

ABSTRACT

Purpose: To identify and compare the usage and patient selection for the use of the Nusmile SOAN Computer Controlled Local Anesthetic Delivery device (CCLAD) in comparison to traditional aspiration syringes within the University of Texas Health Houston, Graduate Pediatric Dental clinic

Methods: A retrospective chart review of patients < 18years old in UTH Grad pediatric clinic from 2024/01/01 to 2025/06/31. Charts were included if they received dental care which involved local anesthetic delivery within the time period. Charts were excluded if they only received emergency dental care, dental care under moderate sedation or general anesthesia or not treated by pediatric dental residents. Data extracted from the medical and dental charts included age, medical history, medication use prior dental sedation history, teeth treated including method and radiographic caries depth, Frankl scores from exam and appointments, method of local anesthetic delivery, type of local anesthetic, amount of local anesthetic delivered. Student t test, chi-squared tests and fisher exact tests were used, where appropriate, with p-values less than 0.05 considered significant.

Results: Of 313 records 215 patients met inclusion criteria comprising 325 appointments and 574 treated teeth, SOAN was also more likely involved with needing supplemental local with 5 out of 31 appointment needing it compared to 11 of 272 with needle(p=0.022) Patients who were F4 at exam but had a change in Frankl score at treatment appointment were more likely to have SOAN used(p=0.025) SOAN mainly using septocaine in 38 of the 41 appointments compared to 6 out of 283 appointments with needle(p<0.001) in addition to SOAN mainly being used for its intraosseous delivery (p<0.001). higher SOAN usage was noted with with 18 of the 53 SSC being completed with SOAN(p=0.019)

Other criteria were not statistically significant.

Conclusions: Our findings find that the SOAN was more likely to be used for Primary SSCs and for its intraosseous delivery and with patients who were F4 at exam but had a change in Frankl score at treatment in the UTH grad pediatric dental clinics

BACKGROUND

- The Nusmile SOAN Computer Controlled Local Anesthetic Delivery device is new to the market CCLAD device which has limited data in the literature and was introduced within the University of Texas Health Houston Graduate Pediatric Clinics at the beginning of 2024
- CCLAD devices are typically associated with lower pain scores or discomfort when it comes to treating pediatric patients¹. Additionally, there is typically less reported fear from patients for CCLAD devices in comparison to traditional aspiration syringes¹.
- In comparison to many other CCLAD devices on the market the SOAN is advertised with the ability to perform intraosseous injections

Radiograph	Method		Total
	Needle	SOAN	
RA1	180	33	213
BC1	12	2	14
BC2	28	3	31
RA2	39	2	41
RA3	41	7	48
RA4	56	3	59
R5	130	17	147
RA Radiographic	14	0	14
RA no radiographic	18	6	24
SSC	1	0	1
Total	494	73	567

METHODS

- This study was approved by the UTHealth Houston Institutional Review Board.
- Patients 18 years of age and under seen in the UT Grad Pediatric Dentistry Clinic who had dental treatment involving local anesthetic, patients were excluded if they had only emergency treatment, only treatment under sedation/GA or endodontic appointments
- 313 charts were identified by clinical IT of which 215 patients met inclusion criteria, and the following information was obtained:
 - Age, medical history, dental history, dental sedation history, teeth treated, method of local anesthetic delivery, amount of local anesthetic
- Data was collected in Microsoft Excel and analyzed using R statistical software (R Core Team 2024) and Jamovi project (version 2.6)
- Statistical analysis completed. P-values <0.05 considered significant.

- A total of 313 records were identified and reviewed, of which 215 patients met the inclusion criteria, comprising 325 appointments and 574 treated teeth
 - There were 120 Female (55.8%) and 95(44.2%) Males in the study, sex did not have an effect on LA method choice(p=0.743)
 - Of the patients 108(50.2%) had no reported medical conditions, 44(20.5%) had medical conditions that may be alter or affect behavior(i.e. Autism, Down syndrome, ADHD) and 63(29.3%) had medical conditions that did not, when comparing needle and SOAN, the medical history did not appear contributory to method chosen (p=0.896). Similarly, use of medications showed no effect on method chosen (p=0.933).
 - 58(27.8%) of patients never had reported dental treatment history, 56(26.8%) had dental treatment within less than 1 year from last prior exam for treatment in the measured time period and 95(45.5%) had treatment completed at more than 1 year from last prior exam. Prior dental history did not appear contributory to LA delivery method(p=0.700) Prior history of dental sedation/GA was also non contributory(p=0.533)
 - Average number of teeth treated per appointment was 1.77(SD=0.933) and number of teeth treated was not contributory to chosen LA delivery method (p=0.857) and teeth treated were not contributory between methods(p=0.192)
 - Local anesthetic choice was found to be related to local anesthetic delivery method with SOAN mainly using septocaine in 38 of the 41 appointments compared to 6 out of 283 appointments with needle(p<0.001) in addition to SOAN mainly being used for its intraosseous delivery (p<0.001)
 - Overall if a change in Frankl behavior scores occurred it was not related to the method local anesthetic delivery chosen (p=0.065)
 - Patients who were F4 at exam but had a change in Frankl score at treatment appointment were more likely to have SOAN used(p=0.025)
 - Caries depth of lesion was not related to the method chosen (p=0.313)
 - Anxiety specifically discussed in the note at time of injection was not statistically relative (p=0.161) but only the aspiration needle method was mentioned in notes designating anxiety at injection
 - Of dental treatment only primary SSCs were shown to be statistically significant with higher SOAN usage with 18 of the 53 SSC being completed with SOAN(p=0.019)
 - SOAN was also more likely involved with needing supplemental local with 5 out of 31 appointments needing it compared to 11 of 272 with needle(p=0.022)

ADA code	Needle	SOAN	Total
02091	56	13	69
02092	123	19	142
02111	44	4	48
02031	28	2	30
02032	21	1	22
02033	25	3	28
02140	50	9	59
02040	10	0	10
02041	1	0	1
02091	22	2	24
02150	5	0	5
02160	5	0	5
02035	7	0	7
02030	5	1	6
02040	1	0	1
02050	35	17	52
02051	1	1	2
02052	1	0	1
02053	0	1	1
02021	1	0	1
02020	2	0	2
02070	1	0	1
Total	494	73	567

Prior dental sedation(No=0, Mod 1, P2, D3)	Counts	% of Total	Cumulative %
0	143	67.8%	67.8%
1	32	15.2%	83.0%
2	30	14.7%	97.7%
3	26	12.3%	100.0%

Exam Frankl	Needle/SOAN delivery	Treatment Frankl				Total
		1	2	3	4	
1	Needle	1	0	0	0	1
	SOAN	0	0	0	0	0
	Total	1	0	0	0	1
2	Needle	0	3	6	0	9
	SOAN	0	0	0	0	0
	Total	0	3	6	0	9
3	Needle	2	9	10	8	29
	SOAN	0	2	3	2	7
	Total	2	11	13	10	36
4	Needle	1	5	36	202	244
	SOAN	0	0	12	22	34
	Total	1	5	48	224	278
Total	Needle	4	17	52	210	283
	SOAN	0	2	15	24	41
	Total	4	19	67	234	324

Total teeth treated	Frequencies of Total teeth treated		
	Counts	% of Total	Cumulative %
0	2	0.6%	0.6%
1	152	46.8%	47.4%
2	115	35.4%	82.8%
3	37	11.4%	94.2%
4	15	4.6%	98.8%
5	3	0.9%	99.7%
6	1	0.3%	100.0%

CONCLUSIONS

- Our findings show that SOAN and traditional aspiration syringe appear comparable in most areas with the SOAN being mainly used for its intraosseous delivery with septocaine, primary SSCs, and that if patient was F4 at exam and had a change in frankl score at treatment SOAN was more likely used. SOAN was also more likely to need supplemental delivery**
- Limitations:** Patients seen by a variety of residents with varying levels of comfort and training with SOAN. Data available for review depends on accuracy and detail of patient charts.
- Further research** should look at longer timespans of use, more uniformly trained provider base on how to use SOAN, and at a larger patient volume and breadth of treatment types

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REFERENCES

1. Altuhafy M, Sodhi GS, Khan J. Efficacy of computer-controlled local anesthesia delivery system on pain in dental anesthesia: a systematic review of randomized clinical trials. *J Dent Anesth Pain Med.* 2024;24(4):245-264. doi:10.17245/jdapp.2024.24.4.245