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Oral Rehabilitation for Special Health Care Needs Egyptian Children Under General Anesthesia during the First, Second, and Third Waves of COVID-19 Pandemic: A Cross-sectional Study

Research Article

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Abstract

Aim: This study was conducted to assess the oral rehabilitation performed for special health care needs Egyptian children under general anesthesia during the first, second, and third waves of COVID-19 pandemic.
Methods: Data of CSHCN who performed oral rehabilitation under general anesthesia during the three waves of COVID-19 pandemic were retrieved, registered and statistically analyzed.
Results: There was a statistically significant difference between the number of CSHCN who performed oral rehabilitation under general anesthesia between the three waves of COVID-19 pandemic. There was a statistically significant difference in restorative treatment, pulp therapy and extraction performed in primary anterior and posterior teeth between the three waves with the first wave showing the least percentages. There was a statistically significant difference between the three waves in the restorative treatment performed in permanent anterior teeth. There was a significant difference between the three waves for all types of dental treatments performed in permanent posterior teeth.
Conclusion: The first wave of COVID-19 pandemic reduced the attendance of CSHCN for oral rehabilitation under general anesthesia. The attendance of CSHCN during the second and third waves of the pandemic increased. Extraction was the most commonly adopted line of treatment for CSHCN.

Keywords: COVID-19; CSHCN; General Anesthesia; Oral Rehabilitation.

Introduction

The novel coronavirus (COVID-19) emitted a public health crisis, as it causes severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), with rapid spread and high mortality around the world [1-4].

On July 30, 2020, World Health Organization (WHO) declared that COVID-19 was a public health emergency of international concern [5], and after the global spread of COVID-19 beyond China, WHO stated COVID-19 a pandemic instead of epidemic [6-8].

On March 16, 2020, American Dental Association (ADA), recommended that dentists should suspend elective dental procedures for three weeks to counteract the spread of COVID-19 pandemic, and to perform only emergency dental treatment, eventually, this policy was extended [9]. Moreover, The Centers for Disease Control and Prevention (CDC), ADA, and WHO guided providers of oral health care on how to control and minimize the spread of this highly infectious disease [10-12].

In Egypt, The Egyptian health authorities followed the worldwide recommendations and guidelines, and suspended general treatment in the medical and dental institutions, but allowed only emergency treatments, and activated hotline telephone services[13-15].

Children with Special Health Care Needs (CSHCN) are both children or young adolescence with different medical impairments

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(developmental, physical, mental, cognitive, behavioral, or emotional situations) and who need specific medical management, health care mediation rather than that required by healthy children [16, 17].

CSHCN are usually presented in dental institutions with poor oral hygiene, high plaque and calculus accumulation, increase in the prevalence of dental caries, gingivitis, and periodontal disease compared to their healthy peers [18, 19]. This may be related to either the disabilities of CSHCN or to their restricted access to oral health care institutions. In addition to, insufficient availability and utilization of dental services for CSHCN [20, 21].

Delivery of dental care for CSHCN is becoming a major dental public health concern [24]. Therefore, dental treatment under general anesthesia (GA) is the proper solution to deliver effective treatment for their dental problems. Oral rehabilitation of CSHCN under GA provides high-quality dental care. It ensures a quick, safe, easy, and convenient method for CSHCN and the dentist together [22, 25].

During the COVID-19 pandemic, pediatric dentists ought to manage the oral health of CSHCN if they are suffering from emergencies or ordinary dental clinical conditions [22]. It is declared that CSHCN pediatric dentists are obliged to follow national guidelines and cross-infection management's policy during the treatment of those children in dental institutions [22, 23].

The purpose of this study was to assess the oral rehabilitation performed for special health care needs Egyptian children under general anesthesia during the first, second, and third waves of COVID-19 pandemic.

Methods

Study settings

Archive Filing System of General Anesthesia Dental Unit, Department of Pediatric Dentistry and Dental Public Health, Faculty of Dentistry, Cairo University.

Study design

The present study is a cross-sectional study.

Sample size estimation

Convenient sampling was applied; retrieving data of all CSHCN who performed complete oral rehabilitation under general anesthesia in the General Anesthesia Dental Unit, in Pediatric Dentistry and Dental Public Health Department, Faculty of Dentistry, Cairo University, from 15th of March 2020 (date of declaration of partial curfew in Egypt) till September 2021 (the period of the first wave, second wave, and third wave of COVID-19 pandemic).

Ethical Aspects

This study was approved by the Department Research Board. Ethical approval was obtained from the Committee of Ethics, Faculty of Dentistry, Cairo University under the registration code:11321.

Participants

• CSHCN required complete oral rehabilitation under general anesthesia.
• Inclusion criteria:

1- Special health care needs Egyptian children.
2- Both sexes were included.

Procedures

Data of CSHCN were retrieved and registered from the Hard Copy Archive Filing System Unit by the two main investigators of the study. All diagnostic and treatment plan charts of CSHCN who performed complete oral rehabilitation under general anesthesia in the General Anesthesia Dental Unit, in Pediatric Dentistry and Dental Public Health Department, Faculty of Dentistry, Cairo University, during the three waves of COVID-19 pandemic were included in the present study. These registered the full detailed procedures performed during oral rehabilitation under general anesthesia, in the operating room in General Anesthesia Dental Units in Pediatric Dentistry & Dental Public Health Department, Faculty of Dentistry, Cairo University.

The Policy of the General Anesthesia Dental Units services allows using filing data by the investigators in research work. The confidentiality of all CSHCN data retrieved and registered in the present study was totally preserved by the investigators' board.

Bias

Selection bias: was avoided by including all diagnostic and treatment plan charts fulfilling the inclusion criteria.

Information bias: was avoided by including only the data of all CSHCN fulfilling the inclusion criteria and data were sent to the statistician as concealed data to avoid this type of bias.

• Reporting bias: was avoided by reporting all data assessed.

Statistical analysis

Categorical data were presented as frequencies (n) and percentages (%) and were analyzed using chi square test followed by pairwise comparisons utilizing multiple z-tests with bonferroni correction. The significance level was set at $p \leq 0.05$. Statistical analysis was performed with R statistical analysis software version 4.1.1 for Windows [26].

Results

This study was conducted to assess the oral rehabilitation performed for special health care needs Egyptian children under general anesthesia during the first, second and third waves of covid-19 pandemic. A total of 345 were included in this study, they were divided into three groups according to the time of receiving the dental treatment; group 1: CSHCN who performed oral rehabilitation during the first wave of covid-19 pandemic, group 2: CSHCN who performed oral rehabilitation during the second wave of covid-19 pandemic, group 3- CSHCN who performed

oral rehabilitation during the third wave of covid-19 pandemic.

Demographic assessment of the study population revealed that the first wave group included 60 (17.4%) children, the second wave included 124 (35.9%) children, while the third wave included 161 (46.7%) children. There was a statistically significant difference between the number of CSHCN present in each group with the second and third waves having significantly higher number of children than the first wave ($p<0.001$). However, there was no a statistically significant difference in the demographic characteristics including age, sex and medical condition between the CSHCN of the three groups ($p>0.05$) (Table 1).

Oral rehabilitation performed for the CSHCN

Regarding the oral rehabilitation performed for primary anterior teeth, the results revealed that preventive treatment was performed only for CSHCN in the second wave. On the other hand, there was a statistically significant difference in restorative treatment, pulp therapy and extraction performed for the children between the three waves ($p<0.05$), with the third wave scoring the highest percentages, followed by the second wave while the first wave demonstrated the least percentages for the three types of dental treatments (Table 2).

Concerning the oral rehabilitation performed for primary posterior teeth, there was no statistically significant difference between the three waves in the preventive treatment performed for CSHCN ($p=0.651$). Nevertheless, there was a statistically significant difference in the other dental treatments performed for the children between the three waves ($p<0.05$), with the first wave showing the lowest percentages (Table 2).

As regards the oral rehabilitation performed for permanent anterior teeth, none of the CSHCN received preventive treatment in the three waves, while all the CSHCN who received pulp therapy treatment were in the second wave. Moreover, there was a statistically significant difference between the three waves in the restorative treatment performed ($p=0.003$), while there was no a statistically significant difference between the three waves in the

Table 1. Intergroup comparison of demographic characteristics.

Parameter			First wave	Second wave	Third wave	p-value
Gender	Male	n	38	82	93	0.341
		%	17.80%	38.50%	43.70%	
	Female	n	22	42	68	
		%	16.70%	31.80%	51.50%	
Age (years)	Mean ± SD		6.46 ± 2.94	6.50 ± 2.45	6.16 ± 2.76	0.514
Number of CSHCN		n	60^{B}	124^{A}	161^{A}	<0.001*
		%	17.40%	35.90%	46.70%	
Medical condition	Behavioral or emotional disability	n	2	7	1	0.281
		%	20.00%	70.00%	10.00%	
	Developmental disability	n	33	61	92	
		%	17.70%	32.80%	49.50%	
	Medical disability	n	15	30	38	
		%	18.10%	36.10%	45.80%	
	Physical disability	n	10	26	30	
		%	15.20%	39.40%	45.50%	

Different superscript letters indicate a statistically significant difference within the same horizontal row*significant ($p<0.05$)

Table 2. Intergroup comparison of treatment performed in primary teeth in the three waves.

Primary teeth	Treatment		First wave	Second wave	Third wave	p-value
Anterior	Preventive treatment	n	0	8	0	NA
		%	0.00%	100.00%	0.00%	
	Restorative treatment	n	23^{C}	44^{B}	91^{A}	<0.001*
		%	14.60%	27.80%	57.60%	
	Pulp therapy treatment	n	3^{B}	4^{AB}	11^{A}	0.042*
		%	16.70%	22.20%	61.10%	
	Extraction	n	97^{B}	228^{A}	244^{A}	<0.001*
		%	17.00%	40.10%	42.90%	
Posterior	Preventive treatment	n	6^{A}	6^{A}	9^{A}	0.651ns
		%	28.60%	28.60%	42.90%	
	Restorative treatment	n	78^{C}	192^{B}	336^{A}	<0.001*
		%	12.90%	31.70%	55.40%	
	Pulp therapy treatment	n	72^{B}	142^{A}	167^{A}	<0.001*
		%	18.90%	37.30%	43.80%	
	Extraction	n	150^{B}	371^{A}	350^{A}	<0.001*
		%	17.20%	42.60%	40.20%	

Different superscript letters indicate a statistically significant difference within the same horizontal row*significant ($p<0.05$)

extraction performed (p=0.417) (Table 3).

Finally, with respect to the oral rehabilitation performed for permanent posterior teeth,there was a significant difference between the three waves for all types of dental treatments (p<0.05). The third wave displayed the highest percentages in preventive, restorative treatments and pulp therapy performed for CSHCN, whereas, the second wave showed the highest percentage in extraction performed (Table 3).

Discussion

Providing dental service during COVID-19 pandemic is a real challenge for the dental health care professionals all over the world. This may be attributed to fear of cross-infection, the shortage of personal protective equipment particularly at the peak of the pandemic from March to April 2020, as well as the financial burdens as a consequence of the pandemic [27].

The present study which was conducted by the end of the third wave of COVID- 19 pandemic, assessed the oral rehabilitation performed for special health care needs Egyptian children under general anesthesia during the first, second, and third waves of COVID-19 pandemic.

The results of this study revealed that there was no statistically significant difference between the number of male and female CSHCN attending the General Anesthesia Dental Unit, in Pediatric Dentistry and Dental Public Health Department, Faculty of Dentistry, Cairo University during the three waves of COVID-19 pandemic. These findings come in accordance with other studies [15, 28-30], which confirmed the lack of gender predilection in patients seeking dental treatment.

The results also showed that there was a statistically significant difference between the number of CSHCN who received oral rehabilitation under general anesthesia between the three waves, with the second and third waves having a significantly higher number of children than the first wave. These findings may be related to the strict restriction of providing dental services during the first wave of the pandemic where all elective procedures were deferred in response to ADA recommendations [9]. These recommendations were adopted to assist in flattening the curve and reducing the possibility of cross-infection among the dental health care workers as they are more vulnerable to catch infection during dental practice in the absence of protective measures as a result of close contact with patients, and aerosol splatterespeciallyafter SARS-CoV-2 isolation from the saliva of infected patients [30, 31].

Moreover, the patients' anxiety and fear of COVID-19, as a result of its rapid transmission and serious complications, led to their reluctance in demanding dental care except in emergency conditions. Consequently, Urgent dental care was only performed during the first wave of the pandemic after following standard droplet infection precautions including the use of personal protective measures for the dental professionals and hand hygiene practices. Additional precautions were also implemented like recording patients' body temperature, taking patients' recent travel history, and using antiseptic mouthwash prior to the dental treatment [27, 32, 33].

Thus, the diminished availability of dental care during the first wave led to an increased demand for dental services for CSHCN during the second and third waves as proved by the findings of the current study. This speculation was previously proposed by many researchers who predicted that there will be a gross rise in the patients' demand for dental services over time after COVID-19 pandemic [29, 34].

The higher attendance of CSHCN seeking dental treatment during the second and third waves of COVID-19 pandemic than the first wave may also be related to the assurance messages delivered to the people that they have to adapt to the current situation of the pandemic and perform their daily activities following the recommended health precautions. Furthermore, the vaccination pro-

Table 3. Intergroup comparison of treatment performed in permanent teeth in the three waves.

Permanent teeth	Treatment		First wave	Second wave	Third wave	p-value
Anterior	Preventive treatment	n	0^{A}	0^{A}	0^{A}	NA
		%	0.00%	0.00%	0.00%	
	Restorative treatment	n	1^{B}	7^{A}	14^{A}	0.003*
		%	4.50%	31.80%	63.60%	
	Pulp therapy treatment	n	0	7	0	NA
		%	0.00%	100.00%	0.00%	
	Extraction	n	4^{A}	3^{A}	1^{A}	0.417ns
		%	50.00%	37.50%	12.50%	
Posterior	Preventive treatment	n	3^{B}	19^{A}	24^{A}	<0.001*
		%	6.50%	41.30%	52.20%	
	Restorative treatment	n	22^{C}	36^{B}	92^{A}	<0.001*
		%	14.70%	24.00%	61.30%	
	Pulp therapy treatment	n	4^{B}	2^{B}	13^{A}	0.004*
		%	21.10%	10.50%	68.40%	
	Extraction	n	34^{B}	69^{A}	40^{B}	<0.001*
		%	23.80%	48.30%	28.00%	

Different superscript letters indicate a statistically significant difference within the same horizontal row*significant (p<0.05)

grams played a vital role in reducing the prevalence of COVID-19 and minimizing its complications, and accordingly reducing the people's anxiety towards the pandemic [34].

The results of the current study revealed that extraction was the most commonly performed line of treatment for the CSHCN during the three waves of COVID-19 pandemic, this may be attributed to the difficulty in maintaining good oral hygiene and high caries index in CSHCN leading to the increased number of non-restorable primary and permanent teeth. These findings come in agreement with previous studies on CSHCN where extraction was the treatment of choice [28, 30, 35, 36].

Conclusion

1. The first wave of COVID-19 pandemic reduced the attendance of CSHCN for oral rehabilitation under general anesthesia.
2. The attendance of CSHCN for oral rehabilitation under general anesthesia during the second and third waves of the pandemic increased.
3. Extraction was the most commonly adopted line of treatment for CSHCN.

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