EV0004

ePoster Viewing

Antimicrobials: antibiotic usage

Development of a smart phone application to individualize antibiotic dosing in critically ill patients using Monte Carlo simulations, Bayesian feedback and drug interaction modelling approaches

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Objectives: Smart phone technology can help facilitate mobile computing at the point of care. The objective of this study was to develop a mobile phone application to provide individual dosing recommendations based on Cumulative Fraction of Response (CFR), Probabilities of Target Attainment (PTA), Bayesian feedback and combination drug interaction modeling for several antibiotics. Here the example of Cefepime is presented.

Methods: Population pharmacokinetic (popPK) model for CEF in critically ill patients is used as the Bayesian prior and to estimate concentration - time profiles for 5000 virtual patients per simulation. Additionally, the Greco interaction equation is employed and linked to simulated concentration - time profiles to generate the curve of killing effect for combination therapy. The models and conditions are coded into Individually Designed Optimum Dosing Strategies (ID-ODS^{TM}) on - line to provide the necessary background for the high - level computations.

Results: The user provides patient demographic and laboratory information (including institution specific MIC distribution) via a user friendly interface in conventional units, which is then passed through the template of conditions in ID-ODS^{TM}. PTAs for short, extended, or continuous infusion regimens for the target *f*T>MIC of 60% for MICs up to 32 µg/ml in serum are established assuming lognormal distribution for all pharmacokinetic parameters. These PTAs are also used to calculate CFRs, allowing to compare up to 4 different regimens side by side at a time. For Bayesian dose individualization, a total of 5000 iterations are completed using a sequential approach allowing for the change of PK parameters from time to time. After the computation, clinically useful information including individual PK parameter estimates and suggested dosing regimens, PTAs, CFRs, and the predicted killing effect of the candidate dosing strategies will be displayed using uncomplicated and adequately descriptive plotting designs.

Conclusions: This mobile-platform application provides the opportunity for clinicians interested in optimizing antimicrobial therapy at the point of care. 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, Bayesian feedback and Monte Carlo simulation.