The Use of Dexmedetomidine for Sedation in Mechanically Ventilated Patients in the Pediatric Intensive Care Unit

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Background

- Opiates and benzodiazepines have traditionally been the primary agents used as sedatives during mechanical ventilation of pediatric patients in the intensive care unit.[1]
- Dexmedetomidine, an alpha2 adrenergic agonist, provides sedation with fewer effects on respiratory function than traditional sedatives. When used in combination with other sedatives, dexmedetomidine can reduce their doses.[2,3]
- Despite not being well studied in pediatric patients, the use of dexmedetomidine for sedation has increased over the past several years.

Objective

- To evaluate the current use of dexmedetomidine for sedation in mechanically ventilated pediatric patients in the pediatric intensive care unit (PICU) pre-implementation of a sedation protocol.

Methods

Study Design and Sample

- Study design: a single-center, retrospective chart review of pediatric patients admitted to a 19-bed PICU at a large, academic medical center from 2/1/2014 to 7/30/2014
- Inclusion criteria: <18 years old, mechanically ventilated for respiratory failure, dexmedetomidine use for at least 4 hours
- Exclusion criteria: neuromuscular respiratory failure, cyanotic heart disease, primary pulmonary hypertension, cardiac surgery, dependence on ventilator upon admission

Data Collection

- Each patient's medical record was used to collect information regarding baseline characteristics, medications administered during hospitalization, and measures of clinical assessment while on dexmedetomidine infusion.
- The durations of therapy, mean doses, maximum doses, and cumulative doses were collected for dexmedetomidine and other sedatives or analgesics used in combination with dexmedetomidine.
- The Face, Legs, Activity, Cry, Consolability (FLACC) score was used to monitor pain, the State Behavioral Scale (SBS) was used to measure sedation, and the Cornell Assessment of Pediatric Delirium (CAP-D) score was used to monitor delirium.

Data Analysis

- Descriptive statistics were used to characterize the population and describe the use of dexmedetomidine.

Results

Table 1: Baseline Characteristics (n=41)

Characteristic	Value
Age (yr) mean (range)	4.50 (0-17)
Weight (kg) mean (range)	25.29 (2.9-105)
Sex, n (%) Male	24 (58.5)
Race, n (%) White	16 (39)
Black	18 (43.9)
Other	7 (17.1)
Diagnosis, n (%) Cardiovascular	1 (2.44)
General Surgery	6 (14.63)
Infectious	16 (39.02)
Neurology	2 (4.88)
Respiratory	9 (21.95)
Other	7 (17.07)

Table 2: Course of Hospitalization (n=41)

Characteristic	Value
Mechanical ventilation (days), mean (SD)	10.2 (19.4)
PICU length of stay (days), mean (SD)	18.59 (26.7)
Hospital length of stay (days), mean (SD)	22.71 (27.71)

Table 3: Dexmedetomidine Use (n=41)

	Mean (SD)
Infusion duration (hr)	117 (163.11)
Start dose (mcg/kg/hr)	0.48 (0.2)
Maximum dose (mcg/kg/hr)	1.09 (0.69)
Mean dose (mcg/kg/hr)	0.73 (0.41)
Cumulative dose (mcg/kg/hr)	94.08 (139.58)

Table 4: Concomitant Use of Continuous Infusion Sedatives or Analgesics (n=41)

	Fentanyl (mcg/kg/hr)	Hydromorphone (mcg/kg/hr)	Midazolam (mg/kg/hr)	Morphine (mg/kg/hr)
Number of patients, n (%)	34 (82.93)	4 (9.76)	8 (19.51)	7 (17.07)
Infusion duration (hr), mean (SD)	99 (170.34)	315 (250.32)	85.88 (78.15)	118 (136.13)
Mean dose, mean (SD)	1.92 (1.26)	29.43 (9.08)	0.1 (0.03)	0.15 (0.11)
Cumulative dose, mean (SD)	229.14 (446.56)	9680.25 (7408.61)	8.79 (9.28)	15.39 (14.16)

Figure 1: Concomitant Use of Non-Continuous Infusion Sedatives or Analgesics (n=41)

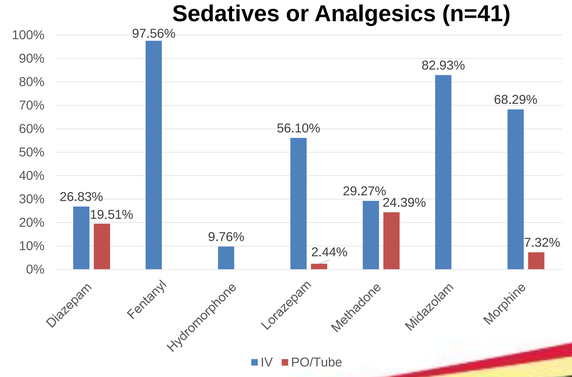

Table 5: Clinical Assessment During Dexmedetomidine Infusion

Assessment Parameter	Median (Interquartile Range)
FLACC, n=41	
Maximum FLACC	5 (0, 7)
Median FLACC	0 (0, 0)
SBS, n=39	
Median SBS	0 (-1, 0)
CAP-D	
Most frequent CAP-D, n=23	6 (3.5, 9)
Maximum CAP-D, n = 33	12 (7, 16)

Conclusions

- Dexmedetomidine was most commonly used among patients hospitalized for infectious, respiratory, or surgical causes.
- The mean starting dose and mean maximum dose for dexmedetomidine were 0.48 and 1.09 mcg/kg/hr, which were higher than the doses reported by other studies.
- Fentanyl was the most common concomitant analgesic used with dexmedetomidine, being used in over 80% of patients.
- Patients experienced minimal pain and adequate sedation control while on dexmedetomidine.

References

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Disclosures

There are no conflicts of interest to disclose.