

Changes of the Dental Service Delivered to Patients with Intellectual Disability under General Anaesthesia in Dental Polyclinic Split, Croatia, during the Years 1985–2009

Ivan Kovačić¹, Antonija Tadin¹, Nikola Petričević², Branimira Mikelić¹, Neven Vidović¹, Antonija Palac¹, Irina Filipović-Zore² and Asja Čelebić³

¹ University of Split, School of Medicine, Study of Dental Medicine, Split, Croatia

² University of Zagreb, School of Dental Medicine, Department of Oral Surgery, Zagreb, Croatia

³ University of Zagreb, School of Dental Medicine, Department of Prosthodontics, Zagreb, Croatia

ABSTRACT

People with intellectual disability (ID) usually have a poor quality of oral health, which include poor oral hygiene, untreated caries and high proportion of missing teeth. Due to their fear and repulsive attitude towards medical staff, general anesthesia is often a useful method for dental treatment. One thousand and fifty four intellectual disability patients for the period of 1985–2009 who received dental treatment under general anesthesia in Dental Polyclinic Split, were included in the study. Patients were divided into five groups based upon the period when a specific dental treatment had been received. Each period was analyzed for the number of ID patients treated and the type of dental treatment. The results showed that the most services provided were 4006 fillings, followed by 3225 extracted teeth and finally 274 endodontic treatments. Significantly the lowest number of fillings and endodontic treatments were found among patients in group II (1990–1994), with significantly the highest number of extracted teeth. In Conclusion, the types of dental treatment have changed during twenty five years. Number of extracted teeth decreased while the number of fillings and endodontic treatment increased. However, dental status of people with intellectual disability should be improved with more restorative treatments and with better oral health prevention program.

Key words: *intellectual disability, dental care, general anesthesia, dental treatment, oral health*

Introduction

People with intellectual disability usually have a poor quality of oral health which include poor oral hygiene, gingival disease, high proportion of missing teeth, untreated caries and/or heavy tooth wear due to grinding^{1–4}. Many people with ID also have other conditions such as cerebral palsy, seizure or psychiatric disorders, deficit of attention, hyperactivity disorder, or problems with vision, communication and eating⁵. ID patients are mainly unaware of their dental problems, therefore the decision to visit a dentist depends on their parents and caregivers, often upon the criteria of teeth appearance and presence of pain^{3,6}. Many parents, as well as caregivers of people with ID may have perceived oral health care as a luxury instead of as a necessity for overall health.

Poor dental health amongst people with ID may also relate to poor access to dental practitioners. Because of ongoing health visits to doctors due to their illness, people with ID usually have a negative attitude towards »white coats« and medical staff, so they demand a special care and preparation before seeing dentists in order to start any kind of therapy. Also, many dentists are reluctant to accept people with disabilities into their private practices because of inadequate knowledge of their treatment needs or due to inadequate compensation for the additional time and effort needed to treat such patients. Due to poor cooperation, difficulties in communication, and related medical conditions many ID patients require general anesthesia (GA) for dental treatment⁷. General

anesthesia should only be provided in accredited hospitals with adequate staff including dental surgeons, specialist paediatric dentists and anesthesiologists, the facility's equipment, and the patient's dental condition. Coordination amongst the different professionals is necessary to guarantee systematic and multidisciplinary care, which results in better oral health care⁹.

Regular preventive oral health care can improve the health of patients with disabilities requiring little effort and great long term benefit^{10–12}. The treatment of dental caries in many ID persons often leads to dental extraction of otherwise restorable teeth¹³. A problem compounded further by many ID patients is that they only seek dental care on an emergency basis. With continued education of dental therapists and allied personnel, the provision of oral health to people with ID should improve in time.

The aims of this retrospective study was to determine the characteristics of comprehensive dental care in ID persons under general anesthesia, and to determine whether any changes have occurred in dental procedures during the twenty five-year period.

Materials and Methods

Participants

The population included all ID patients who received dental treatment under general anaesthesia in »Dental polyclinic Split« between January 1985 and December 2009. The population that was treated consisted of children and young people from the »Institute for the accommodation and rehabilitation of children and young people« in Vrlika, »Centre for training and education Juraj Bonaci« in Split, »Centre for occupational therapy and rehabilitation« in Kastel Novi-Rudine, »Centre for rehabilitation Samaritanac«, as well as of ID individuals living with their parents and guardians in the Split-Dalmatian district and surrounding areas.

General anesthesia was provided by a specialist anesthesiologist. Informed consent for dental treatment under GA was obtained from the parents, guardians and/or caregivers.

Treatment under GA

Between 1985–1999, GA was performed using 2% halothane (Jugoremedija, Zrenjanin, Yugoslavia). In 1999, the use of halothane as an inhalation anesthetic agent was aborted in favour of sevoflurane (Sevorane; Abbott Laboratories Ltd, Queenborough, Kent, UK). The inhalation anesthetic agent was first administered via a nasal or a facial mask, chosen in relation to the age, face morphology, and the type of spontaneous respiration of the patient (nose- or mouthbreather). After that all patients were intubated. The gas was distributed via a pressure-reducing valve with a double tube, reservoir bag, antibacterial filter, and a passive evacuation tube to the outside. Patients were monitored throughout the procedure for blood pressure, oxygenation, carbon dioxide retention and cardiac function.

Dental treatment was carried out by a team of experts, which usually consisted of a pediatric dentist, an oral surgeon and a specialist in prosthodontics. In addition, an anesthesiologist together with an anesthesiological technician from the Clinical Hospital »Firule«, Split, participated during dental treatments. All restorative and endodontic treatments were completed first. Extractions were carried out at the end of treatment. After the completion of the operative treatment under general anesthesia the patients were transferred to the recovery area for approximately one hour.

Data management and statistical analysis

The following data was collected from the patient records: date of birth, date of preoperative dental examination, date of treatment, gender, medical status and dental treatment received. Participants were divided into five groups depending on the year of dental treatment: Group I consisted of ID patients treated during the period between 1985–1989; Group II consisted of ID patients treated between 1990–1994; Group III consisted of ID patients treated between 1995–1999; Group IV consisted of ID patients treated between 2000–2004, and Group V consisted of patients treated from 2005 to 2009. Patient groups are presented in Figure 1.

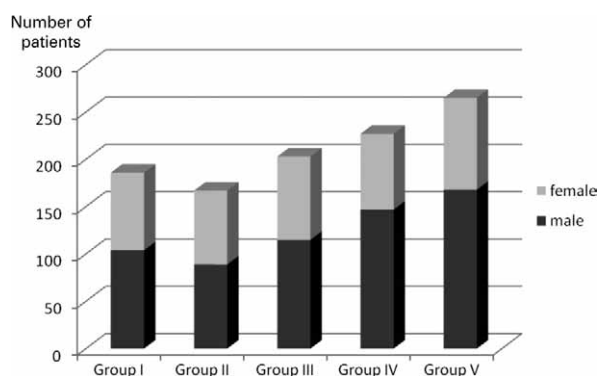


Fig 1. Distribution of patients according on the period of dental service (Group I = 1985–1989, Group II = 1990–1994, Group III = 1995–1999, Group IV = 2000–2004, Group V = 2005–2009).

The data was analyzed with a statistical software SPSS for Windows (SPSS Version 15.0; SPSS Inc, Chicago, Ill). The following statistical methods were used:

- Standard descriptive statistic
- Analysis of variance- one way ANOVA followed by Scheffe's post hoc test.

The level of significance was set at 95% probability ($p < 0.05$).

Results

Sample size

A total of 1054 (626 males and 428 females) ID patients received preoperative dental examination. Six pa-

TABLE 1
DESCRIPTIVE STATISTICS OF THE TYPE OF DENTAL TREATMENT PROVIDED TO ID PATIENTS UNDER GA DURING THE PERIOD FROM THE YEAR 1985 TO THE YEAR 2009

	Type of dental treatment provided to ID patients		
	Teeth extraction	Fillings	Endodontic treatment
Number of ID patients	1048	1048	1048
Mean (\bar{X}) \pm SD	3.08 \pm 3.09	3.82 \pm 2.93	0.26 \pm 0.62
Minimum	0	0	0
Maximum	22	19	4
Sum	3225	4006	274

tients were excluded from study. Two, had a panic-stricken fear (psycho and pharmaco therapy was attempted), and four showed hypersensitivity to local anesthetic. Finally, 1048 patients are included. There were 623 male patients (mean age 16 years, age range 5 to 47 years) and 425 female patients (mean age 18 years, age range 5 to 54 years) (Figure 1).

Dental treatment

Analysis of the service provided to ID patients shows that initially conservative-surgical operations prevailed, while later conservative-restorative and prosthetic treatments were more frequent. The number of extracted and restored teeth are shown in Table 1. The majority of the services provided were fillings, 4006, (3.82 *per patient*),

followed by 3225 tooth extractions (3.08 *per patient*) and 274 endodontic treatments (0.26 *per patient*). Restorative materials used included composite resin, glass ionomer cements and amalgam. The number of patients treated under GA increased gradually from 1985 to 2009, except in the 1990–1994 period. The number of patients and mean numbers of extractions, fillings and endodontic treatments in each tested period is shown in Table 2. Sheffe post hoc test revealed statistically significant difference ($p < 0.05$) in the number of extractions and endodontic treatments between the Group II (1985–89) and the Group V (2005–2009) (Table 2). Statistically significant difference was found in the number of fillings between Groups I, II and III and Group V.

Discussion

All ID patients successfully completed dental treatment under GA during the 25-year period. The results of this study show the increase of the number of patients treated under GA. As we already mentioned, a decrease in the number of patients was recorded only in the Group II (1990–1994). This was most likely a consequence of the war from 1991 to 1995. A large number of patients were refugees who lived in the occupied territories. Also, some institutions for accommodation and rehabilitation of children and young people with ID were as well in the war zone and were not able to travel. All ID patients were transferred to other institutions, mostly in and around Split area, which led to overcrowding and inability to provide sufficient quality of medical care. Therefore, oral health of ID patients certainly was not the pri-

TABLE 2
TYPE OF DENTAL TREATMENT IN ID PATIENTS DEPENDENT ON THE PERIOD OF DENTAL SERVICE (GROUP I = 1985–1989, GROUP II = 1990–1994, GROUP III = 1995–1999, GROUP IV = 2000–2004, GROUP V = 2005–2009),

Type of dental treatment	Treatment period	Number of patients	Number of procedures	Mean (\bar{X})	SD	F	p	Sheffe post hoc				
Extractions	Group I	186	589	3.17	3.145	4.158	0.002	I	II	III	IV	V
	Group II	167	636	3.81	2.959			II				
	Group III	203	645	3.18	2.993			III				
	Group IV	227	663	2.92	3.292			IV				
	Group V	265	692	2.61	2.908			V	*			
Fillings	Group I	186	635	3.41	2.850	11.09	0.000	I	II	III	IV	V
	Group II	167	533	3.19	2.307			II				
	Group III	203	676	3.33	2.831			III				
	Group IV	227	912	4.02	3.270			IV				
	Group V	265	1250	4.72	2.897			V	*	*	*	
Endodontic treatment	Group I	186	41	0.22	0.550	3.002	0.018	I	II	III	IV	V
	Group II	167	27	0.16	0.401			II				
	Group III	203	47	0.23	0.572			III				
	Group IV	227	65	0.29	0.660			IV				
	Group V	265	94	0.35	0.760			V	*			

N = Number of ID patients, \bar{X} = Mean value *per person*; * = $p < 0.05$

ority. Dental treatment was only provided with presence of pain, and therefore extractions were the most common treatment modalities. The results of the present study (high number of extractions in ID people) are consistent with other literature where extractions are common, often a low number of restored teeth and a high number of missing teeth^{4,14,15}. Harrison et al. suggested that parents, guardians and/or caregivers of people with ID are usually aware of the need for dental treatment, but pre-occupation with immediate medical needs frequently causes considerable delays in seeking dental treatment¹⁶.

However, the results of this study have also shown that the number of extractions has decreased over the years (significant difference in the numbers of extractions between group II and group V, Table 2). The results of this study also showed a lower number of fillings in the first three periods compared to recent years.

People with ID often do not receive adequate restorative or preventive dental care, despite their poor oral health. However, the patients from Group II (1990–1994) had the lowest number of fillings, which could be justified by war throughout this period. The largest number of fillings was carried out in 2005–2009 period which may indicate a conservative approach to tooth preservation. Endodontic treatment of patients with ID is rarely done. The results of this study confirm this fact. Endodontic treatments were carried out only 274 times, or an average of 0.26 *per* patient during the 25-year period of observation. However, changes in the number of received endodontic treatments were observed. Patients received significantly more endodontic treatment from 2005 to 2009 than those from 1990 to 1994. Our findings are similar with the results of Chia-Ling Tsai et al. who reported more endodontic treatments in 2002 than in 1992¹⁷.

The different number and proportion of dental treatment under GA within the five groups over a period of twenty five years can not only be explained by the war which took place from 1990–1995. It is certain that the increasing number of fillings and endodontic treatments over the last 10 years could be attributed to the greater use and experience of therapists and the constant education on dental treatment of people with ID. However, problems still remain in the prevention and early diagnosis of oral diseases. Dental care should improve by involving parents, caregivers and social workers in oral health education¹⁸. It is also necessary to gain understanding of health social services where oral health is important for good general health, and quality of life in ID patients. The community dental service should focus on ID patients, by increasing screening programs provided by pri-

mary dental care to reduce the number of extractions and increase the number of restorative treatments.

In 1999 the use of halothane as inhalation anesthetic agent was abandoned in favour of sevoflurane, due to adverse effects on liver function, ventilation and occlusion pressure and hearth arrhythmia provocation^{19,20}. Modern inhalation anesthetic agents, particularly sevoflurane, is less irritating to tissues and less likely to cause long lasting damage than halotane. It is easier to control the depth of anesthesia. Sevoflurane is the preferred anesthetic agent for induction and maintenance of paediatric anesthesia due of its rapid induction and recovery characteristics²¹. The improvements of inhalation anesthetic agents has positively contributed to the delivery of better dentistry, which resulted in a higher number of fillings and endodontic treatments in the last two groups. By using the aforementioned inhalation anesthetic agent, we were able to treat many patients and after a quick recovery, these patients were sent immediately home or to their institutions. Therefore, hospitalization was unnecessary.

A good relationship was established with ID patients during the initial/post-operative consultation (a month or two before treatment under GA) followed by up check-ups. So, in a small number of formerly uncooperative patients, we noticed a positive shift with regard to cooperation. Time and continuity with the same staff were needed to build a relationship. Namely, some ID patients allowed simple dental procedures to be done by a familiar physician or nurse. This important shift in communication may be attributed to the positive experience these patients had during treatment under GA²².

The waiting time for dental GA was about 12 months in some of the patients, which is much longer than reported in some studies in England²³, Australia²⁴, and the United States²⁵. Delays may bring a subsequent risk of the development of anxiety and deterioration of the dental status²⁶. A waiting time of more than four months must be considered relatively long²⁷.

Although the dental service and type of treatment improved over a 25 year period in ID patients (decreased number of extracted teeth, increased number of fillings and endodontic treatments), this is still not sufficient. The Croatian Institute for Health Insurance should increase the number of teams treating under GA and reduce waiting time. However, oral health of people with ID should be improved on the basis of development of preventive dental care which is still not adequately organized in the country.

REFERENCES

1. HINCHELIFE JE, FAIRPO CG, CURZON ME, Community Dent Health, 5 (1988) 151. — 2. KENDAL NP, Community Dent Health, 9 (1992) 31. — 3. CUMELLA S, RANSFORD N, LYONS J, BURNHAM H, J Intellect Disabil Res, 44 (2000) 45. DOI: 10.1046/j.1365-2788.2000.00252.x. — 4. FRANCIS JR, STEVENSON DR, PALMER JD, Community Dent Health, 8 (1991) 131. — 5. KERR M, FRASER W, FELCE D, Br

- J Learn Disabil, 24 (1996) 2. DOI: 10.1111/j.1468-3186.1996.tb00192.x. — 6. MIYAWAKI T, KOHLJTANI A, MAEDA S, EGUSA M, MORI T, HIGUCHI H, KITA F, SHIMADA M, J Intellect Disabil Res, 48 (2004) 764. DOI: 10.1111/j.1365-2788.2004.00598.x. — 7. TRAPP LD, Dent Clin North Am, 31 (1987) 131. — 8. MAEDA S, KITA F, MIYAWAKI T, TAKEUCHI K, ISHIDA R, EGUSA M, SHIMADA M, J Intellect Disabil Res,

- 49 (2005) 253. DOI: 10.1111/j.1365-2788.2005.00644.x. — 9. DE NOVA-GARCIA MJ, MOURELLE-MARTINEZ MR, MARTIN-SANJUAN C, GALLARDO-LOPEZ NE, CARRACEDO-CABALEIRO E, ALONSO-GARCIA Y, *Med Oral Patol Oral Cir Bucal*, 12 (2007) 569. — 10. TESINI DA, FENTON SJ, *Dent Clin North Am*, 38 (1994) 483. — 11. TESINI DA, *Spec Care Dentist*, 1 (1981) 75. DOI: 10.1111/j.1754-4505-1981.tb01232.x. — 12. NUNN JH, GORDON PH, CARMICHAEL CL, *Community Dent Health*, 10 (1993) 389. — 13. PIPER K, DIRKS B, KESSLER P, *Community Dent Oral Epidemiol*, 14 (1986) 28. DOI: 10.1111/j.1600-0528.1986.tb01489.x. — 14. SHAW MJ, SHAW L, FOSTER TD, *Community Dent Health*, 7 (1990) 135. — 15. GABRE P, MARTINSSON T, GAHNBERG L, *Eur J Oral Sci*, 109 (2001) 20. DOI: 10.1034/j.1600-0722.2001.00965.x. — 16. HARRISON MG, ROBERTS GJ, *Br Dent J*, 184 (1998) 503. DOI: 10.1038/sj.bdj.4809675. — 17. TSAI CL, TSAI YL, LIN YT, LIN YT, *Chang Gung Med J*, 29 (2006) 412. — 18. OWENS PL, KERKER BD, ZIGLER E, HORWITZ SM, MRDD, 12 (2006) 28. — 19. CANET J, SANCHIS J, ZEGRI A, LOERNTTE C, NAVAJAS D, CASAN P, *Anesthesiology*, 81 (1994) 563. DOI: 10.1097/0000542-199409000-00007. — 20. DOI M, IKEDA K, *Can J Anaesth*, 40 (1993) 122. DOI: 10.1007/BF03011308. — 21. GOA KL, NOBLE S, SPENCER CM, *Paediatr Drugs*, 2 (1999) 127. DOI: 10.2165/00128072-199901020-00005. — 22. MIKELIC M, CIZMIC S, *Acta Stomat Croat*, 39 (2005) 211. — 23. MASON C, HOLT RD, RULE DC, *Br Dent J*, 179 (1995) 136. DOI: 10.1038/sj.bdj.4808855. — 24. ALCAINO E, KILPATRIC NM, SMITH ED, *Int J Paediatr Dent*, 10 (2000) 206. DOI: 10.1046/j.1365-263x.2000.00193.x. — 25. LEWIS CW, NOWAK AJ, *Paediatr Dent*, 24 (2002) 6. — 26. WOGELIUS P, POULSEN S, SORENSEN HT, *Acta Odontol Scand*, 61 (2003) 178. DOI: 10.1080/00016350310003468. — 27. HAUBEK D, FUGLSANG M, POULSEN S, ROLLING I, *Int J Paediatr Dent*, 16 (2006) 239. DOI: 10.1111/j.1365-263X.2006.00737.x.

I. Kovačić

University of Split, School of Medicine, Study of Dental Medicine, Šoltanska 2, 21000 Split, Croatia
e-mail: ivan.kovacic@mefst.hr

PROMJENE STOMATOLOŠKIH USLUGA PRUŽENIH OSOBAMA SA INTELEKTUALNIM TEŠKOĆAMA POD OPĆOM ANESTEZIJOM

SAŽETAK

Osobe s intelektualnim teškoćama obično imaju nedovoljnu kvalitetu oralnog zdravlja što podrazumijeva lošu oralna higijenu, nesaniрани karijes i veliki broj ekstrahiranih zubi. Zbog straha i negativnog stava prema medicinskom osoblju, opća anestezija je često jedina učinkovita metoda za stomatološko liječenje osoba sa intelektualnim poteškoćama. Tisuću pedeset četiri osobe sa intelektualnim teškoćama su stomatološki sanirane u općoj anesteziji i uključene su u ovo istraživanje. Ispitanici su podijeljeni u pet skupina s obzirom na vremensko razdoblje kada se vršila sanacija u općoj anesteziji. Za svaki vremenski period analiziran je broj saniranih osoba i vrsta stomatološkog zahvata. Rezultati pokazuju da najveći broj zahvata predstavljaju ispuni, 4006, zatim 3225 izvađena zuba te 274 endodontski sanirana zuba. Najmanji broj ispuna i endodontskih zahvata pronađen je kod pacijenata u grupi II, uz značajno veći broj izvađenih zuba. Broj i vrsta stomatoloških zahvata, koji su pruženi osobama sa intelektualnim poteškoćama, se promijenio tijekom dvadeset pet godina rada. Broj ekstrahiranih zuba se tijekom vremena smanjivao, dok se broj ispuna i endodontskih zahvata povećavao. Međutim, za bolju kvalitetu oralnog zdravlja osoba s intelektualnim teškoćama potrebno je još više povećati broj restaurativnih zahvata, ali i poboljšati samu prevenciju koja još nije dovoljno organizirana.