Analysis on Inpatient Dental Consultations to Pediatric Dentistry at the Severance Hospital in Past 5 Years: A Retrospective Study

Jungeun Sohn

The Graduate School

Yonsei University

Department of Dentistry

Analysis on Inpatient Dental Consultations to Pediatric Dentistry at the Severance Hospital in Past 5 Years: A Retrospective Study

Directed by Professor Jae-Ho Lee

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Jungeun Sohn

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연세대학교
YONSEI UNIVERSITY

This certifies that the Masters Thesis of Jungeun Sohn is approved.

Jaeho Lee

Thesis Supervisor: Lee, Jae-Ho

Byung Jai Choi

Choi, Byung-Jai

Seong Oh Kim

Kim, Seong-Oh

The Graduate School

Yonsei University

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2016년 6월

손정은 드림

Table of Contents

List of Table and Figures

Abstract

Analysis on Inpatient Dental Consultations to Pediatric Dentistry at the Severance Hospital in Past 5 Years: A Retrospective Study

Jungeun Sohn

Department of Dentistry
The Graduate School, Yonsei University

(Directed by Professor Jae-Ho Lee)

Objective: The goal of this study is to provide a fundamental and comprehensive report on the status of oral healthcare on pediatric inpatients by conducting statistical analyses on the data of consultation requests to the pediatric dental clinic for the children hospitalized with systematic diseases at Yonsei Severance Hospital for the past 5 years.

Methods: The study targeted approximately 2000 pediatric patients hospitalized for the treatment of systematic diseases at Yonsei University Severance Hospital from 2010 to 2014. All subjects had complete records available for consultation and had received treatments at the Pediatric Dentistry Department. The patient data was collected from

Yonsei University Severance Hospital's Clinical Data Retrieval System and the retrieved data was classified and statistically analyzed using Excel 2000 (Microsoft, Redmond, Washington, USA).

Results: There were 1203 male children and 932 female children with an average age of 8.9 in the referred patient group. A comparative analysis on the data of annual dental consultation records for the children, ages between 0-18, revealed 0.3% rate of increase between 2010 to 2014, except for a momentary decline in 2012. In all, the proportion of patients referred to the Pediatric Dentistry Department was found to be about 2.5%. Of the 29 departments that requested consultation to the Pediatric Dentistry Department, Pediatrics Department (PD) requested the most dental consultations with 594 cases, comprising 28% of total requests made. The prevailing chief complaint for dental consultation was for general oral examination with 913 cases, comprising approximately 43% of all chief complaint for dental consultation. About half of all inpatients referred to the Pediatric Dentistry Department had only received routine oral examinations without any subsequent treatments. Operative and preventative treatments had been performed on 479 and 198 cases respectively, and 200 cases of tooth extractions had been made.

Conclusion: The analyses of the extracted data on consultation requests to the Pediatric Dentistry Department for children hospitalized with systematic diseases have revealed that general oral examination was the most common form of chief complaint, among a variety of other chief complaints. The analyses also have revealed that Rehabilitation Medicine and Pediatrics Departments had made the most frequent dental consultation requests. The prevailing diagnosis on the consulted patient group had been dental caries.

While an increasing trend in the general frequency of pediatric dental consultation requests have been observed, further analysis of the collected data have suggested that children suffering from systematic diseases still may lack the appropriate oral examination and treatments. The strong interrelation between prevention of oral diseases and management of systematic diseases advocate for the critical needs to educate the physicians and the guardians for proper care and treatment of oral cavity and ultimately encourage them to make more frequent requests for consultation to the dental clinics.

Keywords: pediatric inpatient, dental consultation, analysis, systematic diseases

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Department of Dentistry
The Graduate School, Yonsei University

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I. Introduction

There is an indisputable relationship between the oral diseases and general systematic health. Deterioration of oral health condition can negatively affect the life quality of a person and the effect can be particularly detrimental for patients hospitalized with systematic diseases. There have been extensive medical discussions on the subject through a number of research publications in recent years. (Locker D et al., 2002, Duke RL et al., 2005).

The concept that compromised oral health conditions can adversely affect systematic health is a widely accepted fact and patients suffering from systematic diseases generally tend to have poor dental hygiene. Numerous studies have been published to better understand the interconnection between the poor dental health and development of ventilator-associated pneumonia. In recent years, there has been a series of reports which demonstrated the benefit of proper oral health care for the effective prevention of aspiration pneumonia. Moreover, the report which proved that dental plaques cause colonization of pneumonia causing bacteria further solidified the relationship between oral health condition and occurrence of pneumonia. (Chika Kuramoto et al., 2011). Oral manifestations of systemic disease and dental complications related to various pediatric illnesses are well documented, but there's still limited information regarding the prevalence of oral diseases and access to dental care for medically compromised children (Michelle L. Mayer et al., 2004, Martine Nicopoulos et al., 2007).

Research results have confirmed that patients with poor oral health conditions may have increased exposure for respiratory complications during hospitalization. (Chan EY et al., 2007) On the contrary, lower instances of respiratory complications have been observed for patients with adequate oral health conditions. Although there is a general guideline in place for proper oral care of inpatients with systematic diseases, the overall dental consultation requests for oral examinations and treatments have been infrequent due to the lack of awareness on the importance of oral care by guardians and medical staffs, patient's own reluctance, the limited availability of dental staff and perception of dental treatment as lower priority compared to other medical treatments (Cope D et al., 2003,

Scannapieco FA et al., 2006). Dental care for pediatric patients suffering from systematic diseases require a particular attention because of the inherent vulnerability to infections and the difficulty in expressing symptoms, compared to adult patient group. The risks of manifestation and progression of oral diseases are especially high for the pediatric patients undergoing chemotherapy and radiation therapy treatments as well as for children undergoing treatments for neurological disorders, cardiac diseases, stroke, and asthma (Pool DM et al., 1982, Tablan OC et al., 2003, Ross A et al., 2007, Jablonski RA et al., 2009). A close cooperation between medical and dental staffs is essential for the development of treatment plans to effectively manage systematic and oral diseases for the hospitalized children. For this reason, it is imperative to accurately determine and analyze the status the dental consultation data of pediatric inpatients with systematic diseases (Kihoon Joo et al., 2014).

A statistical study conducted on the patients who visited pediatric dental clinic at a hospital located in Seoul have reported lower cases of patients receiving preventative treatments from 2000 to 2005. The study identified the change in Korea's national health insurance policy as the main reason for the decline (EunJung Choi et al., 2006). Since 2013, there have been a few statistical and analytical reports on the data of the children hospitalized with systemic diseases who had pediatric dental consultations referrals. However, the previous reports were based on the data had been limited to annual scope, inadequate to determine the current status of pediatric dental consultations and unable to ascertain the extensive trends (Pollard MA et al., 1992, Dodd MJ et al., 2000).

The purpose of this study is to provide a fundamental and comprehensive report on the state of multidisciplinary cooperation and treatment trends among physicians and dentists by collecting and analyzing the data on pediatric patients hospitalized with systematic diseases who had been consulted to the pediatric dental clinic in past five years.

II. Materials and Methods

The study is conducted on the patient data of approximately 2000 children, ages between 0-18, admitted for treatment of systematic diseases at Yonsei University Severance Hospital from 2010 to 2014 who had been consulted and treated at the pediatric dentistry clinic with complete treatment records available. The data of the patients without complete treatment records and overlapping requests are excluded. Patients' age, sex, requesting department, chief complaints, dental diagnosis and treatment records for dental consultation are gathered and the collected data is categorized and statistically analyzed using Excel 2000 (Microsoft, Redmond, Washington, USA). Oral exam conveys the routinely performed basic examination of oral cavities, while pre-operative evaluation are performed to inspect for the possibilities of complications prior to surgeries. Operative treatment encompasses simple restorative treatments and root canal treatments. (Table 1)

This is a retrospective research without any elements, which may be detrimental to the safety of the patients. The collection of the patient data have been approved by the Institutional Review Board of Yonsei University Dental Hospital (Approval number 2-2015-0007)

Table 1. Classification of dental chief complaint, dental diagnosis and dental treatment.

Chief complaint of dental consultation	Dental diagnosis	Dental treatment
1. Oral exam	1. Within normal limit	1. Exam only
2. Dental caries	2. Dental caries	2. Preventive treatment (fluoride treatment, sealant)
3. Pre-operative evaluation	3. Soft tissue abnormality	3. Operative treatment
4. Oral pain	4. Trauma	4. Trauma treatment
5. Trauma	5. Physiological tooth mobility	5. Extraction
6. Tooth mobility	6. Etc.	6. Etc.
7. Fluoride treatment		
8. Self-injury		
9. Etc.		

III. Results

From 2010 to 2014, total of 2135 pediatric inpatients admitted for treatment of systematic diseases at Yonsei University Severance Hospital were consulted and treated at the pediatric dental clinic. There were 1203 male children and 932 female children with an average age of 8.9 in the referred patient group. A comparative analysis on the data of annual dental consultation records for the children, ages between 0-18, revealed 0.3% rate of increase from 2010 to 2014, except for a momentary decline in 2012. Thus, the proportion of patients referred to the Pediatric Dentistry Department was found to be about 2.5% (Table2, 3).

From 29 departments which made consultation request to the pediatric dental clinic, Pediatrics Department (PD) requested the most referrals with 594 cases, comprising 28% of total requests made. Department of Rehabilitation Medicine (RM) had the second most consultations requested, followed by Department of Pediatric Cardiology (PC), Department of Pediatric Hematology-Oncology (PHO) and Department of Pediatric Neurology (PN) with 319, 201 and 160 cases, respectively. In addition, 19.17% of all pediatric patients admitted to Department of RM were referred to the pediatric dental clinic and 10.3% of patients admitted to Department of PHO were referred to the pediatric dental clinic. PD and RM departments had the highest number of patients referred to pediatric dental clinic, while RM and PHO departments had the highest ratio of patients referred to the pediatric dental clinic (Table 4).

The analysis of annual patient referrals to Pediatric Dentistry Department revealed that

PD Department maintained highest frequency for consultations referrals until the abrupt decline in 2014. While the consultation requests from RM department increased at a steady pace, the consultation requests from PHO department increased sharply in 2014 (Fig 1.).

Table 2. Annual records on the total number of inpatients and pediatric dental consultation.

	2010	2011	2012	2013	2014	Total
Number of total inpatients	91,860	95,764	98,785	97,497	100,058	393,964
Number of inpatients ages between 0~18 (A)	15,840	16,581	17,498	17,555	17,372	84,846
Number of total consultations (B)	389	417	399	444	486	2,135
(B)/(A) x 100(%)	2.5	2.5	2.3	2.5	2.8	2.5

Table 3. General characteristics of subjects.

Total patients	2135
Gender (Male:Female)	1203:932(1:0.77)
Mean age	8.9
Consultation to pediatric dentistry /inpatients of pediatric ward	2135/84846 (2.5%)

Table 4. Percentage of consultations to Pediatric Dentistry Department by referring departments per pediatric inpatient population and per entire inpatient population at Yonsei Severance Hospital.

Referring department	Percentage of consultations per total consultations	Percentage of consultations per entire inpatient population
Pediatric Neurology (PN)	7% (160/2135)	3.17% (160/5041)
Pediatric Cardiology (PC)	15% (319/2135)	1.17% (319/2716)
Pediatrics (PD)	28% (594/2135)	2.26% (594/26267)
Pediatric Hematology-Oncology (PHO)	9% (201/2135)	10.3% (201/1952)
Rehabilitation medicine (RM)	28% (591/2135)	19.17% (591/3083)
Etc.	13% (270/2135)	0.58% (270/45787)

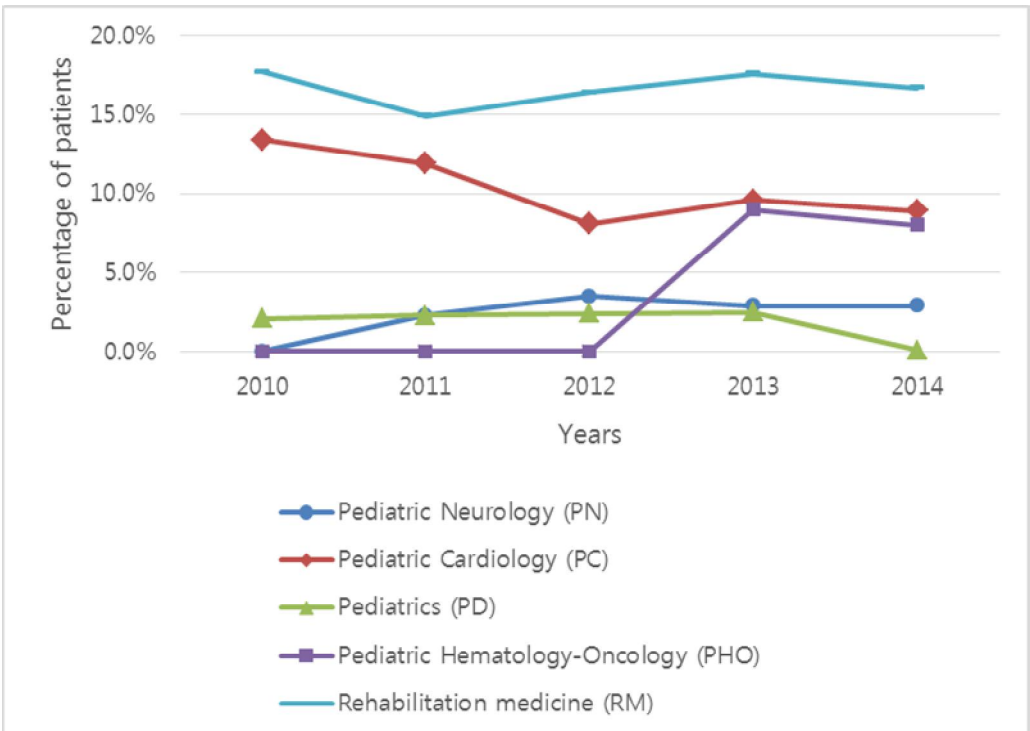

Figure 1. Annual rates on inpatients with pediatric dentistry consultation by departments. The number of consultation request from RM and PC departments were largely consistent over the years.

The analysis of the chief complaints on the consulted patient group for the past five years revealed that the number of oral examination requests increased constantly. The number of tooth mobility cases experienced a sudden surge in 2014, while cases of trauma had been declining gradually since 2012. The most frequent chief complaint for the referrals from the PD Department were for general oral examination requests with 913 cases, comprising about 43% of all chief complaint for dental consultation. The second most frequent chief complaint was for dental caries treatments with 572 cases. The number of patients consulted for pre-operative evaluation and tooth mobility were 275 and 195 cases respectively, comprising close to 22% of all chief complaint for dental consultation. Aside from the major chief complaints for the pediatric inpatient population, a variety of other chief complaints such as oral pain, fluoride treatment, teeth discoloration, self-inflicted injuries, bruxism and orthodontic treatments were verified and categorized as etc. (Table 5).

More than 37% of all patients with records of chief complaint for dental consultation were diagnosed with dental caries and about 51% of the patients with dental caries diagnosis received operative treatments. However, other than the 35 patients who received tooth extraction, about 34% of all patients diagnosed with dental caries only received oral exams without proper follow-up treatments. Only about 1% of all consulted patients were diagnosed with soft tissue abnormality and 48% of the consulted patients showed no signs of dental problems. About half of the all inpatients consulted to the pediatric dental clinic simply received routine oral examinations without any following treatments. Operative treatments and preventative treatments were performed on 418 and

259 cases respectively, and 200 cases of tooth extractions made. Other treatments, such as trauma and orthodontic treatment were categorized as etc (Table. 6).

16% of all patients within normal limits received preventative treatments and the rate of preventative treatments were observed to be in an increasing trend in 2014, other than the slight decline in 2011. Lastly, the annual percentage of operative treatments performed on patients diagnosed with dental caries maintained at around 50%, except in 2010 (Fig 2).

Table 5. Annual number and percentage of patients by chief complaints.

	2010	2011	2012	2013	2014	Total
Oral exam	135	150	151	213	264	43% (913)
Dental caries	63	137	121	159	92	27% (572)
Pre-operative evaluation	40	84	69	44	38	13% (275)
Oral pain	15	4	8	5	15	2% (47)
Trauma	9	22	21	13	3	3% (68)
Tooth mobility	35	31	26	39	64	9% (195)
Fluoride treatment	6	6	3	5	10	1% (30)
Self-injury	3	1	0	0	0	0% (4)
Etc.	11	7	9	3	1	2% (31)
Total	317	442	408	481	487	100% (2135)

Table 6. Treatments made by dental diagnosis.

Dental diagnosis / Dental treatment	Within normal limit	Dental caries	Soft tissue abnormality	Trauma	Tooth mobility	Etc.	Total
Exam only	843 (83%)	265 (34%)	7 (26%)	30 (56%)	33 (16%)	19 (44%)	1197 (56%)
Preventive treatment	168 (17%)	82 (10%)	2 (7%)	1 (1%)	3 (1%)	3 (7%)	259 (12%)
Operative treatment	0 (0%)	404 (51%)	1 (4%)	10 (2%)	1 (1%)	2 (5%)	418 (20%)
Trauma treatment	0 (0%)	1 (0%)	1 (4%)	1 (1%)	18 (8%)	0 (0%)	21 (1%)
Extraction	0 (0%)	35 (5%)	2 (7%)	8 (15%)	153 (74%)	2 (5%)	200 (9%)
Etc.	5 (0%)	0 (0%)	14 (52%)	4 (8%)	0 (0%)	17 (39%)	40 (2%)
Total	1,016 (48%)	787 (37%)	27 (1%)	54 (2%)	208 (10%)	43 (2%)	2135 (100%)

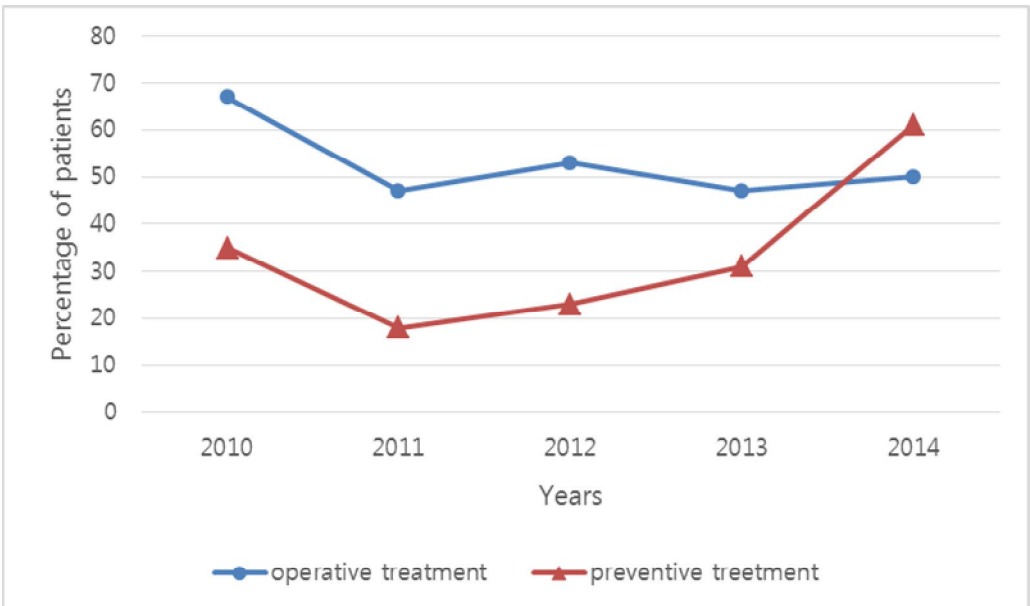

Figure 2. Annual percentages of patients within normal limits who received preventative and operative treatments for dental caries. The annual percentage of patients diagnosed with dental caries who received operative treatments have maintained at around 50% except in 2011. The annual percentage of patients diagnosed with dental caries who received preventative treatments have been in an increasing trend since 2011, exceeding 60% in 2014.

IV. Discussion

For the past 5 years, from 2010 to 2014, a slightly increasing trend was observed on the number of hospitalized children suffering from systematic diseases who were consulted by Pediatric Dentistry Department. Despite the increasing trend, only about 2.5% of all pediatric inpatients admitted at Yonsei University Severance Hospital with systematic diseases were consulted and received treatments at the pediatric dental clinic. The figure reflected similar findings as the previous study (Kihoon Joo et al., 2014) and suggested that most children hospitalized with systematic diseases lack the appropriate oral examination and treatments.

Preventative measure against stomatopathy is very important because ordinary dental problems can create major complications for the patients suffering from systematic diseases (Pollard MA et al., 1992). Therefore, the pediatricians at major hospitals have to take careful attention on the oral conditions of the pediatric patients with systematic diseases and recognize oral disease as a significant variable in the establishment of treatment plan for systematic diseases.

Similar to adult patient group, children receiving chemotherapy or radiation therapy to the head and neck region often develop oral mucositis. Damage to the oral mucosa by cancer therapy can lead to a various and often serious complications (Martine Nicopoulos et al., 2007).

The largest share of the dental consultation requests were made from Pediatric Rehabilitation department which has a sizeable population of inpatients suffering from

systematic disease related to brain legions disability (Kihoon Joo et al., 2014). Decreased motor functions and abnormal muscle functions are often observed on the patients with cerebral palsy. Along with the occurrences of 2nd class malocclusions, on which protruding maxillary anterior teeth and short lips can be observed, the occurrences of dental trauma cases nearly doubled compared to ordinary children. Due to the characteristics of the illness, the patients suffering from cerebral palsy tend have high frequency of injuries to the maxillary anterior. A previous study has claimed that patients with cerebral palsy were three timely likely to suffer from dental trauma compared to the general population (Miamoto CB et al., 2011). Therefore, pediatric dentists have to inform the dangers of dental traumas to the guardians of children suffering from CP and prescribe preventative measures such as mouth guards when required.

In this study, the collected data revealed that Pediatrics Department made the most number of dental consultations requests at Yonsei Severance hospital among the pediatric inpatient population. However, as for the ratio of referral frequency per number of patients by departments, RM department was observed to have the highest percentage of referrals followed by PC department. Basic oral examination made up the most of consultation requests at RM department while pre-operative evaluation made up the most of consultation requests at PC department. It is speculated that the higher frequency of pre-operative evaluation by PC department can be attributed to the likelihood of oral bacteria getting into the blood and causing complications during dental treatment for immunologically compromised patients.

The third most frequent dental consultation requests were made from PHO department

with patients who suffer from leukemia, central nervous system tumors (brain tumors), lymphoma, or genital tumors. Lymphocytic leukemia had the highest frequency of occurrence within PHO department. As a general rule, preventative dental screening and appropriate treatment measures are recommended for the variety of oral complications that may occur before, during and after the chemotherapy treatments for patients in PHO department. Still, the pediatric patients who underwent such treatments typically have poor dentition and dental health before and after their diagnosis. Because timing of edentulation correlates with prospective quality of life, the maintenance oral hygiene and vigilant recall exams with adjunctive fluoride therapy during cancer treatment can decrease the risk and sequellae of oral mucositis (Dodd MJ et al., 2000). Since the main path of infection are through the mouth for the immunocompromised patients on chemotherapy treatments, (Pope JE et al., 1991) the pediatric dentists have to eliminate all possibilities of infection and stimulation factors and consult with the medical oncologists to exchange opinions on treatment schedules as well as educating the guardians and patients on the oral care methods in order to minimize the possibility of oral problems and discomfort (Miamoto CB et al., 2011).

The study revealed the prevailing chief complaint for dental consultation requests were made for general oral examinations for the most department, while pre-operative evaluation consultations requests were observed to be overwhelmingly high for the pediatric cardiology patients.

It was observed that more than half of the chief complaint of dental consultation to pediatric dental clinics were made for general oral examinations. The study also revealed

similar results with previous studies on the state of dental consultation in pediatric inpatients. The previous study reported that 33% of chief complaint for dental consultation was for a general oral examination and most patients were consulted for more comprehensive oral examinations other than the chief complaint (Kanuga S et al., 2012).

Inpatients with a variety of chief complaints were consulted to pediatric dentistry for other than general chief complaints such as oral examination or dental caries. Therefore, pediatric dentists from major hospitals will have to have the ability to respond to individual circumstances and the dental needs for the pediatric patients with systematic diseases. 27% of the patients were observed to have dental caries in this study and the figure corresponds with findings in previous studies (Martine Nicopoulos et al., 2007). Another study in 2012 exhibited much lower rate of receiving operative treatments for children suffering from systematic disease with pediatric dental consultations (Kihoon Joo et al., 2014). However, the results of this study, obtained by analyzing five years of patient data from 2010 to 2014, demonstrated the actual rate of patients that received operative treatments maintained at about 50%, excluding 2010.

There are two main reasons for these occurrences, first, this study lacked the specific classification on the severity of dental caries on the overall diagnosis of the dental caries. In general, early developments of dental caries do not require conservative treatment, hence the low rate of conservative treatment may not reflect the reality of the situation. Secondly, there is always a possibility of postponing immediate treatments on dentist's discretion regarding on the general condition and the cooperation level of the patient.

Furthermore, there is an increasing trend in receiving preventative treatments without observable signs of problems. In all, the analyses can be interpreted as the overall improvement of awareness in dental care by the patients and the guardians in the recent years.

The study also revealed significantly lower cases of soft tissue abnormality than previous studies (Caio Perrella de Rezende et al., 2008). It can be speculated the observed difference is due to the different diagnostic standards for soft tissue abnormality and the low frequency of dental consultation requests due to the lack of awareness on the oral diseases by the referring physicians. Therefore, the need for a unified outline for diagnosis of the comparison and analysis on the status oral diseases arises. The need to provide a foundation to promote for smooth consultation processes between the medical staffs and dentists through surveys of university hospital medical staffs also arises.

V. Conclusion

The results of the statistical analyses on the consultation requests to the pediatric dental clinic for the pediatric inpatients suffering from systematic diseases revealed a variety of chief complaints, oral examinations being the most prevalent. The most frequent consultation requests were made by Rehabilitation Medicine and Pediatrics Departments. Dental caries were most common diagnosis in the consulted patient population.

In past 5 years, there had been an increasing trend in patients receiving preventative treatments without observable signs of problems. This trend can be interpreted as an overall improvement in awareness for proper dental care by the patients and the guardians. However, the collected data have also revealed that there were instances of dental caries diagnosis without proper follow-up treatments. For this reason, there still seems to be a room for improvement in raising awareness for proper dental care on the patients and the guardians in the future.

In closing, it can be concluded that the need to raise awareness for the physicians and the guardians to encourage requests for consultation to the dental clinic is critical due to the close interrelation between prevention of oral diseases and the management of systematic diseases for the inpatients. Moreover, raising awareness, providing education as well as presenting opportunities for structured discussions for the pediatricians and guardians need to take place in order to promote more comprehensive oral examinations to be offered for the pediatric inpatients suffering from systematic diseases.

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국문요약

최근 5년간 세브란스 병원 내 입원한 환자의 소아치과 의뢰 현황의 분석

연세대학교 대학원 치의학과
손 정 은
지도교수: 이제호

본 연구의 목적은 최근 5년간 전신질환으로 연세대학교 세브란스 병원 내 입원한 환자의 소아치과 협진 의뢰 현황에 대한 통계분석을 실시하여 그 실태를 파악하고 협진 시 부족한 점을 보완하는 것이다. 2010년부터 2014년까지의 연세대학교 세브란스 병원에 전신질환으로 입원한 소아환자 중 소아치과에 의뢰되어 실제 진료를 받은 0세부터 18세까지의 2135명, 남아 1203명과 여아 932명의 환자를 대상으로 하였다. 환자의 나이, 성별, 전신질환명, 협진의뢰과, 협진주소, 치과적 진단명, 치과적 치료 내용으로 분류하여 통계분석하였으며 환자 정보의 수집은 연세의료원의 Clinical Data Retrieval System을 이용하였으며 협진 의뢰를 한 환자의 수는 2010년부터 2014년

사이에 약 0.3% 증가하여 5년간 전체적으로 약 2.5%를 차지했다.

환자는 총 29개 과에서 협진의뢰 되었으며, 그 중 가장 많은 협진을 의뢰한과는 소아청소년학과로 총 594건을 의뢰해 전체의 28%를 차지하였다. 협진주소는 기본 구강검진이 913건으로 전체 주소의 약 43%를 차지하였다.

협진 의뢰된 환자의 약 절반 가량이 단순 구강검사만 시행하였으며, 보존치료와 예방치료는 각각 479건과 198건, 발치는 200건이 이루어졌다. 의뢰된 환자의 치과적 진단명은 치아우식증이 가장 많았지만, 정상 범주 내에 해당하는 환자의 수가 더 많았다. 입원환자의 전신건강관리와 밀접한 관련이 있는 구강질환의 예방 및 처치를 위하여 치과협진이 앞으로 더 활발하게 이루어져야 할 것이며 이를 위한 의사 및 보호자의 인식 개선이 요구된다.

핵심 되는 말: 소아 입원 환자, 치과 협진, 분석, 전신질환