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The common dental diagnosis under general anaesthesia in Hospital UniversitiSainsMalaysia: A four years paediatric case study

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Abstract— Dental treatment under general anaesthesia (GA) is often indicated in uncooperative paediatric patients with or without the complex dental procedure. Preoperative diagnosis needs to be thoroughly assessed to ensure the dental treatment under GA can be efficient and safely completed by the paediatric dentist and trained anaesthetist. The research aims to determine the common preoperative diagnosis prior dental treatment under GA among paediatric patients in Hospital UniversitiSains Malaysia, and its association to gender. A retrospective review of paediatric dental treatment under GA from 2015 to 2018 was undertaken. A total of 298 patient's records were retrieved for data collection. Descriptive statistics and multiple response analysis were used to analyze the data. The most common preoperative diagnosis made was early childhood caries (53.1%, n=188), followed by dental caries (25.1%) and dentoalveolar abscess (17.1%). Firstly, the analysis of multiple responses was combined between male and female; the highest diagnosis within four years was ECC diagnosis 188(53.1%) and dental caries 89(25.1%). Second, the result was being separate according to gender. The result indicates that the ECC diagnosis for males; 98(52.7%) and females; 90(53.6%), while dental caries is 49(26.3%) for males and 40(23.8%) for females. This research is beneficial for the better understanding the paediatric dental service, particularly those children who are indicated for dental treatment under GA.

Keywords—General anaesthesia, paediatric, gender, multiple response, spearman correlation

1. Introduction

Dental management in paediatric patient offers an interesting and rewarding experience in the dental profession. However, it might be a very challenging experience to dental health professionals to manage the uncooperative paediatric patient, particularly those with special health care needs [1]. Generally, a behaviour management technique can be divided into the non-pharmacological and pharmacological technique. The most common practised non-pharmacological behaviour management techniques, including tell-show, do positive reinforcement, remodelling, voice control and desensitization techniques. Dental rehabilitation or treatment under GA is a treatment choice for many paediatric dentists, particularly in managing uncooperative patients [2].

Nowadays, the needs and demands for dental treatment under GA in paediatric dentistry are increasing worldwide throughout the years [3]. General anaesthesia is commonly used to facilitate dental treatment in

patients with high anxiety or challenging behaviour, many of whom are children with special needs and is also necessary when dental disease is interfering with the health and general well-being of patients. Besides, it can facilitate dental treatment by allowing dentists to benefit from improved treatment conditions and provide a higher quality of care. General anaesthesia is a drug-induced loss of consciousness during which the patient cannot be aroused, even though through painful stimulation [4]. Similar to another healthcare setting, Hospital USM provides paediatric dental treatment under GA, whereby the patient needs to be warded before the GA. Here, the local protocol involved includes the referral of the paediatric patients who met the referral criteria by the dental office, to a paediatric specialist clinic for a consultation. The decision to send the patient for dental treatment under GA will be made by the paediatric dental specialist after a thorough evaluation and preoperative diagnosis made during the consultation clinic. Next, the patient's details will be placed on the waiting list, and the waiting period is depending on the urgency of the patient's current sign and symptom.

Dental caries that warrant comprehensive dental treatment is the most common diagnosis in treating children under GA [5,6,7]. Other diagnosis includes soft or hard tissue pathology that requires minor oral surgery procedure. Such cases include surgical removal of impacted tooth or teeth, excision biopsy of soft tissue or others. The prevalence of choosing dental GA for paediatric patients include the extensive treatment needed and young age with behaviour management problem [8]. Besides, dental treatment facilitated by GA is needed to give benefit to the dental practitioners on handling this behaviour challenge and provide a higher quality of oral care. Meanwhile, as for parents or guardian's views, the failure of several previous attempts to carry out dental treatment in the clinic due to pre-cooperative behaviour and pain during treatment, are the most common reasons to opt for dental treatment under general anaesthesia [9]. It is supported by a study done by Al-Eheideb and Herman in 2003 that showed the behaviour problems and inability to cooperate were the main reasons for treatment under GA and also patients that are too young with early childhood caries to endure long-standing dental treatment [10].

Therefore, this retrospective study aims to assess the common preoperative diagnosis prior dental treatment under GA among paediatric patients in Hospital USM, and its association to gender.

2. Data and Methods

This study is a retrospective review study cases of dental treatment under GA among paediatric patients in Hospital USM. The study site was at the Paediatric dental specialist clinic and Record Unit Centre of Hospital USM, Kelantan, Malaysia. Due to some limitations, we abled to retrieved only 298 folders of patient's medical records or approximately 80.76% from the estimated sample size of 369 total sample size. A checklist had been prepared by using previous studies to retrieve the details needed from patients' medical records [7, 11]. To comply with the green environment campaign, the checklist had been prepared in the form of soft copy using online Google Form™. Data collection was commenced in July to August 2019. This study had collected data from patient's medical records who had received paediatric dental treatment under GA from 2015 till 2018. The retrospective analysis of sociodemographic data includes gender and age during received treatment and preoperative diagnosis. Other details such as the reason for dental general anaesthesia, types of performed dental treatment for the deciduous and permanent tooth, waiting period for the GA date, duration of treatment, and annual trends in the use of anaesthesia were also retrieved but have been covered in other publications. This study had been approved by the Internal Review Board of Human and Ethics Committee, UniversitiSains Malaysia with assigned code of **USM/JEPeM/19010033**.

Two statistical approaches were used in this paper to analyse the dataset. Multiple response analysis was the first statistical method and Spearman correlation analysis was the second method. For multiple response

sets, the multiple response frequencies procedure generates a frequency table and the most frequent treatment information can be collected. The percentage used will be given throughout the sample, the highest percentage used to indicate the most and the lowest percentage used to indicate the least. The second analysis is based on the Spearman correlation. Through this analysis, all possible association will be tested through the spearman matrix correlation. All of the variables are listed in Table 1.

Table 1: Data description of the selected variable in the study

Num.	Variables	Explanation of user variables
1.	Age	Age in years
2.	Gender	Patient Gender 1= Male, 2= Female
3.	Ethnic	Patient Ethnic 1= Malay, 2= Chinese, 3 = Indian, 4 = Others
4.	Early Childhood Caries (ECC)	ECC-Diagnosis pre-operatively 1= Yes, 2 = No
5.	DentoalveolarAbsces	Dentoalveolar abscess-Diagnosis pre-operatively 1= Yes, 2 = No
6.	Cyst	Cyst-Diagnosis pre-operatively 1= Yes, 2 = No
7.	Granuloma	Granuloma-Diagnosis pre-operatively 1= Yes, 2 = No
8.	Cleft	Cleft-Diagnosis pre-operatively 1= Yes, 2 = No
9.	Wound	Wound-Diagnosis pre-operatively 1= Yes, 2 = No
10.	Dental Trauma	Fracture-Diagnosis pre-operatively 1= Yes, 2 = No
11.	Impacted Teeth/Tooth	Impacted teeth/tooth-Diagnosis pre-operatively 1= Yes, 2 = No
12.	Dental Caries	High caries-Diagnosis pre-operatively 1= Yes, 2 = No

3. Results

3.1 Part I: Descriptive statistics

Analysis of the bar chart for patient frequency according to year.

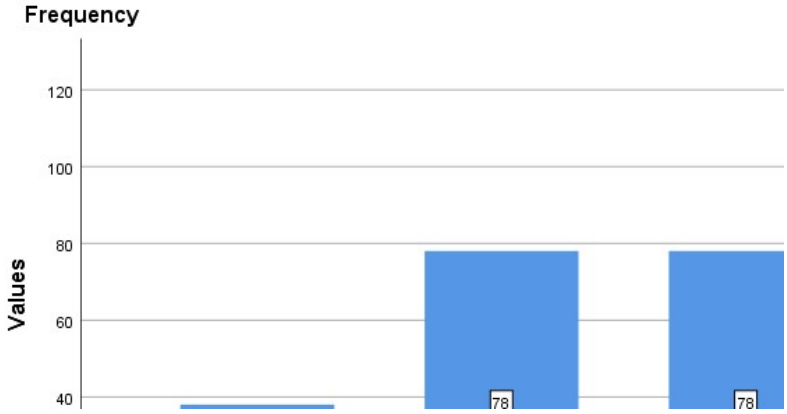

Fig. 1: Frequency of patient according to year

Figure 1displays the number of patients according to the year from 2015 to 2018. During the year of 2015, 38 people received further treatment and were under general anaesthesia.The number of patients increased twofold from the year 2015 to the year 2016. The number of patients under general anaesthesia has remained constant in 2017. However, the number of cases increases significantly over time, gradually achieving 104 cases in the year 2018.

3.2 Part II: Multiple response analysis

Table 2: Preoperative diagnosis under general anaesthesia

Diagnosis	Responses *n*(%)
ECC	188(53.1%)
Dental caries	89(25.1%)
Dentoalveolar abscess	62(17.5%)
Supernumerary abscess	8(2.3%)
Impacted teeth/tooth	4(1.1%)
Dental trauma	2(0.6%)
Cleft	1(0.3%)

Table 2 shows the diagnosis for patients. Table 2, which is provided by 53.1% of ECC patients, is the highest percentage. The second-largest, 89 cases or 25.1%, is patients with dental caries. While this third largest is from the group of dentoalveolar abscess patients. This shows that a high diagnosis of ECC, dental caries and a dentoalveolar abscess is obtained in most patients under general anaesthesia.

Table 3: The common preoperative diagnosis under general anaesthesia- Male

Diagnosis	Responses *n*(%)
ECC	98(52.7%)
Dental caries	49(26.3%)
Dentoalveolar abscess	30(16.1%)
Supernumerary abscess	4(2.2%)
Impacted teeth/tooth	4(2.2%)
Dental trauma	1(0.5%)

Diagnosis of male patients as seen in Table 3. The largest percentage is in Table 3, which is provided by 52.71% of ECC patients. Patients with dental caries are the second-largest, 49 cases or 26.3%. Although the third largest is from the dentoalveolar abscess group of cases, 30 are from the dentoalveolar abscess group (16.1%). This suggests that under general anaesthesia, a high diagnosis of ECC, dental caries and a dentoalveolar abscess is acquired in most patients.

Table 4: The common preoperative diagnosis under general anaesthesia- Female

Diagnosis	Responses *n*(%)
ECC	90(53.6%)
Dental caries	40(23.8%)
Dentoalveolar abscess	32(19.0%)
Supernumerary abscess	4(2.4%)
Cleft	1(0.6%)
Dental trauma	1(0.6%)

The diagnosis of male patients is seen in Table 4. Table 4, which is given by 53.6 % of patients with ECC, is the highest percentage. Patients of dental caries are also the second largest, 40 cases or 23.8%. Although this third largest is in the dentoalveolar abscess group, 32 are in the dentoalveolar abscess group (19.0 %). This shows that a high diagnosis of ECC, dental caries and a dentoalveolar abscess is attained in most cases under general anaesthesia.

Table 5: Crosstabulation of the preoperative diagnosis across Gender

			Gender		
			Male *n*(%)	Female *n*(%)	Total
1.ECC	Yes	*n*(%)	98(32.9%)	90(30.2%)	188(63.1%)
	No	*n*(%)	63(21.1%)	47(15.8%)	110(36.9%)
	Total	*n*(%)	161(54.0%)	137(45.0%)	298(100.0%)
2.Supernumerary abscess	Yes	*n*(%)	4(1.3%)	4(1.3%)	8(2.7%)
	No	*n*(%)	157(52.7%)	133(44.6%)	290(97.3%)
	Total	*n*(%)	161(54.0%)	137(46.0%)	298(100.0%)
3.Dentoalveolar abscess	Yes	*n*(%)	30(10.1%)	32(10.7%)	62(20.8%)
	No	*n*(%)	131(44.0%)	105(35.2%)	236(79.2%)
	Total	*n*(%)	161(54.0%)	137(46.0%)	298(100.0%)
4.Cleft	Yes	*n*(%)	-	1(0.3%)	1(0.3%)
	No	*n*(%)	161(54.0%)	136(45.6%)	297(99.7%
	Total	*n*(%)	161(54.0%)	137(46.0%)	298(100.0%)

5.Dental trauma	Yes	*n*(%)	1(10.3%)	1(10.3%)	2 (0.7%)
	No	*n*(%)	160(53.7%)	136(45.6%)	296(99.3%)
	Total	*n*(%)	161(54.0%)	137(46.0%)	298(100.0%)
6.Impacted teeth/tooth	Yes	*n*(%)	4(1.3%)	-	4(1.3%)
	No	*n*(%)	157(52.7%)	137(46.0%)	294(98.7%)
	Total	*n*(%)	161(54.0%)	137(46.0%)	298(100.0%)
7.Dental caries	Yes	*n*(%)	49(16.4%)	40(13.4%)	89(29.9%)
	No	*n*(%)	112(37.6%)	97(32.6%)	209(70.1%
	Total	*n*(%)	161(54.0%)	137(46.0%)	298(100.0%)

Table 5 shows the distribution of the diagnosis by gender distribution. The crosstabulation study revealed that the distribution of diagnosis between males and females was nearly the same. The highest diagnosis is ECC, 188(63.1%) followed by dentoalveolar abscess 62(20.8%).The lowest diagnosis was cleft 1 (0.3%), dental trauma (0.7%) and impacted teeth/tooth 4 diagnosis (1.3%).

Table 6: Spearman correlation matrix of the study variable

		1.	2.	3.	4.	5.	6.	7.
1.Dental Caries	r_s	1.000	-0.808**	-0.018	-0.136*	-0.038	-0.054	-0.012
	p-value	-	0.000	0.761	0.019	0.515	0.356	0.831
2.ECC	r_s		1.000	0.041	0.169**	-0.076	0.063	-0.152**
	p-value		-	0.481	0.003	0.192	0.279	0.008
3.Supernumerary Abscess	r_s			1.000	-0.085	-0.010	-0.014	-0.019
	p-value			-	0.143	0.868	0.814	0.739
4.Dentoalveolar Abscess	r_s				1.000	-0.030	0.059	-0.060
	p-value				-	0.609	0.309	0.304
5.Cleft	r_s					1.000	-0.005	-0.007
	p-value					-	0.935	0.907
6.Dental trauma	r_s						1.000	-0.010
	p-value						-	0.869
7.Impacted Tooth	r_s							1.000
	p-value							-

Spearman's rho was applied.
***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

The matrix result of the Spearman correlation as shown in Table 1.6. Dental caries is shown to have substantial correlation with ECC from Table 1.6 (r_s =-0.808, p< 0.05). Besides, the correlation study showed that dental caries was correlated strongly with dentoalveolar abscess (r_s =-0.136, p< 0.05). The next result from the study of the spearman association revealed that ECC was correlated strongly with dentoalveolar abscess (r_s=0.169, p <0.05). It is also known that the ECC has a substantial correlation (r_s =-0.152, p < 0.05) with the impacted tooth.

4. Summary and Discussion

In this present study, total of 298 medical records had been retrieved which comprises of 80.8% of initial sample size. The limitation includes limited time for data collection and lack of patients' records successfully retrieved from the medical record unit. It was noted that there was higher number of cases by year when compared to the data retrieved from the previous study in Hospital USM [7]. This might due to increase in referral cases to paediatric dental clinic and a greater number of paediatric dental specialists

available nowadays. Therefore, it is believed that the number of patients receiving dental treatment under GA is likely will continue to show an upward trend [12].

The current data shows male predilection which comprises of 54% among paediatric patients involving in dental treatment under GA. Similar gender prevalence had been reported previously [2, 7, 13]. Other study revealed that there was no significant difference in the proportions of male and female children who are utilizing the dental GA service [14]. However, some studies had demonstrated that female children possess higher caries experience and dental anxiety which associated with lower levels of oral health-related emotional well-being [15,16].

ECC was the highest diagnosis stated in this study with 63.1%, that involved 188 of paediatric patients out of 298. Then, followed by dental caries with 41.9%, that included multiple dental caries, high caries of patients and rampant caries. This result may correlate with the current status of caries experience in Malaysia [17]. Besides, the result in agreement with other study that stated majority of cases treated were rampant caries [18]. It was also noted that some patients did had multiple diagnosis made preoperatively. Spearman association revealed that ECC was correlated strongly with dentoalveolar abscess (r_s=0.169, p <0.05), and has a substantial correlation (r_s =-0.152, $p < 0.05$) with the impacted tooth.

The crosstabulation analyis revealed that the distribution of diagnosis between males and females was nearly the same, with the highest diagnosis was ECC, 188(63.1%) followed by dentoalveolar abscess 62(20.8%). The lowest diagnosis was cleft 1 (0.3%), dental trauma (0.7%) and impacted teeth/tooth 4 diagnosis (1.3%). It has been shown that male children received significantly greater mean number of extracted primary teeth and pulp therapy treated teeth than female children in dental treatment under GA [19]. However, no data available to find the association of patient's gender and preoperative diagnosis. Pediatric dental treatment under GA has been used significantly in the care of specified patients in paediatric dental specialist settings. There was an improvement in the number of paediatric patients interested in dental care under GA in this current study over the four years of the study period.

5. Conclusion

This paper examines the most common dental diagnosis under general anaesthesia in Hospital UniversitiSains Malaysia (USM) from 2015 till the year 2018. The study conducted found that the most common diagnosis among dental patients was ECC, which is about 53.1%. The second highest diagnosis was on patients with dental caries, 25.1%, and the third highest was dentoalveolar abscess 17.5%. This study will give us a deeper understanding of the paediatric dental service, particularly those children who are indicated under GA for dental care.

6. Conflict of interest disclosures

The authors declare no conflicts of interest.

7. Acknowledgments

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