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A multilevel model of methicillin-resistant *Staphylococcus aureus* acquisition within the hierarchy of an Australian tertiary hospital

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Hospitals without universal single room accommodations typically contain multibed cubicles within wards. In this study, we examined whether the variation in a patient's risk for acquiring methicillin-resistant *Staphylococcus aureus* (MRSA) in a major tertiary hospital was greatest at the bed, cubicle, or ward level, and quantified the risk of MRSA acquisition associated with exposure to MRSA-colonized/infected patients within the same bed, cubicle, and ward at differently distributed lag times. Nested tri-level hierarchical logistic regression models with random effects were used for non-multiresistant MRSA (nmMRSA) and multiresistant MRSA (mMRSA). The models were internally validated. Receiver operating characteristic curves were used to compare the models predictive capability. The odds of new nmMRSA acquisition were 6.06-fold (95% credible intervals [CrI], 3.93- to 9.34-fold) greater in bed-weeks when a nmMRSA-colonized/infected patient was in the same cubicle 2 weeks earlier. The odds of mMRSA acquisition were 5.12-fold (95% CrI, 4.02- to 6.51-fold) greater in bed-weeks when a colonized/infected patient was in the same ward 2 weeks earlier. The between-cluster variance was highest at the ward level. Patients were at greater risk if there was a colonized/infected patient in the same cubicle or ward 2 weeks earlier. Our findings indicate that focusing on the relevant cubicles and wards during this high-risk period can help target infection control resources more efficiently.