

Avian influenzavirus: Are we prepared?

So far, almost all of the 69 cases of human infection with avian influenzavirus reported since January 2004 have involved people who lived or worked with poultry, poultry meat or eggs in Southeast Asia. Why should these relatively few cases cause such worldwide comment and engender fear of a global epidemic similar to the pandemics in 1957, 1968 and, of course, 1918? (See *CMAJ*'s coverage of the 1918 epidemic online at www.cmaj.ca/cgi/content/full/172/8/965/DC1.) Avian influenzavirus infection — recently reviewed in *CMAJ*¹ — is very common in birds. Because birds and humans have species-specific viral receptors, human infection with avian influenzavirus is rare, but when it does occur it likely results from spontaneous viral mutations.

Fear of a pandemic arises because this virus is highly pathogenic in humans — death has occurred in 46 of the 69 reported cases — and because the incidence of human cases is rising. So far, only 1 of the 69 human cases has been shown to result from human-to-human transmission, but this barrier could be breached by further mutation.

The triple coincidence needed for a global epidemic of human influenza A (H5N1) infection is frequent contact between humans and infected birds (which increases the chances of a newly mutated virus infecting a human), human disease that has a long prodromal phase (which makes early detection difficult) and poor surveillance (which lowers chances for early containment). All 3 conditions exist in Southeast Asia.

The features of typical family-operated poultry production in Southeast Asia — where birds live in close proximity to humans (often sharing the same building), marketing customs involve the sale of live chickens at local markets and animal slaughter is done at point of sale or in family kitchens — all conspire to place humans in close contact with infected birds, their meat or eggs. These are ideal conditions for a virus to mutate and find human hosts.

Rapid detection of human cases and quick isolation might interrupt human-to-human transmission. Unlike SARS, however, avian influenza appears to have a substantial subclinical phase. For example, 2 siblings in Dong Thap Province in southern Vietnam had nonspecific diarrheal illness for days before the onset of the respiratory and neurologic symptoms (coma) that are the hallmarks of H5N1.² Live virus was recovered from the children's stools.

Current disease surveillance (still inadequate in developed countries and patchy in the developing world) will not help much with early identification of humans with avian influenza, and there is no laboratory test for rapid identification of live virus.

Are we prepared? Canada's approach is typical of most Western countries: the emphasis has been on rapid development of a vaccine, on the reasonable assumption that the pandemic will begin in Asia and the unreasonable assumption that there will be time to identify the virus and produce the massive amounts of vaccine necessary. Western plans to cut off air travel from infected countries is highly unlikely to happen in time or be effective. Stockpiling doses of the only effective antiviral agent (oseltamivir) may be helpful, but the nonspecific prodromal phase of the illness and the fact that oseltamivir is effective only if taken within the first few days of infection are major limitations of this strategy (although the drug may be helpful if taken prophylactically by contacts of patients³). And, importantly, such narcissistic planning does nothing for people in Southeast Asia and elsewhere in the developing world.

The only effective way to stop a global pandemic is to stop it in Southeast Asia. Although likely to have only a limited effect, stockpiles of oseltamivir need to be created throughout Southeast Asia.

In the longer run, we need to change animal husbandry practices in much of the world, not just as an economic measure, but as a public health initiative. Restricting poultry farming to large-scale commercial operations similar to those in the West, where human-bird contact is limited and controlled and where infected birds can be rapidly identified and culled, would reduce the risks considerably. This would reduce the chances that viral mutations occurring in birds or other animals will find human hosts. We should have learned this after our experiences with SARS. Evidently, we haven't. — *CMAJ*

References

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3. Monto AS. The role of antivirals in the control of influenza. *Vaccine* 2003; 21:1796-800.