

**Measure Abbreviation:** NMB 01

**Description:** Percentage of cases with a documented Train of Four (TOF) after last dose of non-depolarizing neuromuscular blocker.

**NQS Domain:** Effective Clinical Care

**Measure Type:** Process

**Scope:** Calculated on a per case basis.

**Measure Summary:** NMB 01 is a monitoring measure that identifies the percentage of cases that had a documented Train of Four or acceleromyography result after the last dose of non-depolarizing neuromuscular blocker. The purpose of this quality measure is to help reduce the number of patients who have residual neuromuscular blockade after extubation.

**Rationale:** Postoperative residual neuromuscular blockade can lead to significant complications. Several studies have found associations between the use of neuromuscular blockade agents (NMBA) and residual neuromuscular blockade in the recovery room. Adverse postoperative respiratory outcomes are even more frequent when patients receive NMBA and reversal agents are not used. A mainstay of residual blockade prevention continues to be monitoring to allow for detection, and use of reversal agents like neostigmine and sugammadex. Due to variability in duration of muscle relaxants, even in defasciculating doses, we recommend that TOF is monitored when any non-depolarizing neuromuscular blockers are administered.

**Inclusions:** All patients that have received either by bolus or infusion a non-depolarizing neuromuscular blocker (NMB) AND were extubated post-operatively or in the PACU. The following NMBs were included:

- Atracurium
- Cisatracurium
- Pancuronium
- Rocuronium
- Vecuronium

Older drugs (Mivacurium and Doxacurium) were not included.

**Exclusions:**

- ASA 5 and 6 cases.
- Patients that were not extubated in the immediate post-operative period.
- Patients not given NMBs.
- Cardiac surgery without pump (CPT: 00560)
- Cardiac surgery with pump and <1 year old (CPT: 00561)
- Cardiac surgery with pump and > 1 year old (CPT: 00562)

**Exclusions (continued):**

- Cardiac surgery with hypothermic arrest (CPT: 00563)
- CABG with pump (CPT: 00567)
- Heart Transplant (CPT: 00580)
- Any cardiac case with an intraoperative note mapped to one of the following MPOG Concepts:
  - 50399 Cardiopulmonary bypass -- aortic clamp on/off note
  - 50409 Cardiopulmonary bypass terminated
  - 50410 Cardiopulmonary bypass initiated (full)
  - 50416 Cardiopulmonary bypass -- crossclamp and circulatory arrest time totals
  - 50417 Cardiopulmonary bypass -- Access cannula removed note
  - 50714 Cardiopulmonary bypass - Bypass start / stop event
- Cases performed by cardiac surgical service: MPOG concept 80005.

**MPOG Concept IDs Required:**

Neuromuscular Blocker Medications MPOG Concept IDs		Train of Four MPOG Concept IDs		Extubation MPOG Concept IDs		Neuromuscular Reversal Agent MPOG Concept IDs	
10043	Atracurium	3330	Train-of-four (Subjective Assessment)	50127	Intubation Extubated Awake or Deep	10739	Sugammadex
10129	Cisatracurium	3485	Train-of-four (Acceleromyography)	50202	Emergence-Patient Extubated		
10393	Rocuronium	3033	Train-of-four Acceleromyography Count (Objective monitoring)				
10446	Vecuronium						

**Data Diagnostics Affected:**

- Percentage of Cases with a Non-Depolarizing NMB Administration
- Percentage of Cases with an Extubation Note
- Percentage of Cases with a Train of Four Observation
- Percentage of Cases with any Staff Tracking
- Percentage of Anesthesia Provider Sign-Ins that are Timed

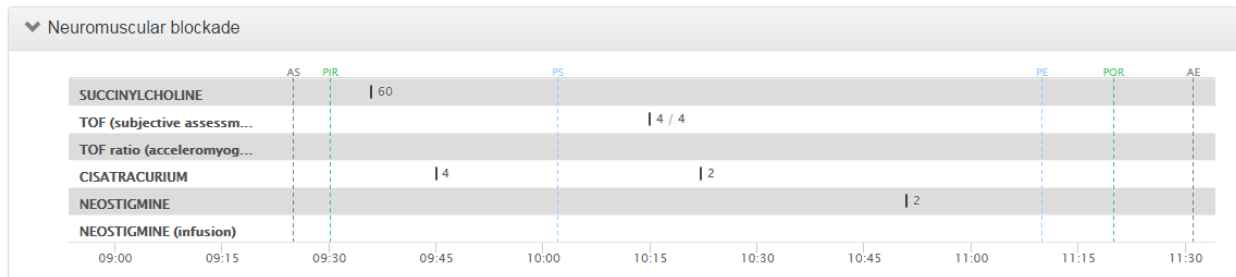
**Collations Used:**

- AsaNotes
- Asa5or6
- Cardiac
- ExtubationTimes
- TrainOfFour

**Failed Case Grid Template:**

- Link to Case
- Date of Service
- Procedure
- Surgical Service
- Operating Room
- Last NMB Dose
- First Extubation
- NMB-02
- Has Anesthesia CPT
- Responsible Provider
- MPOG Case ID

**Case Viewer Template:**



**Success:** Documentation of a Train of Four count (1, 2, 3, or 4), sustained tetany, or TOF ratio provided by acceleromyography AFTER last dose or stopping of infusion of neuromuscular blocker and before earliest extubation. **Note:** A Train of Four value of '0' is accepted for cases in which sugammadex is administered for reversal.

**Threshold:** 90%.

**Responsible Provider:** The provider signed in at time of earliest extubation.

**Risk Adjustment (for outcome measures):**

*Not applicable.*

**References:**

Beecher HK, Todd DP. A study of the deaths associated with anesthesia and surgery: based on a study of 599, 548 anesthetics in ten institutions 1948-1952, inclusive. *Ann Surg* 1954; 140:2-35.

Brull SJ, Murphy GS. Residual neuromuscular block: lessons unlearned. Part II: methods to reduce the risk of residual weakness. *Anesth Analg*. 2010. 111(1): 129-40.

Grosse-Sundrup M, Henneman JP, Sandberg WS, Bateman BT, Uribe JV, Nguyen NT, Ehrenfeld JM, Martinez EA, Kurth T, Eikermann M. Intermediate acting non-depolarizing neuromuscular blocking agents and risk of postoperative respiratory complications: prospective propensity score matched cohort study. *BMJ* 2012; 345:e6329

**References (continued):**

Harrison GG. Death attributable to anaesthesia. A 10-year survey (1967-1976). *Br J Anaesth* 1978; 50:1041-6.

Lien CA, Kopman AF. Current recommendations for monitoring depth of neuromuscular blockade. *Curr Opin Anesthesiol*. 2014; 27(6): 616-622.

Lunn JN, Hunter AR, Scott DB. Anaesthesia-related surgical mortality. *Anaesthesia* 1983; 38:1090-6.

Pedersen T, Viby-Mogensen J, Ringsted C. Anaesthetic practice and postoperative pulmonary complications. *Acta Anaesthesiol Scand* 1992; 36:812-8.