Background Pharmacokinetics (PK) are severely altered in critically ill patients due to changes in volume of distribution (Vd) and/or drug clearance (Cl). To what extent this affects the PK of antibiotics in critically ill children is largely unknown. We aimed to identify gaps in current knowledge and to compare published PK parameters and target attainment of antibiotics in critically ill children to healthy children and critically ill adults.

Methods Systematic literature search in PubMed, EMBASE and Web of Science. Articles were labelled as relevant when they included information on PK of antibiotics in critically ill, non-neonatal, pediatric patients. Extracted PK-parameters included Vd, Cl, trough concentrations, AUC, probability of target attainment, and elimination half-life.

Results 45 relevant articles were identified. Studies focusing on vancomycin were most prevalent (15/45). Other studies included data on penicillins, cephalosporins, carbapenems and aminoglycosides, but data on ceftriaxone, cefotaxime, penicillin and metronidazole could not be found. Critically ill children generally show a larger Vd and higher Cl than healthy children and critically ill adults. Reduced target attainment was described in critically ill children for multiple antibiotics, including amoxicillin, piperacillin, cefotaxime, vancomycin, gentamicin, teicoplanin, amikacin and daptomycin. 32/45 articles included information on both Vd and Cl, but a dosing advice was given in only 18 articles.

Conclusion The majority of studies focus on agents where therapeutic drug monitoring is applied, while other antibiotics lack data altogether. The larger Vd and higher Cl that is observed in critically ill children might warrant a higher dose or extended infusions of antibiotics in this patient population to increase target attainment. Studies frequently fail to provide a dosing advice for this patient population, even if the necessary information is available. Our study shows gaps in current knowledge and encourages future researchers to provide dosing advice for special populations whenever possible.

Disclosure(s) Nothing to disclose