

Clipping the wings of avian influenza

Up to now, the threat of avian influenza has been lessened by effective animal husbandry methods. However, the public health community is trying to ensure enough measures are in place to prevent a possible pandemic. Jane Parry reports.

Fifteen years after avian influenza killed six people in Hong Kong Special Administrative Region of China in 1997, poultry selling practices have changed radically because the government took the step that year of ordering a slaughter of all poultry in the city, effectively halting the disease in its tracks. Despite sporadic outbreaks among poultry, there have been no human cases originating in the city and its poultry industry has undergone a transformation.

Although live poultry is still sold in the city's fresh produce, or wet, markets, the government revoked licenses from three quarters of the poultry traders in 2008, dramatically reducing the number of locations where live poultry is sold.

There used to be compulsory monthly rest days for poultry stalls; since 2008 this has been extended to a ban on keeping live birds overnight in retail markets so all poultry must be slaughtered at the end of each working day. There have also been periodic bans on poultry selling whenever birds infected with the virus have been found at or near markets or the city's 30 poultry farms.

Professors Malik Peiris, Tam Wah-Ching and their colleagues at Hong Kong

University (HKU) Pasteur Research Centre, are currently documenting the impact of these interventions to control H5N1 avian influenza among poultry. "We have found that they dramatically reduce the amplification of avian flu viruses in wet markets, thus reducing risk to humans. Unfortunately, Hong Kong SAR is one of only a few places that is doing any of these things. From the point of view of the safety of Hong Kong SAR, the measures are effective but H5N1 is certainly not under control in many parts of Asia. That is the concern, especially now that we know it can potentially acquire human-to-human transmissibility."

It is this potential for transmissibility and the threat of a possible pandemic that is keeping epidemiologists occupied. Two groups in the Netherlands and the United States of America have demonstrated that the virus can be altered to enable transmissibility in ferrets, and research on vaccines that can neutralize all influenza A viruses is also ongoing.

According to the World Health Organization (WHO), people in countries experiencing outbreaks of H5N1 in poultry will likely continue to be exposed to the virus through contact with infected poultry or contaminated environments; and therefore sporadic human cases will occur as long as the virus continues to circulate in poultry, especially in household poultry.

Worldwide, as of 6 July this year, there had been 607 reported human cases and 358 deaths in 15 countries, according to WHO. "Although this case-fatality estimate may be skewed by a bias in detecting more severe cases, there is no doubt that H5N1 is the nastiest of all the flu viruses around currently. The 2009 H1N1 pandemic virus itself is relatively benign and has not changed much antigenically," says Peiris.

Egypt, Indonesia and Viet Nam account for 80% of all cases since 2003 and 78% of all avian influenza deaths. WHO is working with these and other countries that are most affected to better prevent, detect and deal with human cases of avian influenza. In the process, this is leading to far wider benefits – health system

improvements that leave countries better prepared for other threats to public health.

"There is a public health impact in countries that are struggling in terms of surveillance, hospitals, clinical care and public perception," explains Dr Elizabeth Mumford, a scientist with the WHO's Global Influenza Programme. "Viruses of the H5N1 subtype that are currently circulating in poultry in Asia and Egypt seem to be associated with a very high case-fatality rate when they infect humans, and these viruses do pose a pandemic threat. We don't know what level of threat, because if they acquire the ability to transfer easily between humans we just don't know if they would retain the same case-fatality, but it is of concern anywhere the virus is circulating widely in poultry and there are humans in contact with poultry."

"We really think the biggest threat is from household poultry," adds Mumford. There is slightly less concern when there are outbreaks of avian influenza in commercial poultry operations because they tend to have strong bio-controls in place. For example, avian flu outbreaks in Japan and the Republic of Korea in 2010 and 2011 were rapidly contained and did not lead to any human cases.

The Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE) and WHO are working more closely than ever to combine their food safety, animal health and public health expertise, and to encourage countries to do the same.

In Egypt and in parts of Asia, the avian influenza threat has been problematic for both animal and public health. Almost five million families in Egypt generate some or all of their income from subcontracting for the poultry industry or backyard poultry raising. With 163 confirmed cases in humans and 57 deaths, Egypt's total is second only to Indonesia, and it has reported the highest number of cases in the world during the last three years at 59% of the global total.

"There was a remarkable acceleration of the disease during 2011, where 39 cases were reported versus 19 in In-



WHO/Gary Hampton

Avian flu is still a concern in Indonesia's poultry markets



Many birds have had to be culled following the emergence of H5N1

Indonesia during the same year,” explains Dr Nasr El-Tantawy, an epidemiologist at WHO’s country office in Egypt.

“The disease has become endemic in the nation’s poultry population and within all poultry production sectors. Many activities to reduce virus circulation have been ineffective and possibly counterproductive, such as current vaccination strategies, compensation policy, communication strategies of both public and animal health as well as outbreak detection and response.

“The control of this disease has proved to be a complex and dynamic challenge due to the social, economic, and cultural background,” says El-Tantawy.

WHO is supporting the Egyptian government in avian influenza surveillance, and early detection of any viral reassortment or mutations of public health concern through a WHO H5 Reference Laboratory at the United States Naval Medical Research Unit No. 3, explains El-Tantawy.

“Egypt is also building national epidemiological and laboratory capacities, influenza pandemic preparedness planning and enhanced joint risk assessment through information sharing between public health and animal health,” he says.

By contrast, Indonesia saw a sharp drop-off in reported cases in 2010 and 2011, partly due to successful risk communication.

“Now cases are less commonly related to direct contact, and more commonly related to indirect contact such as

environmental contamination from bird droppings and so now it’s harder to tailor the prevention message,” says Dr Graham Tallis, leader of the Communicable Diseases Surveillance and Response Team in WHO’s country office in Indonesia.

“You cannot say ‘don’t go to live bird markets’ for example, and if there are bird deaths in the neighbourhood, all you can say is ‘wash your hands more often.’”

WHO has been involved in field epidemiology training programmes and continues to support the Indonesian government, which has now taken over the funding to build the training curriculum and closely link it to the workforce needs of public health sector.

Thailand is another country where fast response has helped change practices to animal husbandry.

“Thailand is a good example,” says Dr Alex Thiermann, special adviser to the Director General of OIE. “There was a rapid reaction by the government, it used existing local channels of communication, such as giving mobile phones to community leaders in villages to report illness, and the poultry industry got very much involved,” he says.

Under the WHO International Health Regulations (IHR 2005), Member States are obligated to have certain core capacities, particularly the capacity to detect and respond to potential public health emergencies of international concern. “While we have a bit of breathing room we would like to help support countries to strengthen health systems and improve core capacities under IHR,

and also to align WHO capacity development with the animal health sector. This would help minimize the global public health threat from avian influenza” says Mumford.

The three-way link-up between the OIE, FAO and WHO has bolstered avian influenza surveillance efforts, according to Dr Juan Lubroth, senior officer of the Infectious Disease Group of FAO’s Animal Health Service.

“The OIE/FAO network of expertise for animal influenza and its collaboration with WHO constitute a strong technical platform for monitoring of circulating viruses, harmonizing diagnostics, coordinating approaches and sharing experience for surveillance, contributing to the development of joint risk assessment tools and other factors,” he adds.

“Through active and permanent scientific cooperation, the network develops and harmonizes projects in different parts of the world, sharing updated scientific information and expertise on efficient methods for controlling animal influenza and providing a proactive approach in helping countries eliminate the disease and free countries to prevent occurrences.”

Controlling the disease in the poultry population requires behaviour change among humans, which highlights the importance of considering the social, economic and anthropological dimensions of the disease, says Lubroth.

“Although measures have been introduced in all endemically infected countries to address the major identified challenges, all require further long-term commitments and investment if the virus is to be eliminated. It may also be necessary to explore unconventional control methods in endemic countries. It is now generally accepted that the H5N1 virus is unlikely to be eliminated from poultry in these countries and regions for at least a decade.”

While countries grapple with the known threat of H5N1 avian influenza, this will hopefully ensure they are better prepared for other influenza viruses of zoonotic impact. “An influenza A virus has recently been detected in bats... [which] proves that influenza viruses can be found in many different bird and mammal species. So far there is no indication that this virus is a threat to public health, but monitoring and reporting these findings are important, and transparency in sharing information is essential,” says Thiermann. ■