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An Outpatient Methadone Weaning Protocol by a Neonatal Intensive Care Unit for Neonatal Abstinence Syndrome

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Introduction:
- Neonatal Abstinence Syndrome (NAS): neonatal withdrawal symptoms as a result of perinatal exposure to drugs, especially opioids, during pregnancy.
- The rate of NAS has increased by 300% in the United States since the 1980’s.
- NAS treatment costs reach as high as $112.6 million dollars per year, the majority of which was heavily influenced by extended hospital stays.
- Inpatient management using traditional strategies of care has led to a length of stay (LOS) range of 8-10 days with a median of 25-34 days.
- Oei et al. 2001 found that inpatient LOS was decreased with the establishment of an outpatient clinic designed specifically for managing NAS patients.
- The Neonatal Intensive Care Unit (NICU) at Lehigh Valley Health Network (LVHN) has adopted an outpatient methadone weaning protocol to treat NAS patients with the goal of limiting readmissions and decreasing inpatient length of stay.

Plan:
- Characterize patients with NAS, describe the current practices used at LVHN to treat infants with NAS, assess outcome variables at LVHN.
- Develop a plan for treatment of NAS.
- Implement the outpatient methadone weaning protocol.

Do:
- All term newborns (>37 weeks Estimated Gestational Age) at Lehigh Valley Hospital - Cedar Crest (LVHC) between 1/1/2010 and 12/31/2014, admitted to LVHC-CC, with an ICD-9 co-diagnosis of NAS at discharge were examined.
- Data collected via electronic medical records independently by at least two investigators.
- Exclusion criteria: treatment for NAS with medications other than opioids, an EGA less than 37 weeks at birth, congenital anomalies, iatrogenic NAS due to opiate administration while in the NICU, or infants of multiple gestation.

Study / Results:
- Patients with NAS were admitted to LVHC-CC from 2010 to 2014.
- All patients were treated with methadone at LVHC-CC from 2010 to 2014.
- The study compared inpatient versus outpatient management of NAS.

Table 1: Secondary Outcome Parameters. There were 56 patients identified that met inclusion/exclusion criteria.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated Gestational Age</td>
<td>39.50</td>
<td>3.46</td>
<td>39.25</td>
</tr>
<tr>
<td>Total Hospital Length of Stay (days)</td>
<td>10.00</td>
<td>2.21</td>
<td>10.00</td>
</tr>
<tr>
<td>Total Days on Methadone Weaning</td>
<td>5.93</td>
<td>4.75</td>
<td>5.00</td>
</tr>
<tr>
<td>Total Hospital Charges</td>
<td>$53,081.00</td>
<td>$61,421.66</td>
<td>$32,816.05</td>
</tr>
</tbody>
</table>

Do: All term newborns (>37 weeks Estimated Gestational Age) at Lehigh Valley Hospital - Cedar Crest (LVHC-CC) between 1/1/2010 and 12/31/2014, admitted to LVHC-CC, with an ICD-9 co-diagnosis of NAS at discharge were examined.

Act / Conclusions:
- The establishment of a clear management protocol for infants discharged from the NICU for NAS has many advantages. It has been shown to increase opportunities for maternal-infant pair bonding due to shorter hospital stays and increased rates of breastfeeding.
- Abdel-Latif et al. 2002 found that the role of breastfeeding in the outpatient management of NAS led to reduced withdrawal severity, delayed onset of NAS, and decreased need for pharmacological treatment.
- Backes et al. 2012 calculated that patients in combined inpatient-outpatient management plan saved on average $13,817 in hospital costs per patient compared to a traditional, inpatient-only management strategy.

Next Steps: develop clinical pathway, compare cost savings.

Literature cited:

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