Intercollegiate Specialty Fellowship Examination

Part A

Paediatric Dentistry

Critical Appraisal

Note: Parts of the sections within the original article are not relevant to this examination and have been redacted.

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ORIGINAL SCIENTIFIC ARTICLE

Dental treatment and caries prevention preceding treatment under general anaesthesia in healthy children and adolescents: a retrospective cohort study

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Introduction

There are approximately two million children and adolescents in Sweden aged 0–19 years, and their oral and dental health has improved over the years. According to the Swedish National Board of Health and Welfare, caries prevalence has reduced to less than half that of two to three decades previously (National Board of Health and Welfare 2008). However, in some risk groups, such as immigrant children and children living in areas of lower socio-economic status, caries remains a major problem (Grindefjord et al. 1995; Stecksén-Blicks et al. 2014).

In Sweden, 10% of all children referred to specialists in paediatric dentistry receive treatment under general anaesthesia (GA) (Klingberg et al. 2010). The most common are the need for major treatment, dental fear, problems related to chronic illness or disability, and for young children, a lack

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of cooperation with dental treatment (Klingberg et al. 2010). For adolescents, untreated severe dental caries is largely a consequence of long-term avoidance of dental care (Skaret et al. 2004; Jamieson et al. 2009).

The aetiology of dental caries is multifactorial, such as oral hygiene habits, dietary habits, and fluoride intake (Mejàre et al. 2014). Tooth decay in both the primary and permanent dentitions can cause pain due to either infection or treatment, and pain is a strong predictor for developing dental fear and/or dental avoidance (Skaret et al. 1998; Skaret et al. 1999; Low et al. 1999). The most important reasons for using GA, as reported by parents, are dental fear and repeated unpleasant experiences during dental treatment (Savanheimo et al. 2005). Uncooperative children with severe caries pose a demanding challenge to Public Dental Health Service (PDS). Savanheimo and Vehkalahti (2008) reported that early identification of high caries risk patients and intensive preventive care are the key to reducing the number of children receiving treatment under GA due to severe dental caries. [redacted] The aim of this study was to compare healthy children and adolescents treated under GA with a healthy age- and gender-matched control group not receiving GA, [redacted]

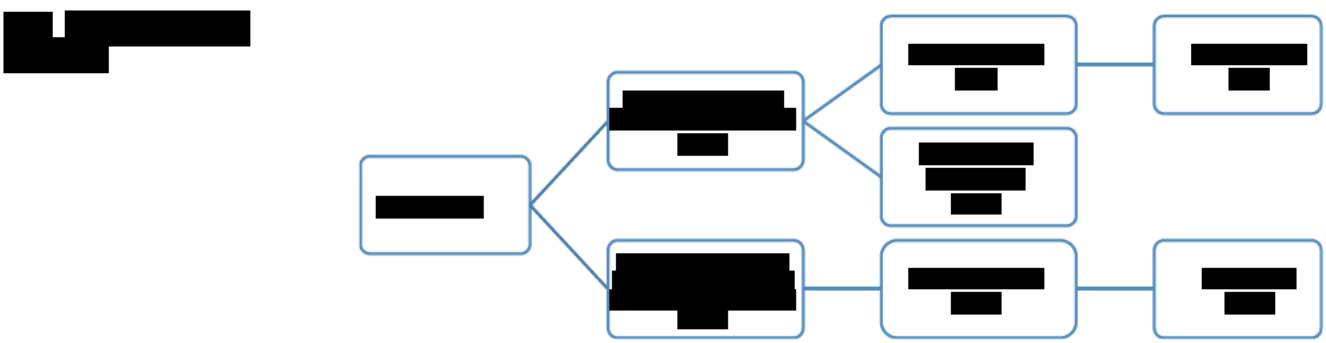
Methods

This retrospective cohort study comprised healthy patients referred from the PDS in Stockholm to the Department of Paediatric Dentistry, Eastman Institute, Stockholm between January 2006 and October 2007 and a healthy control group from the PDS in Stockholm. The majority of patients included in this study, came from socio-economically strong areas (59%). A general dentist assessed the need for specialist dental treatment whilst a paediatric dentist determined the need for GA. Inclusion criteria for the treatment group were need for treatment under GA because of severe caries, in combination with dental fear or behaviour management problems. [redacted] During 2006–2007, the Department of Paediatric Dentistry at The Eastman Institute treated 297 patients under GA. [redacted] The final treatment group comprised [redacted] (44 boys and 27 girls) with a mean age of 8.1 years (3–18 years). The healthy control group [redacted] n = 29) came from the same public clinics as the referred patients. To build a control group, each patient in the treatment group were matched with three patients at the same PDS clinic who had not been referred to the Department of Paediatric Dentistry, Eastman Institute. The control group comprised 213 patients (132 boys and 81 girls) with a mean age of 8.1 years (3–18 years, Fig. 1).

Two of the authors (GT and JP) extracted all data from the electronic patient records (T4 Practice Management Software, CareStream Dental AB). For the treatment group, data on the number of decayed primary and permanent teeth, as well as treatment under GA, came from patient records at the Department of Paediatric Dentistry, Eastman Institute whilst data on dental treatments and missed appointments before the referral came from patient records from the PDS between the baseline period (1999–2001) and the date of referral (between 2003 and 2007). The reason for the 3-year baseline period is that the introduction of the electronic patient records took 3 years (1999–2001). For both the treatment and control groups, recordings were made of the number of missed appointments; number of cancelled appointments; introductions to treatment; number of prophylactic treatments; number of visits to the dentist, dental nurse, or dental hygienist; number of dentists during the treatment period; number of conscious sedations with midazolam; restorations; extractions; fissure sealants; bite-wing radiographs; and decayed teeth in the primary and permanent dentitions (dt and DT).

Statistical analysis

All statistical calculations used a software package (IBM SPSS Statistics 21.0). The Mann–Whitney U test compared



the treatment and control groups according to the distributions of numerical variables. A Chi square test compared the socio-economic backgrounds of the GA group and control group. Stepwise logistic regression analysis calculated the impact of all potential explanatory factors on the dependent variable "treatment under general anaesthesia." Results were statistically significant at $p < 0.05$.

Results

No significant difference was found in socio-economic background between the treatment and control groups. Tables 1, 2, 3 and 4 show the patient history data before referral to the Department of Paediatric Dentistry.

Number of dental visits

Number of visits for behaviour management

Number of visits for preventive treatment

Table 1 Means (range) of investigated variables for treatment and control groups before referral to paediatric dentistry

Variable	Treatment group (N = 71)	Control group (N = 213)	*p*
Age (years)	8.1 (3–18)	8.1 (3–18)	NS
Number of primary teeth with caries	5.2 (0–16)	0.49 (0–12)	<0.001
Number of permanent teeth with caries	0.73 (0–7)	0.07 (0–3)	<0.001
Number of dental visits	4.9 (0–16)	3.0 (0–17)	<0.001
Number of dentists during the period prior to referral	2.0 (0–5)	1.4 (0–6)	<0.001
Number of dental nurse visits	0.66 (0–10)	0.51(0–6)	NS
Number of dental hygienist visits	0.80 (0–4)	0.54 (0–4)	NS
Number of missed appointments	0.54(0–5)	0.42 (0–6)	NS
Number of cancelled appointments	0.17 (0–3)	0.43 (0–7)	<0.05
Number of visits for behaviour management treatment	0.65 (0–7)	0.02 (0–1)	<0.001
Number of visits for preventive treatment	1.0 (0–6)	0.23 (0–4)	<0.001
Number of conscious sedations with midazolam	0.23 (0–2)	0.02 (0–1)	<0.01
Number of restorations	1.8 (0–13)	0.83 (0–12)	<0.01
Number of tooth extractions	0.18 (0–4)	0.17 (0–3)	NS
Number of teeth with fissure sealant	0.01 (0–1)	0.08 (0–4)	NS
Number of bite-wing radiographs	1.9 (0–10)	2.0 (0–13)	NS

Table 2 Description of the number of visits and nature of treatment in preschool children (3–6 years), school-age children (7–12 years), and adolescents (13–18 years) in the treatment and control groups prior to referral to the specialist clinic

Treatment variables (n = number of)	3–6 years (N = 120)		7–12 years (N = 136)		13–18 years (N = 28)	
	Treatment group (N = 30)	Control group (N = 90)	Treatment group (N = 34)	Control group (N = 102)	Treatment group (N = 7)	Control group (N = 21)
Decayed primary teeth	6.1 (0–16)***	0.2 (0–5)***	5.3 (0–15)***	0.8 (0–12)***	0.4 (0–3)	0.4 (0–3)
Decayed permanent teeth	0	0.01 (0–1)	1.1 (0–4)***	0.1 (0–3)***	2.1 (0–7)*	0.2 (0–2)*
Dental visits	3.3 (0–9)***	0.9 (0–7)***	6.7 (1–16)**	4.1 (0–17)**	3.4 (0–6)*	6.7 (2–12)*
Dentists during the period prior to referral	1.8 (0–4)***	0.7 (0–5)***	2.3 (1–5)	1.9 (0–6)	1.6 (0–3)	2.2 (1–6)
Dental nurse visits	0.5 (0–3)	0.4 (0–4)	0.8 (0–10)	0.7 (0–6)	0.4 (0–2)	0.4 (0–3)
Dental hygienist visits	1.1 (0–4)	0.7 (0–3)	0.7 (0–3)	0.5 (0–4)	0	0.1 (0–1)
Missed appointments	0.3 (0–5)	0.2 (0–3)	0.7 (0–5)	0.6 (0–6)	0.9 (0–3)	0.6 (0–3)
Cancelled appointments	0.2 (0–3)	0.3 (0–6)	0.1 (0–1)*	0.5 (0–7)*	0.3 (0–2)	0.6 (0–3)
Visits for behaviour management treatment	0.57 (0–4)***	0***	0.8 (0–7)***	0.04 (0–1)***	0.1 (0–1)	0
Visits for preventive treatment	1.0 (0–5)***	0.1 (0–2)***	1.1 (0–6)***	0.3 (0–2)***	0.3 (0–1)	0.4 (0–4)
Restorations	0.8 (0–5)***	0.1 (0–5)***	2.8 (0–13)	1.2 (0–12)*	1.4 (0–3)*	2.0 (0–7)
Extraction	0.03 (0–1)	0.02 (0–1)	0.3 (0–4)	0.3 (0–3)	0	0.3 (0–2)
Teeth with fissure sealant	0	0	0.03 (0–1)	0.1 (0–4)	0	0.2 (0–3)
Radiographic examination (BW)	1.2 (0–10)**	0.2 (0–2)**	2.3 (0–9)	2.5 (0–9)	2.1 (0–6)**	7.0 (0–13)**

BW Bitewing radiograph

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 3 Frequency distribution of visits for behaviour management treatment in the treatment and control groups

Number of visits	Treatment group (N)	Control group (N)
0	46	209
1	16	4
2	4	0
3	1	0
4	3	0
5	0	0
6	0	0
7	1	0

Table 4 Frequency distribution of visits for preventive treatment in the treatment and control groups

Number of visits	Treatment group (N)	Control group (N)
0	34	179
1	19	22
2	10	11
3	5	0
4	0	1
5	2	0
6	1	0

Number of decayed teeth

Treatment variables

Discussion

Table 5 Results of stepwise logistic regression analysis with the decision to perform treatment under general anaesthesia as the dependent variable

Variable (n)	Odds ratio	Confidence interval	*p*
Introductions to treatment	10	(2.3; 45)	< 0.01
Prophylactic treatments	1.8	(1.1; 3.0)	< 0.05
Teeth with caries	2.2	(1.7; 2.7)	< 0.001
Restorations	0.75	(0.56; 0.98)	< 0.05

[redacted]

Conclusion

[redacted]

References

Adams GC, Landes DP. The relationship between children's dental caries experience and the prescription of general anesthetics. an evaluation of the effectiveness of a Personal Dental Service Pilot. Commun Dent Health. 2005;22(1):43–5.

Aljafari AK, Scambler S, Gallagher JE, Hosey MT. Parental views on delivering preventive advice to children referred for treatment of dental caries under general anaesthesia: a qualitative investigation. Commun Dent Health. 2014;31(2):75–9.

Alm A, Wendt LK, Koch G, Birkhed D, Nilsson M. Caries in adolescence—influence from early childhood. Commun Dent Oral Epidemiol. 2012;40(2):125–33.

Anderson M, Dahllöf G, Twetman S, et al. Effectiveness of early preventive intervention with semiannual fluoride varnish application in toddlers living in high-risk areas: a stratified cluster-randomized controlled trial. Caries Res. 2016;50(1):17–23.

Dahlander A, Jansson L, Carlstedt K, Grindefjord M. The influence of immigrant background on the choice of sedation method in paediatric dentistry. Swed Dent J. 2015;39(1):39–45.

Diercke K, Ollinger I, Bermejo JL, et al. Dental fear in children and adolescents: a comparison of forms of anxiety management practised by general and paediatric dentists. Int J Paediatr Dent. 2012;22(1):60–7.

Grindefjord M, Dahllöf G, Nilsson B, Modéer T. Prediction of dental caries development in 1-year-old children. Caries Res. 1995;29(5):343–8.

Helminen SK, Vehkalahti MM. Dental indices and their impact on targeting of dental prevention, periodontal and filling therapy in young adults undergoing subsidised public dental care. Community Dent Health. 2003;20(2):100–5.

Jamieson LM, Mejía GC, Slade GD, Roberts-Thomson KF. Predictors of untreated dental decay among 15–34-year-old Australians. Commun Dent Oral Epidemiol. 2009;37(1):27–34.

Källestål C, Fjelddahl A. A four-year cohort study of caries and its risk factors in adolescents with high and low risk at baseline. Swed Dent J. 2007;31(1):11–25.

Karki AJ, Thomas DR, Chestnutt IG. Why has oral health promotion and prevention failed children requiring general anaesthesia for dental extractions? Commun Dent Health. 2011;28(4):255–8.

Klingberg G, Berggren U, Norén JG. Dental fear in an urban Swedish child population: prevalence and concomitant factors. Commun Dent Health. 1994;11(4):208–14.

Klingberg G, Andersson-Wenckert I, Grindefjord M, et al. Specialist paediatric dentistry in Sweden 2008—a 25-year perspective. Int J Paediatr Dent. 2010;20(5):313–21.

Kvist T, Zedrén-Sunemo J, Graca E, Dahllöf G. Is treatment under general anaesthesia associated with dental neglect and dental disability among caries active preschool children? Eur Arch Paediatr Dent. 2014;15(5):327–32.

Low W, Tan S, Schwartz S. The effect of severe caries on the quality of life in young children. Pediatr Dent. 1999;21(6):325–6.

Macpherson LM, Pine CM, Tochel C, et al. Factors influencing referral of children for dental extractions under general and local anaesthesia. Commun Dent Health. 2005;22(4):282–8.

Mejàre I, Axelsson S, Dahlén G, et al. Caries risk assessment. A systematic review. Acta Odontol Scand. 2014;72(2):81–91.

National Board of Health and Welfare. Karies hos barn och ungdomar. En lägesrapport förår 2008. Stockholm, Sweden: Socialstyrelsen. 2010. In Swedish Available online at http://www.socialstyrelsen.se/publikationer2010/2010-3-5. Accessed 9 Nov 2011.

Pine CM, Adair PM, Nicoll AD, et al. International comparisons of health inequalities in childhood dental caries. Commun Dent Health. 2004;21(1 Suppl):121–30.

Savanheimo N, Vehkalahti MM, Pihakari A, Numminen M. Reasons for and parental satisfaction with children's dental care under general anaesthesia. Int J Paediatr Dent. 2005;15(6):448–54.

Savanheimo N, Vehkalahti MM. Preventive aspects in children's caries treatments preceding dental care under general anaesthesia. Int J Paediatr Dent. 2008;18(2):117–23.

Skaret E, Raadal M, Berg E, Kvale G. Dental anxiety among 18-yr-olds in Norway. Prevalence and related factors. Eur J Oral Sci. 1998;106(4):835–43.

Skaret E, Raadal M, Berg E, Kvale G. Dental anxiety and dental avoidance among 12 to 18 year olds in Norway. Eur J Oral Sci. 1999;107(6):422–8.

Skaret E, Weinstein P, Milgrom P, Kaakko T, Getz T. Factors related to severe untreated tooth decay in rural adolescents: a case-control study for public health planning. Int J Paediatr Dent. 2004;14(1):17–26.

Skeie MS, Klock KS. Scandinavian systems monitoring the oral health in children and adolescents; an evaluation of their quality and utility in the light of modern perspectives of caries management. BMC Oral Health. 2014;30(14):43. https://doi.org/10.1186/1472-6831-14-43.

Smallridge JA, Al Ghanim N, Holt RD. The use of general anaesthesia for tooth extraction for child out-patients at a London dental hospital. Br Dent J. 1990;168(11):438–40.

Stecksén-Blicks C, Kieri C, Nyman JE, Pilebro C, Borssén E. Caries prevalence and background factors in Swedish 4-year-old children—a 40-year perspective. Int J Paediatr Dent. 2008;18(5):317–24.

Stecksén-Blicks C, Hasslöf P, Kieri C, Widman K. Caries and background factors in Swedish 4-year-old children with special reference to immigrant status. Acta Odontol Scand. 2014;72(8):852–8.

Strøm K, Rønneberg A, Skaare AB, Espelid I, Willumsen T. Dentists' use of behavioural management techniques and their attitudes towards treating paediatric patients with dental anxiety. Eur Arch Paediatr Dent. 2015;16(4):349–55.

Torriani DD, Ferro RL, Bonow ML, et al. Dental caries is associated with dental fear in childhood: findings from a birth cohort study. Caries Res. 2014;48(4):263–70.

Wigen TI, Skaret E, Wang NJ. Dental avoidance behaviour in parent and child as risk indicators for caries in 5-year-old children. Int J Paediatr Dent. 2009;19(6):431–7.

Intercollegiate Specialty Fellowship Examination in Paediatric Dentistry

Critical Appraisal

Extract 1 - 38 marks

Grindefjord M, Persson J, Jansson L, Tsilingaridis G. 2019. Dental treatment and caries prevention preceding treatment under general anaesthesia in healthy children and adolescents: a retrospective cohort study. *European Archives of Paediatric Dentistry.* Apr;19(2):99-105. doi: 10.1007/s40368-018-0332-1.

1.
   a) What type of research is reported and what is the level of evidence it produces? (2 marks)
   b) Give three advantages and three disadvantages of the authors using this study design (6 marks)

   (8 marks total)

2. List two appropriate exclusion criteria for this study. **(2 marks)**

3. Define the Mann-Whitney U test (3 marks) and explain why it was appropriate to use in this instance. (1 mark)

   (4 marks total)

4. Was the Chi squared test appropriate to compare the socio-economic backgrounds of the GA group and control group? Explain your answer. **(2 marks)**

5. Explain the findings regarding overall numbers of dental visits in table 1. **(2 marks)**

6. Summarise the different restoration experience reported in table 2. **(3 marks)**

7. Interpret the data presented in tables 2 and 3 in relation to visits for behaviour management. **(3 marks)**

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Critical Appraisal

8.

a) Interpret the results shown in table 4 regarding children in the treatment group (1 mark)
b) What conclusion can be drawn from these results in relation to this group of children? (2 marks)

(3 marks total)

9. Interpret the results shown in table 5. **(4 marks)**

10. What are the indications for using a logistic regression analysis? **(2 marks)**

11. What are two limitations of this study? **(2 marks)**

12. Explain how the results presented could be used to plan services. **(3 marks)**

Total Marks for Extract 1 = 38