Implementation of Clinical Practice Guidelines for Care of Neonates with Necrotizing Enterocolitis Reduces Broad Spectrum Antibiotic Use in the Neonatal Intensive Care Unit (NICU)

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Background
- Exposure to broad spectrum antimicrobial agents is a known risk factor for colonization and infection with multidrug resistant organisms (MDROs) in NICU patients.
- Therapy with broad spectrum antimicrobial agents is commonplace with no published guideline to help minimize their use in the NICU.

Objectives
- Describe the utilization of vancomycin and meropenem in the NICU.
- Analyze the impact of a necrotizing enterocolitis (NEC) clinical practice guideline (CPG) on the utilization of vancomycin and meropenem in the NICU.

Methods
- Single center study of a level IV NICU patient population at a tertiary care children’s hospital.
- Quasi-Experimental Study Design (3 parts):
  
  **Part 1:** Retrospective chart review of patients who received vancomycin and/or meropenem (V/M) between 1/2015–12/2015.

  **Definitions:**
  - Treatment courses defined as empiric (< 72 hrs of therapy), definitive (≥ 72 hrs of therapy), and perioperative prophylaxis (specified for surgical prophylaxis).
  - Data analyzed by 2 ID physicians to determine if V/M treatment course was definitively indicated.

  **Part 2:** Implementation of CPG outlining empiric and definitive therapy for infants with NEC in August 2015 (Fig. 1 below).

  **Part 3:** Analysis of V/M days of therapy (DOTs) per 1000 patient-days before and after CPG implementation.

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  - No parallel initiation of other ASP interventions (including prior authorization, prospective review and feedback).

Results

**Vancomycin & Meropenem Utilization Data (1/2015–12/2015)**

- Total number of unique patients: 92
- At start of antibiotic treatment course: mean gestational age: 28.8 weeks; mean chronologic age: 26.9 days
- 91 patients received 191 courses of vancomycin, and 27 patients received 32 treatment courses of meropenem.
- empiric use (44% of V & 53% of M courses); definitive therapy (48% of V & 47% of M courses) accounted equally for majority of V/M use; 8% of vancomycin courses were used for perioperative prophylaxis (including ventricular shunt, ECMO cannulation, etc.)
- Most common indications for definitive courses were NEC (23% of V & 33% of M use), followed by ‘culture-negative sepsis’ (18% of V use), and tracheitis (20% of M use).
- Review by 2 ID physicians revealed that ~40% of definitive use of V/M was clearly not indicated (Table 1).

**Table 1. Clinical Indication Determination of V/M Definitive Courses (n)**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Vancomycin (n=73)</th>
<th>Meropenem (n=15)</th>
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<tbody>
<tr>
<td>Clearly Indicated (clinical cultures warrant use)</td>
<td>18 (25%)</td>
<td>4 (27%)</td>
</tr>
<tr>
<td>Likely Indicated (sepsis in setting of known MDRO colonization)</td>
<td>5 (7%)</td>
<td>3 (20%)</td>
</tr>
<tr>
<td>Clearly not indicated (clinical cultures warrant narrowing)</td>
<td>30 (41%)</td>
<td>6 (40%)</td>
</tr>
<tr>
<td>Unclear if Indicated (critically ill infant but no known MDRO colonization and negative culture results)</td>
<td>20 (27%)</td>
<td>2 (13%)</td>
</tr>
</tbody>
</table>

**Conclusions**

- Widespread use of vancomycin and meropenem (both empiric and definitive use) was identified in the NICU.
- Definitive use of vancomycin and meropenem often did not have clear clinical indication.
- There was a decrease in the empiric and definitive utilization of meropenem following implementation of a NEC CPG.

References

Methodology figures and tables as described.

References

- Data analyzed by 2 ID physicians to determine if V/M treatment course was definitively indicated.
- Review by 2 ID physicians revealed that ~40% of definitive use of V/M was clearly not indicated (Table 1).

Throughout the document, the author emphasizes the importance of clinical practice guidelines in reducing the use of broad-spectrum antibiotics in the NICU. The study found that while empiric use of vancomycin and meropenem was commonplace, definitive use was often unnecessary or indicated. The implementation of a CPG led to a reduction in the number of days of therapy for these antibiotics, indicating a potential for improved patient care and reduced antimicrobial resistance.

Key findings include:
- A total of 92 unique patients were included in the study.
- The majority of V/M use was for empiric purposes (44% of V & 53% of M courses).
- Definitive therapeutic courses for NEC (23% of V & 33% of M use) were the most common indication.
- The study found that 40% of V/M courses were clearly not indicated.

The authors conclude that the implementation of a clinical practice guideline can lead to a reduction in unnecessary antibiotic use, which is important for improving patient outcomes and reducing the risk of antimicrobial resistance.