The use of antibiotic line locks to reduce rates of catheter-related bloodstream infections in children with intestinal failure

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Aims

Based on previous audit data, as of August 2010, antibiotic line locks have been routinely used in children under the age of 5 who require long-term parenteral nutrition (PN) and suffer with recurrent catheter-related bloodstream infection (CRBSI). We aim to quantify the rate of reduction in CRBSI using a larger sample of comparable patients.

Methods

A descriptive cohort study was carried out, involving extraction of data from electronic health records (from the Cerner Millennium application) and pharmacy database. Data collected were for the time period of 1 August 2010 to 1 August 2015, and included episodes of confirmed CRBSI (positive blood culture and/or positive bacterial DNA) and dates on and off antibiotic line locks. Statistical analysis was used to compare rates of CRBSI per 1,000 catheter days while on and off antibiotic locks, using each child as their own historical control. Rates of CRBSI were also compared with previous audit data.

Results

A total of 27 patients with type 3 intestinal failure (IF) were included in this study, with 17 spending a proportion of time within the 5-year study period on antibiotic line locks. In the majority of cases IF was due to short bowel syndrome, often following surgery for necrotising enterocolitis. Table 1 shows patient demographics.

The total number of CRBSI per 1,000 catheter days was lower in children on antibiotic line locks, reducing from 104.46 to 55.08. Although not reaching statistical significance, use of antibiotic line locks reduced average rates of CRBSI per 1,000 catheter days by 47.42%, from 3.88 to 2.04. Results of this study show that rates of CRBSI continue to fall, as evidenced by a 41.71% reduction in rates compared with the preceding 5 years.

Table 1. Patient demographics. Data are expressed as range (median)

Total number of patients	n=27 (17 male)
Age (years)	0.62–17.86 (6.45)
Time on PN (days)	92–1,826 (1,254)
Patients on antibiotic line locks	62.96%
Time on antibiotic line locks (days)	51–1,634 (723)
Age of patients on antibiotic line locks (years)	2.14–17.86 (6.45)
Diagnosis	Short bowel syndrome 48.15% Pseudo-obstruction 29.63% Mucosal disorders 22.22% (tufting enteropathy 83.33%)
Infective organisms affecting patients on antibiotic line locks	n=17 Gram negative 29.41% Gram positive 47.06% Fungal 23.53%

PN = parenteral nutrition

Conclusions

CRBSI is associated with significant morbidity and mortality as highlighted by recent National CQUIN (Commissioning for Quality and Innovation) guidance, identifying diagnosis and treatment of sepsis as a National CQUIN Goal.

Antibiotic line locks are safe and well-tolerated among paediatric patients with type 3 IF. This research has shown that they are effective in reducing rates of CRBSI and associated hospital admission, as well as improving morbidity. Average rates of CRBSI recorded during this study are well below current published rates. Further larger-scale studies are required to accurately assess the effectiveness of this strategy.■

Conflict of interest statement

None declared.

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