Effectiveness of wastewater treatment may be damaged during a severe flu pandemic

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Existing plans for antiviral and antibiotic use during a severe influenza pandemic could reduce wastewater treatment efficiency prior to discharge into receiving rivers, resulting in water quality deterioration at drinking water abstraction points.

These conclusions are published this week (2 March 2011) in a new paper in the journal *Environmental Health Perspectives*, which reports on a study designed to assess the ecotoxicologic risks of a pandemic influenza medical response.

The research was carried out by a team from the Centre for Ecology & Hydrology (UK), the Institute for Scientific Interchange (Italy), Utrecht University (Netherlands), the University of Sheffield (UK), and Indiana University (USA).

The global public health community closely monitored the unfolding of the 2009 H1N1 influenza pandemic to best mitigate its impact on society. However, little attention was given to the impact that the medical response might have on the environment.

In order to evaluate this risk, the research team coupled a global spatially-structured epidemic model that simulates the quantities of antiviral and antibiotics used during an influenza pandemic of varying severity, with a water quality model applied to the Thames catchment in southern England to predict their environmental concentrations. An additional model was then used to assess ecotoxicologic effects of antibiotics and

antiviral in wastewater treatment plants (WWTP) and rivers.

The research team concluded that, consistent with expectations, a mild pandemic (as in 2009) was projected to exhibit a negligible ecotoxicologic hazard. However in a moderate and severe pandemic nearly all WWTPs (80-100%) were projected to exceed the threshold for microbial growth inhibition, potentially reducing the capacity of the plant to treat wastewater. In addition, a proportion (5-40%) of the River Thames was similarly projected to exceed key thresholds for environmental toxicity, resulting in potential contamination and eutrophication at drinking water abstraction points.

Lead author Dr Andrew Singer, from the Centre for Ecology & Hydrology, said, "Our results suggest that existing plans for drug use during an influenza pandemic could result in discharge of inefficiently treated wastewater into the UK's rivers. The potential widespread release of antivirals and antibiotics into the environment may hasten the development of resistant pathogens with implications for human health during and potentially well after the formal end of the pandemic."

Dr Singer added, "We must develop a better understanding of wastewater treatment plants ecotoxicity before the hazards posed by a pandemic influenza medical response can be reliably assessed. However, the production and successful distribution of pre-pandemic and pandemic influenza vaccines could go a long way towards alleviating all of the identified environmental and human health problems highlighted in our paper, with the significant added benefit of reducing morbidity and mortality of the UK population. This latter challenge of vaccination is probably society's greatest challenge, but also where the greatest gains can be made."

Provided by Centre for Ecology & Hydrology