Student Audit and Research in Surgery (STARSurg) Collaborative

REspiratory COmplications after abdomiNal Surgery (RECON)

A student-led observational prospective audit of postoperative pulmonary complications after major abdominal surgery

RECON Bolt-on Protocol V2.0

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Study video available: http://bit.ly/RECONvideo

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Rationale

Postoperative pulmonary complications (PPCs) are common after abdominal surgery, with a spectrum of severity. PPCs range from minor complications such as partial atelectasis, to life threatening complications such as pneumonia, pulmonary aspiration and adult respiratory distress syndrome [1, 2]. PPCs account for 3 to 30% of complications in all patients undergoing abdominal surgical procedures [3-6]. Various peri-operative risk factors have been found to increase the risk of PPCs, including smoking, surgery involving the thorax, and presence of severe underlying respiratory disease [3, 4, 7, 8].

Neuromuscular blocking agents (NMBA) or 'muscle relaxants' are commonly used in procedures requiring general anaesthesia due to their blockade of the neuromuscular junction in skeletal muscle. This effect can facilitate tracheal intubation and reduces the intraoperative requirement for other anaesthetic drugs. However, these drugs are not used without risk their use has previously been associated with severe hypoxemia in the early post-operative period [9, 10], and has been strongly associated with post-operative pulmonary complications [11-14], including aspiration pneumonia. This may be in part due to residual neuromuscular blockade post-extubation which can occur in up to 40% of patients [15, 16]. Various methods are used in practice to reduce the occurrence of residual blockade (as assessed by peripheral nerve stimulation) including: usage of peripheral nerve stimulators (monitoring for resolution of peripheral motor deficit); administration of neuromuscular blockade reversal agents; or avoidance of NMBA use [11].

This effect of these interventions was recently investigated in POPULAR (Post-anaesthesia pulmonary complications after use of muscle relaxants), a large international observational study [11]. This found the risk of postoperative pulmonary complications (PPC) remained significantly associated with NBMA use even after multivariate adjustment. Correspondingly, the Association of Anaesthetists of Great Britain and Ireland (AAGBI) have issued guidelines on the use of NMBA and intraoperative monitoring to minimise risks of pulmonary complications [13].

This "bolt-on" audit aims to evaluate current practice in the UK and Ireland surrounding neuromuscular blocking agents in the operative context to provide a detailed understanding of variability and adherence to current measures for reducing residual neuromuscular blockade.

Study Aims:

Primary Aim:

- To audit compliance to Association of Anaesthetists of Great Britain and Ireland (AAGBI) guidelines[13] on anaesthetic practice of neuromuscular blockade in the perioperative context (**Appendix A**).

Methodology

1. **Summary**:

The REspiratory COmplications after abdomiNal Surgery (RECON) audit will collect data on postoperative pulmonary complications following abdominal surgery. Selected sites participating in the RECON audit will be invited to take part in this enhanced "Bolt-On" audit. This project will have the same patient eligibility criteria and recruitment periods as the main RECON project, and this will involve collection of additional perioperative data fields, which require specific support from a collaborating anaesthetic trainee and consultant at each site (**Appendix B**).

2. **Centre and Patient Eligibility**:

- Any hospital in the UK and Ireland which is eligible for RECON is eligible to participate in the "Bolt-On" audit.
- Collaborators must demonstrate engagement of both an anaesthetic trainee and consultant in their centre to be eligible, supporting the RECON mini-team(s) to collecting the required data fields for the RECON "Bolt-On" audit.
- All patients included within the RECON audit are eligible for inclusion within the 'Bolt-On' audit. Patients who are not included within the main RECON audit but would be theoretically eligible (i.e. eligible surgery, within the audit window, but no mini-teams is collecting data on this patient) will not be eligible.

3. **Authorship**:

- The overall authorship criteria for RECON is outlined in the main protocol. Sites participating in the RECON "Bolt-On" audit must complete at least **one data collection period per speciality at the centre** (minimum of 1 eligible patient per period per speciality included), but are encouraged to complete the "Bolt-On" Audit Form for as many RECON patients as possible in their centre.
- **One additional mini-team member per data collection period, per centre** will be permitted to reflect the additional workload required within the "Bolt-On" audit.
- The data completeness for the RECON "Bolt-On" audit for the site will be evaluated separately from the main project dataset (e.g. >95% data completeness must be independently achieved for included data points).
- All collaborators who meet these criteria will also be credited as PubMed-citable collaborators on any papers and presentations derived from the main RECON dataset.
- The local anaesthetic trainee and consultant who supports the mini-team(s) at the hospital will be also credited as a local collaborator on all on any papers and presentations derived specifically from the RECON "Bolt-On" dataset.

References

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Appendix A: RECON "Bolt-On" Audit Standards

Relevant audit standards from Association of Anaesthetists of Great Britain and Ireland (AAGBI): Recommendations for standards of monitoring during anaesthesia and recovery 2015 [13]:

Peri-operative Standards:	
1. Monitoring using quantitative peripheral nerve stimulators should be used in conjunction with NMB drugs	• A measure of neuromuscular blockade, using a peripheral nerve stimulator, is essential for all stages of anaesthesia when neuromuscular blockade drugs are administered. This is best monitored using an objective, quantitative peripheral nerve stimulator.
2. Recovery from blockade should be assessed as a train-of-four ratio > 0.9.	• A more reliable guarantee of return of safe motor function is evidence of a train-of-four ratio > 0.9.

Appendix B: RECON "Bolt-On" Audit Data Dictionary

Perioperative Data Fields	Required data (definition / comment)	Suggested source(s)
1. Operative airway protection	**Endotracheal intubation** / **Supraglottic Airway** (i-gel or Laryngeal Mask Airway)	– Direct observation. – Anaesthetist – Anaesthetic notes.
2. Time of knife-to-skin	**Time [24HR] Date [DD/MM/YYYY]**	
3. Time of sign-out/end of procedure	**Time [24HR] Date [DD/MM/YYYY]**	
4. Muscle relaxant (Neuromuscular blocking drugs administered)	**Yes** / **No**	
If yes: Please specify drug and total dose during anaesthesia	Please see REDCap for full list of drugs and dosages	
If yes: Please specify time of last dose	**Time [24HR]**	
5. Neuromuscular monitoring during anaesthesia:	**None** / **Qualitative** (Tactile or visual with peripheral nerve stimulator) / **Quantitative** (Acceleromyography e.g. TOF Guard, TOF Watch; Electromyography e.g. GE EMG; or Kinemyography e.g. GE NMT module)	
6. Median intraoperative tidal volume	**Volume [millilitres]**	
7. Target intraoperative FiO2 (fraction of inspired oxygen)	**Liberal (i.e. 80%)** / **Restrictive (i.e. 30%)** / **Other** *(please specify)*	
8. Median intraoperative FiO2	**Percentage (%)**	
9. Intraoperative arterial saturation recorded	**Yes** / **No**	
If yes: Lowest Pa02 recorded intraoperatively	**Number (kPa)**	
10. Ventilatory Positive End-Expiratory Pressure (PEEP)	**Standardised / individualised** (titrated by oxygenation or electrical impedance tomography).	
11. Train of Four (TOF) monitoring in recovery	**Yes** / **No, but available** / **No, unavailable**	
12. NMB Reversal Agent Given	**Yes** / **No**	
If yes: Please specify drug and total dose	Please see REDCap for full list of drugs and dosages	
If yes: Please specify time of last dose	**Time [24HR] Date [DD/MM/YYYY]**	
13. Last recorded Train of Four ratio (TOFR) before extubation	**Not recorded** / *if Qualitative:* **number of TOF twitches /** *if Quantitative:* **ratio [1dp]**	
14. Time of endotracheal extubation (since operation)	**Time [24HR] Date [DD/MM/YYYY]**	
15. Last recorded Train of Four ratio (TOFR) after extubation	*If yes: TOF in recovery:* **ratio [1dp]**	
16. Routine head of the bed elevation in the early post-operative period	**Yes** / **No**	
17. Prophylactic use of non-invasive respiratory support in the immediate post-operative period	**Yes** (full face CPAP mask) / **Yes** (nasal high-flow oxygen e.g. Optiflow) / **No**	