Acute Kidney Injury Rate In Neonates and Infants Receiving An Intravenous Colistin Loading Dose In Comparison With A Standard Initial Dose

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1 Introduction

A decline in the development of newer antibiotics for combating multidrug-resistant (MDR) Gram-negative bacteria (GNB) infections has led to an increase in colistin use (Gogry et al., 2021). Colistin is considered as a last-line therapeutic option for the treatment of MDR-GNB infections. Initiation of colistin therapy with a loading dose is essential and is recommended in adults but not yet in pediatric and neonatal patients (Nation et al., 2017; Ooi et al., 2019). Recently, a pharmacokinetic study demonstrated that giving an intravenous colistin loading dose improved colistin exposure in children (Wacharachaisurapol et al., 2020). The main limiting factor in colistin use is nephrotoxicity. It was found that the administration of a colistin loading dose in pediatric patients did not increase the rate of acute kidney injury (AKI) (Wacharachaisurapol et al., 2021). However, there is no study on AKI rate resulting from the use of a colistin loading dose in neonates and infants.

2 Objective

The primary objective of this study is to examine the AKI rates in neonates and infants prescribed with a standard initial dose and a colistin loading dose and identify other associated factors that may affect these AKI rates.

3 Methodology

A retrospective study was conducted in patients aged 7 days to 12 months who had received intravenous colistin for ⩾ 48 hours. Loading dose (LD) was defined as colistin methanesulfonate at 4–5 mg of colistin base activity/kg/dose. AKI was defined according to the neonatal modified KDIGO serum creatinine (Scr) criteria — SCr ⩾ 1.5 times the baseline, measured 3–7 days after colistin initiation. The rates of AKI were compared between neonates and infants receiving or not receiving an LD.

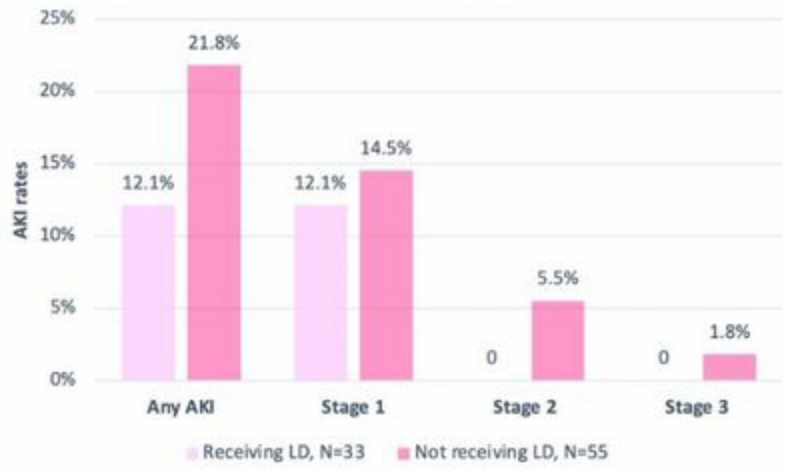
5 Analysis

Table 1
Patient demographics and medical characteristics classified according to first dose of intravenous colistin.

	Total*N* = 88	Receiving a loading dose*N* = 33	Receiving a standard initial dose*N* = 55
Age (month)	4.4 (3.6 – 5.2)	4.7 (3.3 – 6.0)	4.2 (3.3 – 5.1)
Male sex	47 (53.4)	15 (45.5)	32 (58.2)
Weight (kg)	4.4 (3.9 – 4.9)	4.8 (4.0 – 5.6)	4.1 (3.6 – 4.6)
Preterm	27 (30.7)	8 (24.2)	19 (34.5)
Low birth weight	27 (30.7)	11 (33.3)	16 (29.1)
Intensive care unit admission	69 (78.4)	24 (72.7)	45 (81.8)
Baseline eGFR (mL/min/1.73 m^2)	93.3 (80.7 – 106.0)	112.6 (91.0 – 134.2)	81.8 (66.6 – 97.0)
No. of comorbid conditions			
None	5 (5.7)	3 (9.1)	2 (3.6)
1-2	77 (87.5)	28 (84.8)	49 (89.1)
≥3	6 (6.8)	2 (6.1)	4 (7.3)
No. of concomitant nephrotoxic drugs being prescribed within 3 days before colistin initiation OR within 7 days after colistin initiation			
None	5 (5.7)	2 (6.1)	3 (5.5)
1-2	64 (72.7)	23 (69.7%)	41(74.5)
≥3	19 (21.6)	8 (24.2)	11 (20.0)
Overall colistin duration (day)	11.8 (9.9 – 13.7)	8.8 (6.5 – 11.1)	13.5 (10.9 – 16.1)
LOS (day)	82.4 (63.9 – 100.9)	63.5 (47.1 - 79.9)	93.7 (65.7 – 121.1)

Data are shown as mean (95% confidence intervals) or n (%)

Figure 1
Comparison of AKI rates between patients receiving or not receiving a colistin loading dose (LD) within the first week after colistin initiation.



4 Results

In total, 88 patients were enrolled. The mean age was 4.4 months. About half of the patients were male. There were 27 subjects who were born prematurely and had low birth weight. Most of the patients, at least, had one or more comorbid condition (87%) and were given with one or more nephrotoxic medication besides colistin (72%). The rates of AKI within the first week of colistin therapy between patients receiving and not receiving a colistin loading dose were 12.1% and 21.8%, respectively.

6 Conclusion

The administration of a colistin loading dose did not increase the risk of developing AKI in neonates and infants

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