

# Pediatric dental care in a tertiary public hospital. Four years of experience in the Service of Stomatology of Valencia University General Hospital (Valencia, Spain)

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## Abstract

A study is made of the experience gained with the Child Oral Care Program (Plan de Atención Dental Infantil, PADI) in the Service of Stomatology of Valencia University General Hospital (Valencia, Spain) after four years in operation (July 2003 - July 2007).

Study design: The sample comprised 2626 children between 5-14 years of age, pertaining to department 9 of the Valencian public health system. A clinical history was compiled in each case, a radiological study was made, and a treatment plan was elaborated including fillings, extractions, and control visits.

Results: Of the 2626 designated children, 2369 visited our Service - mostly referred from the Preventive Dental Care Units. A total of 5784 fillings were carried out (93.3% with silver amalgam, 5.6% with composites and the rest as provisional fillings). The permanent first molars were the teeth with the largest number of fillings (70.2% of the total). These were followed in order of frequency by the second molars (19.1%). As regards composite resin fillings, most involved the upper central incisors, followed by the upper lateral incisors. A total of 644 extractions were performed, corresponding to 110 permanent teeth and 534 temporary teeth. In the case of the permanent dentition, the first molars were the most commonly removed teeth. In the temporary dentition, the most frequently removed teeth were the second molars.

Conclusions: The response of the population to this program has been very good, and reinforces the preventive measures already in place, with the provision of restorative treatments to improve the oral and dental health of the pediatric population, and yielding good results in terms of the program quality indicators. The Service of Stomatology (Valencia University General Hospital) is able to address the demand and offers the public health network integrated and continuous patient care.

**Key words:** Dental filling, child oral care, health programs, Valencia (Spain).

## Introduction

Citizen right to oral care is generically contemplated in Article 43 of the Spanish Constitution, which acknowledges the right to the protection of health and the competence of the public authorities in this field, through the provision of the required care and services. The Spanish General Health Law contains no explicit reference to buccodental

health (1). Law 16/2003 of May 28, relating to cohesion and quality of the Spanish National Health System, in its Article 12 section i, includes buccodental care among the services offered by primary care. Article 13 section 1 in turn specifies that specialized care will guarantee the continuity of integral patient care once the possibilities of primary care have been exhausted. Spanish Royal Decree

(RD) 63/1995 of January 20, specifying the health care services of the National Health System, in turn offers greater specification by indicating (in section 5 of Annex 1) that buccodental care in the primary care setting will include - among other functions - the filling of teeth in children, in accordance with the financial resources and special programs for oral health implanted each year (3).

Transfer of health care competences to the different Spanish Autonomous Communities led to the implantation of different dental care programs, with differences in terms of both prevention and treatment, depending on the Community involved. However, all the programs implanted to date have a feature in common: they all define children as the priority (or exclusive) target population.

In the Valencian Community, the program began in 1986 with the creation of Oral Health Units. These Units had specific objectives in terms of health education, the early detection of oral problems (caries, gingivitis, malocclusions and other disorders), the application of general preventive measures (fluor rinses in the school setting), and the introduction of specific preventive actions targeted to the population at risk (sealing, fluor varnishes and gels). The Oral Health Units were integrated in the Health System as support units (together with the mental health units, family planning and, posteriorly, the addictive behavior units) - offering coverage for a concrete Health Care Area, with physical location in one or more health care centers of the Area or Department in question.

In the year 2002, the Valencia University General Hospital (Consorcio Hospital General Universitario de Valencia, CHGUV) and the Valencian health authorities (Agència Valenciana de la Salut, AVS) agreed to develop a specific oral health care program in Health Care Area 8 (now referred to as Health Department 9). The program was coordinated with the Oral Health Unit, the Service of Pediatrics of the CHGUV, the odontologists of the specialized care centers and the pediatricians of Area 9 of the AVS, and included clinical and radiological diagnostic procedures (initially based on panoramic X-ray studies), extractions and fillings. The program was targeted to children from age 5-6 years (eruption of permanent first molars) to age 14 years. The most innovating contribution of the program was the fact that it was developed in the Service of Stomatology of the CHGUV, i.e., a tertiary public hospital. The program was launched on July 1, 2003, and up to the time of the present evaluation has been in operation for four years (June 30, 2007).

The present study describes and evaluates the experience gained with the Child Oral Care Program (Plan de Atención Dental Infantil, PADI) in the Service of Stomatology of Valencia University General Hospital (Valencia, Spain), corresponding to Health Department 9 of the AVS, after four years in operation, and compares the results with those obtained in other Spanish Autonomous Communities.

## Material and Methods

The recruitment population of Health Department 9 of the AVS (Agència Valenciana de la Salut) totals 328,744 inhabitants (year 2005). The number of children between 5-14 years of age totaled 29,777.

The data collected in the present study correspond to the period between July 1, 2003 and June 30, 2007, i.e., four years of activity in the context of this program.

The children were referred to the Service of Stomatology of Valencia University General Hospital (Valencia, Spain), through one of the following routes: through the Oral Health Units, the pediatricians in Health Department 9 of the AVS, and the dentists and stomatologists of the specialized care centers of Health Department 9 of the AVS, following the clinical diagnosis of caries.

After establishing the case history, the patients were appointed in groups of 20-30 a week for the first visit, which included a clinical examination and panoramic X-ray study. Once the diagnoses were established, the parents or tutors of the patients were duly informed, and specific informed consent was obtained for participation in the program (approved by the Ethics Committee of Valencia University General Hospital).

The diagnosis of caries was based on clinical criteria such as the presence of a macroscopically visible cavity, probe retention in pits or fissures, or dark transparencies through the dental enamel. Caries were also considered to include dentinal radiotransparencies identified in the X-ray study, even if no corresponding lesion was observed at clinical examination.

The habits of oral hygiene were recorded on the basis of the daily frequency of tooth brushing (good: 2 or more times a day; regular: once a day; poor: less than once a day); the plaque index of the Greene and Vermillion simplified oral hygiene index (OHI-S)(4); the reason for consultation; and the expected degree of cooperation.

Those teeth with caries amenable to filling were appointed for treatment, while permanent teeth with extensive caries not amenable to repair were programmed for extraction. In patients with deep caries and a high risk of pulp exposure during treatment, the parents were informed of the situation and of the fact that root canal treatments were not included in the program.

Only permanent teeth were subjected to filling. When caries in temporary teeth proved very deep, or infection had occurred, extraction was indicated.

As to the type of filling, the teeth in the anterior sector (canine to canine) were restored with resin composites, while caries in the posterior segment teeth (premolars and molars) were filled with silver amalgam.

The activities contemplated by the program were always carried out in the afternoon in the Service of Stomatology of the CHGUV, during five days a week. One of these days was dedicated to first visits, and the remaining four to treatments. The Child Oral Care Program (Plan de

Atención Dental Infantil, PADI) was implemented by the dental professionals working full-time in the Service of Stomatology of Valencia University General Hospital. A nurse and nursing auxiliary personnel member provided support both for the Child Oral Care Program and for the simultaneous surgery, revision, emergency and first visit activities taking place in the Service.

**Results**

A total of 2626 children were referred to our Service in the context of the Child Oral Care Program (PADI). Of these, 2369 presented to the first visit - representing a 90.2% recruitment rate, with a 9.8% lack of response. The gender distribution was balanced (50.6% boys and 49.4% girls). The number of children referred each year is reported in Table 1.

A total of 2231 children (84.9%) were referred from the Oral Health Units of Health Department 9 of the AVS; 100 children were referred by pediatricians of the Department (3.8%); 219 were referred by the dentists and stomatologists of the specialized centers (8.3%); 26 children were referred by the Service of Pediatrics of Valencia University General hospital (0.9%); and in 50 cases the patient origin was not identified (1.9%).

The mean referred patient age was 10.0 years (range 5-14). Table 2 shows the distribution by age of the children referred to the program.

The mean waiting time from consultation request to first visit in the Service of Stomatology was 20.9 days, while the mean time elapsed from the first visit to the start of treatment was 9.6 days.

In 94.9% (n=2493) of the children the reason for consul-

tation was dental caries, while 2.9% (n=75) were seen for dental trauma, and 0.3% (n=9) jointly for dental caries and trauma. A total of 1.8% (n = 49) were seen for other reasons.

In turn, 28.8% (n=628) of the patients claimed to have good oral hygiene (brushing 2 or more times a day), 60.4% (n=1433) of the children claimed to brush once a day, and 10.7% (n=254) less than once a day (poor oral hygiene). Among the children with good oral hygiene, the most common OHI-S score was 1 (62.1% of cases). In the children with regular oral hygiene (brushing once a day), the most common OHI-S score was 2 (86.6% of cases). Finally, in the children with poor oral hygiene (brushing less than once a day), the most common OHI-S score was 3 (80.7% of cases). Table 3 reports the relationship between the OHI-S score and dental hygiene.

During the four years of activities in the program, 5784 fillings were performed, corresponding to 2.44 fillings per child included in the program. The great majority of fillings (93.3%) were carried out using silver amalgam (n = 5396 posterior segment teeth - premolars and molars), while 5.6% (n = 324) were carried out using resin composite due to esthetic reasons (anterior sector teeth). The rest of cases corresponded to provisional fillings with zinc oxide-eugenol pastes (IRM®). The permanent first molars were the teeth with the largest number of permanent fillings (n = 4061; 70.2% of the total). These were followed by the permanent second molars (n = 1105; 19.1% of the total). The premolars totaled 239 fillings (4.1%).

Regarding the resin composite fillings, 64.5% (n=207) involved the upper central incisors, 26.5% (n=85) the upper lateral incisors, and the rest (9.0%; n=25) other anterior

**Table 1.** Children referred and recruited, per year.

Yes	Referred	Visited	Not visited
2003	234	211	23 (9.8%)
2004	692	640	52 (7.5%)
2005	578	555	23 (4.0%)
2006	637	556	81 (12.7%)
2007	485	407	78 (16.1%)
Total	2626	2369	257 (9.8%)

**Table 2.** Patient distribution by age.

Age (yrs.)	N	%	Age (yrs.)	N	%
5	37	1.4	10	294	11.2
6	173	6.6	11	340	12.9
7	302	11.5	12	334	12.7
8	355	13.5	13	251	9.5
9	280	10.7	14	260	9.9

**Table 3.** Relationship between tooth brushing and OHI-S score (plaque) \*.

Hygiene	N total	PI**=0	PI=1	PI=2	PI=3
Good	682	69 (10.1%)	424 (62.2%)	161 (23.6%)	2 (0.3%)
Regular	1433	10 (0.7%)	111 (7.7%)	1,241 (86.6%)	71 (4.9%)
Poor	254	1 (0.4%)	4 (1.6%)	44 (17.3%)	205 (80.7%)
Total	2369	80 (3.4%)	542 (22.9%)	1446 (61.0%)	278 (11.7%)

**Table 4.** Filling distribution according to type of tooth \*.

Tooth	Total fillings	Fillings per type of tooth			
		1.7	2.7	3.7	4.7
<b>2<sup>nd</sup> molars</b>	1105 (19.1%)	169	173	421	342
<b>1<sup>st</sup> molars</b>	4061 (70.2%)	900	906	1180	1075
<b>2<sup>nd</sup> premolars</b>	141 (2.4%)	33	33	35	40
<b>1<sup>st</sup> premolars</b>	98 (1.7%)	46	27	12	13
<b>Canines</b>	6 (0.1%)	2	2	0	2
<b>Lateral incisors</b>	93 (1.6%)	35	50	4	4
<b>Central incisors</b>	222 (3.8%)	93	114	5	10

teeth - including the canines. Table 4 shows the distribution of fillings according to tooth type.

A total of 110 permanent first molars were removed - the lower first molars predominating over the upper first molars (64.5% versus 35.4%).

A total of 534 extractions of temporary teeth were carried out, of which 266 (49.8%) corresponded to temporary second molars, 184 (34.4%) to temporary first molars, 55 to temporary canines (10.3%), 14 (2.6%) to lateral incisors, and 15 (2.8%) to central incisors.

## Discussion

Oral health programs for schoolchildren were introduced in Spain in the mid-eighties. Before that time, the coverage of public health care was limited to tooth extractions in specialized outpatient clinics and to surgery in hospital stomatology and maxillofacial surgery services. Activities relating to the promotion of oral health and general preventive measures (fluorated rinses) were implanted more or less uniformly throughout the country. A different situation has been the provision from the public health care setting of specific preventive measures for the population at risk, and of treatments for dental disease. The first Spanish Autonomous Communities to extend dental treatment to the pediatric population were the Basque Country (1990) and Navarra (1991)(5) - offering the possibility of integrating the private clinics in the public dental care system through a specific "Capitation" payment modality; this model was introduced in the mid-eighties by the National Health Service (NHS) in the United Kingdom (6). With some variations, most Spanish Autonomous Communities have established legislation in the field of buccodental health care, offering incorporation

of the private clinics to the public network (Andalucía, Aragón, the Balearic Islands, the Canary Islands, Castilla-La Mancha, Castilla-León, Extremadura, Murcia), based on the capitation system, or applying a system of payment per medical service provided.

Some Autonomous Communities offer dental treatment from the public health system, e.g., Asturias, Cantabria, Madrid, La Rioja or Cataluña (7).

In the concrete case of the Valencian Community, and on the basis of the characterization of pediatric oral disease from previous epidemiological studies (8,9), a Child Oral Care Program (Plan de Atención Dental Infantil, PADI) has been evaluated over the past four years. The essential features of this program can be summarized as follows:

- Coverage for the entire pediatric population (5-14 years of age) of the reference area, from the start of implementation of the program. Most programs have been implanted on a gradual basis, beginning with the 6-7 years age cohort and expanding the coverage year by year until completing the full pediatric age range (in some cases up to 18 years of age, as in the case of Navarra). The concerns about possible Service saturation proved unfounded, and the demand could be absorbed without generating a waiting list. Thus, at present, the time elapsed from consultation request to first visit is approximately 20 days, while the time from first visit to the start of treatment is 10 days.
- The care is provided by the Service of Stomatology of a tertiary hospital. To our knowledge, this is the first experience in Spain involving the provision of dental treatment (fillings) in a hospital center - thus allowing integration with extractions and any surgical interventions that may prove necessary.
- Integration in the program of the Oral Health Units of

the area. As a result, once treatment has been completed, follow-up of the child is again supervised by the mentioned Units, which can refer the patient once more if further pathology is detected.

The model poses some inconveniences, such as increased difficulty of access due to the distance the patients must travel (compared with the mixed public / private system); the lack of dental or stomatological services in most hospitals; and the deviation of human resources for implementing the program. In our case, this latter inconvenience did not apply, since the program was specifically assigned a dentist and a clinical auxiliary personnel member.

Ours is the first dental care model targeted to the pediatric population in the Valencian Community, and offers the advantage of making use of the hospital infrastructures during working hours in which such resources were previously not used - thereby contributing to reduce the costs of the services provided. In this context, expanding the Service of Stomatology working hours not only for buccodental care but also for the majority of its other activities (surgery, revision visits) improves patient care - with increased coverage of dental, oral and maxillofacial emergency treatments during the time for which the Service is operating (from 8:00 a.m. to 21:00 p.m.).

As has been commented, a dentist and clinical auxiliary personnel member have been incorporated to the Service for implementing the program. In addition, and as has been commented under the Results, the program in these four years has registered 2369 first visits, 5784 fillings and 644 extractions. It is difficult to establish comparisons as refers to the recruitment population, since the data available on the Basque Country and Navarra not only include the children receiving conservative treatment but also all children with or without pathology, integrated within the Child Oral Care Program (Plan de Atención Dental Infantil, PADI). The mean number of fillings per dentist and year for the global PADI of the Basque Country and Navarra was 54.1 for the period between 1999 and 2002 (59.51 in 1999, 54.68 in 2001 and 49.17 in 2002). In our series, the mean number of fillings per dentist and year has been 1437 since the year 2003. Interpretation of these data requires caution, since the global activities of the dental professionals are not comparable.

In our program, the mean number of permanent first molar extractions per year was 27.5, while the mean number of temporary teeth removed per year was 133.5. In the PADI of the Basque Country and Navarra, the mean number of temporary tooth extractions per dentist and year was 1.32 (1.57 in 1999, 1.29 in 2000, 1.32 in 2001 and 1.1 in 2002)(10). As in the case of the fillings, these results must be interpreted with caution.

We consider that the Child Oral Care Program (Plan de Atención Dental Infantil, PADI) of the Service of Stomatology of Valencia University General Hospital constitutes the first experience offering dental care from the public

sector in the Valencian Community. In this context, the productivity of the professional team providing such care is considerable, and we feel that the novelty of offering such services in a public hospital setting offers both direct advantages in relation to the program, and indirect benefits in terms of the global functioning of the Service of Stomatology as a hospital service.

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