

Impact of the introduction of real-time therapeutic drug monitoring on the empirical dosages of carbapenems in critically ill burn patients

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Abstract

Purpose: Adequate empirical antibiotic dose selection for critically ill burn patients is difficult due to extreme variability in drug pharmacokinetics. Therapeutic drug monitoring (TDM) may aid antibiotic prescription and implementation of initial empirical antimicrobial dosage recommendations. This study evaluated how gradual TDM introduction altered empirical dosages of meropenem and imipenem/cilastatin in our burn ICU.

Methods: Imipenem/cilastatin and meropenem use and daily empirical dosage at a five-bed burn ICU were analyzed retrospectively. Data for all burn admissions between 2001 and 2011 were extracted from the hospital's computerized information system. For each patient receiving a carbapenem, episodes of infection were reviewed and scored according to predefined criteria. Carbapenem trough serum levels were characterized. Prior to May 2007, TDM was available only by special request. Real-time carbapenem TDM was introduced in June 2007; it was initially available weekly and has been available 4 days a week since 2010.

Results: Of 365 patients, 229 (63%) received antibiotics (109 received carbapenems). Of 23 TDM determinations for imipenem/cilastatin, none exceeded the predefined upper limit and 11 (47.8%) were insufficient; the number of TDM requests was correlated with daily dose ($r = 0.7$). Similar numbers of inappropriate meropenem trough levels (30.4%) were below and above the upper limit. Real-time TDM introduction increased the empirical dose of imipenem/cilastatin, but not meropenem.

Conclusions: Real-time carbapenem TDM availability significantly altered the empirical daily dosage of imipenem/cilastatin at our burn ICU. Further studies are needed to evaluate the individual impact of TDM-based antibiotic adjustment on infection outcomes in these patients.