

# EVALUATION OF PAEDIATRIC BETA-LACTAM PRESCRIBING IN HOSPITALS

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## Introduction

- Beta-lactam antibiotics: most frequently prescribed class of antibiotics
- Includes penicillins, cephalosporins, monobactams and carbapenems  
→ similar pharmacological profile  
→ similar reasons for deviating from recommended dose
- Studied in a point prevalence survey (PPS) within the Antibiotic Resistance and Prescribing in European Children (ARPEC) project

## PPS data

- 12 beta-lactam antibiotics
  - prescribed to 4778 children
  - within 1191 departments
  - within 219 hospital
  - within 41 countries
  - within 9 UN geographical regions
- Information on:  
antibiotic type, hospital type, department type, treatment type, antibiotic prevalence, gender, indication for treatment, reason for treatment, presence of underlying diagnoses, weight, ventilation status

## Methods

### Single analysis

Hierarchical data

→ Linear multi-level model

Construction of final model:

→ Backwards selection main effects

→ Inclusion of interactions

→ Backwards selection interactions

### Meta-analysis

Construction of final meta-model:

→ Pool antibiotic-specific models

→ Include fixed effect for antibiotic type and interactions with all included variables

→ Backwards selection

## Results

### Single Analysis (ceftriaxone):

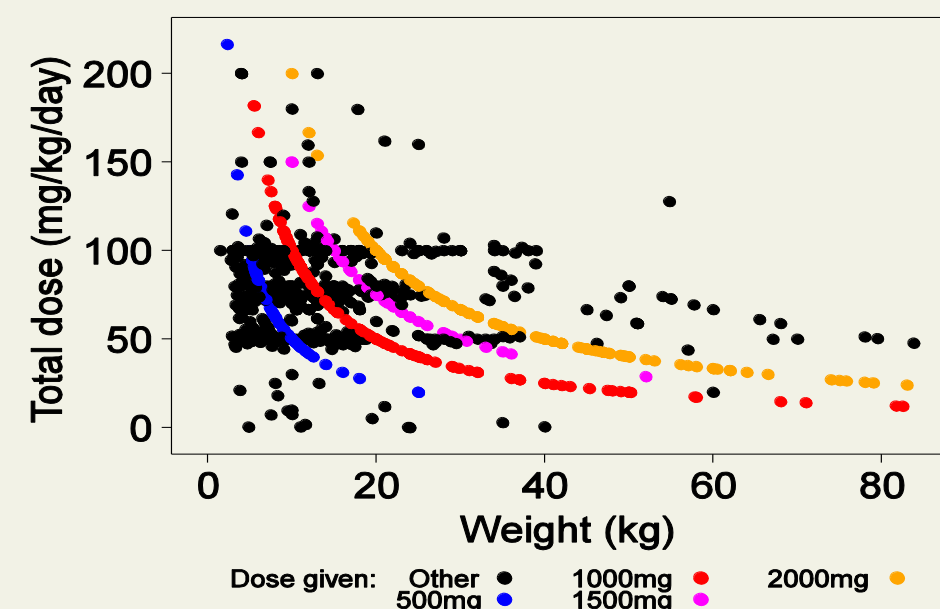


Figure 1. Scatter plot of total dose versus weight.

→ Mixed dosing: 50% weight-based + 50% irrespective of weight

Table 1. Age percentiles for frequently occurring doses.

| Dose   | Percentiles for age (years) |                  |                  |
|--------|-----------------------------|------------------|------------------|
|        | 25 <sup>th</sup>            | 50 <sup>th</sup> | 75 <sup>th</sup> |
| 500mg  | 0.42                        | 0.83             | 1.75             |
| 1000mg | 1.75                        | 3                | 7                |
| 1500mg | 3                           | 5                | 7                |
| 2000mg | 6                           | 9                | 13               |

→ Prescribing irrespective of weight = according to vial size

### Meta-analysis:

→ Antibiotic-specific effect for most variables

→ General effect for hospital type and treatment type

Table 2. Parameter estimates and standard errors for the effect of hospital and treatment type

| Category   | Estimate | Standard error |
|--|----------|----------------|
| Primary or secondary versus tertiary or specialized hospital | -4.5839  | 2.2811         |
| Targeted versus empiric treatment                            | 5.2327   | 1.6073         |

$R^2 = 0.8326$

→ Good fit: about 83% of the variability in the data is explained by the final meta-model

## Conclusion:

- Antibiotics are often prescribed irrespective of weight
- Reasons for deviating from recommended dose are antibiotic-specific rather than general