Midazolam Dental Procedures Discontinued due to Behavior

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PURPOSE

The purpose of this study was to analyze midazolam dental procedures discontinued due to behavior and rescheduled for a different treatment modality.

INTRODUCTION

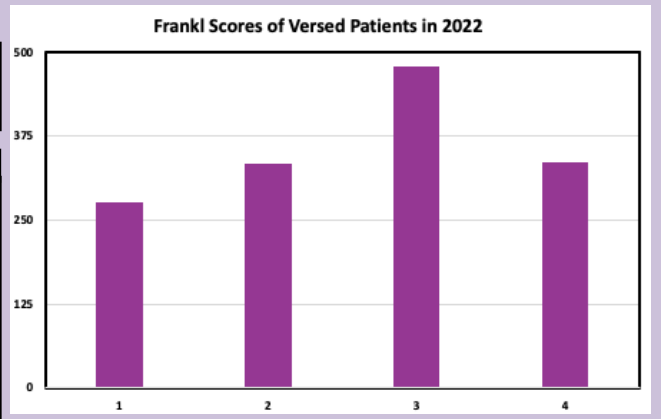
Midazolam is implemented in many pediatric dental offices across the country due to its desired effects of anxiolysis, mild sedation, and dissociation during the dental appointment, as well as a wide-margin of safety. These desired effects allow for dental treatment in anxious, and sometimes pre-cooperative pediatric dental patients. Despite using safe doses, patient response is often quite variable and unpredictable in the pediatric population. Some children have what is called a "paradoxical" reaction to midazolam which includes hyperemotional and/or combative behavior. These types of uncooperative behaviors may include inconsolable crying, combativeness, agitation, and restlessness[1]. Often this reaction is such that patients cannot cooperate for dental work to be completed safely.

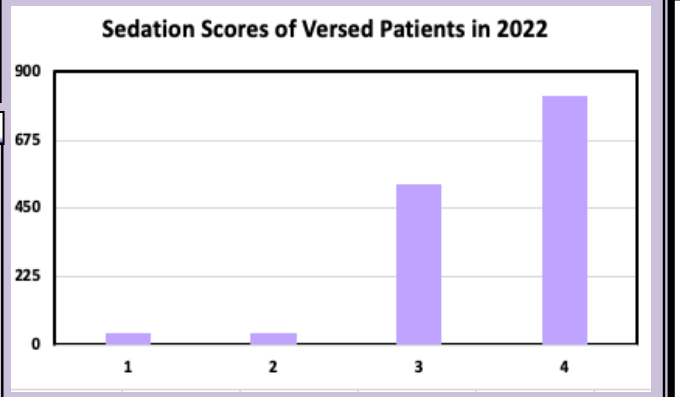
METHODS

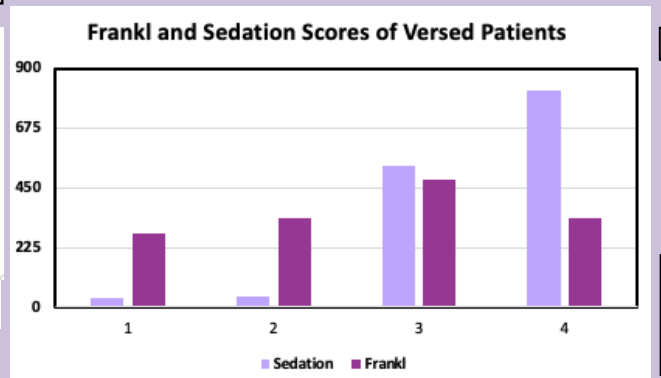
Oral and intranasal midazolam sedations completed by pediatric dental residents in 2022 at the Children's Hospital of Pittsburgh dental clinic were included in this study. Patients were administered a weight-based dose of intranasal (0.3mg/kg) or oral (05.mg/kg) midazolam for a dental procedure limited to 1-2 quadrants of dentistry. Ages of patients ranged from 2-14 years. Midazolam sedation appointments were reviewed and associated Frankl Behavior Scores given by provider were recorded. Each sedation appointment was then analyzed and assigned a sedation score based off the key included in Table 1.

Sedation Score	Description
1	Failed Sedation: No treatment could be rendered due to patient behavior, rescheduled for different treatment modality
2	Procedure Aborted Mid-Procedure due to patient behavior: treatment attempted, but definitive treatment not delivered.
3	Completed Procedure with poor behavior (Frankl 1-2/4): Intended work completed with poor patient behavior
4	Successful Treatment: Completed Procedure with good patient behavior (Frankl 3-4/4), Intended treatment completed.

Table 1: Descriptions for assigned Sedation Scores







RESULTS

A total of 1427 midazolam sedations were analyzed. Frankl behavior scores were recorded for each of the sedation visits. Of the sedation visits, 276 patients were categorized as Frankl 1, 335 as Frankl 2, 479 as Frankl 3, and 336 as Frankl 4. Of the sedations analyzed, 37 sedations were considered a failed sedation (no treatment could be rendered due to patient behavior), 40 sedations were aborted mid-procedure due to to patient behavior, 530 sedations were completed with poor behavior, and 819 sedations were completed with good patient behavior. All failed sedations were associated with a negative behavior score (35/37: Frankl 1, 2/37: Frankl 2). A Pearson's Chi-squared test demonstrated that the success of a sedation, with regard to behavior and specific Frankl score is statistically significant (p-value <2.2e-16).

DISCUSSION

Of the 37 failed sedations, the chart cited explanations as to why treatment was terminated included combative behavior, age-inappropriate behavior, unsafe behaviors, and guardians electing to stop treatment due to patient behavior. The failed sedation patients were either rescheduled for treatment under general anesthesia, treatment without sedation, or active surveillance until patient cooperation could improve. While negative behaviors were associated with all failed sedations in this study, many sedations (530/1427) were able to be completed with poor patient behavior. Midazolam can produce a variety of different affects in patients which can be patient-specific and unpredictable. Some negative behaviors may be tolerable for certain dental procedures, while the same behavior may require treatment termination in others. No patients in this study required reversal with Flumazenil, but many patients exhibited a period of post-sedation hyperactivity. Administration of caffeine may be an alternative and effective option to treat sedation induced paradoxical hyperactivity [2].

CONCLUSIONS

Midazolam continues to be an effective treatment option for pediatric dental patients. A source of failed midazolam sedations is a paradoxical reaction, which can cause treatment to be discontinued due to poor behavior and another treatment modality utilized for completion of dental work.

REFERENCES

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2. Rubin JT, et. al. Oral and Intravenous Caffeine for Treatment of Children with Post-Sedation Paradoxical Hyperactivity. *Pediatric Radiol*. 2004, 34: 980-4.