Evaluation of adequate sedation and analgesia with the use of continuous infusion neuromuscular blocking agents

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Background

- The "Clinical Practice Guidelines for Sustained Neuromuscular Blockade in the Adult Critically Ill Patient" recommend patients achieve deep sedation with an analgesic and sedative prior to receiving a continuous neuromuscular blocking agent (NMBAs).
- Prior to NMBAs initiation, level of sedation may be assessed using RASS (Richmond Agitation-Sedation Scale) with a goal of 4 or -5 (deep sedation to unarousable).
- After NMBAs initiation, a paralyzed patient’s level of sedation may be assessed using Bispectral Index (BIS) with a goal 40-60 (BIS monitoring may reduce awareness in paralyzed patients).
- Patients with inadequate sedation while receiving NMBAs may experience awareness and fear of death.
- During COVID, there was an increase in NMBAs use and shifts in staffing who may be unfamiliar with using NMBAs.

Objective

- Evaluate the adequate use of sedation and analgesia in patients receiving NMBAs

Methods

Study Design: Retrospective, multi-center, quality assurance project
Sample Size: Patient selection was random and based on proportion of patients at each delivery network
Inclusion Criteria: Patients receiving continuous intravenous NMBAs between March 24 and May 8, 2020
Exclusion Criteria: Patients receiving only bolus or continuous infusion NMBAs for less than 1 hour
Primary Outcome: Incidence of adequate sedation and analgesia prior to NMBAs initiation
Secondary Outcome: RASS documentation within 2 hours prior to NMBAs initiation & BIS documentation within 2 hours after NMBAs initiation
Inadequate sedation = receiving a continuous infusion of ketamine, fentanyl, midazolam, or propofol and achieved a RASS of 4 to 5
Adequate sedation = achieving a continuous infusion of ketamine, fentanyl, hydromorphone, or morphine

Results

- Table 1: Baseline characteristics
  - Characteristics: n (%)
  - Age: 62 ± 13
  - Gender: Male 34 (66%)
  - BMI: kg/m² 30.6 ± 6.5
  - Ethnicity: Asian 2 (4%)
  - Black 7 (14%)
  - Caucasian 26 (51%)
  - Hispanic 25 (50%)
  - Positive COVID Status: 46 (93%)

- Table 2: Documented sedation within or not within 2 hours
  - RASS documented: 25/50 (50%)
  - RASS at goal: 17/25 (68%)
  - BIS documented: 18/50 (36%)
  - BIS at goal: 16/18 (99%)

- Table 3: Medication orders updated with appropriate goals
  - Sedation: n = 22
    - 44% received no sedatives
    - 78% received appropriate sedatives
  - Analgesia: 8 patients received as-needed intravenous push (IVP) analgesics [median 1mg (IQR 0-6.2mg) in 24 hours], and 3 patients received no analgesics

- Figure 1: Incidence of adequate sedation and analgesia
- Figure 2: Median time of most recent RASS documentation prior to and BIS documentation after NMBAs initiation

References


Discussion

- Inadequate documentation of sedation or analgesia was possibly due to:
  1) missing continuous infusion order for sedation/analgesia
  2) missing documentation of RASS/BIS at goal
  3) medication orders not updated with appropriate goal parameters
- Patients receiving as-needed intravenous push analgesia may have received suboptimal analgesia – Pain assessment (HR >15%, baseline, tearing, diaphoresis) may be unreliable in paralyzed patients
- Patients with timely documentation were more likely to be at goal sedation
- Limited availability of BIS monitors likely contributed to missing BIS documentation

Conclusions

- Sedation orders with inappropriate goals may have contributed to inadequate sedation
- Patients receiving NMBAs should receive continuous infusion analgesia to ensure adequate pain control
- Electronic health record should be optimized to ensure:
  1) Continuous infusion sedation and analgesia are ordered when starting a continuous infusion NMBAs
  2) Sedation and analgesia orders are updated with appropriate goals
  3) Timely documentation of RASS and BIS in flowsheets

Limitations

- Retrospective analysis
- Small study population
- Data was abstracted from nursing flowsheets. Nursing progress notes were not reviewed

References