The Effect of Temperament on Outcomes of Opioid and Non-Opioid Pediatric Dental Sedation

Raymond Lee, DDS[1], Travis Nelson, DDS, MSD, MPH[1], Anna Forsyth, DDS, MSD, Mariella Garcia, DDS[1], JoAnna Scott, PhD[2]

University of Washington School of Dentistry, Department of Pediatric Dentistry[1], University of Missouri-Kansas City School of Dentistry[2]

BACKGROUND

The ideal pediatric sedation regimen should be safe, efficacious, and have an appropriate duration of action with minimal lingering side effects. Currently there is no standard regimen used among pediatric dentists, and sedation outcomes vary widely.

Safety is paramount when treating children under procedural sedation, and utilizing multi-drug regimens can increase the risk for adverse events. To avoid oversedation and subsequent adverse sequelae, combined sedation regimens must be used judiciously, particularly when considering the addition of a respiratory depressant such as an opioid like meperidine. For these reasons, using tools like temperament is particularly important in guiding a provider towards predictive sedation outcomes.

PURPOSE

The primary objective of this randomized trial was to assess the effects of procedural oral sedation using midazolam and hydroxyzine with and without meperidine on sedation outcomes in pediatric dental patients.

The relationship between child temperament and sedation outcomes was also assessed.

METHODS

- This pilot study recruited 37 healthy children between the ages of 3-7 who met study eligibility criteria and were planned to undergo dental treatment with procedural sedation at the University of Washington Center for Pediatric Dentistry.
- The participants were randomly assigned to receive one of two sedation regimens, which were dosed utilizing a lean body weight scalar:

Midazolam 0.5mg/kg Hydroxyzine 1.0mg/kg Meperidine 1.5mg/kg	Midazolam 0.5mg/kg Hydroxyzine 1.0mg/kg

- Dental treatment was performed and sedation outcomes were assessed via the Houpt Behavior Rating Scale. Sedation results of excellent, very good, and good were defined as a success, and results of fair, poor, and aborted were defined as a failure.
- Parents completed the Child Behavior Questionnaire Short Form (CBQ-SF) to assess fifteen domains of child temperament.

RESULTS

- 37 participants were recruited for this study. 20 received the midazolam + hydroxyzine + meperidine (Mz/H/Mep) regimen, and 17 received the midazolam + hydroxyzine (Mz/H) regimen. No serious adverse events were reported.
- The mean age in months was 69.19±14.05. Pre-operative behavioral rating of Frankl (+)/(+/+) were statistically significant for success. (*P<0.01*) There was no significant association between patient demographics and sedation success (Figure 1).

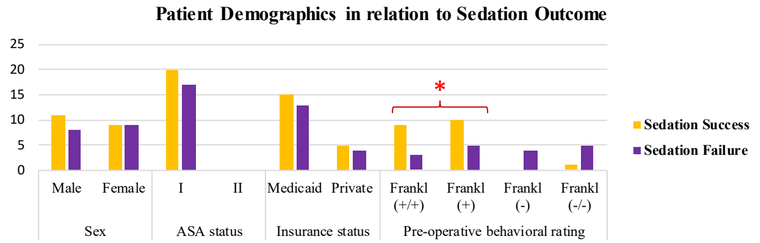


Figure 1. Participant demographics and sedation outcome

- Patients with successful sedation were more likely to have received complex treatment (*P=0.03*). There was no significant difference in sedation outcome in regard to sedation regimen, isolation type, treatment complexity, and treatment duration (Figure 2).

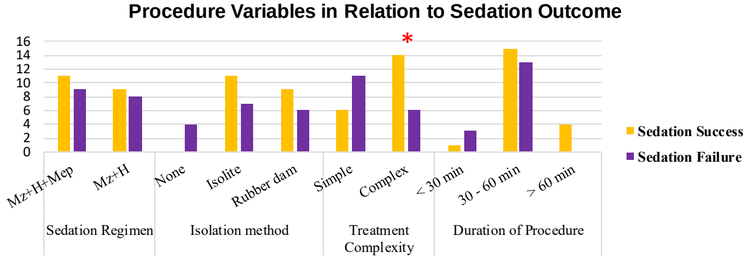
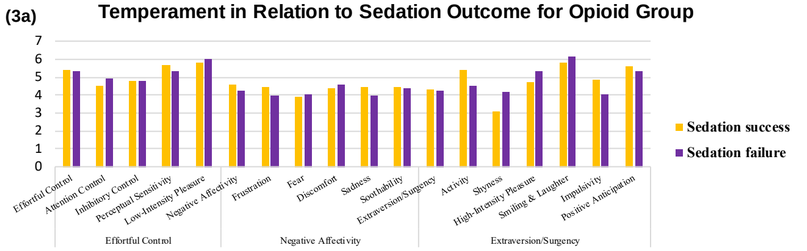


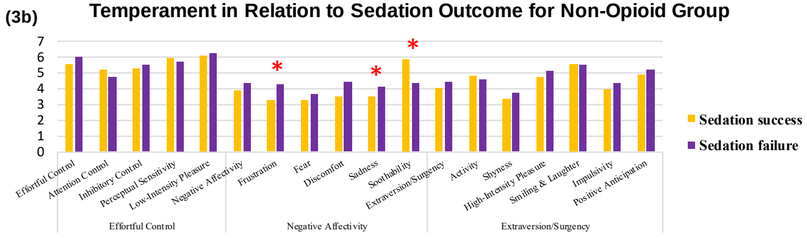
Figure 2. Procedure variables and sedation outcome.

- There were no statistically significant associations between temperament scores and treatment outcome in the opioid-containing regimen **(Figure 3a)**.
- In the non-opioid group, subjects with sedation failures had significantly higher frustration and sadness scores (*P=0.05*). Participants with successful sedations in the non-opioid regimen group also showed higher soothability (*P<0.01*) **(Figure 3b)**.

(3a)



(3b)



Figures 3 a and 3b. Participant temperament scores and sedation outcome.

DISCUSSION

In this study we found no difference in success rates for patients who received an opioid or non-opioid medication regimen. However, in the non-opioid group the temperament characteristics of effortful control and soothability were associated with success while frustration and sadness were associated with failure. In both treatment groups soothability and pre-procedure behavior scores were associated with success.

These findings suggest that dental sedation outcome success may be associated with specific behavioral characteristics and assessing temperament may be particularly important for patients who receive a non-opioid sedation regimen. Given that opioid regimens pose higher risks of respiratory depression and adverse events compared with a non-opioid regimen, there should be a clear justification of added benefit from an opioid before using it in the pediatric procedural sedation setting.

CONCLUSION

Overall, there was a low rate of success in this study a relatively small sample size. However, the results suggest that pre-procedure behavior and the temperament characteristic of soothability may warrant more exploration as predictors of sedation success.