Retrospective Review of Pediatric Conscious Sedation at The University of Toledo College of Medicine Department of Dentistry

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Introduction

Procedural sedation and analgesia is the use of sedative analgesia and dissociative drugs to provide analgesia, anxiolysis, sedation and motor control during painful diagnostic or therapeutic procedures.[1] Sedation can be used safely and effectively with patients who are unable to cooperate due to the lack of psychological or emotional maturity as well as mental or physical medical conditions.[2] It is important that the provider is well versed in the pharmacokinetics and pharmacodynamics of the sedation medications they use as well as the reversal medications. Careful consideration in the selection of the sedation medication is instrumental. Currently, weight-based, or scaled weight dosing is used in pediatric procedural sedations. Chemotherapy and burn patients are frequently dosed based on body surface area (BSA).

Hypothesis

The hypothesis is that The University of Toledo College of Medicine Department of Dentistry procedural sedation protocol is safe and effective.

Purpose

The purpose of this study is to confirm that in office sedations are safe, and effective as well as establish BSA dosing guidelines for medications used in procedural sedations at The University of Toledo College of Medicine Department of Dentistry.

Material & Methods

This study was a retrospective review of dental patient records in patients under sixteen years old who had undergone procedural sedation with the second-year pediatric dental residents enrolled in The University of Toledo College of Medicine Department of Dentistry during the academic year of 2021-2022. The University of Toledo Institutional Review Board in Toledo, Ohio approved this study #301005-PM. The majority of patients were sedated with merperidine and hydroxyzine. Other sedations were completed with hydroxyzine alone, midazolam and hydroxyzine, diazepam and hydroxyzine or diazepam alone in liquid Kool-Aid flavoring as a vehicle. Following a latent period of 45 minutes, oral sedation patients were placed on nitrous oxide and treatment initiated. A pre-cordial stethoscope was used. A pediatric dental resident monitored the patient during the treatment phase. The following parameters were monitored and recorded every five minutes: blood pressure, heart rate, level of consciousness, pain, SpO_2, $EtCO_2$ and temperature. N_2O/O_2 concentration and anesthetic dosage was recorded when used. The patient was placed on 100% O_2 for 5 minutes post nitrous oxide administration. Apple juice was given right after treatment completed. The patient was monitored for a minimum of thirty minutes post sedation, during the recovery period. The sedation was deemed either successful or unsuccessful. The DuBois BSA calculation was used. Body Surface Area in=0.007184 X weight in $kg^{0.425}$ X $height^{0.725}$`

Results

Sedation Data

n	male	female	S %	U %	Age	Wt kg	Ht cm	HR	RR	SpO_2	$EtCO_2$
113	59	54	93.8	6.2%	87.3	29.43	127.16	91	19	98.9	22.2
T °F	BSA	BMI	M	Mmg/kg	H	Hmg/kg	D	Dmg/kg	Mz	Mzmg/kg	
97	1.01	17.53	28.75	1.18	26.5	1.13	8.75	0.19	2.5	0.11	

Discussion

Ninety-three point eight percent of the procedural sedations performed by inexperienced sedationists, for the 2020-2021 academic year were successful, leaving 6.2% unsuccessful. Eight percent of the patients in this study had a body mass index considered obese and eight percent were underweight. The BMI for each patient was calculated using the BMI calculator at the CDC child/teen website.[3] The average BMI in this study was found to be 17.53 which is the 85th percentile and the lower limit of the overweight range. The overweight range is 85th-95th percentile. Forty-six percent of the patients sedated were either overweight or obese. The majority of these patients were dosed based on the CDC's 50th percentile weight for their age. Despite almost fifty percent of the patients being overweight or obese, there were not any adverse events. In addition, there were not any significant desaturation events during the 2020-2021 academic year procedural sedations. Based on the average body surface area and average weight and body surface area dosage was determined for the merperidine hydroxyzine combination. The body surface area dosage for merperidine in a 87 month old is 34.26 mg/m^2. The body surface area dosage for hydroxyzine of the same age group is 32.5 mg/m^2. Body surface area dosages were not determined for the other sedation medications used since there were 2.65% or less of patient's who were treated with those medications.

Conclusion

The results showed that current in office sedation medications, dosing and protocols are safe and effective.

References: 1. Krauss, B. and S. M. Green (2006). "Procedural sedation and analgesia in children." Lancet 367(9512): 766-780.
2. American Academy of Pediatric Dentistry. (2021). The reference manual of pediatric dentistry. American Academy of Pediatric Dentistry, 315.
3. https://www.cdc.gov/healthyweight/bmi/calculator.html