FACULTY CANDIDATE PRESENTATION

INDUSTRIAL & MANAGEMENT SYSTEMS ENGINEERING

Estimating Disease Burden of a Potential A(H7N9) Pandemic Influenza Outbreak in the United States

Walter Silva

Biography

Walter Silva is a current PhD candidate in the Department of Industrial Engineering and Management Systems Engineering at University of South Florida. He received his B.S. in Industrial Engineering (1999) from Pontificia Universidad Católica del Perú and an Master of Sciences and Technologies (2006) and Master of Sciences in Applied Mathematics to Decision Making (2007) from Université d'Orléans, France, and a Master of Industrial Engineering (2014) from University of South Florida. His research focuses on Estimating Disease Burden from potential A(H7N9) Influenza pandemic outbreak in the United States. He has more than 15 years of experience in Teaching and consulting which includes experience in solving problems related to statistical process control, simulation models and operation research methods. He is certified Quality Process Analyst and Certified Six Sigma Green Belt (by ASQ). He is also member of INFORMS, IISE and ASQ. His teaching interest includes data analytics, operations research, discrete event simulation, programming methods, statistics, and production control.

Abstract

Since spring 2013, periodic emergence of avian influenza A(H7N9) virus in China has heightened concerns for a possible pandemic outbreak, though it is believed that the virus is not yet human-to-human transmittable. Till June 2016, A(H7N9) has resulted in 781 laboratory-confirmed cases of human infections causing 313 deaths (40% fatality rate). This paper presents disease burden estimates from a potential A(H7N9) pandemic outbreak throughout the United States. Estimation method uses a machine learning technique to divide 50 states into three clusters based on urban population size and density, and thereafter employs an agent based (AB) model to simulate outbreaks mitigated by a set of non-pharmaceutical interventions in selected states from each cluster. Infection attack rates (IARs), as fraction of the population, stratified by age-groups from these states are used to arrive at disease burden estimate for the whole U.S. For transmission scenarios with $R_0 = 1.5$ and 1.8, overall IARs (95% C.I.) are found to be 18.78% (17.3 – 20.27) and 25.05% (23.11 – 26.99), respectively. The corresponding number of deaths, in millions, are estimated to be 23.9 (22.0 – 25.8) and 31.9 (29.4 – 34.6).

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