

P1293

Paper Poster Session

Antimicrobial consumption in the hospital

Evaluation of paediatric beta-lactam prescribing in hospitals

Robin Bruyndonckx^{*1}, Niel Hens², Marc Aerts³, Ann Versporten⁴, Herman Goossens⁵, Julia Anna Bielicki⁶, Charlotte Barker⁶, Mike Sharland⁶

¹*Interuniversity Institute for Biostatistics and Statistical Bioinformatics (I-Biostat), University of Hasselt, Hasselt, Belgium*, ²*Institute: Laboratory of Medical Microbiology, Vaccine & Infectious Disease Institute (Vaxinfectio), University of Antwerp, Antwerp, Belgium*

²*Interuniversity Institute for Biostatistics and Statistical Bioinformatics (I-Biostat), University of Hasselt, Hasselt, Belgium*, ^{2nd Institute: Centre for Health Economic Research and Modelling of Infectious Diseases (Chermid), Vaccine & Infectious Disease Institute (Vaxinfectio), University of Antwerp, Antwerp, Belgium}

³*Interuniversity Institute for Biostatistics and Statistical Bioinformatics (I-Biostat), University of Hasselt, Hasselt, Belgium*

⁴*University of Antwerp, Laboratory of Medical Microbiology, Antwerp, Belgium*

⁵*University of Antwerp, Laboratory of Medical Microbiology, Wilrijk, Belgium*

⁶*Paediatric Infectious Diseases Research Group, Institute for Infection and Immunity, St. George's University of London, London, United Kingdom*

Background: β -lactam antibiotics are a large group of antibiotics with broad-spectrum activity against Gram-positive and -negative bacteria. Although drug-specific guidelines for the different β -lactam antibiotics exist, the reasons for variation in the prescribed doses are expected to be the same.

Material/methods: Data on prescriptions of 12 β -lactam antibiotics in hospitalized children were collected within the Antibiotic Resistance and Prescribing in European Children Point Prevalence Survey. These data contain information on 4833 prescriptions from 1195 departments in 219 hospitals in 41 countries located in 9 UN macro-geographical regions. Included antibiotics were: oral amoxicillin and amoxicillin with beta-lactamase inhibitor (BLI); parenteral ampicillin, benzylpenicillin, amoxicillin with BLI, piperacillin with BLI, cefazolin, cefuroxime, cefotaxime, ceftazidime, ceftriaxone and meropenem. Prescriptions for each specific antibiotic were modelled using a linear mixed model, which accounts for the correlated nature of the data (i.e. children nested within departments nested within hospitals nested within countries). In these models, information on the country (i.e. UN macro-geographical region), the hospital (i.e. hospital type), the department (i.e. number of beds, prevalence of antibiotics, department type) and the patient (gender, indication for treatment, severity of infection, treatment type, primary underlying diagnosis, weight, ventilation status) was included. Final antibiotic-specific models were constructed using backwards model building. To assess the factors contributing to variation in dosing among β -lactam antibiotics, a meta-model that pools the antibiotic-specific models was used.

Results: Plots of total dose (mg/kg/day) versus weight (e.g. for ceftriaxone - Figure 1) show that prescribing is done according to two different styles, one according to and one independent of weight. The results, shown in Figure 1, suggest that the prescriptions, which do not account for the child's

weight, are based on vial size, with different vial sizes prescribed according to the child's age (Table 1).

Table 1.

Dose	Age (years)		
	25 th percentile	50 th percentile	75 th percentile
500mg	0.42	0.83	1.75
1000mg	1.75	3	7
1500mg	3	5	7
2000mg	6	9	13

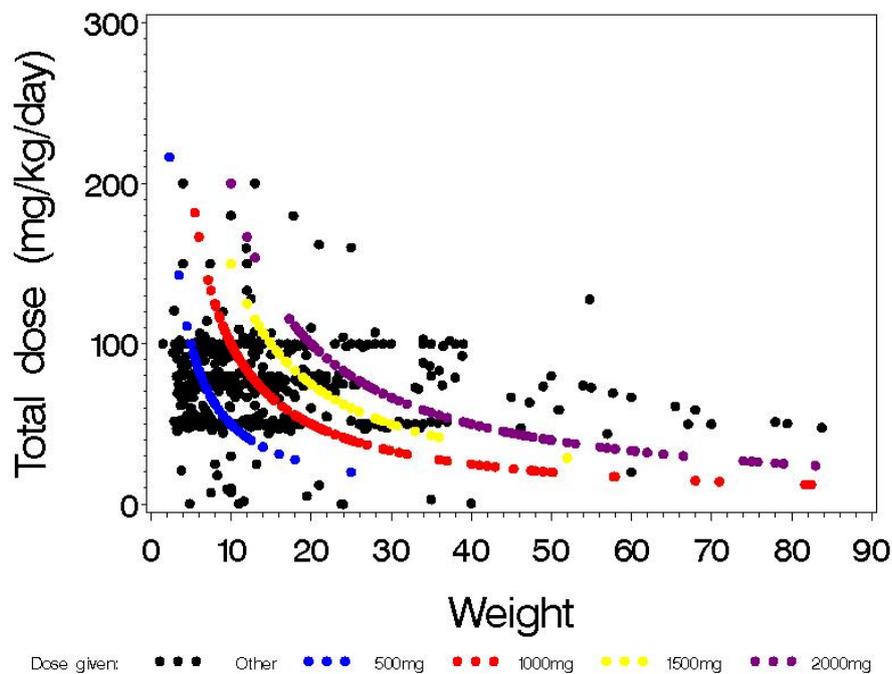


Figure 1.

The meta-model for the 12 studied β -lactam antibiotics fits the data quite well ($R^2 = 0.8231$), and illustrates that the reasons for variation within prescribed doses are antibiotic-specific, rather than common for the group of β -lactam antibiotics.

Conclusions: Although recommended doses are based on the child's weight, almost half of ceftriaxone prescriptions are based on vial sizes given according to the child's age. As these 12 β -lactam antibiotics all have the same pharmacological target, we would expect the reasons for variation in prescribed doses to be similar. However, they are antibiotic-specific, indicating that factors other than the expected pharmacokinetics and pharmacodynamics of these drugs influence prescribing. Variation may be related to centre- or country-specific practices, available formulations and individual physician decisions amongst other factors