Implementation of a Clinical Pathway to Decrease Unnecessary Tests in Healthy Newborn Admitted for Sepsis Evaluation

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ABSTRACT

Background: Early-onset sepsis is one of the most common causes of neonatal morbidity and mortality. Infants born to mothers with suspected chorioamnionitis are at high risk for development of sepsis. The United States Center for Disease Control recommends newborns to be started on intravenous antibiotics for a minimum of forty eight hours during the evaluation of sepsis. A clinical dilemma exists in obtaining serial blood tests to try to identify these infants with early onset sepsis. Diagnostic tests with complete blood count (CBC) for neonatal sepsis have a poor positive predictive accuracy, especially when obtained shortly after birth, but a CBC does have a high negative predictive value. In 2012, an expert panel recommended that the first CBC be obtained at 6-12 hours of life. Despite this recommendation, there is still a wide range of clinical practice and many providers still obtain a CBC shortly after birth.

Methods: Beginning November 1, 2015, a new clinical pathway at the Rady Children's Hospital Neonatal Intensive Care Unit (NICU) was implemented for sepsis evaluation of term well appearing neonates with maternal diagnosis of chorioamnionitis. The intervention was to obtain the first CBC at 12 hours of life instead of shortly after birth on NICU admission and not to repeat CBC if initial values were normal. Baseline data was collected from June 1, 2015 to October 31, 2015 and compared to the intervention period from November 1, 2015 to June 30, 2016.

Results: There were 132 infants who met criteria prior to the sepsis protocol pathway implementation and 177 infants were identified after the intervention. The time of the first CBC obtained post to our new clinical pathway was 2.21 ± 1.46 and before intervention was 13.0 ± 7.22 (p < 0.001). The mean number of CBCs per patient before and after intervention were 2.31 ± 0.62 and 1.52 ± 0.65, respectively (p < 0.001). The total number of patients diagnosed with culture-negative sepsis were 14 out of 132 (10.5%) before intervention compared to 13 out of 178 (7.3%) after intervention (p = 0.15). The average hospital length of stay (LOS) decreased from 2.34 ± 1.72 days to 2.21 ± 1.46 days with the implementation of the clinical pathway for sepsis evaluation of term newborns with maternal diagnosis of chorioamnionitis (p = 0.25).

Conclusions: The initiation of our sepsis protocol pathway showed significant statistical reduction in the number of CBCs obtained in healthy well appearing neonates admitted to the NICU with maternal diagnosis of chorioamnionitis. In addition, a trend was seen in fewer newborns being diagnosed with culture-negative sepsis and a reduction in average hospital length of stay. The introduction of this best practice protocol to obtain the first CBC at 12 hours of life was an effective way to reduce the number of unnecessary blood tests and did result in quality improvement.

AIM

Creation of a new neonatal sepsis protocol pathway with the aim to reduce the number of blood tests (CBC) obtained on healthy term newborns being admitted to NICU for the evaluation of early-onset sepsis due to maternal diagnosis of chorioamnionitis.

METHODS

Inclusion criteria:
- Infants ≥ 37 weeks gestation
- Maternal diagnosis of chorioamnionitis
- Clinically well appearance

Exclusion Criteria:
- Premature infants (≤ 36+6 weeks)
- Having clinical symptoms (respiratory distress, hypoglycemia, vital signs instability)

Intervention: Initiated November 1, 2015
- A new clinical pathway for the evaluation of early-onset sepsis
  - No CBC done on admission and first CBC obtained at 12 hours of life
  - No repeat CBC if patient remains asymptomatic and normal first CBC results

Measures:
- Electronic Medical Record reporting tools were used to identify patient population
- Manual chart review; data collected on:
  - Number of blood tests (CBCs per patient)
  - Patients with diagnosis of culture-negative sepsis
  - Days in hospital (Length of Stay)

Statistical Methods:
- Student’s T-test was used to compare mean differences in pre- and post-intervention period.

RESULTS

<table>
<thead>
<tr>
<th></th>
<th>BASELINE (6/1/15 – 10/31/15)</th>
<th>NEONATAL SEPSIS PATHWAY (11/1/15 – 6/30/16)</th>
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</thead>
<tbody>
<tr>
<td>Number of Patients</td>
<td>132</td>
<td>178</td>
</tr>
<tr>
<td>Number of CBCs</td>
<td>306</td>
<td>272</td>
</tr>
<tr>
<td>Mean CBCs per Patient</td>
<td>2.31 ± 0.62</td>
<td>1.52 ± 0.65</td>
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<tr>
<td>Average Hours from Birth</td>
<td>2 ± 1.5</td>
<td>11.5 ± 3.5</td>
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<tr>
<td>When First CBC Obtained</td>
<td></td>
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<tr>
<td>Patients with Culture-Negative Sepsis (%) Total</td>
<td>14 (10.6%)</td>
<td>13 (7.3%)</td>
</tr>
<tr>
<td>Length of Stay (Days)</td>
<td>2.34 ± 1.72</td>
<td>2.21 ± 1.46</td>
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<tr>
<td>Clinical Pathway Compliance</td>
<td></td>
<td>80.2%</td>
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</tbody>
</table>

CONCLUSIONS

- Implementation of a neonatal sepsis protocol pathway for healthy term newborns being admitted to the NICU due to maternal chorioamnionitis resulted in:
  - A statistically significant reduction in the number of blood tests (CBCs)
  - A trend in fewer newborns being diagnosed with culture negative sepsis
  - A trend in reducing patient’s hospital length of stay
- The protocol pathway was an effective way to reduce the number of unnecessary blood tests resulting in quality improvement.