REVIEW OF PRESCRIBING AND MONITORING PRACTICES OF SEDATION AND ANALGESIA IN CRITICALLY ILL PATIENTS ON CONTINUOUS NEUROMUSCULAR BLOCKING AGENTS

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Background
Neuromuscular blocking agents (NMBA) are used in critically ill patients receiving mechanical ventilation, most commonly those with acute respiratory distress syndrome (ARDS). NMBAs provide no analgesic or sedative effects, therefore it is essential to achieve deep sedation with adequate pain management prior to initiating the NMBA. Clinicians should monitor using tools such as Richmond Agitation and Sedation Scale (RASS) and train of four (TOF), and may also use Bispectral Index Scale (BIS), to assess the depth of sedation and neuromuscular blockade.

Methods
This single-center retrospective medication use evaluation (MUE) was approved as Quality Improvement. Patients ≥ 18 years old admitted to intensive care units at Atrium Health Cabarrus from May 1st, 2020 – Nov 1st, 2020 who received a continuous NMBA infusion were included. Exclusion criteria: patients who were pregnant, incarcerated, or who received therapeutic hypothermia post-cardiac arrest. Descriptive statistics were used to assess primary endpoints of prescribing, monitoring, and adverse effects associated with NMBAs, including achievement of adequate sedation prior to NMBA initiation.

Results
Fifty (50) patients met inclusion criteria, of whom 54% were male with a mean age of 57.1 (± 13), and an average length of NMBA use of 93.9 hours. The most commonly infused NMBA was rocuronium (86%), sedative was propofol (58%), and analgesic was fentanyl (92%) (Table 1). All patients had an appropriate regimen of continuous IV fentanyl plus propofol and/or midazolam All patients had ARDS, and 80% also had COVID-19. Prior to initiating NMBA, 88% of patients were at their target RASS Score and RASS Scoring was in place for the duration of the NMBA infusion in all patients. BIS monitoring was used on 74% of patients receiving NMBA. Of those with BIS monitoring, the mean percentage of BIS Values was not well-maintained within goals (27.6 ± 27%). Baseline TOF was recorded prior to initiation of NMBA (48%) and monitored according to nursing protocol (44%) less than half the time (Table 2). Supportive care with DVT prophylaxis and ocular lubricant was adequately provided.

Summary
RASS monitoring prior to and during NMBA therapy was performed more consistently than TOF or BIS monitoring. These results have been discussed with critical care leadership and are being used to drive process improvement.

Conclusions
This MUE highlights opportunities for standardizing the initiation and titration of analgesia and sedation prior to and during continuous infusion NMBAs, and the importance of protocols and education for monitoring while infusing a NMBA.

Table 1: Baseline Characteristics	
Number of patients, n	50
Sex Male*	27 (54%)
NMBA agent selection* Rocuronium Cisatracurium Vecuronium	43 (86%) 4 (8%) 3 (6%)
Mean age, y†	57.1 ± 13
Average length of use, h†	93.9 ± 97.3
Renal dysfunction*	28 (56%)
Hepatic dysfunction*	12 (24%)
Indication* Mechanical ventilation (ARDS)	50 (100%)
Patients with COVID-19*	40 (80%)

Table 2: Monitoring	
RASS score at goal prior to NMBA initiation*	44 (88%)
RASS monitoring in place for duration of infusion according to nursing protocol*	50 (100%)
Mean percentage of RASS scores in goal†	98.9 ± 3.7%
BIS monitoring in place* Mean percentage of BIS values in provider-specified goal†	37 (74%) 27.6 ± 27%
Baseline TOF recorded prior to initiation of infusion*	24 (48%)
TOF monitoring in place for duration of infusion according to nursing protocol*	22 (44%)
Mean percentage of TOF readings in goal†	82.6 ± 25.2%