Neuromuscular Blockade (NMB) Monitoring

Train-of-Four (TOF) Monitoring

Variables Affecting NMB:
- Electrolyte imbalances
- Hypothermia
- Neuromuscular disorders or denervation injuries
- Drug interactions

Monitoring Sites:
- Ulnar Nerve
- Facial Nerve
- Tibial Nerve

Train-of-Four Results:

<table>
<thead>
<tr>
<th>Depth of Blockade</th>
<th>Objective Monitoring</th>
<th>Subjective Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep Block</td>
<td>0 twitches</td>
<td>0 twitches</td>
</tr>
<tr>
<td>Moderate</td>
<td>1-3 twitches</td>
<td>1-3 twitches</td>
</tr>
<tr>
<td>Shallow</td>
<td>&lt; 0.4 (TOF%)</td>
<td>4 twitches – fade present</td>
</tr>
<tr>
<td>Minimal</td>
<td>0.4 – 0.9 (TOF%)</td>
<td>4 twitches – no fade</td>
</tr>
<tr>
<td>Acceptable Recovery</td>
<td>&gt; 0.9 (TOF%)</td>
<td>Same as above, cannot be determined</td>
</tr>
</tbody>
</table>

Signs & Symptoms of Residual Paralysis:
- Hypoxia
- Muscle Weakness
- Low Tidal Volume
- Increased O₂ Requirements
- Stridor

Reversal: (will be determined by LIP but you should be aware of standard dosing)

<table>
<thead>
<tr>
<th>Neostigmine</th>
<th>Sugammadex (only roc/vec)</th>
</tr>
</thead>
</table>
| Dosing = 0.03-0.07mg/kg [MAX = 5mg] Must be given w/ glycopyrrolate | Dosing
- > 2 twitches = 2mg/kg
- < 2 twitches = 4mg/kg
- Immediate reversal = 16mg/kg |
Neuromuscular Blockade Monitoring Steps

**STEP 1 | Determine and Prepare Site:**
1. Peripheral nerve stimulation (PNS) can be performed on the ulnar, facial or posterior tibial nerves. Whenever possible, the ulnar nerve is the site of choice.
2. Review physician order to determine the number of twitches desired and if a specific monitoring location is indicated.
3. Apply electrodes to clean, dry area (see locations above) ensuring the site is non-edematous and free of arterial lines. Attach electrodes to proximal (red) and distal (black) sites.

**STEP 2 | Prior to NMBA, Determine Supramaximal Stimulation** *(when possible)*
1. To administer the correct current level to the patient, set the peripheral nerve stimulator at 3 or 5mA and observe response. Continue to move up current levels (5mA at a time) until there is no change in response evoked by the TOF monitor.
2. Confirm this level with an additional one to two more stimuli. If there is no change in response, this will be the current setting used to assess TOF.

**STEP 3 | TOF Response and Use During Continuous NMB**
1. Use the TOF monitor to assess response prior to bolus dose or changing the infusion rate.
2. 30 minutes after change, reassess NMB with TOF monitor.
3. NMB may be unsatisfactory if 2 or more twitches are present. Communicate with provider and increase infusion rate per provider order. Retest in 30 minutes.
4. Once patient is stable (Titrating to 1 of 4 twitches) monitor NMB with the TOF monitor every 4 hours to ensure level of blockade and patient safety. If patient status changes, check NMB status using TOF monitor. If a rate change is indicated by provider, make the change and reassess NMB with TOF monitor 30 minutes post change.

**STEP 4 | Using the TOF Monitor to Assess for Residual Paralysis**
1. If patient has been monitored previously use the mA previously documented in EMR, if not use the maximal setting available.
2. If less than four twitches or fade is present, consult provider with suspicion of residual blockade/paralysis.
3. Administer reversal agent as ordered. *Review above for standard dosing*

**STEP 5 | Documentation**
1. Finish assessment by providing complete documentation in patient’s EMR.
2. Document: location of monitoring site, current setting used, response/# of twitches observed and any interventions performed.