Implementation of a Cognitive Aid to Increase the Use of Neuromuscular Monitoring in the Operating Room

Hannah Parker MSN, RN, CCRN, SRNA

Cedar Crest College School of Nursing, Allentown, PA

Background

- Role of anesthesia: analgesia, amnesia and akinesia (Sorin & Kopman, 2017)
- Neuromuscular blocking agents are administered to 20 – 60 percent of the surgical population (Wiatrowski et al., 2018).
- Residual neuromuscular blockade has unintended consequences: hypoventilation, hypoxia, hypercarbia, airway obstruction, silent aspiration, post-operative respiratory failure and reintubation (Dunworth et al., 2018).
- Intraoperative effectiveness of neuromuscular blocking agents are monitored by a peripheral nerve stimulator (PNS) to monitor the train of four (Nagelhout & Elisha, 2018).
- The train of four is subjective. The train of four ***ratio*** is only available with a quantitative PNS whereas the qualitative PNS only provides the train of four count (Sorin & Kopman, 2017).

Objectives

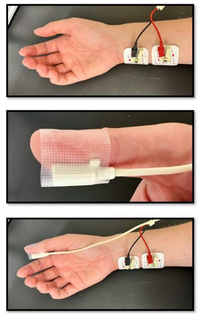
- The purpose of this DNP project is to determine the effect of a cognitive aid on the usage of a quantitative neuromuscular monitor pre- and post- intervention.

PICO Question

- In anesthesia providers, does the use of a troubleshooting cognitive aid in the operating room increase the use of quantitative neuromuscular monitors?

Methodology

- Up to 40 articles met the inclusion criteria in the literature search. Each were published within the last ten years.
- Kurt Lewin's Change theory was implemented to provide a framework for the project
- Two Philips quantitative PNS implemented at LVH-CC. Monitors can move depending on case need and volume
- Pre-implementation data:
  - In-service from Philips
  - Retrospective chart review (60 days)
- Implementation of intervention
  - Cognitive aid
- Post-implementation data:
  - Retrospective chart review (60 days)
- *EPIC* electronic medical record system
- If quantitative PNS was used correctly, data transferred was train of four and train of four ratio
- Cases that used the quantitative PNS were isolated



1 Place distal electrode near wrist; connect black wire. Place proximal electrode 2 cm up the arm; place red wire.

2 Place and secure the large, flat side of the transducer on the palmar side of the thumb.

3 Secure cables, avoid tension. Ensure thumb movement is not obstructed when tucking arms.

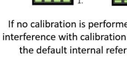
Calibration:

Calibrate after induction, but *before* paralytic administration

If calibration is not done, an internal reference value will be used

NMT SETUP > START CAL > CONFIRM
A white line will display in the columns to indicate the twitch representation

1.With Calibration
2.Without Calibration



If no calibration is performed, or there is interference with calibration (?TOF), it uses the default internal reference value

Monitoring

AUTO MODE > REPEAT TIME

TOF COUNT: Number of responses to the stimuli; shown as numbers 1 – 4

TOF RATIO (%): 4th twitch amplitude / 1st twitch amplitude

?TOF Alert

Questionable result (TOF?) = will not transfer data to EPIC

Generally created by interference for three seconds before the train of four

Make sure patient/staff are not moving/repositioning the TOF arm and the lines are not taut

Reset to Default: Monitoring:

In case of discharge, transfer or end of case, the calibration is still stored in the NMT
Between new patients:
To reset to default values:
NMT Setup menu > select **Clear Ref** > **Confirm**

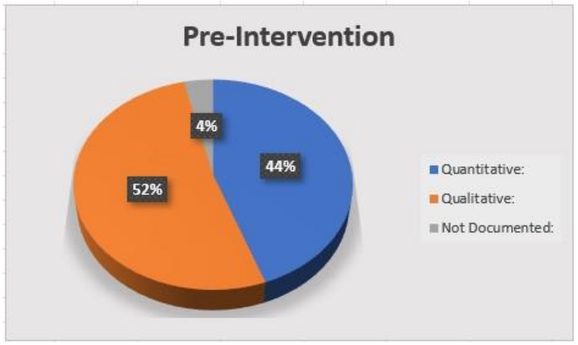
Quick Tips:

- Use on the ulnar nerve of the hand only
- If fingers twitch, the ulnar nerve is not being isolated – reposition leads
- As long as the thumb can move freely, the other fingers can be fixed

More detailed information available on the IntelliVue Patient Monitoring NMT Quick Guide

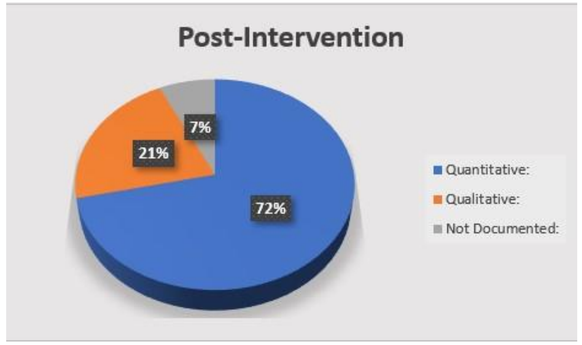
Translation

The findings indicate there was an increase in use of the quantitative PNS after the cognitive aid was implemented.



Pre-Intervention:

- 27 cases total
- 52% of CRNAs used the qualitative PNS
- 44% of CRNAs used the quantitative PNS



Post-Intervention:

- 13 cases total
- 21% of CRNAs used the qualitative PNS
- 71% of CRNAs used the quantitative PNS

Recommendations

- Quantitative PNS are recommended when caring for a patient who requires paralytic.
  - Train of four ratio of less than 0.9 indicates there will be residual neuromuscular blockade.
    - Residual neuromuscular blockade is indicative of post-operative airway complications (Dunworth et al., 2018).

Conclusion

- There is a high risk to the patient if they have residual neuromuscular blockade after extubation (Sager et al., 2019).
- Qualitative neuromuscular monitoring is subjective and is more likely to lead to residual neuromuscular blockade (Rudolph et al., 2018)
- Quantitative neuromuscular monitoring is recommended to minimize the amount of risk to the patient (Rudolph et al., 2018).
- The cognitive aid increased the use of the quantitative PNS by 27 percent.
- The cognitive aid decreased the use of the qualitative PNS by 31 percent

References

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