Characteristics of Pediatric Patients Receiving Dental Treatment at an Ambulatory Surgery Center Versus a Hospital Operating Room

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Abstract

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Purpose: The purpose of this study was to compare characteristics of pediatric patients seen for comprehensive dental care under general anesthesia (GA) between two venues; an ambulatory dental surgery center (ASC) and a hospital operating room (H-OR).

Methods: Data was collected from electronic medical records of patients seen at either venue between June 1, 2017 and May 31, 2018. This included demographics, American Society of Anesthesiology (ASA) Status, medical history, treatment completed, treatment times, pre- and

post- operative admission status, and utilization of other services under the same GA. Historical data collected at the same institution in 2010 were referenced for comparison.

Results: In total, 516 (45%) patients were ASA I, whereas only 12 (1.1%) patients were ASA IV. The ASA statuses varied significantly between the groups with 21 (4.1%) of H-OR patients being ASA I and five (0.8%) of the ASC patients being ASA III ($p < .001$). Perioperative times for day surgery patients were shorter at the ASC venue by an average of 2.5 hours ($p < .001$). In comparison to previously collected data, there was a 141% increase in total number of patients treated since the opening of the ASC venue, with most of the increase seen in ASA I patients (39.9% vs 5.6%).

Conclusion: This study shows that there are distinct differences between the patients treated at an ASC and H-OR. There is a need for both types of facilities to best address the needs of pediatric patients who require GA for dental treatment.

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DEDICATION

As my formal education comes to a close with this thesis, I cannot help but reflect upon the many papers, projects, posters, and presentations that have preceeded this one. Not one of which made it to a final draft without the help of my mother, Wende. I would like to dedicate this thesis to her as she has contributed more to my accomplishments and abilities than anyone.

INTRODUCTION

Although most children are able to receive dental treatment in the clinic setting, delivery of restorative care to children with uncooperative behavior can present a significant challenge. Reasons for inability to accept dental treatment include lack of psychological or emotional maturity, and/or mental, physical, or medical disability.[1] For pediatric dental patients who cannot be managed effectively using basic behavior guidance techniques, pharmacological management, such as general anesthesia (GA), is acceptable and desirable to both parents and practitioners.[2,3]

The American Academy of Pediatric Dentistry (AAPD) recognizes that the use of GA may be indicated for pediatric dental patients: A) who are unable to cooperate; B) have significant anxiety; C) for whom local anesthesia is ineffective; D) who require extensive surgical procedures; E) for whom GA may protect the developing psyche and/or reduce medical risk; and F) require immediate comprehensive oral/dental care.[1]

Different Surgical Venues

In North America, currently there are multiple venues where dental patients may receive treatment under general anesthesia. These include a hospital operating room (H-OR), an ambulatory surgery center (ASC), or in a dental office with a mobile anesthesia provider. Although the H-OR is considered the gold standard, ASCs offer the advantages of decreased cost, increased access to care, and improved patient and provider convenience. The ASC venue also may provide greater ease and efficiency of scheduling, and decreased wait times for necessary procedures.[4–8] Additionally, many hospitals are reluctant to provide operating room time to pediatric dentists due to scheduling and reimbursement difficulties.[9] Studies have shown

that ASCs are comparable to H-ORs in regard to quality and safety of dental treatment.[5,6] These factors make the ASC an appealing option for provision of pediatric dental care.

Not all patients are candidates for care at an ASC. Selection of the optimal surgical venue is primarily determined by the patient's overall health, recognizing that certain patients are at increased risk for adverse events. The American Society of Anesthesiologists (ASA) Physical Status Classification System is used to assess anesthetic and surgical risk prior to a surgery and is often used to determine the most appropriate surgical venue for treatment.[10]

ASA Physical Status Classifications [10]

ASA I – A normal healthy patient

ASA II – A patient with mild systemic disease

ASA III – A patient with severe systemic disease

ASA IV – A patient with severe systemic disease that is a constant threat to life

ASA V – A moribund patient who is not expected to survive without the operation

ASA VI – A declared brain-dead patient whose organs are being removed for donor purposes

Children with systemic diseases and/or special health care needs have an increased oral health burden and are more likely to have unmet dental needs.[11,12] Due to increased anesthesia risk and need to coordinate care with medical specialists, these patients often benefit from care at a H-OR compared to an ASC. Other factors affecting choice of venue may include: need for combination with medical or surgical specialties, estimated surgery time, and indication for admission to the hospital following dental surgery.[13–15]

Previous Research

In 2010, the University of Washington (UW) and Seattle Children's Hospital (SCH) opened the Dental Surgery Center, an ASC exclusive to pediatric dentistry. Prior to this, all UW and SCH patients requiring dental GA were treated in the SCH H-OR. Currently, pediatric patients from UW, SCH, and other community dental clinics who require dental treatment under GA are treated either at this ASC or the SCH H-OR. Because the two surgical venues are affiliated with the same organizations, this offers a unique opportunity to evaluate and describe the patients seen at these venues.

At the time the Dental Surgery Center opened, it was estimated that 43% of patients could have been assigned to receive treatment in this ASC environment. Criteria for treatment in the outpatient setting included: ASA I or II, no other surgical or diagnostic services required, and no indication for admission to the hospital following surgery. This estimate was projected from two previous studies of patients receiving dental treatment under GA at SCH.[13,14] However, this projection had not been evaluated since the ASC opened.

Purpose

The purpose of this study was to compare patients treated at an outpatient ASC with those seen at an H-OR and describe the differences between these two patient groups. This study focused on differences in demographic variables, medical diagnoses, ASA classification, length of surgery, dental treatment needs, need for combination surgery, and indication for admission pre/post-surgery. Additionally, this data was compared to data collected on patients treated between 2007 and 2009, prior to the opening of the ASC.

METHODS

Description of Surgical Venues

H-OR - Seattle Children's Hospital (SCH) is a 407 bed, tertiary-care pediatric teaching hospital in Seattle, King County, Washington. At this H-OR, attending and resident dentists provide treatment in the SCH operating room with support from the SCH Anesthesiology Department.

ASC – The University of Washington (UW) and SCH opened The Center for Pediatric Dentistry in 2010 in Seattle, King County, Washington. In addition to a 16-chair dental clinic, this location has an outpatient Dental Surgery Center , which treats pediatric dental patients under GA. At this ASC, attending and resident dentists provide treatment with support from a privately contracted anesthesiologist.

Study Sample

This institutionally approved study was a 1-year retrospective cohort study of patients who received dental treatment under GA. Criteria for inclusion were patients ages one to twenty-six who received treatment under GA by pediatric dentists at either SCH (H-OR) or at the UW Dental Surgery Center (ASC) between June 1, 2017 and May 31, 2018. Criteria for exclusion were patients who received treatment outside of the study period and patients who were seen by private practice pediatric dentists at the H-OR. For the eight patients who received GA for dental procedures more than once during the study period, only one surgical date, selected at random, was evaluated. This resulted in the exclusion of ten records. Two patients had three GA

procedures within the study period. One patient had significant dental trauma, and the other patient had a fixed bite guard fabricated and delivered due to significant self-injurious behavior. All patients were treated by or under the supervision of a board-certified attending pediatric dentist.

Data Collection

A single dentist examiner collected data from the electronic patient medical records in the SCH Clinical Information System (CIS) (Kansas City, MO: Cerner Corporation) for patients treated in the H-OR and from AxiUm (Las Vegas, NV: Exan Enterprises Inc.) for patients who underwent GA at the ASC; ambiguities were resolved by consensus of dentists familiar with the project.

Data was entered into REDCap manually by the examiner with the exception of the following data, which was imported from institutionally generated reports:

H-OR: Birth date, surgery date, sex at birth, zip code, chart number, surgery time, inpatient status, ASA classification, interpreter status, combination surgery status

ASC: Birth date, surgery date, sex at birth, zip code, chart number, and dental treatment details

Medical diagnoses were categorized analogous to those used in a 2010 SCH dental surgery study.[13] For patients with multiple medical diagnoses, all diagnoses were recorded and included in the data analysis. ASA Classification was determined by the anesthesiologist who treated the patient on the day of surgery.

There were 220 (19.2%) patients excluded from the treatment time analysis. Reasons for exclusion included patients who underwent a combination surgery (11.0%), were inpatients at time of surgery (1.7%), or were post-operatively admitted (6.5%).

Data Analysis

Descriptive statistics were calculated for all variables of interest (means, standard deviations (SD), minimums, maximums, counts, and percentages). Associations between venue type (hospital operatory vs. surgery center) and categorical variables were analyzed using Chi-square tests or Fisher's Exact test. Associations between venue type and continuous variables were calculated using 2 sample t-tests. All statistical tests were completed using Stata/SE 14.2 for Windows (College Station, TX: StataCorp LLC). The significance level was preset to 0.05.

RESULTS

Patient Characteristics

During the study period, a total of 1,148 patients received dental treatment under GA; of these, 635 were seen at the ASC and 513 were seen at the H-OR (Table 1). The most common age range was three to five years (39%), however, the H-OR group was significantly older ($p < .001$) and included all 43 study patients over the age of eighteen (4%). The H-OR saw significantly more patients from out-of-state (5.1% vs 0.5%) and out-of-county with 38% of the H-OR patients coming from within King County. The ASA status varied significantly, with 21 (4.1%) of H-OR patients being ASA I and five (0.8%) of the ASC patients being ASA III (p

<.001). Only 12 (1.1%) patients were ASA IV, whereas 516 (45%) were ASA I (Figure 1). No patient was ASA V or higher. Interpreter status, BMI, and sex at birth did not vary significantly between the venues.

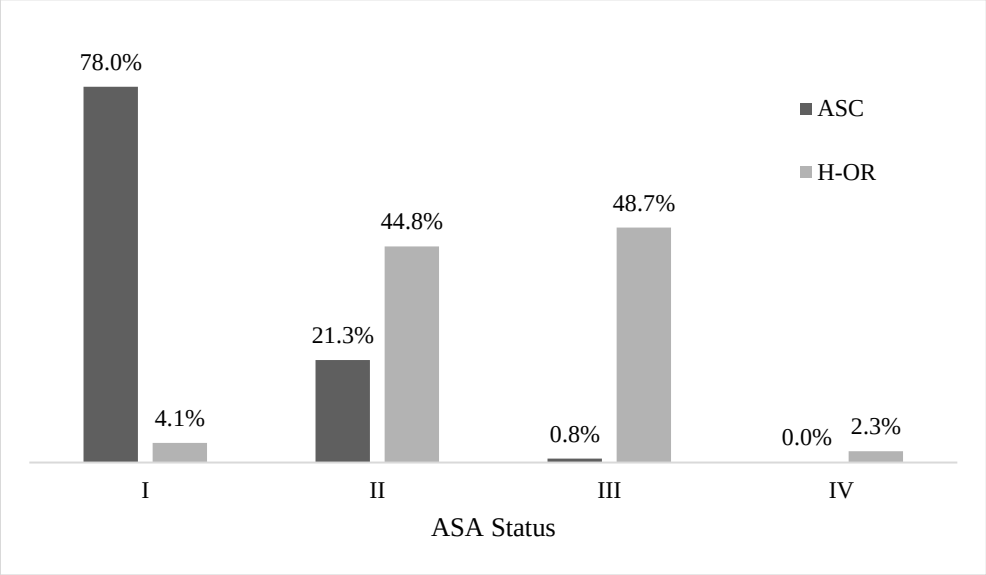

Figure 1: Percent of Patients ASA Status by Surgical Venue

Medical Diagnoses

The most frequent medical diagnosis was healthy (39.9%), with autism (16.5%), developmental delay (15.4%), and cardiac disorders (11.1%) the next most common (Table 2). ASA I patients were mostly diagnosed as healthy (85.5%), with other diagnoses including autism (5.4%), developmental delay (1.9%), attention deficit hyperactivity disorder (ADHD) (1.9%) and anxiety (1.9%). For ASA II patients, there was a greater range of medical diagnoses, with autism (31.8%), developmental delay (23.6%), craniofacial disorders (14.5%), and asthma (13.7%) being the most frequent diagnoses. ASA III patients most frequently had developmental delay (31.0%), cardiac disorders (31.0%), neurologic disorders (22.8%), and seizure disorders (21.6%). The ASA IV group was much smaller and included patients with cardiac disorders (50%),

seizure disorders (33%), and pulmonary disorders (33%). The H-OR had more frequent comorbidities with the exception of patients who were categorized as healthy (71.3% vs 1.0%), with asthma (39% vs 34%), and ADHD (37% vs 34%), all other diagnoses were found more commonly in the H-OR group. These data are summarized in Figure 2.

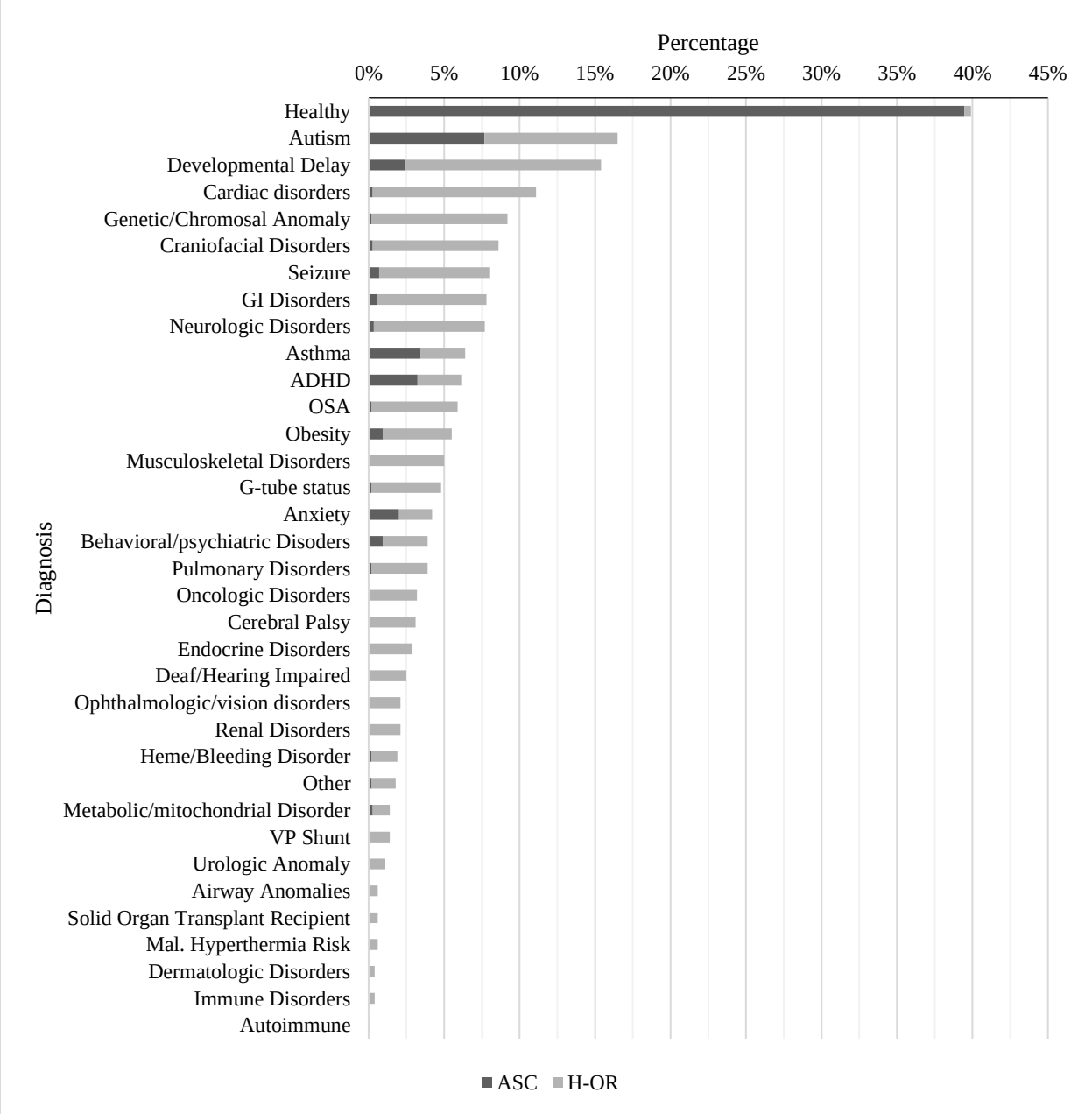

Figure 2: Percentage of Patients with a Medical Diagnoses by Surgical Venue

Table 3 evaluates the relationship between medical diagnosis and venue type within the group of patients classified as ASA II. Patients with the following medical diagnoses were more commonly seen at the ASC compared to the H-OR: healthy (10.4% vs 1.3%), ADHD (20.0% vs 8.3%), asthma (21.5% vs 9.1%), anxiety (11.1% vs 3.5%), and autism (44.4% vs 24.4%) ($p < .05$). Obesity and 'other behavioral/psychologic disorders' did not vary significantly between the groups, nor did any of the medical diagnoses with 10 or fewer total patients. All other medical diagnoses recorded for the study were more likely to be seen at the H-OR in comparison to the ASC.

Some patients seen at the H-OR venue were hospital inpatients and/or were admitted after dental surgery (Table 2). Of the 513 hospital patients, 24 (4.6%) were hospital inpatients at the time of surgery. The most common diagnoses of the patients who were inpatient at time of surgery were oncologic disorders (29.2%), GI disorders (25%), and musculoskeletal disorders (25%). One hundred thirty two patients were admitted post-operatively (25.7%). Cardiac disorders were the diagnoses most associated with post-operative admission (32.6%), followed by obstructive sleep apnea (OSA) (29.6%).

Time Factors

The H-OR group had significantly longer total venue times (351 minutes vs 170 minutes), surgical times (106 minutes vs 90 minutes), and perioperative times (246 minutes vs 82 minutes) (Table 4). In general, older patients had longer surgery times; however, this trend was not observed in patient ages three to five. The differences in surgical time between the venues was not significant in very young patients (less than two years) or for patients age nine and above. Surgery times increased as number of teeth treated increased. There was a difference

between the venues in regard to surgical time within each stratification for number of teeth treated ($p < .05$).

Dental Treatment Details

The total number of teeth treated under GA varied significantly between venues, but not for all age groups or tooth types (Table 5). For patients age 13 years and older, there was no significant difference observed in the total number of teeth treated. In regard to number of permanent teeth treated for ages six and above, there was no difference in number of permanent teeth treated; nor did they vary regarding extraction or restorative treatment.

On average there were more primary teeth treated per patient at the ASC venue than the H-OR (8.43 vs 6.06, $p < .001$). There was a significant difference in types of treatment between the two groups. H-OR patients under age 12 years had more primary teeth extracted, whereas ASC patients received more pulpal therapy ($p < .01$).

Combination Surgeries

One hundred twenty-three patients received combination surgeries (10.7%) (Table 6). This included 6 of 635 (0.1%) patients treated at the ASC where the other services were exclusively dental, including endodontics (0.5%), oral surgery (0.3%), and periodontics (0.2%). In comparison, 117 of the 513 (23%) H-OR cases were combination cases; oral surgery (5.9%), otolaryngology (5.7%), endodontics (4.3%), and MRI (2%) were the most common services combined with pediatric dentistry. ASA III patients had the highest rate of combined procedures (25%); whereas ASA I had the lowest rate at (1.2%).

Previous Research

Data from a previous study[13] included 958 patients who were treated in the H-OR between July 1, 2007 and June 30, 2009. The current study's data included 1148 patients treated between June 1, 2017 and May 31, 2018. Higher rates of very young children, 0-2 years, (9% vs 7%) and older children, 12-14 years (10% vs 7%) and 15-17 years (10% vs 6%), were observed in the previous study's data ($p < .001$). There were significantly lower rates of ASA I (24% vs 45%) and higher rates of ASA III (26% vs 22%) in the previous study (Figure 3).

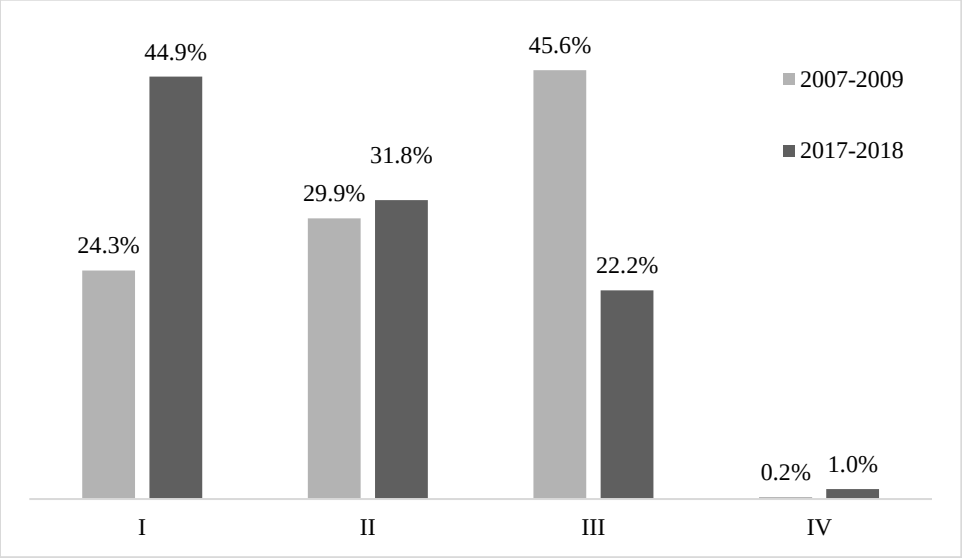

Figure 3: Percentage of ASA Classifications by Study Date

A large difference was seen between the current and previous data, with more ASA I patients in the current study (39.9% vs 5.6%). A higher rate of many diagnoses was noted in the previous study in comparison to the current study. Statistically significant exceptions where current rates were higher included: neurologic disorders (8% vs 3%), behavioral/psychiatric disorders (7% vs 3%), musculoskeletal disorders (5% vs 2 %), obesity (6% vs 1%), and 'other' diagnoses (5% vs 1%) ($p < .05$).

A lower rate of combination surgeries was observed in the current data in relation to the previous data (10.7% vs 18.8%) ($p < .001$). All of the rates for the individual services combined with dental were higher in the previous study or not statistically significant ($p > .05$).

DISCUSSION

The decision of where a patient should receive dental treatment under GA is ultimately made by the dentist and anesthesiologist providing care for the patient. Our research provides evidence that there is a need for both hospital (H-OR) and surgery center (ASC) venues in order to safely and efficiently serve a community's dental needs. In this study, the primary determinant for venue assignment was ASA classification; very few ASA I patients were treated in the H-OR and very few ASA III patients were treated in the ASC. These findings are consistent with what others have found previously.[4–6,16–18] Our data confirmed that ASA II patients may be candidates for either venue. In this study, ASA II patients diagnosed with asthma, behavioral/psychological disorders, and/or obesity were more often treated at an ASC. As ASA increased, the percentage of patients receiving combined surgeries increased. An increase in ASA implicates a higher risk of complications with GA.[10] It is thus particularly beneficial to combine multiple surgical procedures for patients with higher ASA classifications in a single surgical visit. This mitigates risk by eliminating the need for subsequent surgeries.[14]

As typically developing children mature, they are increasingly able to cooperate for dental treatment without sedation or GA. This may help explain the differences in age seen between the two venues, as more ASA I patients were treated at the ASC. This also relates to

dental treatment details. A treatment modality with a lower success rate (e.g. pulpotomy) may be chosen for children who are likely to learn to accept dental treatment in a clinic setting and if treatment failure will not result in catastrophic health consequences. For medically complex children with behavioral challenges, GA may always be needed to deliver dental treatment. In these cases, definitive treatment with high success rates (e.g. extractions, stainless steel crowns) is indicated. Other patients that may benefit from the most predictable treatment options include those that require dental care prior to chemotherapy or organ transplant, as well as patients who require infusion of blood products prior to treatment.[19]

The greater length of time required to provide care at a H-OR venue found in this study has also been reported by others.[7,8] Although statistically significant, the average surgical time between the venues (16 minutes) did not differ as greatly as perioperative time (154 minutes). This highlights that the difference in venue time is primarily a result of perioperative time and offers insight to where logistical improvements can be made. However, it is important to note that patients with more medical complexity may require additional time, particularly in recovery.[20]

The need for multiple surgical venues is demonstrated by comparing the current data to a study completed at SCH prior to the opening of the ASC venue.[13] In this previous study, it was estimated that 43% of the patients would be candidates for an ASC; the present study showed that 55% of the total population was seen at the ASC. A striking difference seen between these two study groups is the number of healthy patients who were treated. Despite diversion of patients to the ASC, the H-OR had a 30% increase in cases indicating that the demand for dental care in a hospital setting is continuing to increase. A part of this demand may be because the H-OR serves a larger geographic area that covers rural communities where there may not be

providers or hospitals staffed and equipped to serve medically complex children.

Although GA may be less expensive and more convenient for patients and providers at ASCs,[7–9] our study demonstrates a need for a H-OR venue. While some dentists are able to provide a service similar to that of an ASC within their own clinic, professional guidelines discourage treatment of medically complex patients with in-office GA. A hospital setting is the most appropriate venue for the most medically complex children to receive comprehensive dental care. Many patients who are ASA III or greater cannot be seen in community clinics or ASCs, despite significant dental needs. A two-venue model is beneficial to all parties. It offers a more efficient experience for healthy patients and decreases the number of patients waiting for treatment in an H-OR. For providers, it offers options to provide patients with the safest and most efficient care possible. And for the community, it increases the total number of patients who are able to access care, as is demonstrated by the 141% increase in patients treated since the opening of the ASC venue.

Limitations

This study, like many retrospective chart reviews, was limited by incomplete and/or inconsistent charting between subjects. The two venues had different providers and different electronic health records. Some pediatric patients are treated with GA at dental offices with a mobile anesthesia provider, this venue type was not evaluated in this study. Nearly all patients who were admitted were pre-planned for admission. The present study does not evaluate the difference between the pre-planned and unplanned post surgery admissions.

ASA status was assigned by the anesthesiologist overseeing the case; however, this measure is subjective. Multiple anesthesiologists provided care to the H-OR patients during this

study, at the ASC there was only one anesthesiologist. Medical diagnoses were collected by chart review and may not have included all the medical diagnoses for a given patient. This study did not account for the nuances in medical diagnoses, for example, a cardiac condition included a wide range of severity from a repaired ventricular septal defect to cyanotic heart disease.

This study is not meant to replace a clinician's judgement in routing a patient to an ASC or H-OR venue; as it does not take into consideration a child's specific diagnoses, the severity of their disease, or the operator's comfort level.

CONCLUSION

Comparison of two different surgical venues revealed differences and similarities between the venues:

1. In comparison to the H-OR, ASC patients were younger, traveled shorter distances, and had lower ASA statuses, with fewer medical diagnoses.
2. ASA II patients who do not require H-OR level of care may include patients with diagnoses of asthma, obesity, and behavioral/psychological disorders.
3. Perioperative times for day surgery patients were shorter at the ASC venue by an average of 2.5 hours.
4. The importance of a two-venue model is demonstrated by the 141% increase in patients treated since the opening of the ASC venue, with most of the increase seen in healthy, ASA I patients.

Conflict of Interest

The authors report no conflict of interest.

TABLES

Table 1: Patient Characteristics

	Entire Sample N = 1148 N (%)	**ASC** N = 635 N (%)	**H-OR** N = 513 N (%)	p-value†
Age (years)				<0.001
0-2	85 (7.4%)	50 (7.9%)	35 (6.8%)	
3-5	445 (38.8%)	319 (50.2%)	126 (24.6%)	
6-8	277 (24.1%)	161 (25.4%)	116 (22.6%)	
9-11	151 (13.2%)	72 (11.3%)	79 (15.4%)	
12-14	81 (7.1%)	23 (3.6%)	58 (11.3%)	
15-17	66 (5.8%)	10 (1.6%)	56 (10.9%)	
18+	43 (3.8%)	0 (0.0%)	43 (8.4%)	
Sex at Birth				0.994
Male	667 (58.1%)	369 (58.1%)	298 (58.1%)	
Female	481 (41.9%)	266 (41.9%)	215 (41.9%)	
Lives in WA State				<0.001
Yes	1119 (97.5%)	632 (99.5%)	487 (94.9%)	
No	29 (2.5%)	3 (0.5%)	26 (5.1%)	
County lives within in WA State				<0.001
King	638 (55.6%)	441 (69.5%)	197 (38.4%)	
Other	481 (41.9%)	191 (30.1%)	290 (56.5%)	
Missing	29 (2.5%)	3 (0.5%)	26 (5.1%)	
Interpreter Status				0.092
Yes	257 (22.4%)	154 (24.3%)	103 (20.1%)	
No	891 (77.6%)	481 (75.8%)	410 (79.9%)	
ASA				<0.001
I	516 (45.0%)	495 (78.0%)	21 (4.1%)	
II	365 (31.8%)	135 (21.3%)	230 (44.8%)	
III	255 (22.2%)	5 (0.8%)	250 (48.7%)	
IV	12 (1.1%)	0 (0.0%)	12 (2.3%)	
BMI (percentile)				0.217
<5th (Underweight)	76 (6.6%)	24 (3.8%)	52 (10.1%)	
5-85th (Healthy)	529 (46.1%)	228 (35.9%)	301 (58.7%)	
85-95th (Overweight)	117 (10.2%)	51 (8.0%)	66 (12.9%)	
>95th (Obese)	136 (11.9%)	52 (8.2%)	84 (16.4%)	
Missing	290 (25.3%)	280 (44.1%)	10 (2.0%)	

†Calculated using Chi-square test

Table 2: Medical Diagnoses by ASA, Surgical Venue, and Admission Status

	Entire Sample	ASA Status				Venue			Pre-op Admission		Post-op Admission	
		ASA I	ASA II	ASA III	ASA IV	Surgery Center	Hospital OR		No	Yes	No	Yes
	N = 1148	N = 516	N = 365	N = 255	N = 12	N = 635	N = 513		N = 489	N = 24	N = 381	N = 132
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	p-value†	N(%)	N(%)	N(%)	N(%)
Medical Diagnosis												
Healthy	458 (39.9%)	441 (85.5%)	17 (4.7%)	0 (0.0%)	0 (0.0%)	453 (71.3%)	5 (1.0%)	<0.001	4 (0.8%)	1 (4.2%)	4 (1.1%)	1 (0.8%)
Autism	189 (16.5%)	28 (5.4%)	116 (31.8%)	45 (17.7%)	0 (0.0%)	88 (13.9%)	101 (19.7%)	0.008	99 (20.3%)	2 (8.3%)	80 (21.0%)	21 (15.9%)
Developmental Delay	177 (15.4%)	10 (1.9%)	86 (23.6%)	79 (31.0%)	2 (16.7%)	28 (4.4%)	149 (29.0%)	<0.001	145 (29.7%)	4 (16.7%)	116 (30.5%)	33 (25.0%)
Cardiac disorders	127 (11.1%)	1 (0.2%)	41 (11.2%)	79 (31.0%)	6 (50.0%)	3 (0.5%)	124 (24.2%)	<0.001	121 (24.7%)	3 (12.5%)	81 (21.3%)	43 (32.6%)
Genetic/Chromosal Anomaly	106 (9.2%)	2 (0.4%)	43 (11.8%)	60 (23.5%)	1 (8.3%)	2 (0.3%)	104 (20.3%)	<0.001	101 (20.7%)	3 (12.5%)	72 (18.9%)	32 (24.2%)
Craniofacial Disorders	99 (8.6%)	4 (0.8%)	53 (14.5%)	42 (16.5%)	0 (0.0%)	3 (0.5%)	96 (18.7%)	<0.001	95 (19.4%)	1 (4.2%)	69 (18.1%)	27 (20.5%)
Seizure	92 (8.0%)	1 (0.2%)	32 (8.8%)	55 (21.6%)	4 (33.3%)	8 (1.3%)	84 (16.4%)	<0.001	79 (16.2%)	5 (20.8%)	62 (16.3%)	22 (16.7%)
GI Disorders	90 (7.8%)	4 (0.8%)	32 (8.8%)	49 (19.2%)	5 (41.7%)	6 (0.9%)	84 (16.4%)	<0.001	78 (16.0%)	6 (25.0%)	52 (13.7%)	32 (24.2%)
Neurologic Disorders	88 (7.7%)	2 (0.4%)	26 (7.1%)	58 (22.8%)	2 (16.7%)	4 (0.6%)	84 (16.4%)	<0.001	80 (16.4%)	4 (16.7%)	64 (16.8%)	20 (15.2%)
Asthma	73 (6.4%)	8 (1.6%)	50 (13.7%)	15 (5.9%)	0 (0.0%)	39 (6.1%)	34 (6.6%)	0.737	34 (7.0%)	0 (0.0%)	21 (5.5%)	13 (9.9%)
ADHD	71 (6.2%)	10 (1.9%)	46 (12.6%)	14 (5.5%)	1 (8.3%)	37 (5.8%)	34 (6.6%)	0.575	33 (6.8%)	1 (4.2%)	25 (6.6%)	9 (6.8%)
OSA	68 (5.9%)	3 (0.6%)	25 (6.9%)	39 (15.3%)	1 (8.3%)	2 (0.3%)	66 (12.9%)	<0.001	65 (13.3%)	1 (4.2%)	27 (7.1%)	39 (29.6%)
Obesity	63 (5.5%)	3 (0.6%)	23 (6.3%)	36 (14.1%)	1 (8.3%)	11 (1.7%)	52 (10.1%)	<0.001	51 (10.4%)	1 (4.2%)	36 (9.5%)	16 (12.1%)
Musculoskeletal Disorders	57 (5.0%)	0 (0.0%)	21 (5.8%)	33 (12.9%)	3 (25.0%)	1 (0.2%)	56 (10.9%)	<0.001	50 (10.2%)	6 (25.0%)	31 (8.1%)	25 (18.9%)
G-tube status	55 (4.8%)	2 (0.4%)	7 (1.9%)	42 (16.5%)	4 (33.3%)	2 (0.3%)	53 (10.3%)	<0.001	48 (9.8%)	5 (20.8%)	25 (6.6%)	28 (21.2%)
Anxiety	48 (4.2%)	10 (1.9%)	23 (6.3%)	15 (5.9%)	0 (0.0%)	23 (3.6%)	25 (4.9%)	0.292	25 (5.1%)	0 (0.0%)	17 (4.5%)	8 (6.1%)
Behavioral/psychiatric Disoders	45 (3.9%)	3 (0.6%)	17 (4.7%)	25 (9.8%)	0 (0.0%)	11 (1.7%)	34 (6.6%)	<0.001	34 (7.0%)	0 (0.0%)	23 (6.0%)	11 (8.3%)
Pulmonary Disorders	45 (3.9%)	2 (0.4%)	17 (4.7%)	22 (8.6%)	4 (33.3%)	2 (0.3%)	43 (8.4%)	<0.001	38 (7.8%)	5 (20.8%)	20 (5.3%)	23 (17.4%)
Oncologic Disorders	37 (3.2%)	1 (0.2%)	6 (1.6%)	30 (11.8%)	0 (0.0%)	0 (0.0%)	37 (7.2%)	<0.001	30 (6.1%)	7 (29.2%)	23 (6.0%)	14 (10.6%)
Cerebral Palsy	36 (3.1%)	0 (0.0%)	13 (3.6%)	21 (8.2%)	2 (16.7%)	1 (0.2%)	35 (6.8%)	<0.001	35 (7.2%)	0 (0.0%)	27 (7.1%)	8 (6.1%)
Endocrine Disorders	33 (2.9%)	1 (0.2%)	13 (3.6%)	18 (7.1%)	1 (8.3%)	1 (0.2%)	32 (6.2%)	<0.001	32 (6.5%)	0 (0.0%)	22 (5.8%)	10 (7.6%)
Deaf/Hearing Impaired	29 (2.5%)	2 (0.4%)	11 (3.0%)	16 (6.3%)	0 (0.0%)	1 (0.2%)	28 (5.5%)	<0.001	28 (5.7%)	0 (0.0%)	19 (5.0%)	9 (6.8%)
Ophthalmologic/vision disorders	24 (2.1%)	0 (0.0%)	10 (2.7%)	14 (5.5%)	0 (0.0%)	1 (0.2%)	23 (4.5%)	<0.001	23 (4.7%)	0 (0.0%)	19 (5.0%)	4 (3.0%)
Renal Disorders	24 (2.1%)	2 (0.4%)	6 (1.6%)	15 (5.9%)	1 (8.3%)	0 (0.0%)	24 (4.7%)	<0.001	23 (4.7%)	1 (4.2%)	12 (3.2%)	12 (9.1%)
Heme/Bleeding Disorder	22 (1.9%)	2 (0.4%)	11 (3.0%)	8 (3.1%)	1 (8.3%)	2 (0.3%)	20 (3.9%)	<0.001	19 (3.9%)	1 (4.2%)	13 (3.4%)	7 (5.3%)
Other	21 (1.8%)	3 (0.6%)	7 (1.9%)	11 (4.3%)	0 (0.0%)	2 (0.3%)	19 (3.7%)	<0.001	18 (3.7%)	1 (4.2%)	14 (3.7%)	5 (3.8%)
Metabolic/mitochondrial Disorder	16 (1.4%)	1 (0.2%)	7 (1.9%)	8 (3.1%)	0 (0.0%)	3 (0.5%)	13 (2.5%)	0.003	13 (2.7%)	0 (0.0%)	10 (2.6%)	3 (2.3%)
VP Shunt	16 (1.4%)	0 (0.0%)	4 (1.1%)	12 (4.7%)	0 (0.0%)	0 (0.0%)	16 (3.1%)	<0.001	16 (3.3%)	0 (0.0%)	12 (3.2%)	4 (3.0%)
Urologic Anomaly	13 (1.1%)	1 (0.2%)	6 (1.6%)	6 (2.4%)	0 (0.0%)	1 (0.2%)	12 (2.3%)	<0.001	12 (2.5%)	0 (0.0%)	7 (1.8%)	5 (3.8%)
Airway Anomalies	7 (0.6%)	0 (0.0%)	3 (0.8%)	4 (1.6%)	0 (0.0%)	1 (0.2%)	6 (1.2%)	0.050 ‡	6 (1.2%)	0 (0.0%)	3 (0.8%)	3 (2.3%)
Solid Organ Transplant Recipient	7 (0.6%)	1 (0.2%)	2 (0.6%)	4 (1.6%)	0 (0.0%)	0 (0.0%)	7 (1.4%)	0.003 ‡	7 (1.4%)	0 (0.0%)	4 (1.1%)	3 (2.3%)
Mal. Hyperthermia Risk	7 (0.6%)	1 (0.2%)	6 (1.6%)	0 (0.0%)	0 (0.0%)	1 (0.2%)	6 (1.2%)	0.050 ‡	6 (1.2%)	0 (0.0%)	6 (1.6%)	0 (0.0%)
Dermatologic Disorders	4 (0.4%)	0 (0.0%)	2 (0.6%)	2 (0.8%)	0 (0.0%)	0 (0.0%)	4 (0.8%)	0.040 ‡	4 (0.8%)	0 (0.0%)	1 (0.3%)	3 (2.3%)
Immune Disorders	4 (0.4%)	0 (0.0%)	2 (0.6%)	2 (0.8%)	0 (0.0%)	0 (0.0%)	4 (0.8%)	0.040 ‡	4 (0.8%)	0 (0.0%)	3 (0.8%)	1 (0.8%)
Autoimmune	1 (0.1%)	0 (0.0%)	1 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (0.2%)	0.447 ‡	1 (0.2%)	0 (0.0%)	1 (0.3%)	0 (0.0%)

†Calculated using Chi-square tests and where indicated with ‡Fisher's Exact test

Table 3: ASA II Patients, Medical Diagnosis by Surgical Venue

	Entire Sample N = 365 N (%)	Surgery Center N = 135 N (%)	Hospital OR N = 230 N (%)	p-value†
Medical Diagnosis				
Autism	116 (31.8%)	60 (44.4%)	56 (24.4%)	<0.001
Developmental Delay	86 (23.6%)	21 (15.6%)	65 (28.3%)	0.006
Craniofacial Disorders	53 (14.5%)	3 (2.2%)	50 (21.7%)	<0.001
Asthma	50 (13.7%)	29 (21.5%)	21 (9.1%)	<0.001
ADHD	46 (12.6%)	27 (20.0%)	19 (8.3%)	0.001
Genetic/Chromosal Anomaly	43 (11.8%)	1 (0.7%)	42 (18.3%)	<0.001
Cardiac disorders	41 (11.2%)	2 (1.5%)	39 (17.0%)	<0.001
GI Disorders	32 (8.8%)	4 (3.0%)	28 (12.2%)	0.003
Seizure	32 (8.8%)	6 (4.4%)	26 (11.3%)	0.025
Neurologic Disorders	26 (7.1%)	2 (1.5%)	24 (10.4%)	0.001
OSA	25 (6.9%)	1 (0.7%)	24 (10.4%)	<0.001
Obesity	23 (6.3%)	8 (5.9%)	15 (6.5%)	0.821
Anxiety	23 (6.3%)	15 (11.1%)	8 (3.5%)	0.004
Musculoskeletal Disorders	21 (5.8%)	1 (0.7%)	20 (8.7%)	0.002
Healthy	17 (4.7%)	14 (10.4%)	3 (1.3%)	<0.001
Behavioral/psychiatric Disoders	17 (4.7%)	8 (5.9%)	9 (3.9%)	0.378
Pulmonary Disorders	17 (4.7%)	1 (0.7%)	16 (7.0%)	0.007
Cerebral Palsy	13 (3.6%)	1 (0.7%)	12 (5.2%)	0.037 ‡
Endocrine Disorders	13 (3.6%)	0 (0.0%)	13 (5.7%)	0.003 ‡
Deaf/Hearing Impaired	11 (3.0%)	0 (0.0%)	11 (4.8%)	0.008 ‡
Heme/Bleeding Disorder	11 (3.0%)	0 (0.0%)	11 (4.8%)	0.008 ‡
Ophthalmologic/vision disorders	10 (2.7%)	1 (0.7%)	9 (3.9%)	0.099 ‡
G-tube status	7 (1.9%)	1 (0.7%)	6 (2.6%)	0.267 ‡
Other	7 (1.9%)	1 (0.7%)	6 (2.6%)	0.267 ‡
Metabolic/mitochondrial Disorder	7 (1.9%)	3 (2.2%)	4 (1.7%)	0.713 ‡
Mal. Hyperthermia Risk	6 (1.6%)	1 (0.7%)	5 (2.2%)	0.419 ‡
Oncologic Disorders	6 (1.6%)	0 (0.0%)	6 (2.6%)	0.089 ‡
Renal Disorders	6 (1.6%)	0 (0.0%)	6 (2.6%)	0.089 ‡
Urologic Anomaly	6 (1.6%)	0 (0.0%)	6 (2.6%)	0.089 ‡
VP Shunt	4 (1.1%)	0 (0.0%)	4 (1.7%)	0.301 ‡
Airway Anomalies	3 (0.8%)	1 (0.7%)	2 (0.9%)	0.999 ‡
Dermatologic Disorders	2 (0.6%)	0 (0.0%)	2 (0.9%)	0.533 ‡
Solid Organ Transplant Recipient	2 (0.6%)	0 (0.0%)	2 (0.9%)	0.533 ‡
Immune Disorders	2 (0.6%)	0 (0.0%)	2 (0.9%)	0.533 ‡
Autoimmune	1 (0.3%)	0 (0.0%)	1 (0.4%)	0.999 ‡

†Calculated using Chi-square tests and where indicated with ‡Fisher's Exact tests

Table 4: Time Variables by Surgical Venue

	Entire Sample			Surgery Center			Hospital OR			
	N	Mean (SD)	(Min, Max)	N	Mean (SD)	(Min, Max)	N	Mean (SD)	(Min, Max)	p-value†
Total Time	931	229.45 (109.87)	(39 ,891)	629	170.84 (61.99)	(39 ,891)	302	351.52 (84.58)	(116 ,714)	<0.001
Perioperative Time	927	135.03 (96.46)	(0 ,864)	625	81.51 (53.67)	(0 ,864)	302	245.77 (66.34)	(41 ,607)	<0.001
Surgery Time	931	95.04 (38.78)	(4 ,374)	629	89.90 (32.72)	(4 ,237)	302	105.74 (47.37)	(7 ,374)	<0.001
Age (years)										
0-2	70	84.94 (28.83)	(19 ,167)	50	81.20 (27.37)	(19 ,135)	20	94.30 (30.95)	(41 ,167)	0.086
3-5	407	95.86 (33.66)	(9 ,237)	318	92.98 (32.71)	(9 ,237)	89	106.16 (35.17)	(33 ,222)	0.001
6-8	238	89.84 (28.96)	(9 ,176)	159	86.58 (27.29)	(25 ,173)	79	96.41 (31.21)	(9 ,176)	0.013
9-11	113	81.60 (35.75)	(4 ,199)	71	77.92 (34.29)	(4 ,182)	42	87.83 (37.69)	(7 ,199)	0.155
12-14	53	105.92 (43.59)	(41 ,255)	21	112.38 (37.23)	(54 ,177)	32	101.69 (47.39)	(41 ,255)	0.388
15-17	27	141.44 (87.75)	(30 ,374)	10	126.10 (54.10)	(44 ,196)	17	150.47 (103.11)	(30 ,374)	0.497
18+	23	151.43 (55.89)	(70 ,328)	0	--	--	23	151.43 (55.89)	(70 ,328)	--
Number of Teeth Treated										
0-4	90	56.69 (26.84)	(4 ,113)	46	51.11 (23.33)	(4 ,95)	44	62.52 (29.21)	(7 ,113)	0.043
5-9	402	85.37 (29.60)	(12 ,203)	268	79.38 (26.32)	(24 ,196)	134	97.34 (32.16)	(12 ,203)	<0.001
10-19	423	109.10 (33.98)	(33 ,328)	308	103.95 (30.40)	(33 ,237)	115	122.88 (39.02)	(57 ,328)	<0.001
20-32	16	182.19 (89.79)	(86 ,374)	7	129.43 (37.60)	(86 ,193)	9	223.22 (98.63)	(100 ,374)	0.024 ‡

†Calculated using a 2-sample t-test with equal variances or where indicated with ‡unequal variances

Table 5: Number of Teeth Treated by Surgical Venue

		Entire Sample			Surgery Center			Hospital OR			
		N	Mean (SD)	(Min, Max)	N	Mean (SD)	(Min, Max)	N	Mean (SD)	(Min, Max)	p-value†
Overall											
All Teeth	All Treatment	1148	9.32 (4.54)	(0, 32)	635	9.72 (3.73)	(1, 21)	513	8.82 (5.35)	(0, 32)	0.001
	Restored	1148	7.10 (4.26)	(0, 25)	635	7.88 (3.52)	(0, 19)	513	6.13 (4.87)	(0, 25)	<0.001
	Extracted	1148	2.22 (2.77)	(0, 24)	635	1.84 (2.37)	(0, 13)	513	2.69 (3.13)	(0, 24)	<0.001
	Pulpal Therapy	1148	0.46 (1.01)	(0, 7)	635	0.78 (1.24)	(0, 7)	513	0.07 (0.31)	(0, 3)	<0.001
Primary	All Treatment	1148	7.37 (4.94)	(0, 20)	635	8.43 (4.22)	(0, 20)	513	6.06 (5.45)	(0, 20)	<0.001
	Restored	1148	5.38 (4.48)	(0, 20)	635	6.74 (4.08)	(0, 19)	513	3.71 (4.40)	(0, 20)	<0.001
	Extracted	1148	1.98 (2.57)	(0, 14)	635	1.69 (2.27)	(0, 13)	513	2.35 (2.86)	(0, 14)	<0.001
	Pulpal Therapy	1148	0.45 (1.01)	(0, 7)	635	0.76 (1.24)	(0, 7)	513	0.06 (0.30)	(0, 3)	<0.001
Permanent	All Treatment	1148	1.95 (3.93)	(0, 32)	635	1.29 (2.83)	(0, 20)	513	2.77 (4.85)	(0, 32)	<0.001
	Restored	1148	1.71 (3.59)	(0, 25)	635	1.14 (2.55)	(0, 19)	513	2.42 (4.46)	(0, 25)	<0.001
	Extracted	1148	0.24 (1.16)	(0, 24)	635	0.15 (0.76)	(0, 12)	513	0.35 (1.51)	(0, 24)	0.007
	Pulpal Therapy	1148	0.01 (0.11)	(0, 2)	635	0.01 (0.13)	(0, 2)	513	0.00 (0.06)	(0, 1)	0.081
Age 0-5											
All Teeth	All Treatment	530	10.27 (3.99)	(0, 20)	369	10.19 (3.45)	(2, 20)	161	10.47 (5.03)	(0, 20)	0.526
	Restored	530	8.50 (3.73)	(0, 20)	369	8.86 (3.31)	(0, 19)	161	7.68 (4.47)	(0, 20)	0.003
	Extracted	530	1.77 (2.49)	(0, 14)	369	1.33 (2.07)	(0, 13)	161	2.78 (3.01)	(0, 14)	<0.001
	Pulpal Therapy	530	0.79 (1.26)	(0, 7)	369	1.07 (1.39)	(0, 7)	161	0.14 (0.43)	(0, 3)	<0.001
Primary	All Treatment	530	10.23 (4.00)	(0, 20)	369	10.13 (3.45)	(0, 20)	161	10.45 (5.05)	(0, 20)	0.459
	Restored	530	8.46 (3.76)	(0, 20)	369	8.80 (3.35)	(0, 19)	161	7.68 (4.47)	(0, 20)	0.005
	Extracted	530	1.76 (2.48)	(0, 14)	369	1.33 (2.07)	(0, 13)	161	2.77 (3.00)	(0, 14)	<0.001
	Pulpal Therapy	530	0.79 (1.26)	(0, 7)	369	1.07 (1.39)	(0, 7)	161	0.14 (0.43)	(0, 3)	<0.001
Permanent	All Treatment	530	0.05 (0.35)	(0, 4)	369	0.06 (0.41)	(0, 4)	161	0.01 (0.11)	(0, 1)	0.042
	Restored	530	0.04 (0.33)	(0, 4)	369	0.05 (0.40)	(0, 4)	161	0.00 (0.00)	(0, 0)	0.013
	Extracted	530	0.01 (0.11)	(0, 2)	369	0.01 (0.12)	(0, 2)	161	0.01 (0.11)	(0, 1)	0.687
	Pulpal Therapy	530	0.00 (0.00)	(0, 0)	369	0.00 (0.00)	(0, 0)	161	0.00 (0.00)	(0, 0)	--
Age 6-12											
All Teeth	All Treatment	454	8.62 (4.18)	(0, 22)	242	9.11 (4.05)	(1, 21)	212	8.07 (4.27)	(0, 22)	0.008
	Restored	454	5.69 (3.56)	(0, 19)	242	6.48 (3.36)	(0, 19)	212	4.79 (3.59)	(0, 15)	<0.001
	Extracted	454	2.93 (2.66)	(0, 13)	242	2.63 (2.54)	(0, 12)	212	3.27 (2.77)	(0, 13)	0.011
	Pulpal Therapy	454	0.24 (0.69)	(0, 7)	242	0.40 (0.88)	(0, 7)	212	0.05 (0.27)	(0, 3)	<0.001
Primary	All Treatment	454	6.35 (3.94)	(0, 18)	242	6.60 (3.80)	(0, 18)	212	6.07 (4.09)	(0, 18)	0.153
	Restored	454	3.69 (3.18)	(0, 13)	242	4.24 (3.06)	(0, 13)	212	3.07 (3.21)	(0, 12)	<0.001
	Extracted	454	2.66 (2.60)	(0, 12)	242	2.36 (2.46)	(0, 12)	212	3.00 (2.71)	(0, 12)	0.010
	Pulpal Therapy	454	0.22 (0.68)	(0, 7)	242	0.37 (0.88)	(0, 7)	212	0.05 (0.27)	(0, 3)	<0.001
Permanent	All Treatment	454	2.27 (3.15)	(0, 20)	242	2.51 (3.39)	(0, 20)	212	2.00 (2.84)	(0, 15)	0.080
	Restored	454	2.00 (2.93)	(0, 19)	242	2.24 (3.09)	(0, 19)	212	1.72 (2.71)	(0, 15)	0.058
	Extracted	454	0.28 (0.81)	(0, 5)	242	0.27 (0.86)	(0, 5)	212	0.28 (0.74)	(0, 5)	0.941
	Pulpal Therapy	454	0.02 (0.14)	(0, 2)	242	0.03 (0.19)	(0, 2)	212	0.00 (0.00)	(0, 0)	0.019
Age 13+											
All Teeth	All Treatment	164	8.16 (6.27)	(0, 32)	24	8.58 (3.55)	(3, 16)	140	8.09 (6.63)	(0, 32)	0.589
	Restored	164	6.45 (5.91)	(0, 25)	24	6.92 (3.34)	(0, 12)	140	6.37 (6.25)	(0, 25)	0.530
	Extracted	164	1.71 (3.45)	(0, 24)	24	1.67 (2.84)	(0, 12)	140	1.71 (3.55)	(0, 24)	0.942
	Pulpal Therapy	164	0.02 (0.15)	(0, 1)	24	0.08 (0.28)	(0, 1)	140	0.01 (0.12)	(0, 1)	0.249
Primary	All Treatment	164	0.94 (2.42)	(0, 12)	24	0.67 (1.99)	(0, 9)	140	0.99 (2.49)	(0, 12)	0.491
	Restored	164	0.10 (0.79)	(0, 9)	24	0.08 (0.41)	(0, 2)	140	0.11 (0.84)	(0, 9)	0.828
	Extracted	164	0.84 (2.27)	(0, 12)	24	0.58 (1.64)	(0, 7)	140	0.88 (2.36)	(0, 12)	0.453
	Pulpal Therapy	164	0.00 (0.00)	(0, 0)	24	0.00 (0.00)	(0, 0)	140	0.00 (0.00)	(0, 0)	--
Permanent	All Treatment	164	7.22 (6.39)	(0, 32)	24	7.92 (3.39)	(2, 16)	140	7.10 (6.77)	(0, 32)	0.366
	Restored	164	6.35 (5.95)	(0, 25)	24	6.83 (3.33)	(0, 12)	140	6.26 (6.30)	(0, 25)	0.513
	Extracted	164	0.87 (2.67)	(0, 24)	24	1.08 (2.59)	(0, 12)	140	0.84 (2.69)	(0, 24)	0.669
	Pulpal Therapy	164	0.02 (0.15)	(0, 1)	24	0.08 (0.28)	(0, 1)	140	0.01 (0.12)	(0, 1)	0.249

†Calculated using a 2-sample t-test with unequal variances

Table 6: Combination Surgeries by ASA and Surgical Venue

	Entire Sample N = 1148 N (%)	Surgery Center N = 635 N (%)	Hospital OR N = 513 N (%)	p-value†		ASA I N = 516 N (%)	ASA II N = 365 N (%)	ASA III N = 255 N (%)	ASA IV N = 12 N (%)	p-value§
Total Combination Cases	**123 (10.7%)**	**6 (0.9%)**	**117 (22.8%)**	**<0.001**	**‡**	**6 (1.2%)**	**54 (14.8%)**	**62 (24.3%)**	**1 (8.3%)**	**<0.001**
Oral Surgery	32 (2.8%)	2 (0.3%)	30 (5.9%)	<0.001	‡	1 (0.2%)	14 (3.8%)	17 (6.7%)	0 (0.0%)	<0.001
Endodontics	25 (2.2%)	3 (0.5%)	22 (4.3%)	<0.001	‡	1 (0.2%)	16 (4.4%)	8 (3.1%)	0 (0.0%)	<0.001
Periodontics	1 (0.1%)	1 (0.2%)	0 (0.0%)	0.999		1 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0.999
Otolaryngology	29 (2.5%)	0 (0.0%)	29 (5.7%)	<0.001	‡	3 (0.6%)	13 (3.6%)	13 (5.1%)	0 (0.0%)	<0.001
General Surgery	1 (0.1%)	0 (0.0%)	1 (0.2%)	0.447		0 (0.0%)	1 (0.3%)	0 (0.0%)	0 (0.0%)	0.551
Audiology	7 (0.6%)	0 (0.0%)	7 (1.4%)	0.003		0 (0.0%)	3 (0.8%)	4 (1.6%)	0 (0.0%)	0.03
Opthomology	4 (0.4%)	0 (0.0%)	4 (0.8%)	0.040		0 (0.0%)	1 (0.3%)	3 (1.2%)	0 (0.0%)	0.068
Gastroenterology	3 (0.3%)	0 (0.0%)	3 (0.6%)	0.089		0 (0.0%)	0 (0.0%)	3 (1.2%)	0 (0.0%)	0.042
Neurologic Diagnositcs	5 (0.4%)	0 (0.0%)	5 (1.0%)	0.018		0 (0.0%)	3 (0.8%)	2 (0.8%)	0 (0.0%)	0.102
Urology	3 (0.3%)	0 (0.0%)	3 (0.6%)	0.089		0 (0.0%)	1 (0.3%)	2 (0.8%)	0 (0.0%)	0.121
Plastic Surgery	5 (0.4%)	0 (0.0%)	5 (1.0%)	0.018		0 (0.0%)	3 (0.8%)	2 (0.8%)	0 (0.0%)	0.102
Radiology	1 (0.1%)	0 (0.0%)	1 (0.2%)	0.447		0 (0.0%)	0 (0.0%)	1 (0.4%)	0 (0.0%)	0.233
MRI	10 (0.9%)	0 (0.0%)	10 (2.0%)	<0.001		1 (0.2%)	2 (0.6%)	7 (2.8%)	0 (0.0%)	0.009
Other	12 (1.1%)	0 (0.0%)	12 (2.3%)	<0.001	‡	0 (0.0%)	1 (0.3%)	10 (3.9%)	1 (8.3%)	<0.001
Cardiac Diagnositics	7 (0.6%)	0 (0.0%)	7 (1.4%)	0.003		0 (0.0%)	2 (0.6%)	5 (2.0%)	0 (0.0%)	0.009

†Calculated using Fisher's Exact tests

‡Calculated using Chi-square tests

§Calculated using Fisher's Exact test

Table 7: Comparison of Current and Previously Collected Data[13]

	Entire Sample N = 2106 N (%)	2017-2018 N = 1148 N (%)	2007-2009 N = 958 N (%)	p-value†
Age (years)				<0.001
0-2	175 (8.3%)	85 (7.4%)	90 (9.4%)	
3-5	802 (38.1%)	445 (38.8%)	357 (37.3%)	
6-8	458 (21.8%)	277 (24.1%)	181 (18.9%)	
9-11	261 (12.4%)	151 (13.2%)	110 (11.5%)	
12-14	174 (8.3%)	81 (7.1%)	93 (9.7%)	
15-17	161 (7.6%)	66 (5.8%)	95 (9.9%)	
18+	75 (3.6%)	43 (3.8%)	32 (3.3%)	
Sex at Birth				0.481
Male	1209 (57.4%)	667 (58.1%)	542 (56.6%)	
Female	897 (42.6%)	481 (41.9%)	416 (43.4%)	
ASA				<0.001
I	749 (35.6%)	516 (45.0%)	233 (24.3%)	
II	651 (30.9%)	365 (31.8%)	286 (29.9%)	
III	692 (32.9%)	255 (22.2%)	437 (45.6%)	
IV	14 (0.7%)	12 (1.1%)	2 (0.2%)	
Medical Diagnosis				
Healthy	512 (24.3%)	458 (39.9%)	54 (5.6%)	<0.001
Developmental Delay	535 (25.4%)	177 (15.4%)	358 (37.4%)	<0.001
Autism	331 (15.7%)	189 (16.5%)	142 (14.8%)	0.303
Seizure	231 (11.0%)	92 (8.0%)	139 (14.5%)	<0.001
Cardiac disorders	250 (11.9%)	127 (11.1%)	123 (12.8%)	0.209
Genetic/Chromosal Anomaly	204 (9.7%)	106 (9.2%)	98 (10.2%)	0.441
Craniofacial Disorders	201 (9.5%)	99 (8.6%)	102 (10.7%)	0.116
GI Disorders	198 (9.4%)	117 (10.2%)	81 (8.5%)	0.174
Asthma	130 (6.2%)	73 (6.4%)	57 (6.0%)	0.698
Neurologic Disorders	120 (5.7%)	92 (8.0%)	28 (2.9%)	<0.001
OSA	120 (5.7%)	68 (5.9%)	52 (5.4%)	0.625
ADHD	110 (5.2%)	71 (6.2%)	39 (4.1%)	0.030
Behavioral/psychiatric Disoders	107 (5.1%)	80 (7.0%)	27 (2.8%)	<0.001
Pulmonary Disorders	102 (4.8%)	45 (3.9%)	57 (6.0%)	0.031
Cerebral Palsy	93 (4.4%)	36 (3.1%)	57 (6.0%)	0.002
Oncologic Disorders	89 (4.2%)	37 (3.2%)	52 (5.4%)	0.012
Musculoskeletal Disorders	79 (3.8%)	57 (5.0%)	22 (2.3%)	0.001
Obesity	77 (3.7%)	63 (5.5%)	14 (1.5%)	<0.001
Endocrine Disorders	74 (3.5%)	33 (2.9%)	41 (4.3%)	0.081
Heme/Bleeding Disorder	71 (3.4%)	22 (1.9%)	49 (5.1%)	<0.001
Other	67 (3.2%)	60 (5.2%)	7 (0.7%)	<0.001
Renal Disorders	55 (2.6%)	24 (2.1%)	31 (3.2%)	0.101
Airway Anomalies	52 (2.5%)	7 (0.6%)	45 (4.7%)	<0.001
Ophthalmologic/vision disorders	48 (2.3%)	24 (2.1%)	24 (2.5%)	0.526
Metabolic/mitochondrial Disorder	33 (1.6%)	16 (1.4%)	17 (1.8%)	0.483
Solid Organ Transplant Recipient	21 (1.0%)	7 (0.6%)	14 (1.5%)	0.050
Urologic Anomaly	19 (0.9%)	13 (1.1%)	6 (0.6%)	0.221
Autoimmune	12 (0.6%)	1 (0.1%)	11 (1.2%)	0.001
Dermatologic Disorders	8 (0.4%)	4 (0.4%)	4 (0.4%)	0.999 ‡

Table 7 (*continued*): Comparison of Current and Previously Collected Data[13]

	Entire Sample N = 2106 N (%)	**2017-2018** N = 1148 N (%)	**2007-2009** N = 958 N (%)	p-value†
Combination Surgeries				
Total Combination Cases	303 (14.4%)	123 (10.7%)	180 (18.8%)	<0.001
Oral Surgery	105 (5.0%)	32 (2.8%)	73 (7.6%)	<0.001
Otolaryngology	74 (3.5%)	29 (2.5%)	45 (4.7%)	0.007
General Surgery	9 (0.4%)	1 (0.1%)	8 (0.8%)	0.014 ‡
Audiology	18 (0.9%)	7 (0.6%)	11 (1.2%)	0.181
Opthomology	15 (0.7%)	4 (0.4%)	11 (1.2%)	0.030
Gastroenterology	9 (0.4%)	3 (0.3%)	6 (0.6%)	0.315 ‡
Neurologic Diagnositcs	5 (0.2%)	5 (0.4%)	0 (0.0%)	0.067 ‡
Urology	9 (0.4%)	3 (0.3%)	6 (0.6%)	0.315 ‡
Plastic Surgery	21 (1.0%)	5 (0.4%)	16 (1.7%)	0.005
MRI/CT or Radiology	23 (1.1%)	11 (1.0%)	12 (1.3%)	0.517
Other	20 (1.0%)	12 (1.1%)	8 (0.8%)	0.620

†Calculated using Chi-square tests and where indicated with ‡Fisher's Exact test

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