

Nosocomial infection: a look into risk factors and methodological issues

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Healthcare-associated infections are the most common complications affecting hospitalized patients, making infection control a priority for patient safety. It is only recently that the importance of the system as a whole and its components have been acknowledged and studied, although they are likely to become a pre-requisite for high quality of care. Healthcare workers are central to the system and the complex process of care delivery, but increased demands on their time conflict with somewhat inextensible resources.

We prospectively followed a cohort of critically-ill patients to assess the effect of staffing on the risk for nosocomial infection. Overall infection rate was 64.5/1000 patient-days. Higher staffing level was associated with a 30% decrease in the infection rate, even after accounting for other risk factors. Furthermore, we estimated that 26.7% of all infections could be prevented providing that the nurse-to-patient ratio was maintained above 2.2. The same population was then used to apply a case-crossover design that was empirically evaluated against a case-time-control and a cohort design. This work highlights the benefits and limitations of such a design and confirms the association between staffing level and infection risk.

A time discrete individual-based stochastic mathematical model is being built to explore the dynamic of MRSA transmission in a medical ICU. We discuss issues that are not readily addressed with standard statistical tools, pertinent research questions and main assumptions of the model. The model will be validated against MRSA surveillance data and used to simulate interventions.