

Individual variability in antibiotic trough concentrations of piperacillin in critically ill patients

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Introduction: Research has shown that plasma concentrations of beta-lactam antibiotics in critically ill patients are variable and unpredictable. The purpose of this study was to investigate the variability in antibiotic trough concentrations both between patients (inter patient variability), as well as within one patient (intra patient variability). Methods: We studied 16 adult critically ill patients without renal dysfunction, treated with piperacillin/tazobactam in a 3-hour extended infusion. Antibiotic trough samples were taken for 7 consecutive days and were analyzed using a validated UPLC-MS/MS technique with a coefficient of variation (CV) < 15 % at all concentration levels. The intra- and inter patient variability was calculated by means of a type II ANOVA. Results: Eighty-seven % of the patients were male ; mean (SD) age of the patients was 57 (20) years. Mean SOFA score (SD) at the start of AB therapy was 5 (2). Eighty-two antibiotic concentrations were available from these 16 patients. Both the inter-patient as the intra-patient variability were high, as shown in figure 1, with trough concentrations ranging from 4 to 155 mg/L. Taking into account the CV of the method of analysis, the CV of the intra-patient variability was 42 %, ranging from 14 to 147 %. The mean CV of the inter-patient variability was 55 %, ranging from 16 to 114 %. Conclusion: In this study we found considerable variability of piperacillin trough concentrations , both between as well as within the patient, during the first seven days of antibiotic therapy.

