IMPLEMENTATION OF ACCELEROMYOGRAPHY TO INCREASE USE OF QUANTITATIVE NEUROMUSCULAR BLOCKADE MONITORING

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INTRODUCTION

- **Background:** Residual neuromuscular blockade (RNMB) creates excess perioperative morbidity. Quantitative neuromuscular monitoring devices may help ensure full recovery from neuromuscular blocking agents and has been demonstrated to reduce complications associated with residual neuromuscular blockade. We studied the effectiveness of educational efforts to introduce quantitative monitoring to a large academic medical center, with pre-defined main outcome measures of (1) self-reported familiarity with use of the device and (2) actual device uptake.

- **Methods:** Acceleromyographic neuromuscular transmission monitors were released into the clinical environment concomitant with brief introductions by vendor representatives and e-mailed instructions for their use. Six months after release, a blended education curriculum including face-to-face education, online materials and trained super-users was implemented to formally re-introduce the monitors to users. Anonymous surveys of knowledge, skills, and attitudes toward monitors were released into the clinical environment large academic medical center, with pre-defined main outcome measures of RNMB.

- **Hypothesis:** By utilizing a more precise instrument for measurement of neuromuscular function, negative patient outcomes such as hypoxemia, patient discomfort, prolonged post-anesthesia care unit stay, reintubation, critical care admission, and perioperative mortality can be reduced. Additionally, use of quantitative monitors could lead to reduced length of stay, improved patient satisfaction, and lower cost of health care.

- **Proper educational preparation will enhance the safe adoption of new technology in the workplace.

- **Acceleromyography provides a quantifiable measure of neuromuscular function by measuring the TOF ratio (comparing the fourth stimulus response to the first) on a scale of 0-1. Significant muscle weakness is present when the TOF ratio is less than 0.9. No other currently commercially available monitor except acceleromyography can exclude RNMB.

RESULTS

- **The program was effective in increasing the utilization of a new neuromuscular monitoring modality by 74% among clinicians.** We also demonstrated that the impact on provider workflow was not perceived to be a significant barrier to adoption after education.

- **Anesthesia practitioners’ attitudes regarding RNMB was not significantly changed by the project.** This is likely due to the fact that those who were surveyed believed strongly, both before and after implementation that RNMB is a clinically significant problem for patient care and thus the scores did not change.

- **Perceived impediments to the utilization of the monitor (time to setup and calibrate, change in workflow of anesthesia induction, positioning of the thumb for free adduction, and consistent monitor values) remained a perceived barrier to NMT use.** Also, despite the educational effort, the inability to ensure free thumb adduction, in surgical cases when both arms are tucked at the sides, for example, continued to be a physical barrier to utilizing the monitoring device.

**TABLES**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Pre-Education (Mean ± SD)</th>
<th>Post-Education (Mean ± SD)</th>
<th>Difference (Post-Pre)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>3.42 ± 0.73</td>
<td>3.84 ± 0.61</td>
<td>-0.42</td>
<td>0.1233</td>
</tr>
<tr>
<td>Phase 2</td>
<td>3.65 ± 0.64</td>
<td>4.00 ± 0.56</td>
<td>-0.35</td>
<td>0.0059</td>
</tr>
</tbody>
</table>

**CONCLUSION**

- Utilization of acceleromyographic technology has been shown in the literature to enhance patient care outcomes when neuromuscular blocking drugs are administered. Despite the professional consensus on the effects of RNMB among providers, this problem continues to present a clinical challenge in anesthesia care. This project has the potential to serve as an exemplar for other settings wishing to adopt this technology. Further, the ability of acceleromyography monitoring to enhance patient care through (1) a reduction in the number of RNMB events that are experienced and (2) decreased PACU length of stay and total amount of NMGB administered has substantial promise for better patient care and as a subject for further research.