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Title of Research *	Analyzing the Impact of Superspreading Using Hospital Contact Networks
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Introduction & Purpose *

Superspreading events, where a single highly mobile, or peripatetic, individual is responsible for the transmission of a pathogen to a large number of people, have been observed in many outbreaks of emerging infectious diseases. Hand hygiene control measures have proven to be effective in reducing infection rates, but Temime et al. 2009 show that hand hygiene noncompliance in a single peripatetic healthcare worker (HCW) can have a substantial effect on the number of patients infected. This study aims to determine the impact of noncompliant peripatetic HCWs compared to non-peripatetic HCWs using real hospital contact data.

Experimental Design *

We used a sensor network to detect and record contacts among HCWs and patients in a 20 bed intensive care unit (ICU) for one week. Motes, pager-sized devices worn by HCWs and affixed to patient beds, periodically broadcast a message to all nearby motes and record messages from other motes. Then, based on recorded contact data, we ran agent-based simulations modelling the spread of nosocomial pathogens (e.g., MRSA) with various probabilities of transmission. For each shift, we identified the single most and the single least “connected” HCWs based on the number of unique patients each HCW saw during a shift. We then compared the effects of hand hygiene noncompliance between these two HCWs.

Results *

In simulations based on 4 different work shifts, the average number of colonized patients was significantly higher when the single most connected HCW did not comply with hand hygiene policies than when the single least connected HCW was noncompliant.

Conclusions *

Our results use real contact data gathered in an ICU to corroborate earlier mathematical studies of superspreading and confirm that heterogeneity in HCW behavior is an important factor in pathogen transmission. In addition to its potential relevance to hand hygiene policy, this could suggest that current compliance measurement techniques may be flawed, as compliance measurement protocols assume homogenous HCW behavior.

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