Assessing the Safety of Moderate Sedation in Pediatric Dentistry

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PURPOSE

- This retrospective review assessed the safety of moderate sedation for pediatric dental procedures preformed in a dental clinic by looking at adverse events.

BACKGROUND

- Children often need sedation as a choice for completing pediatric dental procedures. This pharmacological approach to behavior management allows children where nonpharmological treatment has been unsuccessful.[1]
- Sedation for pediatric patients is very different than adults as it poses higher risks, especially in children younger than the age of six.[2]
- The scarcity of evidence in the literature makes determining the best drug regimen challenging for many pediatric dentists
- The Tracking and Reporting Outcomes of Procedural Sedation (TROOPS) is one validated tool developed to track adverse events and has been used in the medical literature[3]
- TROOPS is a multidisciplinary quality improvement standardized tool for procedural sedations within medicine.[3]
- The Pediatric Sedation Research Consortium (PSRC) created a list of defined adverse events by their committee's consensus and research has been completed with these lists[4]
- The Pediatric Advance Life Support (PALS) formula is a way to calculate and determine if hypotension occurred at any point during the sedation[5]
- There are many medications used in pediatric dentistry for sedation with limited research on their safety including, but not limited to, midazolam, triazolam, hydroxyzine, dexmedetomidine (DEX) or a combination of these
- More research needs to be completed on moderate sedation in pediatric dentistry and the safety of the medications administered

REFERENCES

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4. Mallory MD, Baxter AL, Yanosky DJ, Cravero JP, Pediatric Sedation Research Consortium. Emergency physician-administered propofol sedation: a report on 25,433 sedations from the pediatric sedation research consortium. Ann Emerg Med. 2011 May;57(5):462-468.e1.
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METHODS

- This retrospective chart review included sedations completed at Bon Secours St. Mary's Pediatric Dental Associates from June 2014 to November 2024
- A total of 941 complete patient records between the ages of 1 and 16 years were included in this study. Data was collected including demographics, age, date of sedation, American Society of Anesthesiologists (ASA), medical history, and vital signs.
- Vital signs included blood pressure, oxygen saturation, heart rate, respiratory rate, end-tidal carbon dioxide, and electrocardiogram collected every 5 minutes during the dental procedure and every 10 minutes after the sedation and prior to discharge. Hypotension was determined by the PALS score.
- Adverse events were classified by a modified Tracking and Reporting Outcomes of Procedural Sedation (TROOPS) and the adverse event list modified from the Pediatric Sedation Research Consortium (PRSC).

Adverse Events
Agitation/delirium
Airway obstruction (no air movement for 16 s despite respiratory effort)
Allergic reaction
Apnea > 15 s
Aspiration
Cardiac arrest
Coughing
Death
Desaturation: O2 Sat (<90) for > 30 s
Emergency anesthesia consultationa
Emergency airway intervention
Hypothermia
IV-related complication
Laryngospasm
Secretions excessive enough to require treatment
Stridor
Unexpected change in heart rate or blood pressureb
Unplanned admission to hospital or increase in level of care
Use of reversal agents- unplanned vomiting

Table 1- Adverse Events Recorded

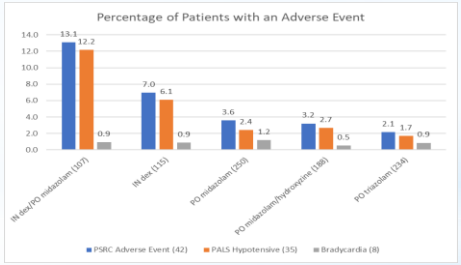

Figure 1- Percent of patients with an adverse event

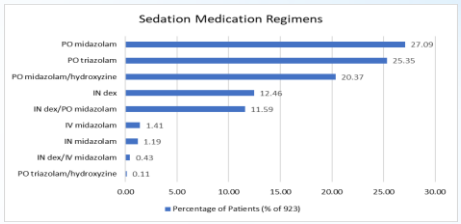

Figure 2- Sedation Medicament Regimens

DATA ANALYSIS

- Continuous data were shown with mean, standard deviation, 95% confidence interval, median, and interquartile ranges. Difference in age between patients with and without an adverse event were test with non-panametric two-tailed Wilcoxon Mann Whitney test. Logistic regression was used to calculate the unadjusted odds of any adverse event among subjects who received a specific medication regimen compared to subjects who received any other medication regimen. Data was analyzed SAS 9.4

RESULTS

- The mean age was 6.41 years of age with 50.27% female and 49.73% male
- Nine sedation medication regimens were used: the most frequently used regimen was PO midazolam (27.09%), followed by PO triazolam (25.35%) and PO midazolam/hydroxyzine (20.37%)
- Forty-two patients experienced an adverse event (4.55%)
- All AEs were either bradycardia or hypotension that did not require a medical intervention and all patients were safely discharged
- DEX is a drug where the "side effect" of bradycardia and hypotension is typically reversed by simple stimulation and other studies in medicine have also found this same finding
- The highest adverse events rates were observed in the IN DEX/PO midazolam group and the IN DEX group
- The odds of having an adverse event were significantly greater for subjects who received IN dex/PO midazolam compared to subjects who received any other medication regiment, but lower for subjects with PO triazolam compared to all other regimens
- There was no significance between age and adverse events

CONCLUSIONS

- Overall adverse event rates were low and similar to other studies in medicine. The TROOPS scale and PSRC scale can be used to track adverse events in pediatric dental sedation.

LIMITATIONS AND FUTURE RESEARCH

- The main limitation is this is a retrospective chart review
- The TROOPS scale and PRDC scale were originally intended for medicine and therefore both scales were slightly modified
- The quality of the sedation was not included in this study
- The drug regimens used do not include narcotics such as meperidine, chloral hydrate, or morphine. Therefore, only the drug regimens included can be compared to adverse events