Quantification of Bird-to-Bird and Bird-to-Human Infections during 2013 Novel H7N9 Avian Influenza Outbreak in China

Hsieh, Ying-Hen
Department of Public Health China Medical University

Wu, Jianhong
The University of York

Fang, Jian

Yang, Yong
The University of York

他

出版情報：MI lecture note series. 60, pp.1-2, 2014-11-28. 九州大学マス・フォア・インダストリ研究所
バージョン：
権利関係：

Quantification of Bird-to-Bird and Bird-to-Human Infections during 2013 Novel H7N9 Avian Influenza Outbreak in China

中国医薬大学　公衆衛生学　感染症教育研究センター	Ying-Hen Hsieh
ヨーク大学　数学統計研究科、疫学モデリングセンター	Jianhong Wu
ヨーク大学　数学統計研究科、疫学モデリングセンター	Jian Fang
ハルビン工科大学　数学科	
ヨーク大学　数学統計研究科、疫学モデリングセンター	Yong Yang
上海大学　数学科」	Jie Lou

概 要

During February-May 2013, 132 human avian influenza H7N9 cases were identified in China resulting in 37 deaths. We develop a novel but simple compartmental modelling framework for transmissions among (wild and domestic) birds as well as from birds to human, to infer important epidemiological quantifiers (i.e., basic reproduction number for bird epidemic, bird-to-human infection rate, and turning points of the epidemics) for the bird and human epidemic via human H7N9 case onset data in order to acquire useful information regarding the bird-to-human transmission dynamics. Assuming no human transmission of the disease had occurred, we obtain the basic reproduction number for infections among birds and the mean daily number of human infections per infected bird from data fitting. The turning point of 2013 H7N9 epidemic is pinpointed at April 16 for bird epidemic and at April 9 for bird-to-human transmissions. Our result reveals very low level of bird-to-human infections, thus indicating minimal risk of widespread bird-to-human infections of H7N9 virus during the outbreak. Moreover, the turning point of the human epidemic, pinpointed at shortly after the implementation of full-scale control and intervention measures initiated in early April, further highlights the impact of timely actions on ending the outbreak.

Ying-Hen Hsieh

Professor
Department of Public Health
China Medical University
Taichung, Taiwan 404

Academic Degrees:

- B.S. (magna cum laude), Mathematics, 1976, Baldwin-Wallace College.
- M.S., Mathematics, 1978, Carnegie-Mellon University.
- Ph.D., Applied Mathematics, 1982, Carnegie-Mellon University.

Professional Appointments:

- 1982-87: Associate Professor, Department of Applied Mathematics, National Chung Hsing University.
- 1987-2007: Professor, Department of Applied Mathematics, National Chung Hsing University.
- 1995-97: Chairman and Professor, Department of Applied Mathematics, National Chung Hsing University.
- 2007-present: Professor, Department of Public Health, China Medical University.

RESEARCH INTERESTS:

Mathematical Biology, Modeling and Analysis of Infectious Diseases Epidemiology, Ordinary Differential Equations, Population Dynamics, Mathematical Ecology