this particular strain of influenza was not very transmissible from person to person. **Seasonal Influenza:** Influenza is a fact of life. It is one of the most common forms of annual disease and occurs each season, usually in the fall or winter months in the United States. This is primarily because the virus favors cool environments and low humidity, which is characteristic in winter and fall. The seasonal influenza virus is extremely infectious, infecting about 10% to 20% of the population each year. In the U.S., >225,000 people are hospitalized and up to 40 million people require outpatient medical visits for seasonal influenza each year. Complications can be extremely serious, especially in the elderly (age ≥60 years) and the very young (age ≤2 years). It can also be very serious in people who have compromising medical conditions, such as respiratory problems and other related diseases. **Influenza Virus:** Genetically, influenza viruses are in a constant state of change. Sometimes they change very slightly in what is called antigenic drift; their genes just drift a little bit, making them unique from season to season and allowing them to be infectious. Therefore, even if a patient was infected with the influenza virus last year, the virus will have changed enough in a subsequent year that the patient can be reinfected with the newer strain. However, humans have had many years of experience with these viruses. While people can become ill and complications can be severe in a small number of individuals, most people infected with seasonal flu only have traditional flu symptoms: fever, sore throat, cough, malaise. Traditionally, symptoms last for several days, and most of these infections resolve without hospitalization or even medical treatment. Periodically, however, the genetic constitution of a strain of influenza completely changes via a process called antigenic shift in which the new strain acquires new traits. Most often, this occurs in a mixing vessel. These viruses are species-specific. For example, influenza viruses can be specific for birds (avian viruses), pigs (swine flu viruses), or humans. However, some species can be infected with multiple strains of viruses (pigs can be infected with swine, human, and avian influenza strains). In this environment, these viruses come in close contact with each other and may exchange genetic traits ("reassortment"). (Reviewer-).
An unidentified virus was causing numerous flu-like illnesses in the United States and Mexico in early 2009. The Centers for Disease Control and Prevention eventually determined this to be an influenza A virus of swine origin.

(Card 1 of 4) The most recent pandemic virus, H1N1 (also known as swine flu), results from the mixing of several different viral strains and a reassorting of their genes to create the novel virus. The first reports of this new infection occurred in February 2009. Experts believed that patient 0 was a 6-month-old girl from northern Mexico. By March 3, cases of influenza were initially recognized in Mexico City and its surrounding area. On March 11, 2009, the first documented symptomatic resident of Mexico City was reported, and the infection was confirmed as an influenza A (H1N1) virus (swine flu). Many influenza A viruses circulate, and initially, this particular virus was not thought to be any different than other circulating viruses at that time. By March 18, the Mexican authorities began to report multiple people with influenza-like illnesses in and around Mexico City. On March 30, the first case in the United States appeared. This case was a 10-year-old boy who went to the Naval Medical Center in San Diego, California, with fever, cough, and vomiting. A swab of his throat and nose was taken and sent for analysis. On April 1, the boy was diagnosed with a probable influenza A infection, but the subtype was unidentifiable. The sample was sent for further analysis, and this was the first clue that we might be dealing with a unique strain of virus. The global alert system was activated at this time from reports in Mexico City surrounding strange respiratory outbreaks in the state of Veracruz that had killed several people. By April 6, the local Mexican health officials had declared an alert because of these respiratory diseases in the area around Veracruz, Mexico. In the local areas, approximately 60% of inhabitants were infected, and 3 deaths were associated with these infections. The local population attributed this outbreak to the numerous pig farms in the area. By April 7, Mexican health authorities began to investigate this cluster of diseases. By April 12, Mexican health authorities confirmed the existence of flu-like acute respiratory infections. Although this was believed to be a potentially serious public health problem that might have international ramifications, there was no link at that time to pigs or pig farms. By April 13, isolates once again were shown to be unidentifiable, and specimens were sent to the Centers for Disease Control and Prevention (CDC) in the United States for further analysis. By April 14, the CDC determined this unidentified virus to be an influenza A virus of swine origin. (Reviewer-).
The novel H1N1 influenza virus associated with 2009 pandemic had properties of swine flu, avian flu, and human flu. Therefore, this represented a triple reassortment of several viruses to generate the H1N1 virus.

(Card 2 of 4) In February 2009, the first infections in the outbreak of the novel H1N1 influenza virus were reported. In March 2009, several infections around the area of Veracruz, Mexico, were reported. By April 21, the Centers for Disease Control and Prevention (CDC) published the first dispatch in Morbidity and Mortality Weekly Report (MMWR) about 2 cases of this novel H1N1 influenza in California. Mexico also began to report atypical influenza associated with severe pneumonia cases in several Mexican cities. By April 23, 2009, the CDC and other international agencies confirmed that the cases in Mexico were the same H1N1 of swine origin. The genetic analysis showed that the virus was a mix of avian and swine influenza viruses from North America, a swine flu usually seen in Asia, and a human influenza virus. This is the first confirmation of the existence of a new reassorted virus. This was actually a very frightening finding because this virus not only had properties of swine flu, but it also had properties of avian influenza and human influenza. Therefore, this represented a triple reassortment of several viruses to generate the H1N1 virus, which presented significant public health ramifications. By April 24, the CDC reported 6 new cases in the United States with increasing evidence that the virus was actually transmitted from person to person. In addition, the CDC publicly linked the same strain of the H1N1 in the U.S. to that of the Mexican outbreak. The World Health Organization received reports from Mexico of 884 suspected cases (most in Mexico City) and 62 deaths. This was a relatively significant finding because the morbidity rate associated with these cases was relatively high at about 7% to 8%. Even more startling was the fact that most of these cases occurred in young healthy adults who, prior to this time, had not had higher rates of mortality with seasonal influenzas. (Reviewer-).
In June 2009, the World Health Organization declared that the novel H1N1 influenza virus was causing a global pandemic. At that time, most people infected with the new virus were aged <25 years.

(Card 3 of 4) In February and March 2009, early reports began surfacing from the United States and Mexico of a flu-like illness caused by an unidentified strain of influenza A virus. By April, the strain was identified as the novel H1N1 influenza virus (swine flu). **Public Health Emergency:** On April 25, 2009, the World Health Organization (WHO) declared a public health emergency of international concern. By April 26, cases were reported in 5 states in the U.S. and in New Zealand and France. **Phase 4 Alert:** By April 27, Canada and Spain reported cases to the WHO, causing the WHO to raise the pandemic alert from Phase 3 to Phase 4, indicating sustained human-to-human transmission in a community. By April 29, the Ministry of Health in Mexico reported 2155 patients with severe pneumonia and 100 deaths. **Phase 5 Alert:** The WHO again raised the threat level from Phase 4 to Phase 5, indicating sustained community transmission in ≥2 countries. At this time, 10 countries reported confirmed cases, with the first cases in Asia appearing in South Korea that same day. By May 3, the WHO reported cases in 18 countries and suggested that they may declare a full-scale pandemic. On May 5, the first American died — a 33-year-old schoolteacher who had recently given birth to a healthy baby. By May 7, Mexico reported 12,000 suspected cases, of which >1000 cases were confirmed. By May 9, the global dispersion of cases matched international air traffic patterns from Mexico City. This significant finding linked international travel to the dissemination of this emerging influenza strain. A number of very rigid travel restrictions were initiated, primarily to Mexico and the United States. By this time, 30 countries were reporting 5200 confirmed cases, 90% of which were from the United States and Mexico. **Vaccine:** On May 19, the WHO produced a seed stock for production of the first H1N1 vaccines, which they hoped would be ready in mid-July. Given that vaccines take up to 6 months to manufacture, some questioned whether a safe and effective vaccine would be ready in time for the winter influenza season in the United States and the northern hemisphere. **Phase 6 Alert:** By June 11, the WHO declared a Phase 6 alert due to indisputable evidence that the new H1N1 virus was causing a global pandemic. At this time, 74 countries were reporting a total of 28,774 confirmed cases and 144 deaths. Most people in the world with H1N1 infection were aged <25 years, and one third of serious cases were in previously healthy young people. (Reviewer-).
During the 2009 H1N1 influenza pandemic, no one appeared to have immunity against the new virus, and anyone coming in contact with the virus could become infected. Therefore, this virus spread very quickly among populations.
Origin of Swine Flu Virus: Pigs are vulnerable to a number of influenza viruses. It is believed that pigs can be infected by avian, human, and swine influenza viruses. When influenza viruses from different species infect pigs, the viruses can reassort, and new viruses that result from the mixing of swine, human, and avian viruses can emerge. As of November 2009, 4 main influenza A virus subtypes had been isolated in pigs: H1N1, H1N2, H3N2, and H3N1. Human Symptoms of Swine Flu: Symptoms of swine flu in humans are very similar to those of seasonal influenza: fever, lethargy, loss of appetite, coughing, and sore throat. Unlike seasonal flu, swine flu may have gastrointestinal symptoms. Transmission From Pork? Can people catch the swine flu virus from eating pork and pork products? No. If the meat is cooked, then the viruses are killed, and there is no chance of infection through eating pork. Swine Flu Transmission: How does the H1N1 virus spread? Influenza viruses are characteristically spread from person to person primarily through respiratory droplets expelled when people cough and sneeze. When a person coughs or sneezes without containing their cough, these droplets are spread into the air. Transmission is via contact with these droplets, so close contact between the source and the recipient is necessary. Because these droplets do not remain in the air, they are disseminated onto surfaces, and viral transmission may occur when people contact any of these surfaces and subsequently touch their nose, mouth, and/or mucus membranes. Incubation & Duration: A typical incubation period for influenza, including swine flu, is 1 to 4 days. Adults can be infectious the day before symptoms appear. This is significant in health care settings because a person can be completely normal or feeling just a little ill and be shedding influenza viruses. Adults can subsequently shed viruses of the infection for 5 to 7 days after onset of illness. Children can be infectious for longer times, sometimes >10 days. The virus is aerosolized in the droplets when people cough and sneeze, and it is also contained in nasal secretions. (Reviewer-).
Symptoms of H1N1 infection are not very differentiable from traditional influenza, except that H1N1 has a high rate of gastrointestinal symptoms that are uncharacteristic of seasonal influenza viruses.

The epidemiology of the H1N1 influenza outbreak in the United States has been followed since the beginning of the 2009 epidemic. As of November 2009, all 50 states had confirmed cases of H1N1 swine flu. By September 2009, the Centers for Disease Control and Prevention (CDC) estimated that approximately 25,000 students were dismissed from secondary schools due to H1N1 infection. Of U.S. colleges and universities, 73% were declaring high rates of influenza-like illnesses, with the highest rates being in the southeast and southwest. Clinical Symptoms: Clinical symptoms of H1N1 infection are not very differentiable from traditional influenza. The most common symptoms are a sudden onset of fever, usually ≥100°F, headache, fatigue, dry cough, sore throat, runny nose, and muscle aches. Additionally, H1N1 has a high rate of gastrointestinal (GI) symptoms, such as nausea, vomiting, and sometimes diarrhea. These GI symptoms are uncharacteristic of seasonal influenza viruses. However, because the H1N1 virus results from the pooling of several viruses (most likely swine and avian influenza viruses), other symptoms frequently accompany H1N1 infections. Testing: Cases are documented by testing done by the CDC and are confirmed with reverse transcriptase-polymerase chain reaction or viral cultures. As of September 2009, 99% of isolates tested in the U.S. were positive for H1N1 influenza. Therefore, up to that time, most cases of influenza diagnosed in the U.S. were an H1N1 infection. Complications: The main complication of H1N1 infection is the exacerbation of underlying chronic diseases. Individuals with an underlying illness may have one of the highest rates of adverse reactions to the H1N1 infection because they already have disease, they already have respiratory impairment, and they are very vulnerable to subsequent infections. Complications can be related to upper airway infections (including sinusitis), pulmonary complications (including bronchitis and asthma), acute exacerbations of chronic bronchitis, and other miscellaneous conditions (including cardiac disease, central nervous system disease, and bacterial pneumonia). One of the most severe H1N1-related complications is pneumonia, and very high rates of pneumonia have been reported. Pneumonia often is reported in patients with a median age of 49 years and in pediatric patients. However, most patients have mild symptoms and recover within a few days without medical intervention or hospitalization. However, a very small subset of individuals are young, previously healthy individuals who seem to develop severe pulmonary disease that progresses to acute respiratory distress syndrome, which may occur with or without underlying preexisting medical conditions. In addition, pregnant women seem to be especially vulnerable and have a high rate of severe adverse sequelae, including development of pneumonia and death. (Reviewer-).
When an H1N1-infected individual coughs or sneezes, respiratory droplets laden with viral particles are released, begin to evaporate, and become increasingly more concentrated with viral particles.

In 2009, the World Health Organization declared that the H1N1 influenza virus (swine flu) had caused a worldwide pandemic. Like other health care providers, oral health providers must focus on how to prevent transmission of the H1N1 virus. We must be concerned about protecting ourselves, our staff, and our patients. Because we must interact with one another in public places during various social, personal, and professional activities, there is absolutely no way we can isolate ourselves from contact with seasonal influenza, H1N1 influenza, or any other circulating respiratory pathogen. However, there are personal and professional precautions that we can take to limit transmission of these viruses. **Transmission:** These viruses are spread when an infected individual coughs or sneezes, releasing respiratory droplets laden with viral particles. Upon hitting the air, these large moisture-laden droplets begin to evaporate, making the droplets both lighter and increasingly more concentrated with viral particles. Therefore, these particles become more infectious, containing a significant number of viruses that are being disseminated in the air. Eventually, the particles settle, and the viruses can be transmitted from person to person either directly (inhale particle or directly contact the particle) or indirectly. Indirect contact results from first picking up viral particles on our hands, and then inoculating our eyes, nose, mouth, and/or mucus membranes with the particles. **Respiratory Hygiene & Cough Etiquette:** One very important prevention strategy is respiratory hygiene and cough etiquette. It is recommended that, when a tissue is not available, cough or sneeze into your elbow rather than coughing into your hand. If you cough or sneeze into your unprotected hand, you will expel viruses onto your hands. Then, you will infect any surfaces that you touch, increasing the transmission risk of any respiratory pathogens that might be in the secretions. **Use of Tissues:** A second fundamental practice in respiratory hygiene and cough etiquette is the proper use and disposal of tissues. If possible, cover your mouth and nose with a tissue when you cough and sneeze. In every dental office, the operatory always has tissues. However, we also must provide tissues in patient reception areas and other areas so that both staff and patients have ready access to the tissues. Also, trash receptacles must be readily available for proper disposal of used tissues. (Reviewer-).
Colds and flu viruses are readily spread by contaminated hands when touching the eyes, nose, and mouth. These viruses are very infectious, and only 1 to 10 viruses are needed to cause disease.

In 2009, the H1N1 influenza pandemic forced health care providers to once again focus on their role in preventing disease transmission. The practice of cough etiquette helped to prevent spread of viral-laden droplets. However, our best efforts cannot completely prevent contamination of surfaces around our work areas and other areas with which we come into contact. **Hand Hygiene:** A fundamental preventive measure that anyone can practice is hand hygiene. Hand contact is responsible for 88% of all disease transmission. Therefore, washing hands with soap and water is especially important. When using soap and water, wet the hands, lather with soap, and wash vigorously for 15 seconds, which is a relatively long time. Most people wet their hands, apply soap, wipe their hands together for a very brief time, rinse, and then dry. To extend the scrubbing time, get into the habit of counting out the recommended 15-second interval. Once you have scrubbed your hands for 15 seconds, rinse, and then dry thoroughly. **New Technology:** Some new products have been very useful in helping us perform hand hygiene. These are the alcohol-based hand sanitizers that contain >60% alcohol and have been found to be very effective in disinfecting the hands. These are not cleaners — they are disinfectants. You will find dispensing systems for alcohol-based hand sanitizers in almost every major hospital and in many institutions in the United States. To use these products, simply dispense a small amount of the alcohol-based hand sanitizer onto your hands and rub thoroughly over the surfaces of the hands until it evaporates. **Other Strategies:** Avoid touching your eyes, nose, mouth, and mucus membranes until you have performed hand hygiene. Remember, cold and flu viruses are readily spread by the hands. Contaminated hands transmit these viruses when touching the eyes, nose, and mouth. These viruses are very infectious, and only 1 to 10 viruses are needed to cause disease. (Reviewer-).
Deferral of elective dental care is prudent in times of the H1N1 influenza pandemic to prevent the spread of this virus. Anyone with a temperature of >100°F should probably have elective procedures deferred.

In 2009, health care providers once again focused on their role in preventing disease transmission when the H1N1 influenza pandemic became a worldwide problem. Two important preventive measures were cough etiquette and hand hygiene, which prevented the spread of viral particles from contaminated surfaces to the eyes, nose, mouth, and mucus membranes. **Avoiding Contact:** One very important measure to prevent H1N1 transmission is to avoid contact with infected individuals. This involves deferring elective dental care on any patient presenting with signs and symptoms of influenza, including fever, sore throat, and runny nose. Deferral of elective dental care is prudent in times of pandemic influenza to prevent the spread of this virus to the dentist, the dental staff, subsequent patients in the operatory, and patients who may contact the infected individual in the office or waiting area. A patient’s body temperature is an excellent gauge for determining if a suspicious case may be infected in influenza. Anyone with a temperature of >100°F should probably have elective procedures deferred until after the temperature has resolved without use of fever-reducing medications, such as aspirin or acetaminophen. If a patient has urgent care needs (pain, swelling, infection), the minimum intervention should be performed, such as antibiotics, analgesics, palliative treatment, and the least-invasive procedure until after the patient has resolved the acute viral infection. **Social Distancing:** Follow public health advisories regarding closures of schools, avoiding crowds, and other social distancing measures. Be highly aware that these viruses are spread very efficiently from person to person. Try to avoid situations in which a large number of infected individuals may be present. (Reviewer-).

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Keywords: Influenza Virus, H1N1, 2009 Pandemic, Prevention, Avoiding Contact

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During the 2009 H1N1 influenza pandemic, 4 vaccines were licensed. One was an intranasal vaccine containing live attenuated virus, and the other 3 were injections containing killed virus.

During the 2009 H1N1 influenza pandemic, health care professionals were put on alert to help reduce disease transmission. **Get Vaccinated:** One very important preventive strategy is proper vaccination of the dentist and dental staff members. The rate of vaccination for dental health care workers is very low, especially for seasonal influenza vaccinations. Traditionally, the seasonal flu vaccine is recommended on an annual basis. It is my experience that dental health care workers have a really low rate of compliance (probably <20%) with this recommendation. During the H1N1 pandemic, vaccination of all health care workers became especially important. **Vaccines:** The seasonal influenza vaccine does not protect against the swine flu (H1N1), but vaccination with the seasonal flu vaccine continues to be important. To protect against H1N1 infection, 4 vaccines have been licensed as safe and effective by the United States Food and Drug Administration. **Vaccines With Live Attenuated Virus:** Of these 4 vaccines, 1 contains a live attenuated virus. This was the first vaccine that was made available. This vaccine is discharged into the nasal passages and is contraindicated in anyone aged >50 years or anyone aged <2 years. Therefore, anyone aged 2 to 49 years may receive the intranasal vaccine containing the live attenuated virus. **Vaccines With Killed Virus:** Of the 4 licensed vaccines, 3 contain killed virus and are administered as injections. During the 2009 H1N1 pandemic, finding this vaccine became of primary importance because it was in very short supply throughout the United States. Because of this shortage, many individuals found it very difficult to find vaccination sites or to find available vaccine. Like all health care workers, any dental health care worker was in the primary indicated group for H1N1 vaccination. (Reviewer-).
For dentists who must treat H1N1-infected individuals, droplet precautions and use of the N95 respirator are recommended. However, before wearing this respirator, the dentist must be fit-tested and undergo a medical evaluation.

As of November 2009, there was no doubt that the H1N1 virus had spread throughout the world after its initial outbreaks in Mexico City reported in February 2009. At this time, there were hundreds of thousands of cases throughout the world. Individuals who had not been vaccinated had no immunity. The H1N1 virus was expected to persist for some time beyond November 2009, infecting many more people. **Public Health Precautions:** Some very basic public health measures help reduce exposure to this virus. The primary measures are respiratory hygiene and cough etiquette. Be considerate of everyone — cover your cough and cover your sneeze. Dispose of all used tissues properly. Perform hand hygiene. You simply cannot wash your hands enough times a day to prevent the spread of disease. However, the more times you perform hand hygiene, the less likely you are to become infected. Of course, all standard precautions should be followed in dental offices. **Droplet Precautions:** If you must treat a patient with a known H1N1 infection, the Centers for Disease Control and Prevention (CDC) recommends droplet precautions and use of a specialized respirator called an N95 respirator. These are available from all distributors, but you must specifically ask for the N95 respirator. However, the National Institute for Occupational Safety and Health and the Occupational Health and Safety Administration require that the individual who will wear the respirator be fit-tested and undergo a medical evaluation before they be allowed to use these masks. The medical evaluation helps ensure that no underlying respiratory diseases are present that can be exacerbated by use of the N95 masks. **Vaccination:** Finally, vaccination is very important if the chain of infection is to be broken. One of the key ways to break the chain of infection is to make the host resistant to the disease. This can be accomplished very effectively with vaccination. My recommendation is that, unless an underlying medical contraindication for receiving the vaccine is present, all dental health care workers be vaccinated for both seasonal and H1N1 influenza. (Reviewer-).

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Keywords: Influenza Virus, H1N1, 2009 Pandemic, Prevention

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Influenza A viruses are subtyped based on 2 surface glycoproteins: hemagglutinin and neuraminidase. Influenza A is capable of infecting different species, while the reservoir for influenza B is only humans.

Influenza is a fact of life. There are 3 types of influenza viruses: influenza A, influenza B, and influenza C. These are distinguished by specific antigenic differences in their viral components. Effects of Influenza: Influenza is a serious disease. It kills up to 500,000 people in the world every year. Influenza is not a cold — it is far more dangerous than a cold. It is a virus that directly infects the lungs, leading to pneumonia and other adverse sequelae. Every year in the United States, seasonal influenza infects up to 26% of the adult population. This is associated with 36,000 deaths in the U.S., with 90% of these deaths being attributed to pneumonia in patients aged >65 years. Influenza is associated with substantial absenteeism and loss of productivity, with an estimated total annual cost of $37 billion. Airborne Transmission: The influenza virus has been studied extensively, and at least 1 report has documented airborne transmission of this virus in a hospital emergency department (ED). This particular study found that, on 3 separate days, influenza A virus was found with >50% of isolates derived from air samplers for aerosolized particles. The air samplers were in the waiting room, in the reception rooms, and worn by physicians treating patients in that ED. The authors concluded that influenza A can be spread by airborne transmission. Pediatric Risk: In June 2008, the Centers for Disease Control and Prevention issued a health advisory stating that there was a high incidence of pediatric mortality with coinfection of Staphylococcus aureus and influenza infections. Influenza A: Influenza A is subtyped based on 2 surface glycoproteins: hemagglutinin (H) and neuraminidase (N). There are 16 strains of H and 9 strains of N, hence the viruses are categorized by H1N1, H3N2, etc. These viruses are capable of infecting multiple species and can jump between species, such as from birds to pigs to horses to dogs. Influenza B: Influenza B has only 1 reservoir — humans. It has less mortality in most years when compared to influenza A. It is often associated with epidemics but not pandemics. Influenza C: Influenza C generally causes a mild disease and has sporadic spread. (Reviewer-).
Pandemics are caused by emerging novel viruses or subtypes that have never circulated or have not circulated for a very long time among people. Because no one is immune, these viruses can gain global distribution.

Influenza A is a virus containing genomes composed of 8 separate segments of negative-sense RNA that can mutate to form completely new viral strains through the processes of antigenic drift or antigenic shift. Antigenic drift is a gradual change caused by a series of point mutations in the hemagglutinin (H) and neuraminidase (N) surface glycoproteins over time. Influenza A can also form new viral strains through the process of antigenic shift, which is an abrupt change in H or N usually derived from reassortment (mixing of genes from different viral strains) within a different species. H allows the virus to attach to the human respiratory mucosa, while N allows the virus to penetrate into respiratory secretions. Both H and N are very specific proteins. For example, a human virus with H and N generally cannot infect a pig, and a pig or a bird virus cannot normally infect a human. However, through the process of reassortment, viruses can acquire different properties. For example, a swine flu virus can develop an H or an N with human properties that will attach to very specific human respiratory receptors, allowing that virus to be transmitted efficiently to a person. Once a human is exposed, the H component of influenza A virus binds onto sialic acid sugars on the surfaces of host cells typically found in the nose, throat, and lungs of mammals. Once reassortment occurs, the virus can completely change its properties, and as these new influenza A viruses emerge, they can be spread very efficiently and very quickly from person to person, resulting in localized epidemics. As the infection gains momentum and more people become infected, pandemics can develop. Pandemics are caused by newer novel viruses or subtypes (1) that have never circulated among people or (2) that have not circulated among people for a very long time. The newly emerging influenza A virus can gain global distribution because no one is immune. (Reviewer-).
The earliest recorded pandemic occurred in 1580. Since then, there have been 31 pandemics, and the most recent 2009 H1N1 influenza pandemic brought the total to 32.

To date, a number of influenza pandemics have infected people in the United States. **Pandemics of the Past:** The first and most significant pandemic was the Spanish influenza outbreak occurring in 1918/1919. This was caused by an H1N1 virus. This pandemic killed 500,000 people in the U.S. and killed 20 million to 50 million people worldwide. In 1957, the Asian influenza (H2N2) killed 70,000 people in the United States. In 1968, the Hong Kong influenza emerged. In 1997, the first reports of the H5N1 virus (avian influenza) emerged. Although this virus never reached the pandemic stage, it was a very concerning virus because of its lethality. The most recent pandemic was the 2009 H1N1 pandemic (swine influenza), which was a completely new reassorted virus containing avian influenza virus, swine influenza virus, and human influenza virus. Worldwide, influenza viruses occur at regular intervals. The earliest recorded pandemic occurred in 1580. Since then, there have been 31 pandemics, and the most recent 2009 pandemic brought the total to 32. **International Travel vs Pandemic Spread:** Prior to 2009, the greatest influenza pandemic was the 1918/1919 Spanish influenza outbreak. At that time, steamship travel was the most rapid form of international transportation. Despite this relatively slow mode of transportation, in 5 months, this virus spread throughout the world and killed 21 million people. How much more efficient is today’s transportation? With international travel, one can start in any major city in the world and be on another continent within 24 hours. The potential for pandemic spread is much greater with today’s rapid modes of transportation. **Cytokine Storm:** One of the other most frightening aspects of the 1918/1919 Spanish influenza pandemic was the fact that nearly 50% of those who died were young, healthy adults. This was paradoxical because influenza usually kills the very old or the very young. This was thought to be caused by something called the “cytokine storm.” Because the Spanish influenza virus was such a novel infection, the immune system had no previous recognition of this infection. Young, healthy adults have a very robust immune system, resulting in a very aggressive immune response to novel infections. Therefore, it is believed that the immune system performed its equivalent of the “Hail Mary pass” in that it released all of its cytokines at 1 time in an attempt to control this infection, resulting in a shutdown of the immune system and subsequent acute respiratory distress syndrome and death in these individuals. This was a worldwide phenomenon. (Reviewer-).
In the United States, swine influenza outbreaks are not novel. After universal swine flu vaccinations were ordered for all Americans in 1976, only periodic localized outbreaks have occurred in the U.S.

In the United States, swine influenza is not a novel outbreak. On March 24, 1976, President Gerald Ford ordered universal swine flu vaccines for all Americans because of a potential risk for swine flu. Since that time, swine influenza has not been problematic in humans. There have been periodic localized outbreaks, occurring mostly with people having close association with pigs or pig farms. However, in the 2009 pandemic, a new virus emerged, resulting from the combination of swine, avian, and human influenza viruses. This new virus was easily transmissible from person to person. As a result, it was a significant public health threat because of the potential for very rapid spread among people with little or no immunity to the new virus. **Rapid Spread of H1N1:** In the U.S. on May 4, 2009, 36 states reported a total of 286 H1N1 cases and 1 death. By May 5, that increased to 403 cases and 1 death. By May 12, we had 3009 cases in 45 states, with 3 deaths. By May 29, there were 8975 cases in 49 states, with 15 deaths. By July 24, there were 43,771 cases and 302 deaths, with cases occurring in virtually all states and territories reportable to the U.S. Centers for Disease Control and Prevention (CDC). In July 2009, the CDC stopped reporting cases of influenza in this manner. Instead, they began to report influenza-like illnesses and hospitalizations. They found that, through August, September, and October and into November 2009, all parameters for influenza increased compared with those of previous years. A pandemic was definitely occurring. The CDC anticipated that there would be more H1N1 cases, more hospitalizations, and more deaths associated with this new virus as the year progressed because no one in the world was immune to this disease. (Reviewer-).
Oseltamivir, Zanamivir Help Treat H1N1 Infections

Chemoprophylaxis for H1N1 Influenza.
Louis G. DePaola, DDS, MS

Louis G. DePaola, DDS, MS - Special Presentation

Four drugs have been approved by the Food and Drug Administration as being safe and effective for controlling influenza. Both oseltamivir and zanamivir are cornerstones in the treatment of H1N1 infections.

In total, 32 influenza pandemics have been recorded since 1580, including the 2009 H1N1 influenza pandemic. Influenza can be prevented and controlled in 2 ways: immunoprophylaxis (vaccination) and chemoprophylaxis (medications). **Chemoprophylaxis:** Four drugs have been approved by the Food and Drug Administration as being safe and effective for controlling influenza: amantadine, rimantadine, zanamivir, and oseltamivir. Both amantadine and rimantadine have been found to be totally ineffective for treating H1N1 viral infections. However, oseltamivir (to some extent) and zanamivir have been shown to be effective, and these 2 drugs are cornerstones in either prophylaxis or treatment of patients infected with the H1N1 virus. **Postexposure Prophylaxis:** The Centers for Disease Control and Prevention defines an exposure as coming within 6 feet of a symptomatic patient infected with H1N1 without wearing appropriate personal protective equipment. This definition means that there are a lot of potential exposures out there. Therefore, we must ask, who should receive prophylaxis? Individuals with a real exposure (came within 6 feet) to a patient diagnosed with flu may be considered for prophylaxis. If the exposure was >48 hours ago and the exposed individual is feeling fine, then benefits of prophylaxis are very minimal. These individuals should contact their physician if they develop worrisome symptoms to determine if prophylaxis is right for them. If the exposed patient is at high risk of flu complications, 1 of 2 approaches is available: starting prophylaxis immediately or remaining vigilant for signs and symptoms of flu before beginning treatment. **General Recommendations:** Should you have flu-like symptoms, especially if they become severe, you should see your physician, who may or may not recommend that you begin a regimen of zanamivir or oseltamivir, depending on the clinical presentation. Some restraint should be shown in the use of these drugs because resistance has been reported. To date, resistance of H1N1 has been relatively low, although there are a number of cases of H1N1 resistance to oseltamivir reported throughout the world. (Reviewer-).

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Keywords: Influenza, H1N1, Swine Flu, Chemoprophylaxis

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Stay Updated on Emerging Pandemic

*Influenza in the United States: Staying Informed.*
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Louis G. DePaola, DDS, MS - Special Presentation

To date, all 50 states in the United States are reporting widespread influenza outbreaks. Dental health care providers must stay updated on the emerging H1N1 pandemic.

Like other health care workers, dental health care providers must be informed about emerging diseases. For this purpose, www.flu.gov is an excellent resource from the Centers for Disease Control and Prevention. I recommend that all health care workers visit this Web site and stay updated on the emerging H1N1 pandemic. Most essential information about influenza is provided in multiple languages. To date, all 50 states are reporting widespread influenza outbreaks. This Web site provides information regarding vaccination centers for flu shots, both seasonal and H1N1, in each state. Information is also provided on recommendations and precautions regarding pregnancy and flu vaccination. Another important topic discussed on this Web site is that of fraudulent H1N1 influenza products. A number of different products have made extraordinary claims that they are effective in preventing influenza infections. Many of these products have been shown to be fraudulent — they have absolutely no efficacy whatsoever. This Web site also thoroughly discusses vaccination — indications, contraindications, and safety. Information is also provided on prevention and treatment of influenza infections, including various drugs that can be administered, how safe they are, how effective they are, and their indications and contraindications. Information is also provided for caregivers and the procedures they can use to prevent the spread of influenza to themselves and to the people for whom they care. The Web site also provides detailed information about travel and how you can travel as safely as possible in this environment of pandemic influenza. A handy self-assessment tool is provided that asks a short series of questions to help you decide if you need to see a doctor for symptoms that might be caused by the flu. (Reviewer-).

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Keywords: Influenza, H1N1, Swine Flu, Education

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Dentistry is a business. Although most of us are relatively small businesses with 2 to 5 employees, some of us have multiple employees. Regardless, as business owners and dental health care professionals, we have an important role in protecting the health of our employees and patients during a pandemic. The Centers for Disease Control and Prevention (CDC) has developed guidelines, including checklists, to assist businesses and employers with advanced planning for a pandemic outbreak. Most of this information can be found on the following Web site sponsored by the CDC: www.flu.gov/professional/business/index.html. During a pandemic, some standard business practices may need to be altered to accommodate the burden being placed on the health care community. For example, some businesses require that, before returning to work, employees who have been sick obtain medical certificates. However, during a pandemic, this practice might be suspended or delayed because physicians will be busy treating sick patients, and they do not need to be filling out a lot of forms for patients who have recovered from influenza. Each business is asked to establish sick-leave policies and compensation that encourage sick workers to stay home until their symptoms resolve. Employees who show influenza-like symptoms while at work should be asked to leave as soon as possible. Contingency plans should be developed for illness-related employee absences. For example, businesses should cross-train current employees in preparation for potential absences of other employees. In addition, arrangements could be made for certain employees to work from home to help reduce their exposure or to help them continue working while caring for sick family members. Another idea to consider is to contact retirees to determine their willingness and availability to work should excessive employee absences threaten to temporarily shut down the business. Businesses are urged to stay updated with any pandemic as it progresses. The CDC recommends that specific individuals on the staff be assigned to monitor updated reliable pandemic information from www.pandemicflu.gov, community public health advisories, emergency management warnings, and other sources. Many other suggestions and checklists are provided at www.flu.gov/professional/business/index.html to help businesses make advance plans for a pandemic. The CDC also presents pandemic planning checklists for health insurers and hospitals. Regarding hospital planning, the Web site provides information about how the government will help keep hospitals running when resources are being stretched to the limit. (Reviewer-).