**Evaluation of the appropriate weaning of neonatal morphine solution (NMS) in the treatment of neonatal abstinence syndrome (NAS) and its effect on length of stay (LOS)**

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**BACKGROUND**

- Neonatal Abstinence Syndrome (NAS) refers to the withdrawal syndrome experienced by neonates born to women who use drugs of abuse (opiates, benzodiazepines, barbiturates, etc.) or who have been treated with methadone for opioid dependency during pregnancy.

- Greater than a three-fold increase in the rate of newborns with NAS was seen between 2000 and 2009 in the United States with an estimated 13,539 newborns with NAS in 2009.

- In 2009, the mean total hospital charges for NAS was $53,400 contributing 5.9% of pregnant women abused illicit drugs from 2011 to 2012.

- NAS management at our institution includes several studies have shown strict adherence to a protocol when treating NAS has improved outcomes and decreased length of stay (LOS); however, there is limited published data evaluating the process and criteria for weaning neonates and infants off NMS.

- 55-94% will experience withdrawal symptoms.

- A MOTW was defined as a 24-hour period from 8:00a.m. to 7:59a.m. the average max dose for each group.

**OBJECTIVES**

- **Primary objective**
  - To evaluate the relationship between missed opportunities to wean (MOTW) NMS in NAS patients and LOS

- **Secondary objectives**
  - To evaluate the relationship between MOTW and LOS in NAS patients and length of treatment (LOT).
  - To identify opportunities for improving NAS patient care and to validate the need for revision of current protocol for treating NAS patients in the intensive care nursery (ICU).

**RESULTS**

- A multiple regression model was used to determine that MOTW and MAX DOSE were positively correlated with LOS (p<0.05). MOTW and MAX DOSE can account for 85% of the variance in LOS. The multiple regression model was used to evaluate the relationship between MOTW and MAX DOSE to predict LOS. The model predicted that for every increase of 1 MOTW, the LOS is increased by 1.708 days (p<0.001).

- A multiple regression model was used to determine that MOTW and MAX DOSE were positively correlated with LOT (p<0.05). MOTW and MAX DOSE can account for 90.7% of the variance in LOT. The multiple regression model was used to evaluate the relationship between MOTW and MAX DOSE to predict LOT. For every increase of 1 MOTW, the LOT is increased by 1.254 days (p<0.001).

- One patient was excluded from the analysis due to the use of intravenous morphine prior to NMS and was later transferred to another institution prior to completion of NMS therapy.

**CONCLUSION**

When accounting for the maximum dose, the LOS for patients with NAS can be significantly decreased by reducing missed wean opportunities. By confirming that MOTW and LOS are related using statistical analysis, we are able to validate the necessity of a revised protocol for the management of NAS with NMS. After completion of the study, it is evident that there is room for improvement in terms of weaning NAS patients off of NMS. The study results confirm that strict adherence to a protocol, alone, can contribute to a reduction in LOS and consequently decrease NAS-associated hospital costs. There are several limitations to the study including the retrospective analysis, small patient population, unknown in-utero exposure, breastfeeding during NAS treatment, inconsistency in nursing NAS documentation, and unknown gestational age. A future study is warranted to show the economic impact of NAS-associated hospital costs and how they relate to LOS, LOT, and adherence to a protocol.

**REFERENCES**


**DISCLOSURES**

Authors have nothing to disclose.

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**Table 1: Baseline demographics**

<table>
<thead>
<tr>
<th>Patient Population</th>
<th>NAS patient (n=47)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make, % (n)</td>
<td>23 (49)</td>
</tr>
<tr>
<td>Birth Weight (kg), median (IQR)</td>
<td>2.8 (2.35-3.24)</td>
</tr>
<tr>
<td>Max Dose (mg/kg/day), median (IQR)</td>
<td>0.59 (0.4-0.79)</td>
</tr>
<tr>
<td>LOS (days), median (IQR)</td>
<td>40 (25-51)</td>
</tr>
<tr>
<td>LOT (days), median (IQR)</td>
<td>35 (22-48)</td>
</tr>
<tr>
<td>Adjust Phenobarbital, n (%)</td>
<td>6 (13)</td>
</tr>
</tbody>
</table>

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**Figure 1: Modified Finnegan’s NAS Scoring System**

**Figure 2: Comparison of the average actual LOS to the average predicted LOS**

**Figure 3: Comparison of the average actual LOT to the average predicted LOT**