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Abstract (poster session)

Development of a smartphone application prototype to individualise antibiotic dosing in critically ill patients based on the results of population-pharmacokinetic models and Monte Carlo simulations

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Objectives: Currently available smartphone technology can help facilitate mobile computing at the point of care. The objective of this study was to develop the prototype of a mobile app that will provide individual dosing recommendations based on Probabilities of Target Attainment (PTA) for several antibiotics. Here the example of meropenem (MER) is presented. Methods: Population pharmacokinetic (popPK) model for MER in critically ill patients was used to estimate PTAs for 10000 virtual patients per simulation. PTAs for 0.5 and 3 hour infusion regimens for the target fT>MIC of 40% for MICs up to 32 µg/ml in serum were established for the creatinine clearance ranges of 20 to 140 ml/min and body weights of 40 to 120 kg at 20 ml/min and at 10 kg increments, respectively. Then, they were coded into HTML5 file format accompanied by the Javascript and CSS, which are to be used to build the cross-platform mobile application. Results: The total of 64 PTAs per regimen were embedded into the HTML5 file that are used to evaluate each candidate dose and dosing interval at the patients renal function category and respective body weight for the selection of the optimal dosing regimen. An easy to use, single page mobile application is produced that is compatible with six platforms. The user provides patient demographic and laboratory information via a user friendly interface in conventional or SI units. After the evaluation of candidate dosing strategies, the dose and interval that achieves a PTA of > 90% at the target MIC, and results in the least amount of drug in mgs per 24 hours of therapy will be displayed. When PTAs of > 90% are unlikely to be achieved by the candidate regimens based on the patient specific parameters, then the dosing strategy that provides the highest PTA at the target MIC and the expected PTA value is provided. Conclusions: The development of this cross-platform application provides the foundations for a multi-model based, point of care clinical decision support tool on mobile devices for clinicians interested in optimizing antimicrobial therapy. This system can be used to improve antibiotic dosing practices at the bedside via the utilization of modern principles of antimicrobial pharmacodynamics, popPK model based approach and Monte Carlo simulation.