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ORIGINAL ARTICLE

Oral health care utilization in children with disabilities

Roos Leroy · Dominique Declerck

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Abstract

Objectives The objectives of this report were to survey the utilization of oral health care in children and adolescents with disabilities over a 7-year period and to compare these data with the utilization pattern of their peers without disabilities. For most countries, these data have not been published in the international literature so far.

Material and methods The cohort used was the Permanent Sample of Socially Insured Persons, an anonymous representative sample of Belgian residents. The database comprised prospective data on oral and general health care utilization and sociodemographic variables collected from 2002 up to 2008.

Results Data were available from 326 children and adolescents with and 53,589 without disabilities. Dental attendance rates were low in both subgroups: only 50 % had a dental visit in four or more of the seven observation years. Emergency oral and medical care was recorded significantly more often in children with disabilities whereas radiographs, restorations, and orthodontic assessments and treatments more frequently in children without disabilities.

Conclusion The present study demonstrated that dental attendance rates in both subgroups were low and that in those who attended, preventive oral health care was only infrequently attested. Further research is needed to elucidate whether the lower number of radiographs and restorations and the higher number of emergency visits observed in the subgroup with disabilities reflect unmet oral treatment needs.

Clinical relevance Objective data on health care utilization are essential to enable governments and stakeholders to devise appropriate care and to optimize access to care for persons with disabilities.

Keywords Oral health care · Care utilization · Disabilities · Children · Epidemiological data

Introduction

Today, it should not need any statement of reasons: optimal oral health is a prerequisite for good general health, is key to self-esteem, communication, nutrition, and quality of life. In many industrialized countries, oral health has improved considerably over the past five to six decades, but some groups have not benefitted from these improvements and still experience suboptimal oral health. One of these groups concerns individuals with disabilities, whose oral health may be seriously jeopardized because of difficulty in obtaining and maintaining sufficient oral hygiene, because of dietary requirements, use of medication, presence of craniofacial birth defects, malpositioning of teeth, enamel abnormalities, etc. [1–3]. The oral health status of several subgroups of persons with disabilities has been described [4–6], yet most reports so far have focused on the group of mentally retarded individuals [1, 2, 7–9]. In a recent review, it was outlined that individuals with intellectual disabilities have poorer oral hygiene, higher prevalence, and greater severity of periodontal disease, comparable caries experience, but higher rates of untreated disease, and more missing teeth [3].

The oral health of individuals with disabilities may not only be compromised through the disability or its consequences, but also through barriers to proper oral health care. These barriers have been categorized as environmental barriers, which originate in the (oral) care delivery system (e.g., financial aspects, insurance, finding a dentist willing to treat

R. Leroy (✉) · D. Declerck
Department of Oral Health Sciences, Oral Health Research Unit,
KU Leuven,
Kapucijnenvoer 7 blok a bus 7001,
3000 Leuven, Belgium
e-mail: Roos.leroy@med.kuleuven.be

patients with disabilities) and non-environmental barriers, which originate within the individual with disabilities and her/his environment (e.g., fear of oral care, medical condition making dental treatment very complicated, competing demands) [10]. The increased risks for poor oral health in combination with a multitude of barriers to optimal oral health care may result in high unmet needs. Research performed in the USA revealed that oral health care was the most prevalent unmet health care need for children with disabilities, affecting substantially more children than any other health care need category. Especially uninsured children were more likely to lack a usual source of oral health care [11–13]. Yet, some studies suggest that (preventive) dental visit rates are at the same level or even higher among children with special needs compared to their peers [13–15]. At first glance, these results might seem contradictory, but surely are not if one realizes that unmet needs may still persist after a (preventive) dental visit. Also, most of these studies were based on parental report and hence are dependent on parental perception of oral health care needs and on parental recall of oral health care utilization, and as a consequence recall bias cannot be excluded [13–15]. Nelson and coworkers explored the impact of recall bias and concluded that the most frequently missed item was that the family had forgotten they had presented for emergency oral care [10]. In addition, some of these studies only report on children enrolled in Medicaid [16], children with specific types of disabilities [17], or children who are not institutionalized [15]. Hence, from a health care planning perspective, it would be very useful to collect longitudinally objective data on oral health care utilization in order to get a better understanding of the utilization of oral health care services in children with disabilities. These data will allow governments and other stakeholders to devise appropriate care and reimbursement schemes, improve access to care, and refine the oral health-related education of care providers. At present, these data are not available in most countries.

The intent of the present research was to map the (registered) utilization of preventive and curative oral health care in children with disabilities over an observation period of 7 years and to compare these data with the utilization pattern of their peers without special needs.

Materials and methods

Oral health care in Belgium

In Belgium, oral health services are almost exclusively delivered in private dental practices by private practitioners; there is no organized public oral health service. All residents are entitled a compulsory medical insurance which includes dental insurance. Within this framework of the National Health Insurance System, reimbursement of 75–79 % of the nationally agreed fees is provided to all inhabitants for preventive and restorative care, removable dentures, and minor oral surgery [18]. For budgetary reasons, age limitations have been installed for the reimbursement of certain treatments; these limitations have changed over time.

For individuals with disabilities, reimbursement of oral health care is increased up to 90 % and some procedures like extractions are fully reimbursed. Professional debridement has been reimbursed once a year for children with disabilities (up to age 18 years) since 1998 and since February 2005 up to four times a year. For children without disabilities debridements have been reimbursed since September 2005 up to age 12 years and the age limit was then extended to 18 years from July 2008 on. For adults (above age 18 years), debridements have been reimbursed once a year since more than 20 years [18].

Since September 2005, endodontic treatment of primary teeth is reimbursed for all children. Recently “free” oral health care (i.e., full reimbursement) was installed for all children up to 12 years (September 2005), extended to 15 years (July 2008) and finally up to 18 years (May 2009). It covers the majority of preventive and restorative care; but the reimbursement for orthodontic treatment remains limited [18]. With regard to preventive care, the reimbursement scheme includes preventive oral examinations, sealing of permanent teeth and professional debridements; there is no reimbursement for fluoride applications.

In Belgium, the rules for the application of the emergency supplement codes are strict. They can only be attested if the patient is seen between 9 PM and 8 AM, during the weekend or on an official holiday.

Study cohort

The database used for this research was the Permanent Sample of Socially Insured Persons, a database that was designed by the Intermutualist Agency (i.e., a joint venture of the seven Belgian Health Insurance Organizations) and some governmental partners to study and monitor health care utilization and expenditure in Belgium. Based on social security number, an anonymous representative sample, stratified by gender and month/year of birth, of 260,000 Belgian residents (i.e., 1/40 of all Belgian residents who have social insurance) was drawn.

In the present study, a child was considered having disabilities if it was entitled to an increased child benefit. In order to be eligible for an increased child benefit, a child has to go through a medical examination performed by an examining physician. Up to April 2003, the allotment of an increased child benefit was mainly based on the medical consequences of the disability; a child was entitled to an increased child benefit if it was judged that it had a physical or mental disability of at least 66 % (of “normal” functioning). Since May 2003, the allowance is based on three main aspects: (1) the physical and mental aspects of the disability, (2) the impact of the disability on the child itself, and (3) the impact of the disability on the family and on family life. For the first aspect, a grading mark between 0 and 6 is attributed depending on the percentage of the physical or mental disability; the evaluation is performed conform the Official Belgian Scale of Invalidity. For the second, a grading mark between 0 and 3 is given per section: (a) communication; (b) mobility and transportation; (c) level of self-help; (d) study, education, and social integration. Also for the third aspect, a grading mark between 0 and 3 is given per section: (a) continuation of the treatment at home, (b) transport for medical supervision and treatment, (c) adaptation of living circumstances. The marks of the last category are doubled; as a consequence, the impact of the disability on family functioning weighs relatively heavily. If the mark for the first aspect is at least 4 or if the sum of the marks for the 3 aspects is at least 6, a child is entitled an increased child benefit. The sum of the marks determines the magnitude of the extra allowance: between €77.62 and €517.44 per month in 2012.

For the present study, children who were not entitled an increased child benefit were considered not having disabilities. For the present research, the sample was limited to all individuals up to (and including) 21 years old, as this is the maximum age for an increased child benefit in Belgium. Age was determined as “observation year” minus “birth year”.

Database

Since 2002, all health care reimbursement invoice data of the selected individuals of the Permanent Sample of Socially Insured Persons have been routinely forwarded from the seven Health Insurance Organizations to the Permanent Sample database. In addition to the medical utilization data, a limited number of sociodemographic items were added: gender, date of birth, allowance of specific social benefits (e.g., increased child benefit, WIGW benefit, OMNIO benefit). The WIGW benefit was introduced in 1963 for surviving spouses, individuals with disabilities, pensioners, and orphans whose family income was below a certain limit; in 1998, the statute was extended to long-term unemployed above age 50 years, children entitled an increased child benefit, residents entitled the guaranteed minimum income benefit, and residents entitled benefits for individuals with disabilities. The “WIGW” benefit includes a reimbursement of up to 90 % of medical costs, including oral health care, hospitalization, and medication. The OMNIO benefit was introduced in 2007 for residents whose family income was below a certain limit and includes also a reimbursement of up to 90 % of medical costs. All data in the Permanent Sample are collected on an individual level; but for privacy reasons, analyses are only allowed on an aggregated level.

For the present study, data collected from 2002 up to 2008 (last available data) were extracted from the database and analyzed. It concerned socio-demographic data, oral health care utilization and a limited number of general health care utilization data. As the data file was based on reimbursement invoice data, only refundable care could be evaluated.

The research presented in this paper was performed within the frame of the Pilot Study Oral Health for Individuals with Special Needs, by order of the National Institute for Health and Disability Insurance. Approval for the study was obtained from the Ethical committee of the University Hospital Ghent (2010/126).

Data analysis and statistics

Data were made available as SAS® files and were analyzed using SAS software version 9.2 (SAS Institute Inc. 2009. Cary, NC, USA).

Two types of analyses were performed in order to compare the two subgroups (i.e., children with versus without disabilities): longitudinal analyses over the seven observation years and cross-sectional analyses per observation year. The longitudinal analyses allowed the calculation of the frequency a certain treatment was delivered over a 7-year period. The cross-sectional analyses per observation year yielded the calculation of the frequency a certain treatment was delivered in a calendar year, but also the evaluation of trends in the 7-year observation period as well as the impact of a change in the legislation (e.g., introduction of reimbursement of endodontic treatment of primary teeth).

For the longitudinal analyses, the following criteria were employed: (1) only children whose data were available over the 7-year period were included, (2) a child was categorized as “child with disabilities” if it was entitled an increased child benefit over the 7-year observation period, (3) a child was categorized as “child without disabilities” if it was not entitled an increased child benefit in any of the seven observation years, and (4) age was determined in the central year (i.e., 2005). The results of the longitudinal analyses are presented in Tables 2 and 3; the results of the cross-sectional analyses are described in the text.

Relative risks with corresponding 95 % confidence intervals were calculated using a log-binomial regression model. Corrections for age and gender were applied since the age and gender distribution were significantly different between the two subgroups (cf. infra).

Results

Study cohort

For the longitudinal analyses, data were available from 326 children and adolescents with and 53,589 without disabilities. Depending on the observation year, data on 647 to

1,008 children and adolescents with and 65,043 to 66,586 without disabilities were analyzed in the cross-sectional analysis (Table 1). Hence, 1–1.5 % of the cohort under study was categorized as having disabilities. In the subgroup with disabilities, significantly fewer women were included; in all observation years, the youngest age group was significantly smaller in the subgroup with disabilities.

Oral health care utilization

Approximately half of all children had a regular contact with a dentist, which was defined as at least one dental visit registered in at least four of the seven observation years (Table 2). However, when these data were analyzed per observation year, it was disclosed that annual dental attendance rates were low: between 48 and 63 % and when emergency visits were excluded, these proportions further dropped to 42–59 %. In addition, when annual attendance rates inclusive and exclusive emergency treatments were compared, the differences in the subgroup without disabilities ranged between 4 and 6 %; but in the subgroup with disabilities, these ranged between 4 and 17 %, indicating that depending on the observation year, 4–17 % of the children with disabilities were only taken to the dentist because they were in need of urgent dental care. This observation was also confirmed in the other data: in some observation years, up to 24 % of the subgroup with disabilities had at least one emergency dental treatment recorded; the highest proportion listed in the group without disabilities was 11 %. In 25 % of the children with disabilities, three or more emergency treatments were noted in the 7-year observation period; the respective proportion for children without disabilities was 9 % and the difference between subgroups was statistically significant.

The longitudinal analyses indicated that intra-oral as well as extra-oral radiographs were significantly more frequently attested in the subgroup without disabilities. In 44 % of children with disabilities, no radiographs were taken in the 7-year observation period; the respective proportion in the peer group was 35 % and the difference statistically significant.

When preventive treatments were considered, no significant differences between subgroups were observed with regard to dental sealants. The reimbursement schemes for professional debridements have been different in both subgroups during the entire observation period; hence, comparison between both was not recommended. The cross-sectional analyses revealed that-depending on the observation year- in 3–8 % of the subgroup with disabilities a professional debridement had been recorded.

The longitudinal analyses further illustrated that restorations were more often registered in the subgroup without disabilities. In 44 % of children with disabilities, no restorations were registered in the period 2002–2008; the respective proportion for the peer group was 35 % and the difference was statistically significant. On an annual basis, however, the analyses indicated that the differences between both subgroups were not statistically significant in most observation years.

The longitudinal analyses further revealed that orthodontic assessments and orthodontic treatments were both significantly more often registered in children and adolescents without disabilities. The cross-sectional analyses however disclosed that these differences were not significant for all observation years.

Medical care utilization

Significantly more children with disabilities had, in at least four of seven observation years, a registered contact with a physician (86 vs 71 %) (Table 3). Likewise in 52 % of children with disabilities, three or more home visits were recorded over the 7-year observation period; the respective proportion in the subgroup without disabilities was 32 % and the difference was statistically significant. The proportion of children with disabilities that was seen by a medical specialist was also significantly higher; in 72 % of children with disabilities and 46 % of children without disabilities, three or more consultations with a medical specialist were recorded over the 7 years. In 15 % of children with disabilities and 9 % of children without disabilities, three or more emergency consultations with the family doctor were recorded; the respective proportions for emergency specialist care were 78 and 55 %.

Table 1 Sociodemographic characteristics of the cohort

	Children with disabilities *n*=326	Children without disabilities *n*=53,589
Median age (IQR)	13.0 (9.0–17.0)	12.0 (8.0–17.0)
Proportion female (95 % CI)	36.5 (31.3–41.7)	49.0 (48.6–49.5)
Proportion at least once[a] WIGW benefit (95 % CI)	42.9 (37.6–48.3)	10.3 (10.0–10.6)
Proportion at least once OMNIO benefit (2007–2008; 95 % CI)	4.6 (2.3–6.9)	2.8 (2.6–2.9)

[a] At least once: (social) benefit at least once in the 7 year observation period assigned; for the explanation of the (social) benefits, the reader is referred to the "Materials and methods" section

Table 2 Cumulative oral health care utilization over the 7 years observation period

	With disabilities n=326 % (95 % CI)	Without disabilities n=53,589 % (95 % CI)	Adjusted RR (95 % CI)
Contact with dentist	94.3 (94.1–94.5)	94.8 (92.4–97.2)	1.00 (0.97–1.02)
Regular contact with dentist[a]	48.8 (48.3–49.2)	49.1 (43.7–54.5)	1.00 (0.90–1.12)
Emergency dental treatment	56.4 (51.1–61.8)	45.9 (45.5–46.4)	**1.21 (1.10–1.33)**
Consult with oral surgeon	47.9 (42.4–53.3)	34.4 (34.0–34.9)	**1.35 (1.20–1.51)**
Intra-oral radiograph	34.1 (28.9–39.2)	41.8 (41.4–42.2)	**0.79 (0.68–0.92)**
Extra-oral radiograph	39.6 (34.3–44.9)	48.1 (47.7–48.5)	**0.82 (0.71–0.93)**
Sealant	8.9 (5.8–12.0)	10.7 (10.4–10.7)	0.93 (0.66–1.32)
Professional debridement[b]	23.0 (18.4–27.6)	12.9 (12.6–13.1)	–
Restoration (1 tooth surface)	40.5 (35.2–45.8)	44.7 (44.3–45.1)	0.90 (0.79–1.02)
Restoration (multi-surface)	46.6 (41.2–52.0)	55.3 (54.9–55.8)	0.83 (0.74–0.93)
Endodontic treatment—primary teeth (2005–8)	0.9 (0.0–2.0)	3.8 (3.7–4.0)	**0.24 (0.08–0.74)**[c]
Endodontic treatment—permanent teeth	7.7 (4.9–10.6)	10.1 (9.8–10.3)	0.73 (0.50–1.05)
Orthodontic assessment	14.4 (10.6–18.2)	20.3 (20.0–20.7)	**0.73 (0.56–0.96)**
Orthodontic treatment	15.3 (11.4–19.3)	23.4 (23.0–23.8)	**0.66 (0.51–0.85)**

Adjusted RR adjusted analyses account for age and gender

[a] Regular contact: in at least four of seven observation years, a dental treatment was registered

[b] Different reimbursement scheme, hence RR not calculated

[c] Unadjusted RR because of computational problems in the calculation of the adjusted RR

Significant results indicated in bold

Discussion

This report describes for the very first time oral health care utilization patterns in children and adolescents with disabilities residing in Belgium, using reimbursement invoice data of a nationally representative cohort.

Invoice data have the big advantage that they are independent of parental recall. Yet they have to be interpreted in view of the prevailing legislation. If for instance certain treatments are not reimbursed (e.g., extractions), it is not possible to unravel in how many children they have been performed since they are not recorded in invoices. In addition, since, e.g., reimbursements schemes for professional debridements were different for both subgroups for the entire study period, it was not recommendable to compare these utilization data.

In the present study cohort, 1–1.5 % of the cohort under study was categorized as having disabilities. This prevalence is in line with data from the Federal Department of Social Affairs, which reveal that in 2005, 1.54 % of children

Table 3 Cumulative medical care utilization over the 7-year observation period

	With disabilities n=326 % (95 % CI)	Without disabilities n=53,589 % (95 % CI)	Adjusted RR (95 % CI)
Contact with physician	99.7 (99.1–100.3)	97.8 (97.7–98.0)	**1.03 (1.01–1.05)**
Regular contact with physician[a]	85.9 (82.1–89.7)	71.0 (70.6–71.4)	**1.24 (1.19–1.29)**
Consultation at family doctor's office	90.8 (87.7–93.9)	92.7 (92.5–92.9)	0.98 (0.94–1.01)
Consultation family doctor at home	72.4 (67.5–77.3)	58.3 (57.9–58.7)	**1.27 (1.18–1.35)**
Consultation at medical specialist's office	87.7 (84.2–91.3)	70.9 (70.5–71.2)	**1.14 (1.09–1.18)**
Emergency consultation family doctor	48.8 (43.4–54.2)	42.2 (41.8–42.6)	**1.18 (1.06–1.32)**
Emergency consultation medical specialist	92.9 (90.2–95.7)	81.3 (81 .0–81.7)	**1.14 (1.10–1.17)**

Adjusted RR adjusted analyses account for age and gender

[a] Regular contact: in at least four of seven observation years a form of medical care was registered

Significant results indicated in bold

residing in Belgium were entitled an increased child benefit. Further, significantly fewer women were included in the subgroup with disabilities compared with the group without disabilities, an observation that was also reported by others [19]. The observation that the youngest age group was significantly smaller in the subgroup with disabilities can also be considered plausible since parents have to request an increased child benefit and this may take some time. In addition, for some disabilities, it may take some years before the disability is being diagnosed.

The studied database contained utilization data collected over a 7-year period, which enabled us to analyze the data longitudinally. The analyses illustrated that in both subgroups the proportion of children and adolescents in whom a certain treatment had been recorded, remained fairly stable over the 7 years. For some treatments (e.g., restorations, orthodontics), inconsistent results from the longitudinal and cross-sectional analyses were obtained. This may (in part) be explained by the fact that for the longitudinal analyses data collected in a more restricted cohort were analyzed, as stricter criteria had to be complied with (cf. supra). This was most pronounced in the subgroup of children with disabilities where less than half of the annual samples could be adopted in the longitudinal sample.

With regard to dental attendance, the present findings concur with previous studies in which it was concluded that children with special health care needs were as frequently or even more frequently seen by the dentist compared with their peers without special needs [13, 15, 20]. The results also illustrate that dental attendance rates in Belgian children were very low. Surely when these data are compared with other studies indicating that more than 90 % of parents of children with special needs had reported a dental visit of their child within the past year [10], it is clear that extra efforts are indicated to motivate parents and caretakers to bring their children to the dentist on a regular basis in Belgium. This is obviously also the case for children without disabilities.

Unisonous to previous reports, emergency oral care and medical care were more frequently recorded in children and adolescents with disabilities [20, 21]. In an American study, it was suggested that when parents encounter difficulties in getting proper oral health care for their child with disabilities, they opt to seek oral health care on an urgent rather than preventive basis [17]. Further research will have to elucidate if this rationale also applies to the Belgian situation.

Radiographs were significantly less frequently recorded in children and youngsters with disabilities. This finding may-in part-be explained by the fact that taking radiographs in some groups of children with disabilities is often very difficult or even impossible. Children with disabilities may be afraid of the roentgen apparatus, have a hard time holding the application tool for intra-oral radiographs, or find it difficult to sit still during irradiation. The reduced radiographic diagnostic possibilities may result in an increased risk for undiscovered oral pathology. On the other hand, it cannot be excluded that in the absence of radiographs some teeth may be extracted prematurely because of unfavorable clinical appearance while radiographic images might have sustained their preservation.

Orthodontic assessments and treatments were also less likely in the group with disabilities. From a theoretical point of view, one would expect the opposite since the prevalence of, e.g., craniofacial deformities, abnormal growth and development, malocclusions, congenitally missing teeth, abnormal tongue posture, and orofacial muscular disturbances is much higher in (some groups of) children with disabilities [22]. From another perspective however, one can sum several possible hypotheses for the observed differences between subgroups. Some children with disabilities may not tolerate the presence of an orthodontic appliance in their mouth or it may be too difficult to obtain the level of cooperation necessary for a successful orthodontic treatment. In some children, good daily oral hygiene levels are very hard to realize, hence an orthodontic appliance may only increase the risk for dental plaque related pathology. In addition, since orthodontic treatment is only partially reimbursed, financial constraints cannot be excluded.

With regard to the use of preventive oral health care in children with special health needs, contradictory results have been published [14, 16, 23, 24]. In the present study, the application levels of dental sealants were very low in both subgroups and because of differences in reimbursement schemes, the comparison of professional debridements was not recommended. Still it was revealed that professional debridements are hardly performed in children with disabilities. Patients' and parents' associations as well as health insurance organizations, professional dental associations, and individual dentists should put in a great effort in making parents (and dentists) of children with disabilities aware of the benefits of a regular professional debridement and the advantageous reimbursement scheme.

The data further illustrated that in significantly more children with than without disabilities no restorations had been recorded in the 7-year observation period. Solely based on the invoice data, one cannot unravel if these results point to high unmet treatment needs or to a reduced prevalence of dental caries in children with disabilities. However, previous research in children with disabilities strongly suggests that the former is the case [3, 4, 7, 9]. It would have been interesting to compare the invoice data with the oral health status of this cohort, but as this is an anonymous sample, this analysis could not be accomplished.

Finally, it is fair to face the limitations of the present study. Children were assigned to the subgroup of children with disabilities if they received an increased child benefit. And although it was realized that not all children with disabilities in Belgium are assigned an increased child benefit and hence misclassification of groups cannot be excluded, there was no alternative way to identify children with disabilities. Indeed, misclassification of groups may have led to differences between groups being veiled to some extent.

In addition, it would have been interesting to compare the utilized oral health care in different subgroups of children with disabilities (e.g., mental versus physical versus multiple disabilities), but this information was not available in the database of the Permanent Sample.

In conclusion, the present investigation based on invoice data of a representative cohort of Belgian children with and without disabilities indicated that dental attendance rates in both subgroups were very low and in those who attended, preventive dental care was only infrequently attested. In addition, in children with disabilities fewer radiographs and restorations but more emergency visits were recorded. Further research will have to elucidate if these observations reflect unmet oral treatment needs.

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Conflict of interest The authors declare that they have no conflict of interest.

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