Appendix D

Sample ESC-based Pharmacologic Treatment Regimens

Boston Medical Center NAS Pharmacologic Treatment Algorithm

- Begin ESC assessments within 4 hours of birth. Infants may be assessed on the mother skin-to-skin.
- Infants should be assessed every 3-4 hours with routine feeds / cares.
- NAS Bundle of Care: Encourage breastfeeding (if eligible), skin-to-skin with parents, parental presence at the bedside, feeding on demand, swaddling, decreased noise and light stimulation

Consider initiation of Level 1 Neonatal Methadone 1mg/ml oral solution after a team huddle if:
- Infant with any 1 “Yes” responses to ESC: 1) E = Poor feeding due to NAS, 2) S = Sleep < 1 hour due to NAS, OR 3) C = Console (Unable to Console within 10 minutes) AND:
- Non-pharmacologic care has been optimized first
- Evaluated for non-NAS causes of symptoms

<table>
<thead>
<tr>
<th>Level</th>
<th>Starting dose of Neonatal Methadone 1mg/ml oral solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.2 mg/kg/day PO divided q8 hours = 0.067 mg/kg/dose</td>
</tr>
<tr>
<td>2</td>
<td>0.4 mg/kg/day PO divided q8 hours = 0.133 mg/kg/dose</td>
</tr>
<tr>
<td>3</td>
<td>0.6 mg/kg/day PO divided q8 hours = 0.200 mg/kg/dose</td>
</tr>
<tr>
<td>4</td>
<td>0.8 mg/kg/day PO divided q8 hours = 0.267 mg/kg/dose</td>
</tr>
</tbody>
</table>

Increase oral methadone to next level if:
- Continues to have “Yes” to ESC due to NAS despite optimal non-pharmacologic care
- Methadone can be increased 1 time per day (q16 hours)

Consider weaning if: ESC scores primarily “No” while being maintained on the same dose for 24 hours.

Methadone Weaning:
- Wean by 10% of maximum dose in mg/kg/day once daily as tolerated.
- Discontinue methadone when dose is 20% of maximum dose.
- For Level 4, consider weaning down to 10% of maximum dose.
- Infants should be monitored for 48 hours off methadone before discharge home.
- Wean methadone before weaning secondary agents

Failed Weans:
If after a wean, persistent ESC “Yes” due to NAS, then:
- Option 1: Consider increasing methadone dose by 10%.
- Option 2: Attempt to hold current dose for up to 24 hrs, particularly towards the end of the weaning process.
- Option 3: If on “off dose” of 20%, consider weaning down to 10% of max dose.
- Option 4: Consider adding secondary agent if <50% through wean.

Consider adding a secondary agent if:
- Level 4 methadone and persistent ESC “Yes” due to NAS, OR
- Stalled weaning for 2-3 days particularly with polypharmacy, after first attempting methadone re-stabilization

- Use Phenobarbital if polypharmacy, benzodiazepine, or illicit drug exposed:
  * 20mg/kg initial load, followed by 5mg/kg/day maintenance
  * Wean by 20% weekly

- Use Clonidine if SSRI and/or opioid only exposed:
  * 1 mcg/kg PO q4 hours
  * Wean by extending the dosing interval from q4hr to q8hr to q12hr, then off
Children’s Hospital at Dartmouth-Hitchcock
NAS Management Algorithm

- Assess infant after feedings preferably while skin-to-skin or held swaddled by mother/caregiver.
- Review ESC behaviors, which have occurred since last assessment, using Newborn Care Diary with parents.
- Optimal non-pharm care: Breastfeeding (if no medical contraindication), rooming-in, parental presence, skin-to-skin, holding, swaddling, ad lib feeding (at least every 3 hours), quiet environment, limiting visitors.
- If “Yes” to any ESC item or “3s” for “Soothing Support Used to Console Infant” (i.e., difficulty responding to all caregiver soothing efforts OR does not soothe within 10 minutes), perform team huddle with mother/parent & RN to determine non-pharm interventions that can be optimized.
- If continues with “Yes” for any ESC item or “3s” for “Soothing Support” despite optimal non-pharm care, perform full team huddle with mother/parent, RN and Infant Provider.

**Morphine Initiation:** Consider initiating oral Morphine after full team huddle if:
- Continues with “Yes” to any ESC item or “3s” for “Soothing Support” AND
- Non-pharm care optimized to greatest extent AND
- Non-NAS causes excluded (e.g., cluster feeding, SSRI or nicotine withdrawal in first 24 hours)

Starting dose of Neonatal Morphine oral solution:
- 0.04 mg/kg/dose PO every 3 hours (use birthweight for dosing)

**Morphine Escalation:** Consider increase in morphine after full team huddle if:
- Continues with “Yes” to any ESC item or “3s” for “Soothing Support” AND
- Non-pharm care optimized to greatest extent AND
- Non-NAS causes excluded

To increase oral morphine dose:
- Give bolus dose of 0.02 mg/kg once and increase baseline dose by 0.02 mg/kg/dose (e.g., baseline dose = 0.04 mg/kg/dose; new dose = 0.06 mg/kg/dose). Recommended maximum dose = 0.12 mg/kg every 3 hours

**Morphine Weaning:** Consider weaning if primarily “No” responses for ESC while on same dose for 24 hours and non-pharm care optimized.
- Wean morphine maintenance dose by 10% of maximum dose.
- If initial wean tolerated, wean up to 20% of maintenance dose daily.
- Discontinue morphine when dose is less than or equal to:
  a) 0.02 mg/kg/dose OR
  b) dose no longer possible to measure for infant less than 2.5 kg
- Monitor for at least 24 hours off morphine before discharge home.

**Failed Weaning:** If after weaning or discontinuation of morphine, infant has persistent “Yes” responses to ESC due to NAS and non-pharm care optimized to greatest extent:
- a) Restart last effective (or discontinuation) dose of morphine and maintain dose for minimum of 24 hours OR
- Attempt to hold current dose for up to 24 hours, particularly towards end of weaning process or after morphine discontinuation.

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