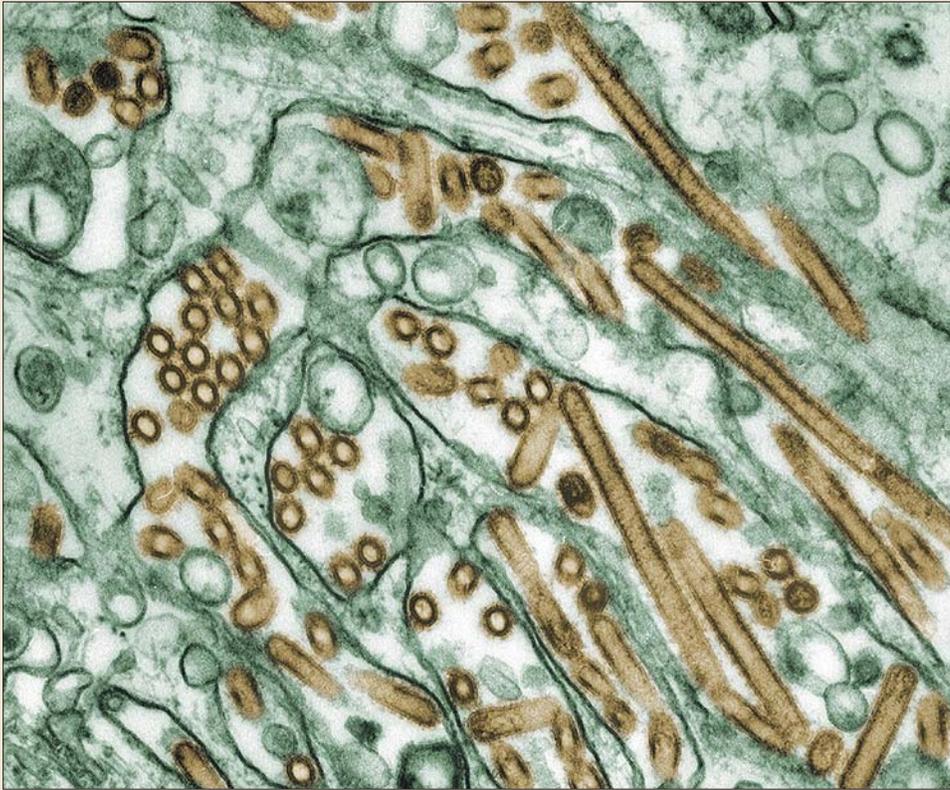


A scientist is shown in profile, working inside a biosafety cabinet. They are wearing extensive personal protective equipment (PPE): a white paper hood, safety goggles, a clear face shield, blue nitrile gloves, and a blue full-body gown. They are holding a small, clear plastic vial with an orange cap and orange liquid inside. The biosafety cabinet has a black flexible duct on the left side and a yellow biohazard warning sign on the wall. A yellow spray bottle is visible on the work surface.

Human Avian Influenza

A sanitation perspective



CYNTHIA GOLDSMITH / CDC

By NICOLE KENNY, Manager of Professional & Technical Services, Virox Technologies Inc.

Many people, certainly the international media, are looking at what is now primarily a viral infection of birds, and predicting a doomsday scenario sufficient in scope to remove almost half of humanity from the face of the earth. In the worst case hypothesis, our hospitals will quickly swell beyond a rapidly diminishing capacity, workplaces will be abandoned grinding commerce to a halt, any large public gathering will be disbursed by public order, transit systems will shut down, face masks will be haute couture, and instead of shaking hands in casual greeting we will bump elbows. The good news is that this doomsday scenario is about as likely as the Chicago Cubs winning the World Series. The bad news is we need to get busy working on a plan for “the just-in-case.”

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Influenza ABC's

Influenza is caused by a virus (although bacterial pneumonia is a classic secondary impact of this viral infection and the cause of many deaths). Unlike bacteria that are complete cells and that can replicate on their own, viruses have to infect a host cell and use the resources of that cell to reproduce. Viruses are the only organisms in the world to have only one type of genetic material and are thus broken down into either RNA viruses (ribonucleic acid) or DNA viruses (deoxyribonucleic acid). Influenza is a RNA virus. There are three further divisions of influenza viruses: A, B and C. Influenza C rarely causes illness so we'll forget about that. Influenza B viruses are common, but only among humans, and they generally don't make us as sick as Influenza A. Influenza A is the monster in the closet.

Influenza A viruses are found in a wide variety of terrestrial beasts, winged creatures and ocean-dwelling behemoths – ducks, chickens, wild birds, pigs, horses, whales and many other animals, including the human animal. It is further divided into sub-types according to the arrangement of two bumpy proteins on the surface of the virus – hemagglutinin (H) and neuraminidase (N). There are 16 different hemagglutinin sub-types and nine



different neuraminidase sub-types (144 possible combinations), all of which have been found among Influenza A viruses in birds. The current strain of influenza that is causing so much concern is a strain very fatal to birds, and has caused a few scattered deaths among humans as well. It is called H5N1.

Genetics... What Ya Gonna Do

There's a famous story of a meeting between Marilyn Munroe and Albert Einstein. Munroe: *"Imagine if we had children together... they'd have my looks and your brains. They'd be beautiful and brilliant."* Einstein replies, *"Ab, but on the other hand, they might very well get my looks and your brains, and then where would they be?"* With genetics, you just can't tell what you're going to end up with. The same holds true for viruses. An influenza virus that is devastating to birds has a huge barrier (the species barrier) to overcome before it can infect humans as well. However, if that virus was comingled with other influenza virus strains, or if the virus were to infect pigs (a short cut to human infectivity), it could eventually become a danger to humans as well. It **could** happen... eventually... certainly not quickly... maybe not at all.

Could It Happen?

Almost invariably, when commentators speak of the potential influenza pandemic, they make reference to the 1918 "Spanish Flu" that killed more than 50 million people worldwide at a

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time when the world's population was a fraction of what it is today. More people died in a single year of that outbreak than in five years of the Bubonic Plague. The Spanish Flu (although it had little to do with Spain) killed only two to three per cent of the people who were infected. Compare that with the almost 70 per cent death rate of humans who have become infected with the H5N1 avian flu. Looks bad, right?

In fact, in 1918 the germ theory wasn't entirely accepted yet, and doctors didn't know about viruses and how to treat them. They certainly didn't have antiviral medications, vaccinations, the World Health Organization, the CDC or the Public Health Agency of Canada. There weren't epidemiologist zealots scouring foreign lands looking for pockets of infectious disease, or public health officials ready to slaughter millions of birds at a moments notice. That flu pandemic coincided with another very deadly pandemic – war. Soldiers crammed into barracks and troop ships, and huddled in the cold, damp trenches of World War One provided an ideal field of transmission for the virus – more people died from influenza infection during World War One than from bullets, bombs and bayonets. Today, soldiers are looked after with meticulous care and wars are much more sanitary (sanitized even?). Modern healthcare, travel restrictions, health screening and infection control precautions would make a global pandemic MUCH more difficult for an influenza virus to manage.

An influenza virus that is devastating to birds has a huge barrier (the species barrier) to overcome before it can infect humans as well.

It Happens

In reality, influenza happens! Every year, tens of thousands of North Americans suffer from an influenza infection. Thousands of those infected with influenza will die as a direct (severe influenza infection) or indirect (underlying illness) result. With all of our focus on and fretting about a bird flu pandemic, we can't lose sight of the threat that is in our hospitals, nursing homes, schools and workplaces right now.

The best way to prevent a bird flu pandemic is to stop it before it starts – kill infected birds and stop dangerous practices.

Dangerous Practices: In Vietnam, a favourite sport among villagers is cock-fighting. To motivate a laidback rooster, the owner of the bird will hold its beak in his mouth. Apparently the acidity of the saliva really annoys them. Perhaps this is an example why Vietnam has experienced the highest incidence of avian influenza in humans. Vaccination is another preferred prevention strategy, but despite the billions of dollars committed to a vaccine, it is likely still years away. Thankfully, there is already an annual vaccination available for our usual strains of influenza, and it helps to protect those who are at the greatest risk. Planning, personal protective equipment and infection control practices are where the rubber really hits the road

in our workplaces and communities.

Influenza Prevention in Workplaces & Public Spaces

"Planning Prevents Panic and Produces Profit" – Allen Soden's (President, Deb SBS-USA) often quoted "5-P's" make good sense at any time, but particularly during influenza season or during a time of pandemic influenza hysteria. Companies that have planned ahead may find themselves working in health while their competitors languish in disease. Policies could (should) include sending ill people home and enabling staff to work in more isolated settings such as from home if possible. All internal spaces should be well ventilated, preferably with fresh air. Dilution of respiratory secretions with fresh, flowing air is absolutely key. (I note that my office doesn't have windows that open).

Hand Hygiene, Again

Hand washing is still the single most important measure to reduce the risk of transmitting infectious organisms from one

Policies could (should) include sending ill people home and enabling staff to work in more isolated settings such as from home if possible.

person to another. Influenza viruses, thought to be exclusively transmitted by droplets spewed by coughing, sneezing, wheezing infected people, are now known to be as commonly transmitted hand-to-hand-to-face, or surface-to-hand-to-face. Our hands come into contact with contaminated surfaces and other people's disgusting hands, and then directly or indirectly contact the vulnerable mucous membranes in our mouth, nose and eyes in a variety of ways, and many times a

day. When we eat, or smoke, apply make-up, rub our eyes, wipe (or pick) our nose, and when we cross our arms and put a finger to our mouth to look introspective and intelligent, we run the risk of infecting ourselves, possibly with a lethal strain of influenza. Regular hand washing with soap and water, and/or regular use of an alcohol hand rub are necessary all the time. During flu season, particularly if we are around sick people, it becomes essential. Remember though, if hands look, feel or smell soiled, they have to be washed rather than rubbed with alcohol.

Personal Protective Equipment

In a healthcare environment it is appropriate for workers to use several types of personal protective equipment (PPE) to protect themselves and their patients – mask, gloves, gowns, etc. It is particularly useful for those doing the viral spewing to cover their mouth and nose with a mask. However, in the world outside of our hospitals, presenting one's self in public in such garb might be somewhat socially isolating. And, unless a Plexiglas shield can be installed between the infected masses and those who work on the front lines of society (taxi and bus drivers, cashiers, wait staff, etc.), during a large influenza outbreak or pandemic it might be necessary for the healthy workers to wear a surgical-style mask to protect themselves. When Hong Kong had a nasty flu outbreak a few years ago the social stigma of wearing a mask in

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public kept many people from doing so when they were ill despite a legal mandate to do so. When the government changed the mandate such that everyone who went into public places must wear a mask, sick or not, the stigma was removed... everyone complied... the outbreak was halted.

Surface Sanitation

During an influenza outbreak or pandemic, thorough cleaning of touchable

surfaces become hyper-important. Viruses will live on environmental surfaces for long enough that they can be picked up by passers-by and subsequently infect a great many people. The influenza virus is an enveloped virus, meaning that it is easily killed. Proper cleaning techniques with detergent or a non-residual disinfectant will effectively make the surface safe. Proper technique for cleaning high-touch surfaces would include diluted detergent or disinfectant in a pail with several dis-

posable wipers or launderable cloths. As a wiper or cloth is used on a surface it is not returned to the bucket, but rather disposed of or set aside, thereby eliminating the risk of cross contamination of other clean cloths and surfaces. Disposable, pre-moistened pop-up wipers are also very useful. A spray bottle and wiper is less than optimal because of the tendency to use the one cloth on several surfaces thereby ensuring that a cluster of influenza viruses in a wad of sputum gets smeared evenly over a much larger surface.

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What Does It All Mean?

On a note of closure, let me say that the hype about bird flu is more immediately dangerous to society than the virus itself. While it is true that someday we will likely face an influenza pandemic of some sort, it is by no means certain that it will be this particular virus, nor is it certain that it will be any time soon. However, the fear generated by all of the media reports will certainly cause a society-wide increase in anxiety, leading to increased blood pressure, heart disease, decreased immune response and depression. We can only do what we can do. If we wash/disinfect our hands faithfully, clean everything meticulously, employ proper PPE, and avoid snuggling up to people who are coughing, sneezing and wheezing, the risk is very low indeed.

Nicole Kenny is the manager of Professional and Technical Services at Virox Technologies Inc. – Tel: (905) 813-0110 ext. 118, e-mail: nkenny@virox.com. Kenny graduated from the University of Guelph with an Honours of Biological Science degree in 1994 and also holds an Associate Chemist designation from the Association of Chartered Chemists of Ontario. In March 2003, during the first wave of SARS, Kenny joined Virox Technologies Inc., a company with a patented technology in cleaning, disinfection and sterilization. As the manager of Professional and Technical Services, Kenny is responsible for Infection Control Education and Technical Support. In this capacity, incorporating her educational background in Biomedical Science and Epidemiology, Kenny has educated hundreds of people in many industries including Healthcare, Public Health, Animal Health, Dental, Laboratory, Pharmaceutical and Food Processing.