**Background**

Non-depolarising neuromuscular blocking agents are frequently used in general anaesthesia. For resumption of efficient spontaneous ventilation, these agents should have dissipated or been reversed. Even with short acting drugs, and when a single dose is administered, residual neuromuscular blockade (RNMB) is a frequent occurrence. RNMB can be associated with significant morbidity such as an impaired ventilatory response to hypoxia, risk of aspiration, increased upper airway collapsibility, postoperative pulmonary complications, critical events in PACU and an unpleasant sensation of muscle weakness. There is substantial evidence that pharyngeal and laryngeal muscle function is impaired at train of four ratio (TOFR) <0.9 so airway protection is not possible in conscious volunteers at TOFR <0.9.

**Aim and objectives**

To measure the incidence of RNMB defined as a TOFR of <0.9 at any time during the PACU stay. The aim is to reduce potential for morbidity associated with RNMB, by achieving a TOFR of ≥0.9 before admission to PACU.

**Research evidence/ best practice**

Residual neuromuscular blockade is defined as a TOFR of <0.9.

Volunteer studies have demonstrated that small degrees of residual paralysis (TOFR 0.7 - 0.9) can be associated with significant morbidity as mentioned above.

Quantitative measurement of muscle blockade improves detection of small degrees of RNMB, which is not reliably detected using qualitative means. Clinical tests of neuromuscular function, such as handgrip or head tilt, are not sensitive enough to be reliable tests of residual paralysis.

Complete recovery of neuromuscular function is more likely when anticholinesterases are administered >15-20 minutes before extubation and at a shallower depth of blockade. Even in intermediate acting agents such as Atracurium and Vecuronium substantial degrees of blockade are seen even if the last dose of NMB was more than one hour previously. Selective neuromuscular reversal agents that can antagonise deep levels of blockade may negate the need for early administration of reversal.

**Suggested indicators**

- TOFR <0.9 at any time during PACU stay.
- Clinical signs of muscle weakness.
- Signs of airway obstruction.
- Desaturation <90 per cent (while on oxygen via Hudson mask).
- Type of intervention(s) needed - (jaw thrust, oropharyngeal airway, nasopharyngeal airway, LMA, intubation).
- Aspiration.
- Complications on follow up.

**Standards and criteria for best practice**

Minimum TOFR ≥0.9 on admission to PACU.

**Method**

Data for 30 to 50 patients who received a NMBA during surgery.

Suggested data collection (refer to RNMB Data Collection Form):
- Cutaneous electrodes placed over the ulnar nerve, to measure accelerographic response of adductor pollicis.
- Use of a quantitative NMB device (such as TOF watch), or device that uses EMG (for example, Datex EMG monitor) or acceleromyography.
- A 30mA submaximal TOF stimulus repeated every five minutes until TOFR ≥0.9 cumulative dose of NMBA recorded.
- Elapsed time between last dose NMBA and reversal agent calculated (if administered).
- Elapsed time between last dose NMBA and arrival in PACU calculated.

### References


### Acknowledgement

This audit guide is based upon: Royal College of Anaesthetists. *Raising the Standard: a compendium of audit recipes*, 2012. The Royal College has kindly granted ANZCA permission to use this material.

Author: Dr Vanessa Beavis, FANZCA. August 2014.

Associated documents:

- RNMB Data Collection Form
- RNMB Results Summary and Conclusions Form