

Quantification of highly pathogenic avian influenza H7N7 virus transmission from poultry to humans

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The occurrence of human infections with avian influenza viruses increases fear for a pandemic. During a H7N7 HPAI epidemic in the Netherlands in 2003, people involved in work on infected farms tested positive in RT-PCR or culture (Koopmans et al., 2004). One person died after developing acute respiratory distress syndrome. This study aimed to quantify the risk of virus transmission from poultry to humans and the effect of exposure variables during the Dutch epidemic, based on data collected during this epidemic.

Farm data included farm characteristics such as flock size, type of poultry, daily bird mortality data and culling method. Human data included time of farm visit, activity on the farm, self-reported health status and test outcomes. Outcome measures were conjunctivitis, and results of hemagglutination inhibition assays (Meijer et al., 2006). Specificity of conjunctivitis for H7N7 infection had been determined by comparison of rates of reporting for persons involved in culling on farms with and without H7N7 infected poultry. The period during which a farm was infectious was based on the daily mortality and estimated with a mathematical simulation susceptible-infectious-dead model, with the bird-infectious period and transmission rate parameter based on field and experimental data with H7N7 HPAI virus. Only data on farm-visits during the farm-infectious period were included in the analysis. The risk of a person becoming infected per visit was calculated with maximum likelihood.

The risk during screening or culling activities was around 4 to 5 times higher than that for people involved in tracing, indexing or handling bio security during the culling. People that reported having handled poultry also had a higher risk. Results of clinical and serological outcome variables were similar. Additional exposure variables such as culling method, housing type, period of the outbreak and flock size will be analysed.

Quantification of the transmission risk of H7N7 HPAI virus from poultry to humans, and the effect of exposure variables on this risk, might enable a more adequate use of protective measures in the future. As expected, actually handling infected poultry during an outbreak presented a higher risk of becoming infected. Therefore, more attention should be paid to compliance with respect to protective measures, such as wearing goggles and masks.