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Oral Health Indicators for Children and Adolescents. European perspectives

L. OTTOLENGHI*, M. MULLER-BOLLA**, L. STROHMENGER***, D. BOURGEOIS****

ABSTRACT. *Aim* The purpose of the European Global Oral Health Indicators Development Project (EGOHIDP) was to support the exchange of expectations and experiences among experts in the field of oral health statistics and their audience, in particular policy makers, resulting in recommendations for a list of essential oral health indicators. EGOHIDP was supported by the Health and Consumer Protection Directorate-General of the European Commission to point out a short list of essential indicators for Oral Health. *Methods* Systematic review of the existing indicators and consensus process between a group of experts in oral health related areas. *Results* The short list of 40 oral health indicators was determined (rate of agreement >70%) among the European experts members of the project. Twelve items focus on Oral Health of children and adolescents: they are described in the present paper. *Conclusion* Further developing phases aimed to establish standardised methodological criteria for the collection of oral health data are also described.

KEYWORDS: Oral Health Indicators; Children, Adolescents, Europe.

Introduction

Paediatric oral health significantly improved during last decades relating to dental caries prevalence, both in primary and permanent teeth. Unfortunately, European Countries did not systematically use the same health indicators and/or collection methods, thus affecting the international comparisons of data [WHO, 1997]. However, in the early '80s WHO and the FDI had proposed, within the Oral Health Goals by the year 2000, that the Member States should set up a functional oral Health Information System in order to support public health decision-making at the European, national, sub-national and local level [FDI, 1982]. In partnership with the IADR, they recalled these goals by 2020, specifying all the advantages of the fundamental oral health indicators for the populations care [Hobdell et al., 2003]. In this context, the European Global Oral Health Indicators

EGOHID associated and collaborating partners

Aerden M. (FDI, Bruxelles, Belgium), **Badeyan G.** (Ministry of Health, Paris, France), **Baehni P.C.** (European Federation of Periodontology, Genève, Switzerland), **Batchelor P.** (Eastman Dental Institute for Oral Health Care Sciences, London, UK), **Bonita R.** (WHO, Genève, Switzerland), **Borutta A.** (Friedrich-Schiller University of Jena, Germany), **Bourgeois D.** (Project Leader, University of Lyon I, France), **Carvalho J.** (Catholic University of Louvain, Belgium), **Ceballos A.** (University of Granada, Spain), **Christensen L.B.** (University of Copenhagen, Denmark), **Desfontaines J.** (UFSBD, France), **Eaton K.A.** (Eastman Dental Institute for Oral Health Care Sciences, London, UK), **Ekman A.** (The national board of Health and Welfare, Stockholm, Sweden), **Heinrich-Weltzien R.** (Friedrich-Schiller University of Jena, Germany), **Hoffmann T.** (University of Dresden, Germany), **Hubkova V.** (Hradec Kralove, Czech Republic), **Kallestal C.** (National Institute of Public Health, Stockholm, Sweden), **Lamure M.** (University of Lyon I, France), **Kinane D.F.** (University of Glasgow, UK), **Llodra J.C.** (University of Granada, Spain), **Mexia de Almeida C.** (Faculty of Dental Medicine, Lisbon, Portugal), **Montserrat Moliner A.** (European Commission, Luxembourg), **Morciano G.** (University of Pavia, Italy), **Muller-Bolla M.** (UNSA, Nice, France), **Nihtila A.** (STAKES, Finland), **Nordblad A.** (Ministry of Social Affairs and Health, Finland), **O'Mullane D.** (University of Cork, Ireland), **Ottolenghi L.** (Sapienza University of Rome, Italy), **Pavi E.** (Ministry of Health, Athens, Greece), **Petersen P.E.** (WHO, Genève, Switzerland), **Pitts N.B.** (Dental Health Services Research Unite, Dundee, UK), **Sax G.** (OBIG, Vienna, Austria), **Senakola E.** (University of Riga, Latvia), **Senkel H.** (Friedrich-Schiller University of Jena, Germany), **Skaret E.** (University of Bergen, Norway), **Strohmenger L.** (University of Milan, Italy), **Szoke J.** (Université Semmelweis, Budapest, Hungary), **Van Neuwenhuysen J.P.** (Catholic University of Louvain, Belgium), **Veerkamp J.** (Academic Centre for Dentistry, Amsterdam, Netherlands), **Whelton H.** (University of Cork, Ireland), **Wimmer G.** (University of Graz, Austria)

*Oral Science Department, Sapienza University of Rome, Italy

** Faculty of Dental Surgery of Nice, France

***Department of Medicine, Surgery and Dentistry, University of Milan, Italy

****Faculty of Dental Surgery of Lyon, France

e-mail: livia.ottolenghi@uniroma1.it

more info available at www.egohid.eu

Development Project (EGOHIDP), initiated by the University of Lyon I, received the support of the Directorate-General "Health and consumer protection" of the European Commission, to identify a short list of 40 essential oral health indicators, resulting from a systematic review of the existing indicators and from a consensus process between a group of experts in oral health related areas (decision-makers, clinicians, scientists, administrators, etc.) [Bourgeois and Llundra Calvo, 2003].

In order to promote standardisation of oral health data collection methods, the selected indicator should be used in Europe from now on. Besides, 12 of them, described in this article, exclusively relate to the monitoring of oral health in children and adolescents.

Methods

European partners of the project, following the Directorate-General "Health and consumer protection" guidelines, drew up a first exhaustive list of the oral health indicators used in four fields: (I) Health, morbidity and oral function state; (II) Determinants (behaviour, life habits); (III) Oral Health System/Promotion, Prevention, Access to Care, Quality and System Performance and (IV) Outcomes and Oral Health Quality of Life, judged as priorities. A long list of 600 possible indicators was outlined. After discussion and voting, the long list of indicators was graded, according to previously defined criteria. Using proper statistical analysis, a short list of the 40 most voted indicators was defined as described in detail in "Health Surveillance in Europe. A selection of essential oral health indicators. 2005" [EGOHID Catalogue, 2005].

Results

The short list of 40 oral health indicators was determined by discussions and a consensus (rate of agreement >70%) among the European experts members of the project.

All the selected indicators comply to scientific needs of validity and objectivity; additionally they have been selected considering the feasibility of obtaining them in addition to ethical issues related to the different European territorial cultural and health system peculiarities.

Each indicator was described on a standard structure and was discussed in order to be published in an exhaustive and easily consulting catalogue [EGOHID Catalogue, 2005]. This form, in compliance with the WHO recommendations, included: title, rationale of

40 Essential Oral Health Indicators

Oral health of Children and Adolescents⁽¹⁾

- A1 Daily toothbrushing with fluoride toothpaste
- A2 Preventive care-seeking for pregnant women
- A3 Mother's knowledge of fluoride toothpaste for child caries prevention
- A4 Fluoridation exposure rates
- A5 Preventive oral health programmes in kindergartens
- A6 Schools with based programs centred on daily brushing with fluoride toothpaste
- A7 Screening oral health programme coverage
- A8 Protective sealants prevalence
- A9 Orthodontic treatment coverage
- A10 Early childhood caries
- A11 Decay experience in 1st permanent molars in children
- A12 Dental fluorosis

Oral Health of General Population

- B1 Daily intake of food and drink
- B2 Tobacco usage prevalence
- B3 Geographical access to oral health care
- B4 Access to primary oral care services
- B5 Dental contact within the previous twelve months
- B6 Reason for the last visit to the dentist
- B7 Reason for not visiting the dentist in the last two years
- B8 Tobacco use cessation
- B9 Untreated caries prevalence
- B10 Periodontal health assessment
- B11 Removable denture prevalence
- B12 No obvious decay experience
- B13 Dental caries severity
- B14 Periodontal disease severity
- B15 Cancer of the oral cavity
- B16 Functional occlusion prevalence
- B17 Number of natural teeth present
- B18 Edentulous prevalence

Oral Health Systems

- C1 Cost of oral health services
- C2 Gross national product spent on oral health care services
- C3 Dentists and other oral care clinical providers
- C4 Satisfaction with the quality of care given
- C5 Satisfaction with the remuneration provided

Oral Health-Related Quality of Life

- D1 Oral disadvantage due to functional limitation
- D2 Physical pain due to oral health status
- D3 Psychological discomfort due to oral health status
- D4 Psychological disability due to appearance of teeth and dentures
- D5 Social disability due to oral health status

(1) the first category – "Oral Health for children and adolescents", is described in the present paper

TABLE 1 - EGOHIDP Oral Health Indicators short list.

the indicators' choice, its definition, definition of important terms, data sources, recommended methods of data collection, use of the indicator, recommended formats of presentation and an essential reference list [WHO, 1996]. Of the 40 selected Oral Health Indicators, 12 are tailored for the monitoring of Oral health in Children and Adolescents, 18 relate to the monitoring of Oral Health in General Population, five regard the Oral Health Systems, and five the Oral Health-Related Quality of Life.

In this paper only the first 12 will be described as summary and the following included in table 1. Of course general population and quality of life indicators can focus on children, too.

Specific indicators for Oral Health of Children and Adolescents

As stated above, twelve items of the selected forty essential oral health indicators are related to children and adolescents Oral Health monitoring [Muller-Bolla and Bourgeois, 2006]. They can be divided into three subgroups: the first group of four corresponds to the determinants, the following five to the process and the last three to the outcome.

Determinants.

A1 Daily toothbrushing with fluoride toothpaste.

This indicator represents the proportion of daily toothbrushing their teeth with a fluoridated toothpaste in subjects aged 3-6 years, 6-12 years, and 13-17 years respectively. There is scientific evidence that fluoride toothpaste (250-750 ppm for the 3-6 years old group and of higher concentration for the oldest), used at least once a day, is effective in dental caries prevention. Data can be obtained from oral health clinical surveys of paediatric population at different levels (national or local basis), or through a self-report household interviews. The results must be indicated according to age, sex, geographical location, socioeconomic status or educational level. The indicators inform about the behaviour of the population in terms of oral hygiene; behaviour which is of great interest for the decision-makers in the area of oral prevention.

A2 Preventive care-seeking for pregnant women.

The key for the oral health promotion and oral pathologies prevention lies in the advices and instructions given upstream to parents. Moreover, preventive dental visit during pregnancy can be an excellent setting for motivating expectant mothers on

the newborn oral health issues, as well as prevention of early childhood caries, appropriate nutritional and hygienic instructions and the correct use of fluoride. For these reasons the indicator has been selected, and it is recorded to determine the rate of women from 15 to 39 years old who report at least one preventive dental visit during their last pregnancy. They are recorded if, having a child younger than 1 year, they experienced oral health preventive care during pregnancy. Should the opposite occur, data are exclusively recorded in the denominator. Data can be collected from state-specific population clinical surveys (data on maternal attitudes during or immediately after pregnancy, birth clinic survey, etc) or from household interviews.

Results should be expressed according to the age, state of disability, ethnic group, level of education and socioeconomic status. These data are useful to improve women and dental teams awareness on oral health and pregnancy relating issues. They also provide to the decision-makers a thorough knowledge on pregnant women attitudes in order to promote activities able to improve family and community practices in relation to pregnancy and childbirth.

A3 Mother's knowledge of fluoride toothpaste for child caries prevention. This indicator is a useful tool to evaluate mothers' knowledge on children's oral health preventive issues. It is also related to the caries risk assessment for children and could be a valid aid in oral health promotion programmes for families.

It measures the proportion of mothers with children younger than 7 years old who know the role that the correct usage of fluoride toothpaste has in preventing dental caries in children. It aims to assess the knowledge of the optimal toothbrushing frequency, namely twice a day, with fluoridated toothpaste. This indicator is a rate whose numerator corresponds to the number of women having a child younger than 7 years and correctly answer to a specific question on the topic, whereas the denominator equalises the total number of surveyed mothers. National, regional or local surveys, based on interviews, make it possible to determine this indicator, additionally useful for the decision makers in order to plan proper prevention strategies and to evaluate the educational programmes for mothers.

A4 Fluoridation exposure rates. The effectiveness of fluoride in dental caries prevention is based on scientific evidence. This evidence is related to the overall fluoride supply, considering all the potential sources of both pre-eruptive and post-eruptive fluoride exposure. Even considering socio-economic, ethical and moral issues, WHO indicates the use of

appropriate fluoridation in all its feasible alternatives as recommended. The selected indicator aims to determine the rate of subjects, preferably from 0 to 13 years old, daily exposed to water or alternative fluoride sources in a given population. Numerator represents the population daily exposed to any type of fluoride: naturally or artificially F- containing water (0,7 to 1,2 mg/l), salt, milk, toothpastes or other sources, among those surveyed (x 1000) and the denominator the total number of the surveyed population. Data collection should be based on household interviews and on oral health surveys at national or local level. The total number of subjects exposed to any fluoridated source should be presented as a rate x 1000 for the different age groups. Special attention should be given to the "type of exposure" data aggregation by age group, socio-economic status, location and gender. The indicator should be used to compare oral health status between European Countries according to their fluoridation status, to identify dental caries risk areas and populations and to determine the most appropriate strategies of fluoride exposure.

Process

A5 Preventive oral health program in kindergartens. This indicator is related to the implementation of oral health promotion programme for children in the nursery schools. These programmes, primarily based on a supervised daily brushing with a fluoride toothpaste, are aimed to reduce inequalities between advantaged and disadvantaged communities. The implementation of preventive educational programmes for children in kindergartens encourages the development of permanent self-oral care habits and abilities through playing and exercise. This indicator measures the proportion of kindergartens that take part in an oral prevention programmes particularly focused on supervised daily toothbrushing with fluoride toothpaste. Information sources can be obtained from databases of public health services, education institutions, or other providers. Otherwise data can be collected by self-reported questionnaires filled in by the involved kindergartens. Data should be calculated by geographical areas and type of location, age and socio-economic groups. This indicator also enables comparisons between European Countries and health systems (public or private) that support institution-based oral prevention programmes and those where oral health education exclusively relies on parents' responsibility.

A6 Schools with based programmes centred on

daily brushing with fluoride containing toothpaste.

This indicator slightly differs from the previous one in the age of the target population. It can be defined in two different ways: the proportion of schools with based oral health programmes centred on supervised daily toothbrushing with fluoride toothpaste and the proportion of schoolchildren (over 5 years of age) involved in daily supervised toothbrushing. Daily toothbrushing should be exercised in groups under the supervision of a trained operator (teacher or dental provider). Data sources are administrative school databases and survey and/or population-based oral health survey or questionnaire administration.

A7 Screening oral health programme coverage.

Early identification of children affected by asymptomatic or latent oral diseases makes it possible to ensure the benefits of an effective preventive intervention; for this reason screening constitutes an essential element of any oral health programme. A routine screening along with follow-up treatment can thus accomplish considerable reductions of morbidity.

Preventive programmes are very effective in paediatric population: compatibly with health and educational system organisation, screening can be performed in schools or other places where the children population can be easily reached. Therefore, this indicator targets children, and not schools. It measures the rate (x 1000 population) of children and adolescents aged 3 to 16 examined at least once for early detection of non-symptomatic oral disease included in a screening programme. Data sources can result from databases of public health services or various administrations (schools, governments, etc.) and from oral health surveys at national or regional level in the general population. This indicator is used to monitor active disease and treatment needs in the age range 3 to 16 years in order to develop periodic screening and preventive strategies in school integrated oral health care programmes.

A8 Protective sealants prevalence. Although sealants are widely accepted as a particularly effective measure of caries prevention in permanent molars, they are underused in European Countries, particularly in low-income families and minority groups. When properly used, dental sealants can substantially reduce occlusal caries: greatest benefits are received in newly erupted permanent teeth. This indicator exclusively monitors children aged 6 to 8 years and adolescents aged 12 to 14 years, measuring the proportion of subjects with at least one sealed permanent molar. Data can be obtained from oral health clinical surveys both school-based and not. However, results of self-reports proved to be reliable as well.

In order to facilitate the international comparisons, it is advised to present the results for the 8 and 14 year age. They are expressed according to the geographical situation and the socioeconomic conditions. It also gives the opportunity to evaluate preventive services impact on disadvantaged children and adolescents.

A9 Orthodontic treatment coverage. The analysis of European oral health systems underlines a disparity in the access to orthodontic care. In Countries with public orthodontic services, the percentage of children needing orthodontic care generally ranges between 30 and 40%. Information on the influence of orthodontics in terms of accessibility and equality of care in children and adolescents is still lacking in Europe. Thus, this indicator aims to ensure a surveillance system in order to enhance the access to orthodontic care throughout Europe. It measures the proportion of children and adolescents from 5 to 17 years who have worn fixed or removable orthodontic appliances for one year. Data can be obtained from oral health surveys and oral health interviews. Other sources can be represented by national health services and health insurance companies, private and public. The indicator allows comparison of orthodontic service between European countries and may be useful to evaluate the adequacy of oral health services for disadvantaged individuals or communities.

Outcome

A10 Early childhood caries. This disease (ECC) is defined by the presence of one or more decayed, missing or filled tooth surface in any primary tooth in a child within the fourth year of age. There are different types of ECC, depending on the clinical and etiological pattern. "Nursing caries" or "Baby bottle syndrome", the most commonly found pattern, corresponds to a typical distribution of caries in the upper primary incisors and upper first primary molars with lower incisors usually sound. Its essential etiological factor is the frequent consumption of sweetened drinks or honey from a feeding bottle or pacifier. "Rampant Caries" affects older children (3-4 years), with extensive caries in almost all primary teeth. It is related to enamel defects or systemic problems. The indicator measures the proportion of ECC - preferably 1-3 years - in the age group 1-5. Data can be obtained by preschool children surveys. The format of presentation should consider stratification according to age or socioeconomic groups, related to severity. The indicator is used to monitor status and trends of oral health in preschool children, and to identify the risk of tooth decay in older children. It provides the chance to implement and evaluate the

impact of preventive strategies.

A11 Decay experience in first permanent molars in children. It represents the DMFT index (mean number of decayed, missing and filled permanent teeth) partially calculated at the first permanent molars level in children aged 6 and 12 years. In other words, it focuses on the four more vulnerable permanent molar teeth in order to provide a more rapid and efficient recording system in some circumstances. As overall dental caries experience, this indicator can be used at different diagnostic thresholds, the initial lesions (D1) and the advanced caries (D3) [Pitts, 2004]. In the WHO basic method, decayed teeth are entered as D3MF. However at the investigators' choice, initial lesions can be recorded as D1MF. In order to limit confusion in data interpretation, it is suggested to avoid reporting DMFT without specifying the used diagnostic threshold. If the D1 Threshold is used, it is recommended to report a subset of data by D3, not to limit the possibilities of comparisons with other studies. Data can be provided by sample surveys systems, surveillance systems, national surveys data, literature review, WHO Global Data Bank. This indicator has the advantage of providing simple information on dental caries trends for population groups even in undersupplied environmental condition or organisation.

A12 Dental Fluorosis. Dental fluorosis results from excessive fluoride intake during the tooth development period (0-12 years of age). It is characterized by opaque white to brownish patches on the enamel surface. There is a variety of fluoride sources within European Countries, including natural water fluoridation. As recommended by WHO, the risk of fluorosis can be prevented by appropriately following label instructions of fluoride products. Fluorosis is classically described by the Dean's index with 6 scores: normal, questionable, very mild, mild, moderate and severe. The indicator "dental fluorosis" measures the proportion of 12 years old presenting fluorosis according to Dean's index score. Data can be collected by oral health surveys of 12-years old children at different geographic levels, surveillance systems and/or household interviews surveys. It is recommended to stratify the data according to degree of severity. Other stratifications can be considered by geographical location, socioeconomic context, etc. It is important to monitor fluorosis to detect changes in levels of fluoride ingestion.

Progress in relation to the current situation

Within the EGOHID I valuable score indicators were created. These are essential for comparisons to be made

over time not only between regions and care units but also at national level. These comparisons can then be used as a basis for development and quality work at all levels of dental care and dental services. However, further development and promotion of models and methods for performance assessment is needed in order to be able to deliver consistent information useful to each nation's health policy makers.

The range of potential quality methods is vast, making a full review impracticable. Supporting evidence might be absent or inadequately documented. Existing data sources might not allow to assess the desired indicators, because the required variables are missing or recorded differently. Dedicated data collection that would yield comparable information on a national level might be too expensive. Thus, to tackle the problem according to time and resource constraints, an opportunistic rather than idealistic approach seems warranted. The main disadvantage of relying on existing data sources is that the data systems have usually been designed for purposes other than quality measurement and may therefore not always provide exactly the desired information. In several countries, data are only available for selected regions, collection of administrative data is sometimes linked to individual characteristics, such as insurance status, and data collected by institutions other than national government or national institutes may sometimes not be readily accessible due to confidentiality issues or property rights issues which prevent any disclosure.

EGOHID Phase II focuses on a set of recommendations for developing common instruments including clinical survey forms, questionnaires, translation processes and fundamental methods guidelines, for which there is agreement on validity, important in order to achieve comparable data collection and a common oral health surveillance system in most EU countries.

Conclusion

The main objective of EGOHIDP is to develop and promote the use of common oral health instruments in Europe in order to facilitate comparisons of data by promoting standardisation of methods. This will certainly improve the ability of area health services to

monitor their oral health trends in the long run and facilitate service standardisation across Europe.

It will also enhance the capacity to analyse the social, economic, behavioural and political determinants with particular reference to disadvantaged populations.

In this view, the current phase of the Project is to promote the actual implementation and to evaluate the performance of new common methodological instruments in order to improve national health interview and clinical surveys data, to allow standardised routine collection in 25 European countries and crossnational comparisons.

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