

# SARASOTA MEMORIAL HOSPITAL NURSING DEPARTMENT POLICY

<b>TITLE:</b> MONITORING NEUROMUSCULAR BLOCKADE IN THE CRITICAL CARE SETTING	<b>POLICY #:</b> 126.445 (special care) <b>EFFECTIVE DATE:</b> 06/95 <b>REVISED DATE:</b> 10/03, 8/06 <b>POLICY TYPE:</b> <input checked="" type="checkbox"/> DEPARTMENTAL <input type="checkbox"/> INTERDEPARTMENTAL <input type="checkbox"/> DEPARTMENTS PROVIDING NURSING CARE <b>PAGE:</b> 1 of 5
---	--

**Job Title of Reviewer:** Director, ICU

- PURPOSE:**
1. To ensure the administration of the lowest and most effective dose of pharmaceutical agent needed to achieve neuromuscular blockade.
  2. To reduce the risk of prolonged paralysis and monitor for potential complications in patients receiving neuromuscular blockage.

- POLICY STATEMENT:**
- Neuromuscular blockade is indicated under the following clinical situations:
1. Facilitate mechanical ventilation and control airway pressure when analgesics and sedatives are not effective.
  2. Minimize oxygen consumption in patients with severe hemodynamic instability and/or oxygen delivery.
  3. Diminish muscle rigidity in tetanus.
  4. Decrease intracranial pressure in the brain-injured patient.
  5. Facilitate a motionless state in patients with unstable surgical wounds.
  6. Facilitate procedures (i.e., endotracheal intubation).

**NOTE:** Peripheral nerve stimulation should be used with Train-of-Four monitoring to reduce the risk of overdose, prevent prolonged paralysis, and monitor individual response to a particular medication and/or dose.

**EXCEPTIONS:** None

**DEFINITIONS:** Peripheral Nerve Stimulation—The delivery of an electrical stimulus to

the motor nerve and monitoring of the muscle response.

Train-of-Four (TOF) Stimulation—A method of monitoring neuromuscular blockade involving four electrical stimuli of 10mA to 80mA delivered at intervals of 0.5 seconds and palpating/observing the muscle response. Sites most commonly utilized for TOF testing are: the ulnar, facial, posterior tibial, and peroneal. The ulnar nerve, which innervates the adductor pollicis muscle, is the most widely used.

Blockade—Quantified by counting the muscle responses to the electrical TOF stimulation. The number of responses observed indicate the degree of neuromuscular blockade (paralysis). As the depth of blockade increases, the number of elicited responses decreases.

TOF Testing:

- a. 4 out of 4 twitches: 75 % or less
- b. 3 out of 4 twitches: 80% paralysis
- c. 2 out of 4 twitches: 85% paralysis
- d. 1 out of 4 twitches: 90% paralysis
- e. 0 out of 4 twitches: 100% paralysis

Unless specified by the physician, the desired level of neuromuscular blockade will be one (1) to two (2) out of four (4) twitches, (or 85-90% paralysis).

Paralysis—No movement, voluntary or involuntary. No spontaneous ventilation.

**PROCEDURE:**

1. An artificial airway **MUST** be in place and airway patency maintained at all times.
2. All alarms must be functional with appropriate parameters set for the patient.
3. Maximum analgesia and sedation must be administered.
4. Obtain order for neuromuscular blocking agent from physician. Physician should specify dose of medication and frequency (prn or continuous infusion), as well as desired level of paralysis, or he/she may choose to utilize the Neuromuscular Blockage Protocol.
5. Ideally, the TOF baseline should be determined prior to the administration of the neuromuscular blocking agent.
6. To establish the TOF baseline:

**PROCEDURE:  
(cont'd)**

- a. Site should be hairless and cleaned with alcohol prep pad and allowed to dry.

- b. Electrodes are placed properly along the nerve being tested. (If the patient is obese or edematous, the ball electrode may be substituted).
- c. Connect the cables to the electrodes, positive to negative, or red to black. (Red closest to the heart).
- d. Turn the stimulator on.
- e. Perform TOF testing.
  - 1) Begin testing at 10mA and slowly increase until the first obvious response is observed. (Usually seen at 20mA).
  - 2) Increase mA until four (4) twitches are observed.
  - 3) Record stimulator settings on computerized flowsheet.
7. Begin administration of neuromuscular blocking agent per physician order.
8. Repeat TOF testing, using the baseline setting, every 15-20 minutes until desired level of paralysis is obtained. Repeat every four hours and PRN to insure the desired level of paralysis is maintained.
  - a. If no twitch is elicited, DECREASE the dose of neuromuscular blocking agent and repeat TOF testing in 15-20 minutes.
  - b. If three (3) or four (4) twitches are elicited, INCREASE the dose of neuromuscular blocking agent and repeat TOF testing in 15-20 minutes.
9. A wake-up assessment MUST be performed every twenty-four (24) hours to allow for the evaluation of the patient's neurological function and documented in the medical record.
10. The clinician should be aware that certain other medication and/or clinical conditions might prolong or enhance neuromuscular blockade. These include: simultaneous administration of steroids, renal failure, or liver failure.
11. The clinician MUST maintain adequate sedation and analgesia during administration of neuromuscular blockade. (Use autonomic responses to pain or anxiety, such as tachycardia, hypertension, and sweating to assess adequacy of sedation and analgesia).
12. During neuromuscular blockade, the clinician must provide meticulous skin care and eye care to prevent complications, such as pressure ulcers or corneal abrasions.

**PROCEDURE:  
(cont'd)**

Reversal:

- a. Reversal agents for NMB agents must be quickly accessible via the critical care satellite pharmacy.
- b. The speed of reversal of residual neuromuscular blockade is primarily determined by the depth of blockade at the time of reversal. Once four (4) out of four (4) twitches are demonstrated by TOF testing, the recovery is probably satisfactory.

**RESPONSIBILITY:** It will be the responsibility of the Director of the Special Care areas to inform staff of this department policy. It will be the responsibility of the clinical nurse specialist to insure that all special care nursing staff are competent at monitoring neuromuscular blockade. It will be the responsibility of the Process Improvement Councils of the Special Care Units to monitor compliance with respect to this department policy.

**REFERENCES:** Rudis et al. "A prospective, randomized, controlled evaluation of peripheral nerve stimulation versus standard clinical dosing of neuromuscular blocking agents in critically ill patients. Critical Care Medicine. April 1997. Vol.25. No. 4 . pp.575-583.

Rudis, M., Giuslets B., Zarowitz, B: Technical and interpretive problems of peripheral nerve stimulation in monitoring neuromuscular blockade in the intensive care unit. Ann Pharmacotherapy, 1996; 30:165-172.

AACN Clinical Reference for Critical Care Nursing. 5th ed. Kinney, Dunbar, et al. Mosby: 2001.

Lynn-McHale, D., Carlson, KC. (2001). AACN Procedure Manual for Critical Care Nursing Fourth edition.(pp647-653). Philadelphia: PA. WB Saunders Co.

**AUTHOR(S):** Ryan Hentges, RN, BSN, CCRN  
Clinical Practice Specialist, ICU

**ATTACHMENT(S):** None

**APPROVALS:**

**Signatures indicate approval of the new or reviewed/revised policy** **Date**

<b>Signature:</b>  <b>Title:</b> Sue Shkrab, Director, ICU	
<b>Signature:</b>  <b>Title:</b>	
<b>Signature:</b>  <b>Title:</b>	
<b>Signature:</b>  <b>Title:</b>	
<b>Committee/Sections (if applicable):</b> Nursing Standards & Practice Council	8/3/06
<b>Vice President/Administrative Director (if applicable):</b>  <b>Signature:</b>  <b>Name and Title:</b>	
<b>Signature:</b>  <b>Name and Title:</b> Jan Mauck, Vice President, Chief Nursing Officer	