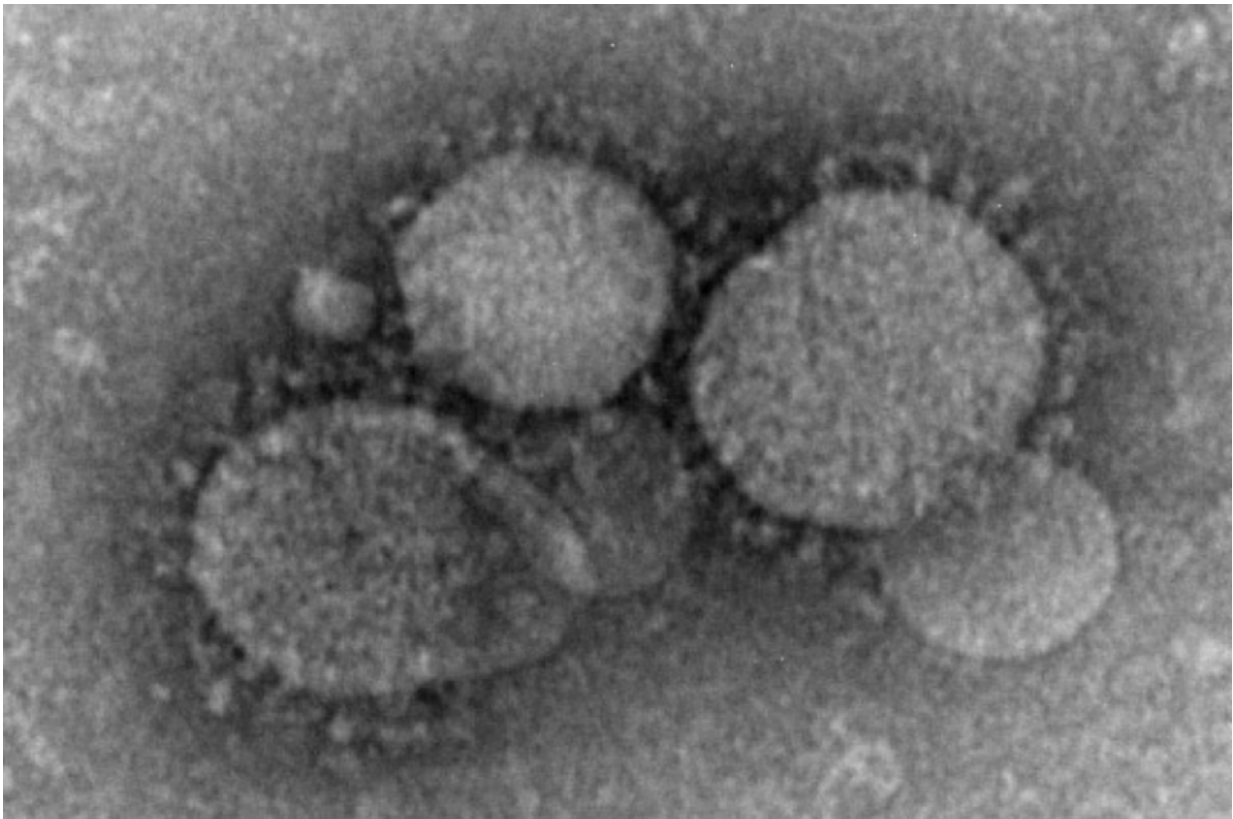


New method reveals real-time death risk of Korean MERS outbreak

September 30 2015



MERS is a viral infectious disease caused by a coronavirus and results in pneumonia and respiratory distress syndrome. The disease has been localized in Middle Eastern countries, most notably, Saudi Arabia, Qatar and United Arab Emirates, mainly transmitted from dromedary camels to humans. Human-to-human transmission is rare, but can occur in close contact. Coronaviruses have a protective protein capsule and what appears to be a "crown" of projections from the surface of the virus, visible in this image. Credit: Public domain

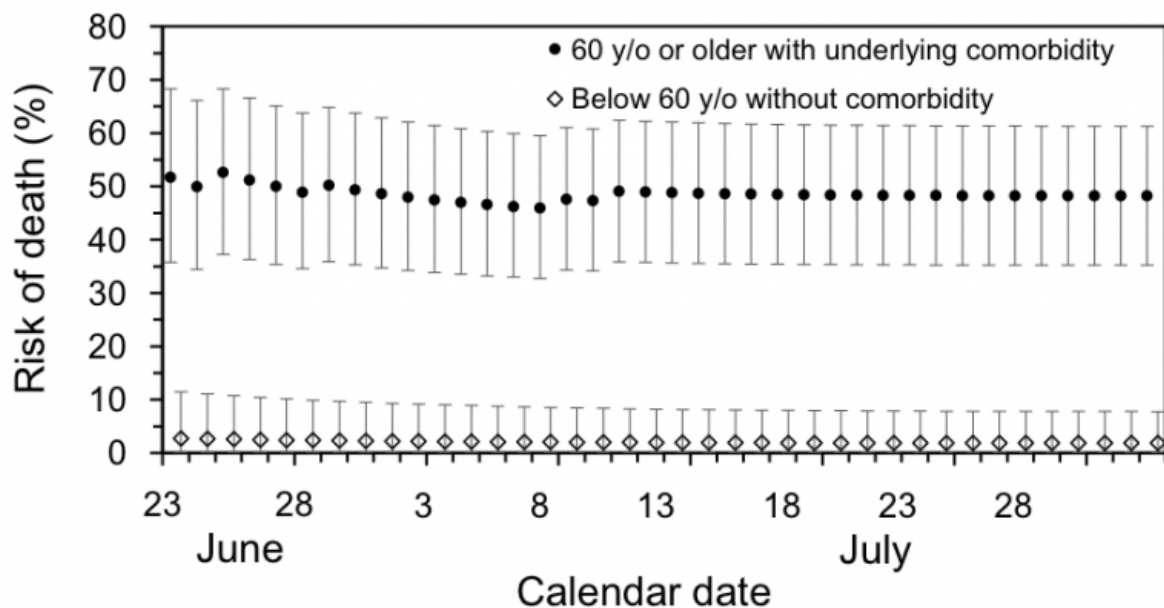
University of Tokyo researchers have developed a real-time statistical method to estimate death risk (i.e., the probability of death given infection) and identify risk factors of death during an infectious disease outbreak. Using this method, the researchers revealed that the death risk of the 2015 Middle East Respiratory Syndrome (MERS) epidemic in the Republic of Korea for patients with an illness prior to MERS infection was as high as 48.2% for those over 60 years while it was below 15% for younger patients. This method will be useful when the death risk of a novel infectious disease has to be quantified using data from small numbers of patients during the course of an outbreak, providing information on which age groups to minimize exposure in hospitals, nursing homes and daycare facilities.

In order to put in place appropriate public health interventions in an ongoing disease outbreak, it is vital to estimate [death risk](#) accurately in real time and identify [risk factors](#) such as age, gender, occupation and health conditions. While there have been attempts to estimate real-time death risks during epidemics, such statistical models require data from large numbers of patients in the order of thousands and therefore could not be applied to the 2015 MERS [epidemic](#) in the Republic of Korea with small patient numbers.

Associate Professor Hiroshi Nishiura and his research group at the University of Tokyo's Graduate School of Medicine have developed a new [statistical method](#) which the group applied in real time during the 2015 MERS epidemic. They found that MERS patients aged 60 or above were 9.3 times more likely to die from MERS than other patient age groups. Those who were already ill before infection with MERS (comorbid patients) were 7.8 time more likely to die compared with those who were not ill. The estimated overall death risk was approximately 20% and was unaffected by gender.

"All of my team members spent many sleepless nights during the several

months of the MERS outbreak developing our new model," says Nishiura. His team was surprised to find many marked similarities with the severe acute respiratory syndrome (SARS) which spread in China and Hong Kong in 2002 and 2003. "The elderly and the ill had higher death risks, and the overall percentage of death due to MERS and SARS was around 20%. We think that the transmission dynamics and severity of SARS and MERS are similar in many ways."



Filled circles show the maximum estimated death rate among MERS patients aged 60 years or older with underlying comorbidity (i.e., patients with an existing illness) for each corresponding date. Unfilled diamonds show the maximum estimated death rate among patients aged less than 60 years old and without comorbidity. Error bars show upper and lower 95 percent confidence intervals. Credit: The authors

The team hopes that in the future the new statistical method will be a

useful tool to characterize emerging infectious diseases and will help when developing effective control strategies.

More information: Kenji Mizumoto, Akira Endo, Gerardo Chowell, Yuichiro Miyamatsu, Masaya Saitoh, Hiroshi Nishiura, "Real-time characterization of risks of death associated with the Middle East respiratory syndrome (MERS) in the Republic of Korea, 2015" *BMC Medicine* 13 (2015) [DOI: 10.1186/s12916-015-0468-3](https://doi.org/10.1186/s12916-015-0468-3)

Provided by University of Tokyo

Citation: New method reveals real-time death risk of Korean MERS outbreak (2015, September 30) retrieved 20 April 2024 from <https://medicalxpress.com/news/2015-09-method-reveals-real-time-death-korean.html>

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