A survey of specialist paediatric dental services in Sweden: results from 2003, and trends since 1983

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Summary. The child population in Sweden has changed dramatically during the last 20 years. Changes have also occurred within the Public Dental Service (PDS), regarding the provision of dental care to children and adolescents. All these changes may affect the referral pattern and provision of specialist dental care for children and adolescents.

Objectives. The primary aim of this study was to survey the services provided by specialists in paediatric dentistry in Sweden during 2003. A secondary aim was to compare the results with previous surveys.

Methods. A Web-based survey was sent to all 34 specialist paediatric dentistry clinics and was answered by all clinics. Data were compared with results from the surveys performed in 1983, 1989, and 1996.

Results. The number of paediatric dentists had been relatively constant over the last 20 years, whereas the number of children referred to paediatric dentists had increased by 28% since 1983. It was estimated that 1.3% of all children in Sweden are treated at a specialist paediatric dental clinic in 2003. Dental treatment need in combination with behaviour management problems (BMP) was the main reason for referral and occurred in 37% of all referrals. The proportion of medically compromised children/children with disabilities had increased from 6% in 1983 to 22% in 2003. The number of patients treated using sedation and general anaesthesia had increased since 1983, and particularly since 1996.

Conclusions. Despite improvements in dental health among children and adolescents in Sweden during the last 20 years, an increasing number of children are referred for specialist paediatric dental treatment. There is an urgent need to increase the number of specialist paediatric dentists in Sweden in order to ensure the continuation of high quality of dental care for children and adolescents.

Introduction

In Sweden, paediatric dentistry was recognized as a dental speciality in 1963. According to the Dental Health Act of 1974, the provision of free comprehensive dental care, including orthodontics for all children aged 0–19 years, is the responsibility of the county health authorities. This act led to a rapid expansion of the number of specialist paediatric dentistry clinics during the period 1974–1980. Now, 34 clinics, including the four university clinics, accept patients by referral from general dentists and from hospitals.

The Swedish Society of Paediatric Dentistry (SSPD) has conducted surveys regarding specialist paediatric dental services since 1983 [1–3]. Results from the surveys show that approximately 1% of all children between 3 and 19 years of age are referred for specialist treatment. In the last survey, two trends were particularly noted: the number of medically compromised children/children with disabilities had increased, as well as children with uncontrolled caries development, and the number of patients with dental traumatic injuries had decreased among the referrals.

The child population in Sweden has changed during the last 20 years. Changes have also occurred within the Public Dental Service (PDS), regarding the provision of dental care to children and adolescents. An increasing number of children are now treated

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in the private sector. The mean DFT has decreased from 3.1 in 1985 to 1.1 in 2002, but recent epidemiological surveys have shown an increasing caries prevalence in 12-year-olds as well as in 3- and 6-year-olds [4]. Parallel to an increasing number of caries-free children, increasing numbers of children with very high caries prevalence are found. Children with immigrant background now constitute more than 20% of the child population. The mean treatment time with a dentist for children and adolescents is decreasing. In Stockholm PDS, it is now 30 min per child per year [5]. All these changes may affect the referral pattern and provision of specialist dental care for children and adolescents. The first aim of this study was to survey the services provided by specialists in paediatric dentistry during 2003. A secondary aim was to compare the results with previous surveys.

Materials and methods

A Web-based survey was sent to all 34 specialist paediatric dentistry clinics in Sweden. The survey consisted of 30 questions. These were the same questions that were answered in the previous surveys since 1983. An additional 10 new questions were also added. The questions concern the number of specialists, type of patients referred, distribution of working hours, and also open questions concerning the speciality and the future. All 34 clinics answered the survey. Data were compared with results for the surveys in 1983 [1], 1989 [2], and 1996 [3]. Data in tables and figure for 1983, 1989, and 1996 are based on previously published data explaining why totalled percentage may differ form 100.

Results

Number of specialists in paediatric dentistry

The number of paediatric dentists has been relatively constant over the last 20 years. In 2003, there were 61.5 positions at 31 clinics (in all but four counties). Seventy-four specialists (16 men and 58 women) aged between 33 and 71 years (mean 54.5 years, SD 7.9) held these positions. In 1996, 60% of the specialists were older than 50 years, whereas 6% were younger than 40. In 2003, 69% are above 50 and 4% below 40 years old. In 2003, there were 20 positions for postgraduate training in paediatric dentistry held by four men and 16 women aged 30–58 years (mean 39.7 years, SD 8.1). The number of positions corresponded to one position for 41,500 children (Table 1). This is an increase in number of children per position compared with previous surveys.

Number of patients treated

In 2003, 1.3% of the child population aged 0-19 years were treated at specialist paediatric dentistry clinics in Sweden. The clinics received 13,541 new referrals, corresponding to a 28% increase since 1983. The number of new referrals represents 0.6%of the Swedish child population aged between 0 and 19 years. The number of patients on waiting list had increased, as well as the number of patients who received all their treatment at the specialist clinic (Table 2). Only one clinic had no patient in the waiting list, whereas the time from referral to first visit could be up to 18 months, with a mean waiting time of 7 months. For referrals with high priority, two clinics had no waiting list. The mean time before first visit was 1.6 months (range 0–12 months).

The age distribution of the patients can be seen in Table 3. Seventy percent of all children referred were between 3 and 12 years of age. The age distribution of referred patients has been constant during the last 20 years.

Figure 1 shows the origin of the referral. General dentists in the PDS accounted for 66% of the referrals. Their part of the referrals has decreased since 1983. During the same period, referrals from physicians and hospitals increased from 5% in 1983 to

Table 1. Number of paediatric dentists and number of children per specialist in 1983, 1989, 1996, and 2003.

Number of	1983	1989	1996*	2003
Positions in PDS	ne	ne	63.5	61.5
Paediatric dentists PDS + university	63	85	89	81
Postgraduate students	21	ne	8.5	20
Children of 0-19 years old per position in PDS	ne	38,000	37,000	41,500

*Response from 86% of the clinics.

ne, not examined.

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Number of	1983	1989	1996*	2003
New referrals	10,545	11,288	10,850	13,541
Treated patients	10,034	11,983	11,408	13,245
Referred patients under treatment per 31 December	12,299	8383	8680	9405
Patients on waiting list	ne	1606	1488	2857
Patients receiving all treatment at specialist clinic	1227	5423	ne	6772
Patients aged 0-19 years treated	24,216	25,789	ne	29,422

Table 2. Numbers of patients treated and flow of patients at specialist paediatric dentistry clinics in Sweden in 1983, 1989, 1996, and 2003.

*Response from 86% of the clinics.

ne, not examined.

Table 3. Age distribution of children and adolescents referred in1983, 1989, 1996, and 2003.

Age	1983	1989	1996‡	2003
0–2 years	6	7	46†	6
3-6 years	37	38		32
7-12 years	50*	48*	48*	38
13-16 years				17
17–19 years	8	6	6	7

*7–16 years; †0–6 years.

‡Response from 86% of the clinics.



Fig. 1. Distribution of referrals by remitter (in percent of total number of referrals) in 1983, 1989, 1996, and 2003. PDS, general practitioner within public dental service; PP, private practitioner; Other spec, other odontological specialist; phys/hosp, physician or hospital.

16% in 2003. Also, referrals from private practitioners have increased.

Dental treatment need in combination with behaviour management problems (BMPs) was the main reason for referral in 37% of all referrals, oral health problems in medically compromised children/ children with disabilities accounted for 22%, and children with a very high caries activity accounted for 14% of the referrals (Table 4). The trends found already in 1996 continue, i.e. the proportion of children referred for dental treatment need in combination with BMP is decreasing as is children with traumatic injuries, whereas the proportion of medically compromised children/children with disabilities has increased from 6% in 1983 to 22% in 2003.

Use of sedation and general anaesthesia

The number of patients treated using sedation and general anaesthesia (GA) has increased since 1983, and particularly since 1996 (Table 5). During 2003, a total of 3088 treatment sessions under GA were performed. The mean time on waiting list before treatment under GA was 4 months (range 0–15 months) and for treatment with high priority 1.3 months (range 0–6 months). Dental treatment using nitrous oxide sedation and rectal or oral administration of midazolam also increased (Table 5).

Working schedule

Sixty-eight percent of the specialists' working hours were spent on clinical treatment (Table 6), 7% on continuing education activities, 5.5% on research, and 4.5% on the specialist's own education. This distribution of the working schedule has been stable since 1983.

Thirty of 34 clinics participated in continuing education of general dentists in 2003. There were also courses directed to medical doctors and nurses, dentists enrolled in postgraduate training, and to parents and users. Only 3 of 34 clinics were able to visit all PDS clinics in their county area. All specialist paediatric clinics had an established network of cooperation with other dental specialities as well as with paediatric departments in hospitals.

Discussion

This is the fourth survey of services provided by specialists in paediatric dentistry in Sweden during a 20-year period, thus a unique follow-up of a dental service. All clinics responded, which is not only a

Reason for referral	1983	1989	1996†	2003
Dental treatment need in combination with BMP	46	46	40	37
Medically compromised/disabilities	6	10	16	22
High caries activity	5	5	12	14
Disturbances in dental development	8	6	6	6
Disturbances in eruption	6	5	7	6
Traumatic injuries	15	14	10	5
Diseases of the pulp and/or alveolar bone	3	3	16*	2.5
Occlusal disturbances/anomalies of craniofacial complex	2	2		2.5
Diseases of the soft tissues excluding gingivitis and periodontitis	3	2		1.5
Temporomandibular joint diseases	1	1		0.5
Gingivitis and periodontitis	1	1		0.5
Other	4	5		2.5

Table 4. Distribution of main diagnosis in referred patients (% of all referrals) in 1983, 1989, 1996, and 2003.

*Refers to all diagnoses below in the table totalled.

†Response from 86% of the clinics.

Table 5. Use of sedation and general anaesthesia at specialist paediatric dentistry clinics in 1983, 1989, 1996, and 2003.

Mode of treatment	1983	1989	1996*	2003			
	1705	1707	1770	2005			
General anaesthesia							
No. of patients	1215	1220	2108	3088			
Nitrous oxide sedation							
No. of patients	1143	2290	2852	3431			
Rectal/oral/nasal sedation							
No. of patients	ne	ne	1302	1518			
No. of treatments	ne	ne	1488	3148			

*Response from 86% of the clinics.

ne, not examined.

100% response rate, but also an indication of the close cooperation among the specialists in Sweden. As there are no comparable reports from other countries, comparisons were made with the previous and identical surveys in Sweden. Repeated surveys of paediatric dentistry on a national basis are important tools when evaluating dental care for children, and

also for the planning and developing of future specialist paediatric dental services within a country.

The results showed that despite improvements in dental health among children and adolescents over the last 20 years, a rising number of children are referred for specialist treatment. Since 1983, the number of referrals has increased by 28%. Furthermore, a growing number of patients are treated each year, including more patients who receive all treatment at the specialist clinic. This often concerns children with disabilities or chronic health conditions combined with complex oral treatments needs. There is also an increasing need for use of sedation and general anaesthesia. With regard to the distribution of main reason for referral, medically compromised children with disabilities continue to increase, whereas children with traumatic injuries decrease.

The population of children in the counties where the clinics are located is around 2.2 million. Of these, 0.6% was referred to a paediatric specialist

Table 6. Distribution of specialists' working hours (%) during 1983, 1989, 1996, and 2003.

Activity	1983	1989	1996†	2003
(Number of clinics)	34	32	31	31
Treatment of patients	68	69	71	68
Consultations at PDS clinic	4	11*	ne	2
Supervision of general dentist attached to the clinic	3		ne	2
Community dentistry	3	2	ne	2
Administration (not related to patients)	10	8	ne	ne
Continuing education	5		ne	7
Specialist's own education	4	8	5	4.5
Research	3	2	5	5.5
Other	5	ne	ne	9

*Consultations, supervision, and continuing education.

†Response from 86% of the clinics.

ne, not examined.

clinic, and together with the clinics 'own' patients, as many as 1.3% of all children up to the age of 19 were treated at specialist paediatric dentistry clinics in 2003. This figure may be an underestimation of the need of specialist dental care among children and adolescents, as an unknown number of children are referred to other specialists (apart from orthodontics) such as oral and maxillofacial surgery, oral physiology, or periodontology.

To handle the increasing numbers of both referrals and patients who receive all their treatment at specialist clinics, an increased productivity is registered among the specialists. The management of children and adolescents has developed during the last 20 years. The increased use of sedation and GA may partly explain this. Previously, much time was spent on time-consuming behaviour shaping and introduction using tell-show-do methodology to treat children with dental anxiety and/or BMPs. Often, several dental appointments were used for behaviour shaping regardless of the child's age without differentiating between dental anxiety and BMPs, or factors causing them. This time-consuming approach is now replaced by an increased use of sedation. At the same time, more behaviour shaping and introduction to treatment at the specialist clinics are carried out by dental auxiliaries. Furthermore, in the continuing education for general dental personnel, there has been much emphasis on this group of patients aiming at improving the care for these children when they are referred back to their general dentists. This may be a wise strategy as it is psychologically very demanding to meet and treat children with dental anxiety and BMPs especially if these problems are accompanied with complex treatment needs.

The proportion of children with dental fear and anxiety is probably constant in the population [6,7], but the resources at the specialist clinics are restricted, which means that only children with BMP combined with extensive or acute treatment needs are accepted. This is indicated in the trends of shifts in main diagnosis for referrals where the proportion of children being referred owing to high caries activity or BMPs is more or less constant. Within this proportion of referrals, however, there is an increase in high caries activity as a reason for referral parallel to a decrease in BMPs.

The proportion of referrals from paediatric departments in hospitals and private dentists is increasing. This reflects two trends. First, an increasing number of children are treated by private dentists, and thereby

the proportion of referrals from private practitioners increases. Second, the number of children with chronic health conditions is increasing. Today, about 10% of the child population are diagnosed with a chronic condition or disability [8-10]. This group of patients are among those considered high priority according to guidelines by the SSPD [11]. These patients often have complex oral treatment needs requiring special knowledge and skills but also access to a network of other dental and medical specialists. The paediatric dentists have the experience to coordinate these complex treatment plans, and many children and adolescents in this group remain patients at the specialist paediatric dentist clinics. A previous study using qualitative research methods reported variability in treatment of children with disabilities within the Swedish dental care system, implying a risk for inequalities in dental treatment and oral health [12]. In order to improve the dental care for these patients, issues like more educational opportunities, better financing, and better support on the organizational level were identified. Today, specialist paediatric dentists are especially equipped for this task by their knowledge and experience as well as resources in terms of time and finances.

All specialist services for paediatric dentistry in Sweden are provided within the PDS. The number of specialists has been constant during the last 20 years, despite an increasing number of referrals and increasing numbers of medically compromised children and children with disabilities. It can also be noted that the group of specialists are ageing, and there is an urgent need for new specialists to replace those soon retiring. The increasing number of referrals is also reflected in the paediatric dentists working schedule. On average, 70% of the working hours are spent on clinical work and only about 10% on the specialists' own education and research. It is also the opinion of the specialists that the time allocated for continuing education and supervision of attached general dentists, which is included in the remaining 20%, is much too limited. More time spent on education and supervision for general dentists aiming at getting more focus on child dental care, treatment planning, and management strategies could in fact be one way to lessen the high number of referrals as well as to ensure and improve quality in general dental care. It would also make it easier to refer specialist patients back to the general dentists.

It has been pointed out by the Swedish Board of Health and Welfare that there are groups of children in Sweden whose treatment needs are not met, for example socially deprived children and children with disabilities [13]. Furthermore, despite the Dental Health Act of 1985, demanding county health authorities to provide comprehensive dental care to children and adolescents 0-19 years of age, there are still four counties in Sweden where there are no specialists in paediatric dentistry employed. It is therefore remarkable that the number of paediatric dentists remains the same over the study period 1983-2003. Taking the increase in referrals and number of treated patients into account, there is an obvious risk of work overload in Swedish paediatric dentists. This is not only a health hazard for the paediatric dentists, it could also risk the quality of dental care for children and adolescents.

In conclusion, the results of this study show that more and more children are being referred to paediatric dentists, and more children require continuous specialist treatment. Among children referred, the proportion of medically compromised children/ children with disabilities has increased. Also, the use of sedation and general anaesthesia has increased. These changes reflect both demographical changes in the child population and organizational changes within the PDS. Despite this, the number of specialists has not changed over the last 20 years. Instead, the mean age of the paediatric dentists has increased considerably and likewise has the productivity. Thus, there is an urgent need to increase the number of specialist paediatric dentists in Sweden in order to warrant sensible working conditions as well as to ensure continuation of high quality of dental care for children and adolescents.

What this paper adds

- Referrals to paediatric dentists in Sweden have increased by 28% over the last 20 years.
- Dental treatment need in combination with behavioural management problems/dental anxiety is the main reason for referral.
- The proportion of medically compromised children and children with disabilities has increased from 6% to 22% from 1983 to 2003.

Why this paper is important for paediatric dentists

 Evaluation of specialist paediatric dental service, preferably on a national basis, is important for evaluation of and planning for future dental services for children and adolescents.

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