



Antimicrobial Stewardship Practices for Infants with HIE

A Quality Improvement Initiative



S. Vigar NP¹, K. Mohammad MD^{1,2}, and S. Doucette MD^{1,2}

¹ Alberta Children's Hospital, Calgary AB, ² University of Calgary, Calgary AB

Alberta Children's Hospital

Aim

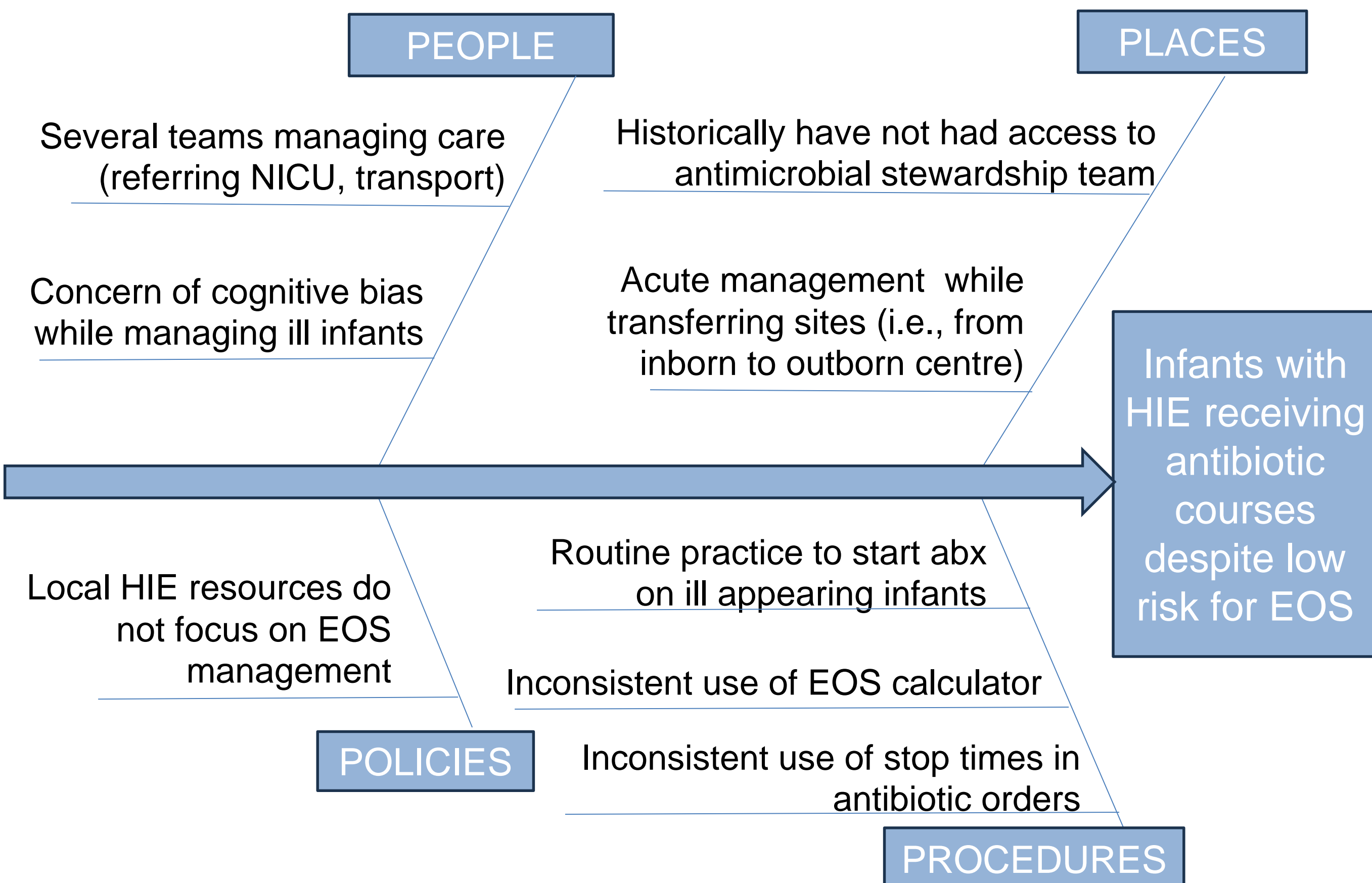
Decrease duration of empiric antibiotics to 24 hours in 75% of infants admitted with hypoxic ischemic encephalopathy (HIE) by November 1, 2025.

Measure	Example
Outcome	Proportion of infants with HIE who received 24 hours of empiric antibiotics
Process	Proportion of infants with HIE being assessed for 24 hours of empiric antibiotics
Balancing	Septic work ups and antibiotics in 5 days following empiric antibiotic discontinuation

Importance

- Difficult to clinically distinguish symptoms of infection vs. hypoxic ischemic encephalopathy¹
- Increasing awareness of adverse effects of antibiotics
- Local data suggests relatively low rates of concurrent infection in infants admitted with HIE

Cause and Effect



Initial PDSA Cycle

- Review of local data of infants admitted with HIE from 2014-2024 (n=312) collecting pertinent data including: maternal history, EOS risk, sentinel event, resuscitation, APGARs, cord gases, coagulopathy, hemodynamic instability, MRI and EEG results, hospital LOS, and mortality
- Local data significant for 4 cases of culture proven EOS in 11 years:

Case # (year)	Blood Culture	Time to Positivity
1 (2017)	Bacillus Cereus	10 hours
2 (2017)	GBS	10 hours
3 (2019)	E. Coli	8 hours
4 (2021)	GBS	11 hours

- Average duration of antibiotics for infants without culture proven sepsis 68.3 hours (n=308), average duration of antibiotics for infants without culture proven or culture negative sepsis was 55 hours (n=269).
- Empiric antibiotic usage trends varied. Most common empiric antibiotic choice was ampicillin and cefotaxime (n=271). Second most common was ampicillin with aminoglycoside (n=31). Six infants received at least one dose of aminoglycoside before antibiotics changed to ampicillin and cefotaxime.
- Stakeholder engagement: MD, NP, NICU pharmacist, antimicrobial stewardship team (Peds ID physician and AMS pharmacist)
- Disseminated results of local data review and process to assess infants admitted with HIE for 24 hours of empiric antibiotics

Implementation

- Since Oct 30, 2024, 3 infants have been admitted to ACH NICU with HIE for TH
- 2 of 3 infants were assessed to received shorter empiric antibiotic course and received 24 hours of empiric antibiotics with no complications
- One infant not assessed for shorter course had a clear sentinel event, remained hemodynamically stable and was treated with 36 hours of empiric antibiotics

Lessons Learned and Future Plans

- Most infants in Calgary zone with HIE received ampicillin and cefotaxime as first choice empiric antibiotics. 3 infants with HIE did not receive any empiric antibiotics!
- One year review to ensure safety and no missed cases of EOS
- Future considerations include assessing optimal empiric antibiotic choice and duration for infants with HIE and low risk for EOS, incorporating EOS calculator into transport calls for infants with HIE, developing a guideline on approach to antibiotic usage in HIE

References

1 Rao, R. et al. Antimicrobial therapy utilization in neonates with hypoxic-ischemic encephalopathy (HIE): a report from the Children's Hospital Neonatal Database (CHND). *J. Perinatol.* 40, 70–78 (2020).

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