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Abstract (oral session)

Assessment of transmission dynamics of KPC carbapenemase producing *Klebsiella pneumoniae* in an intensive care unit using a stochastic model

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Objectives: Carbapenemase producing Gram negative bacteria constitute a major threat especially for critically ill patients due to the limited treatment options. Prevention of transmission is extremely important, however the relative effect of various preventive measures is difficult to estimate. To this aim, modeling can provide important insights. Markov chain stochastic models are appropriate for analysis of data in such cases, where patient to patient transmission is significant. **Methods:** Colonization surveillance data for KPC producing *Klebsiella pneumoniae* were available on a weekly basis for a 21-bed Intensive Care Unit from September 2008 to September 2010. The data were analyzed using a stochastic (Markov chain) model based on the one formulated by Pelupessy I et al with slight modifications. The model parameters estimated were θ , the transmission rate and d , the decolonization-discharge rate. The parameters were estimated by Maximum Likelihood Estimation fit to the model. The effective reproduction number (R) was calculated, as θ/d . Effects of variations in cohorting and hand hygiene compliance were assessed with the log-likelihood ratio for nested models. The prevalence of colonized patients was simulated for various combinations of parameters to assess effects of hypothetical interventions. **Results:** During the study period 623 patients were admitted. Among them 49 (7.8%) were colonized by KPC on admission. The estimated transmission rate per week was 0.45. The overall effective R was estimated to be 1.85. Cohorting was associated with an R of 1.12 ($p < 0.001$) and a 50% increase in hand hygiene compliance was associated with an R of 1.65 (p NS). In simulations doubling the decolonization rate influenced colonization prevalence more than a respective change in transmission rate. **Conclusion:** The R for KPC producing *Klebsiella pneumoniae* was estimated to be higher than unity, indicating the importance of transmission and the potential for failure of control and spread in this population, even if newly admitted patients are not colonized. This highlights the need for transmission prevention measures in order to reduce R , by improving hand hygiene, thus affecting transmission and perhaps even more by cohorting colonized patients, affecting the discharge rate.