Enhancing Patient Safety Through Objective Neuromuscular Monitoring: The STRONG QI Initiative

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DEFINE

BACKGROUND

Residual neuromuscular blockade (NMB) is a common and serious postoperative concern linked to:

- ✓ Airway obstruction
- ✓ Hypoxemia
- ✓ Respiratory distress

Despite strong recommendations from major anesthesia societies, objective neuromuscular monitors remain underutilized.

A GAP IN QUALITY EXISTS WITH THE USE OF OBJECTIVE NEUROMUSCULAR MONITORS TO CONFIRM ADEQUATE NEUROMUSCULAR RECOVERY BEFORE EXTUBATION.

AIM STATEMENT

Increase the use of objective neuromuscular monitoring to confirm adequate neuromuscular recovery from 12% to 24% by June 30, 2025, without increasing operating room exit time.

MEASURE

BASELINE MEASUREMENT

12% of surgical patients with confirmed adequate neuromuscular recovery before extubation (demonstrated by recorded train-of-four ratio ≥ 0.9).

IMPROVEMENT MEASURE

- **Measure**: Adequate neuromuscular recovery before extubation demonstrated in the surgical patient population undergoing anesthesia.
- **Description**: Proportion of patients with train-of-four ratio (TOFr) of 0.9 or above, an established adequate recovery measure.
- **Goal**: 100% improvement (to 24%)

BALANCING MEASURE

- **Measure**: Operating room (OR) exit time of surgical patients undergoing anesthesia.
- **Description**: Time interval, in minutes, between "Surgical End" and "Patient Out of Room" timestamps.
- **Goal**: Stable or decreased

ANALYZE

ANALYZE

To identify the causes and prioritize solutions related to the quality gap, the following approach was used:

ROOT CAUSE ANALYSIS
Fishbone Diagram (Fig 1)
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PRIORITIZATION
Impact Effort Grid (Fig 2)

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SOLUTION IDENTIFICATION
STRONG OMTS Bundle

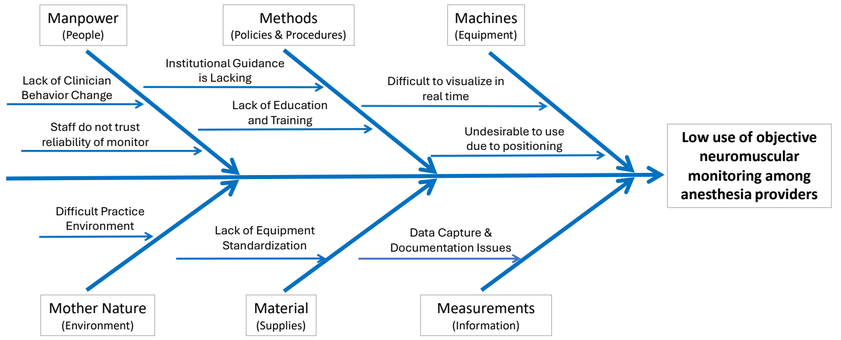


FIGURE 1. Fishbone diagram for Potential Causes

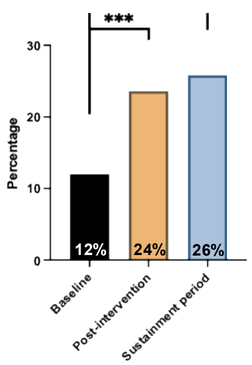
Plot label	Intervention	(Effort, Impact)
Infographic	QI infographic on all OR monitors	(2, 6)
Newsletter	Monthly newsletter articles	(5, 6)
QI Website	STRONG QI Corner website	(5, 5)
QA Reports	Quarterly STRONG QI Reports / QA process	(8, 9)
Incentive	STRONG Incentive Program	(1, 6)
EMG Integration	EMG device augmentation and integration	(8, 10)
Circulator setup	Teach circulator nurses to place monitor	(8, 7)
Governance	Governance & ownership (early-stage)	(6, 7)
CRNA Rounds	Super-user CRNA rounding	(7, 9)

FIGURE 2. Impact Effort Grid for Intervention Selection

RESULTS

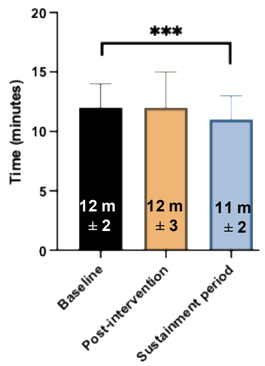
24% of surgical patients demonstrated adequate neuromuscular recovery before extubation without significantly increasing OR exit time, **this represents a 100% improvement from baseline**.

FIGURE 3. IMROVEMENT MEASURE: TOFr ≥ 0.9



24% of surgical patients in the post-intervention period demonstrated adequate neuromuscular recovery before extubation, a significant improvement from baseline (*** = $p < 0.0001$). This improvement was sustained into the subsequent quarter.

FIGURE 4. BALANCING MEASURE: OR exit time



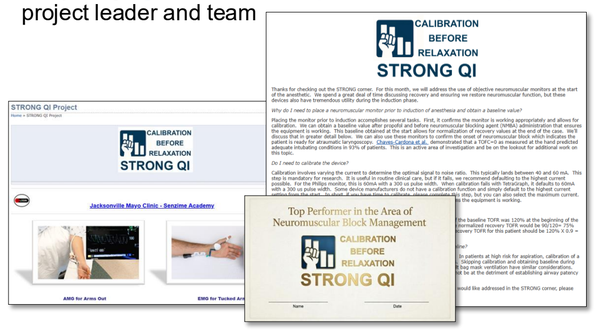
The post-intervention balancing measure was 12 min ± 3; therefore, increasing objective neuromuscular monitoring did *not* cause a significant increase in OR exit times (p = 1.00). OR exit time was significantly lower during the sustained period – not clinically relevant.

IMPROVE

STRONG OMTS BUNDLE
Ownership · **M**easurement · **T**raining · **S**ustainability
Own it. Measure it. Teach it. Sustain it.

To readily address stakeholder education gaps and stakeholder-identified issues, the following were implemented:

- QI **infographic** on all OR monitors
- Monthly **newsletter articles** with troubleshooting tips, FAQ addressed, equipment updates
- STRONG QI Corner **website**
- Quarterly STRONG QI Reports – created and analyzed data to provide **individualized feedback reports** via email to staff on their use of objective monitoring
- STRONG Incentive Program – **recognition** for top performers
- Early-stage **governance** and **process ownership** – project leader and team



CONTROL

CONCLUSIONS

- Increasing objective confirmation of adequate neuromuscular recovery is achievable through a bundled approach addressing quality gaps.

LESSONS LEARNED

- Engaging end users and subject matter experts in root cause analysis was essential for identifying actionable factors contributing to quality gaps.
- Addressing these key issues with a multifaceted, low-effort intervention bundle enabled us to reach our improvement goals more efficiently.

NEXT STEPS

Automate individual feedback reports, create formal education module, develop departmental standards, improve setup workflow