

Health Surveillance in Europe
European Global Oral Health
Indicators Development Project
2003 Report Proceedings

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Denis M. Bourgeois
Juan Carlos Llodra

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Editors
Denis M. Bourgeois Juan Carlos Llodra



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Health and Consumer Protection Directorate-General

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European Global Oral Health Indicators Development. The Challenge

Denis M. Bourgeois¹

Introduction

Numerous projects have been proposed by different teams from European countries within the framework of the Community action programme in the area of health surveillance. The community programme of health surveillance was launched in 1997 by the European Community as part of its duty with respect to public health. The major objective of this programme was to contribute to establish a community system for health surveillance. It embodied three specific objectives²: (i) to develop community health indicators through a critical review of existing data and indicators; (ii) to enable the realisation of a reliable communication system for data and health indicators transfer and sharing; (iii) to define the necessary methods and instruments for analysis activities and the production of reports on health status,

trends, and policies' impact on health. All the results of the various projects sponsored by the Programme of Community Action in the field of public health (1997-2002) are accessible on the Website of the European Commission³.

The project titled "European Global Oral Health Indicators Development" (EGOHIDP) has been developed under the auspices of this Programme. It is one of the latest pathfinder projects financed in 2002 within the framework of the Health Surveillance Programme. The first phase of the Project terminated and the final report was produced in February 2004. The second phase is currently ongoing.

The purpose of the European project on Global Oral Health Indicators Development Project (Convention SPC 2002472) is to establish priorities for a specifically European context in coordination with the existing programme and to make new

1. Project Leader. Faculty of Dentistry, University of Lyon, France.

2. In: Dossier Information en santé. Développements européens. Vue d'ensemble. J. Ryan & F. Sicard. ADSP, 42: 19-21.

3. See http://www.europa.eu.int/comm./health/ph_projects/monitoring_projects_en.htm

recommendations for improving health system performance when necessary.

The argument in favour of developing a plan linked to oral health indicators within the European Programme of Surveillance is based on an analysis of the current situation and the need to organize oral health system monitoring. There are a number of advantages to oral health indicators.

In the first place, the rationale for a plan connected to oral health indicators is obviously related to the impact of disease upon society. Yet the oral health of European populations is generally satisfactory. At least in countries within the Union, it greatly improved in the recent past. An analysis of the literature on this subject is telling: between 1970 and 2000 improvement among children rose from 50 to 80%. Similarly, most cavities were treated. These are predominantly cases of quality dental care, meaning more fillings and fewer extractions.

Even more remarkable is the fact that the state of dental health among European populations, including adults, appears to have been “internationalised”. Thus the index of serious tooth decay (DMFT) is generally the same for all Europe, as are its components D, M, F, although countries such as Spain and Greece noticeably deviate on this point.

The variability of the extent of tooth decay observed in the 1970s has greatly declined. All the countries within the Union are currently converging on a serious decay threshold at age 12, varying around 1-1.5 DMFT. Only adults aged 65-74 present significant differences regarding the rate of tooth loss in Europe. These

differences are related to sanitary conditions and historical cultural customs, but should rapidly disappear in future generations. This analysis also covers periodontal disease. In its severe form, periodontal disease could affect 10% of all European adults in a few places.

It might therefore seem obsolete to recommend promoting national monitoring systems to evaluate health results based on the severity of the incidence of tooth decay, given that all the clinical indicators traditionally utilised are improving so significantly that they are heading towards a zone of “good dental health,” as it might appear frivolous in light of the “globalisation” of dental health in Europe.

Especially since it is obvious that we are forever past the dramatic dental health situation of the 1970s, even if the literature were to contain warning signs of a possible decline in the dental health of European children. Actions undertaken to control and prevent tooth decay have had a considerable effect on current generations. The probability of a significant overall decline in the medium term is slight and without a major impact on the health system, even if we are unprotected from minor recurrences in various places.

Secondly, the monitoring system for tooth decay via the WHO data bank has existed since 1969. Data on periodontal disease was added in 1985 via the CPITN index. In 1995 the data bank was even relayed to the WHOCC of Malmö University website¹, which produced a national synthesis of actualised oral health data for the Internet. Syntheses of epidemiological information thus have been produced regularly.

1. Website: <http://www.who.collab.od.mah.se>

Health goals for the year 2000 were evaluated on the basis of these syntheses, as were recommendations to the year 2015 – in short, most policy directives concerning oral health promoted by the WHO.

Nevertheless, despite the great achievements of oral health in European countries in the last 20 yrs, an unsolved and ongoing problem still remains.

The indicator of the incidence of serious tooth decay (DMFT) is the international reference in the area of oral health. Its 40-year history is an undeniable asset in evaluating past and future trends. Yet, developing an up-to-date representative epidemiological study utilizing the methodology of oral health monitoring in most cases invariably leads to similar results among low-risk or even slight-risk categories. Therefore, only limited information gains, without any real operational implications, are derived from a significant investment. The problem is not so much the usefulness of the CAOD index, but its capacity to translate the short-term health changes and perceptions within oral health systems.

The practice of dentistry has undergone several major changes over the last thirty years. Disease prevention, identification of risk and preventive factors, evaluation of health initiatives, and quality treatments have been required and progressively replaced by the concept of restorative dentistry (care). As in other health areas, the question is whether or not clinical data, with all the logistical and economic implications that it poses, should remain the cornerstone of the dental monitoring system. It is not a question of replacing the DMFT; at issue is its position and prominence in relation to other more responsive indicators, for example questionnaire-based indicators.

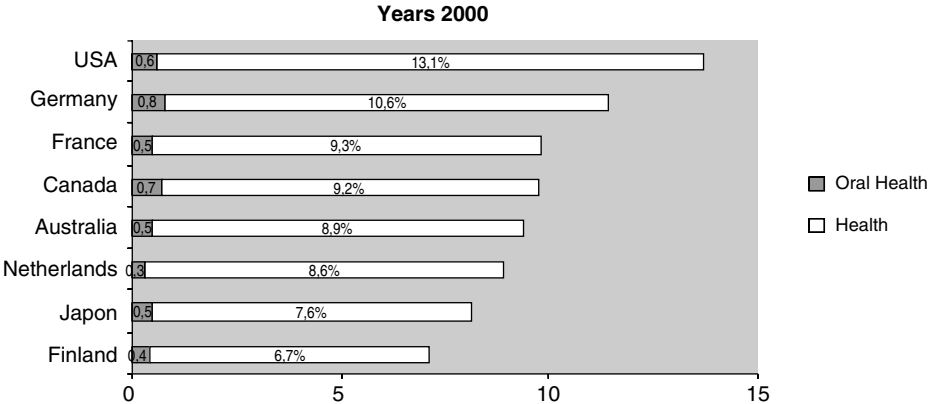
Minorities and deprived groups in many European countries have a high level and/or of untreated diseases. Oral health is characterized by social inequalities in the face of disease and patient management. In France, 40% of 12-year olds have no DMF tooth; most other children fall in the range of 1 to 4 DMFT teeth. In contrast, 10.8% of all children have a DMF greater than 4 teeth. In the trend observed in European countries with good demography, 1/3 of the children have about 80% of DMF teeth, and 1/4 of the children have about 65% of DMF teeth. And 10% of the children have about 40% of DMFT teeth.

Therefore, the “traditional” preventive methods evidenced in most cases exhibit limitations among population groups with a high risk of tooth decay groups moreover poorly identified on the epidemiological level. These populations at high risk for tooth decay – perhaps not their only risk factor – remain on dental health charts recorded in the years 1965, the same populations for whom treatment is apparently difficult to come by.

The failure of prevention is also the failure of the dental health care system. It is therefore necessary to identify alternative approaches if we wish to make progress. Getting rid of inequalities should be the primary purpose of the health system, whence the suggestion of innovative, integrated approaches. Serious thought must be given to the type of indicators for this programme, its strategies, and intended results.

Increasing cost which represents 4-8% of the total expenses in health. The oral health care system in Europe has economic significance, thus the industrialized countries’ clear policy, despite the disparities observed in health care expenses. Data for the OECD is explicit.

Figure 1. Health and Oral health care expenditures 2000 (% GNP) for 8 OECD countries

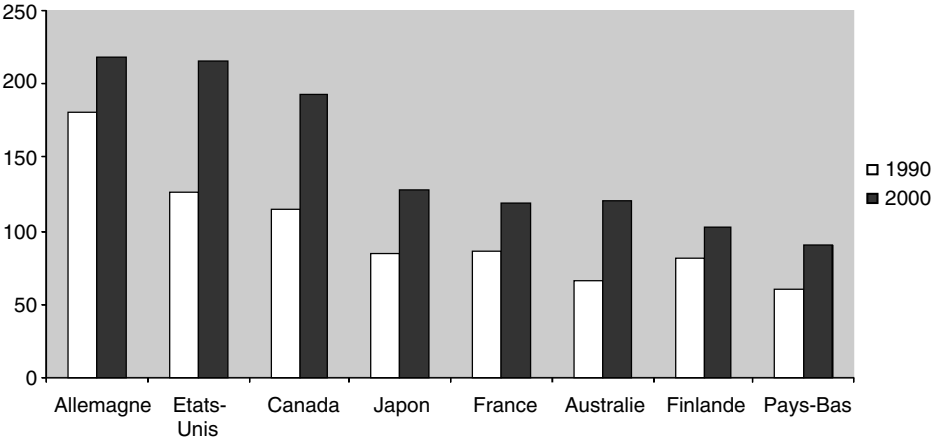


Source: Software Eco-Santé OECD 2003.

Dental expenditures represent 3.8 to 8% of all health care expenditures. For the eight OECD countries used in this example, average expenditures for dental care

per individual increased by 1.5 between 1990 and 2000, with variable differences according to the country.

Figure 2. Oral health care expenditures in 1990 and 2000 per capita for 8 OECD countries



Source: Software Eco-Santé OECD 2003

In 2000, expenditures for dental care represented an average of 0.5% of the GDP, or approximately 1/17th of overall health care expenditures. Germany spent proportionally the most for its oral health: 0.8%

of the GDP. France falls in the middle with 9.3% of the GDP devoted to health care and 0.5% reserved for dental care. Finland (0.4%) and the Netherlands (0.3%) have the smallest expenditures. A comparative

analysis of European oral health care systems therefore seems of the utmost importance. The operational goal via the implementation of a regional monitoring system based on economic-type health indicators would increase their effectiveness, their performances, and improve cost/efficiency.

A professional demography in transition. 245 169 dentists, 13 295 dental hygienists work in 1998 the European Union and EEA. The dental profession has an impact on employment in advanced health care. The majority of European countries question policy choices on dentistry programmes because the profession is sensitive to the economic and health environment. Many issues give rise to questions. The most important questions for planning are: what type of oral health professionals for what type of practice; what type of dentist for what type of practice; and how many dentists per capita in the medium term.

These questions are principally related to the items in the following list – which is not exhaustive –: (1) the observed change in the state of dental health among populations; (2) the evolution of techniques; (3) the development of behaviours and expectations among populations regarding the dental health care system; (4) the announced coordination of European studies for the Licence Master Doctorate; (5) the spread of dental hygienists; (6) the demographic balance linked to retirement; (7) the economic impact of health insurance reforms; (8) health care as a service; (9) the expansion of the Union, etc. Add to that the problem of declining quality of care, a hypothesis advanced in certain countries, and related, among other things, to (1) the growth of increasingly

open professional competition within a free market; (2) the trend of growing operating costs becoming more and more significant and hurting the practitioners' profitability; (3) the impending deregulation of social welfare systems; (4) access to private dental training leading to non-controlled professional demographic, etc.

In the interest of the populations and society at large, which is entitled to a quality undertaking of responsibility, the area of professional demographic control represents an important European issue. The first stage of this approach is a proper qualitative and quantitative assessment of the practices – which is presently lacking –, an assessment that should encourage aid in the decision for planning services. That being said, "Quality of the information in oral health is affected by the insufficient use of available data for planning, implementation, service management and evaluation and the inadequate quality of data produced".

The insufficient available data and the significant decrease in representative studies. The international epidemiological monitoring of oral health is a relatively recent initiative. The Epidemiological and Informative System (EIS) of the WHO Oral Health Programme started in 1969 with the establishment of the Global Oral Data Bank. As a general rule, evaluation of oral health currently relies on the analysis of a large number of studies. A total of 1,890 scientifically validated studies in 2000 was contained in the WHO data base but the fact that these surveys have more local or regional rather than national representativeness somewhat limits their impact. In Europe, the small amount of representative data on the status of oral health among populations is targeted, when it

exists, on DMFT indicators and 12-year olds. Data has significantly declined the past 10 years. Only rarely is data part of a health monitoring methodology. Few countries in Western Europe have established a data collection system at the national level: only Great Britain has secular epidemiological data on the prevalence of caries in young adults. Sweden and the other Scandinavian countries used country council reports to the National Board of Health and Welfare through the public dental service. No representative data on the status of the population's oral health existed in France before 1987 in which year the first two national epidemiological studies were conducted to assess the oral health of children of six, nine and twelve years of age.

The WHO data bank is based on specific methods that are recommended in oral health epidemiology, themselves resulting from basic epidemiological methods. Its methodological specificity is mainly related to the definition of the population that should be studied, sampling methods, indicators and monitoring index of decay, standardization of findings presentation. It seems that synthesis international articles are the main sources used to proceed to a state analysis of trends; they can be found in the WHO Data Bank.

A critical analysis of the methodological criteria used in "Materials, Methods, and Results", rubrics of the international scientific literature on cross-section studies by country at equal age, published for the oral health period 1986-1996 has underlined. New and complementary trends should be recommended so as to improve the production of higher quality information in oral health epidemiology. Standardized procedures should be developed

and used. The expansion of oral epidemiology during the 1970s overcame the obvious shortcomings in terms of knowledge about the oral health status of populations even though developed actions mainly targeted school children. Collected data favoured cross-section studies with no repetitive character since their aim was not to target the cohorts.

At this stage of the produced information analysis, research and development perspectives should focus on the setting up of a health monitoring and recording system and furthermore, on respecting the rules of results dissemination that should lie within a benchmark methodological framework. The analysis of the publications showed weaknesses in the evaluation of oral health trends: weaknesses in terms of methodology, quality control, and presentation of results. The interpretation and conclusions in public oral health are therefore limited. New or complementary measures should be taken in order to improve the quality of medical information in oral health epidemiology.

The profusion of internationally indicators complicates the national selection of indicators and may lead to costly and unnecessary monitoring efforts. Analysis of the literature highlights the profusion of recently available Indicators. These indicators stem from research developed in the health field, within the framework of international oral health programmes (ICSII, Biomed, Oratel, etc.) and national and even local studies with very limited impact. "Improvements" are regularly suggested to improve epidemiological knowledge about the state of dental and periodontal health among the populations. But these new types of indicators have generally dealt with quality of life, deter-

minants that include preventive factors, risk factors, and socio-demographic factors. Curiously, the indicators targeting health services and the health economy are underrepresented.

The many studies and publications available in this area create confusion about the selection and hierarchy of public health indicators. Boundaries are vague between the presentation and utilisation of clinical research indicators, foundational research indicators, and public health indicators, which are related to timely research projects without real operational development and without concrete application to coordinate European monitoring.

Therefore the disparity between the quality and the quantity of available indicators must be emphasized. Oral health has traditionally been defined in terms of disease. The complexity of the indicators required to characterize oral health is undoubtedly influenced by the complexity of this discipline. Oral health is strongly age related and there is often an increase in severity and prevalence with increased age and leads no doubt to an oral health spread of indicators. Yet the priorities given to clinical indicators do not currently rank among the most important recommendations advocated for development by European and/or international authorities in the area of monitoring non-contagious diseases. To this end, a new type of indicators will facilitate further promotion of oral health and non communicable disease surveillance in Europe to collect information, to monitor changes, to assess the effectiveness of the service and to plan oral health services.

In this context, the scopes and purpose of the European Global Oral Health Indicators Development Project for 2003-2004 are to support the exchange of expectations and experiences among experts of oral health statistics and their audience, policy makers in particular. It is also to conduct a systematic review and to outline a process for identifying a set of core indicators for oral health that will help professionals to promote and improve the global oral health promotion, quality of care and surveillance of people in Europe.

Overall objective were listed i.e. to support European Member States in their efforts to reduce the toll of morbidity, disability related to oral health diseases and especially:

- To strengthen the ability at the local, national, regional levels to measure, compare and determine the effects of oral health services and use of resources on oral health;
- To identify indicators of oral health (problems, determinant and risk factors related to lifestyle) of critical oral health care, its quality of care and of essential health resources;
- To identify the types of data generation and management problems within the health information system.

Beyond the actual scientific aspects of the research itself, such European projects are to develop collaborative work among the European country teams to set up networking processes, habits and culture. In addition, the project is an integration and further development of a large number of ongoing oral health projects in different fields in Europe and at WHO. In particular in Europe, it will use the development of set of specific and generic cost and health indi-

cators, i.e. the “Oral health project” (DG XIII, 1993/95; DG XIII 1997/98), the “Biomed Programme” (DG XII 1994/1998); just as the “Oratel Telematic Systems for Quality Insurance in Oral Health Care” (CEC Project A 2029), WHO Regional Office for Europe (1992). In the same way, we can advance the “Quality of Care Development Programme in Oral Health”, WHO Regional Office for Europe (1999). The organization of the project is organised around a steering committee group,

representative of the 15 countries of the European Union and working in collaboration with specific partners (*Table 1*). Agenda, methods and work plan proposed in the two years processes were outlined. The objective of the 2003 year, first period of activity of the project was through a European consultation and an EU/Workshop on Oral Health Statistics to conduct a systematic review and to outline a process for identifying a set of core indicators for oral health that will help professionals

Table 3. The European Global Oral Health Indicators Development Project Organization

<p><i>European Official National Partners</i></p> <p>Austria: University of Graz (Dr G. Wimmer) Belgium: University of Louvain (Pr. JP Vannieuwenhuysen) Denmark: University of Copenhagen (Pr P.E. Petersen) Finland: Ministry of Health (Dr. A. Nordblad) France: University of Lyon (Pr. D. Bourgeois) Germany: University of Dresden (Pr. T Hoffmann) Greece: Technology Institute, Athens Ireland: University of Cork (Pr. D. O’Mullane) Italy: University of Milan (Pr L. Strohmenger) Norway: University of Bergen (Dr E. Skaret) Netherlands: University of Amsterdam (Dr JSJ Veerkamp) Portugal: University of Lisbon (Pr. C. Mexia de Almeida) Spain: University of Grenade (Pr. Loddra Calvo) Sweden: Ministry of Health (Dr C. Källestål) United Kingdom: University of Glasgow (Pr D. Kinane)</p> <p><i>Associate Partners</i></p> <p>European Organization</p> <ul style="list-style-type: none"> • European Association of Dental Public Health • Council of European Chief Dental Officers • European Federation of Periodontology <p>UE Candidate Countries</p> <ul style="list-style-type: none"> • Latvia • Leetonia • Republic Czech <p>World Health Organization</p> <ul style="list-style-type: none"> • Oral Health Programme, Geneva, Switzerland • Surveillance Noncommunicable Diseases and Dental Health, Geneva, Switzerland

to promote and improve the global oral health promotion, quality of care and surveillance of people in Europe.

The also goal of this first year of the European Global Oral Health Indicators Development Project is to initiate at the conclusion of the first meeting, Lyon September, the long list of indicators, background document for the establishment of the major indicators.

The expected results, at the end of the two years process should be:

- To promote of systematic identification and technical specifications of oral health indicators through the use of an oral health outcome framework including information on the level of development of existing indicators and issues where indicators are lacking and require research

- To facilitate comparisons of indicator data by promoting standardization of indicators;
- To improve the capacity of area health services to monitor their oral health improvement activities in a standardized manner in the longer term
- To facilitate, in the longer term, service specifications across area health services with a view to maintaining and improving performance;
- To enhance the capacity to analyse the social, economic, behavioural and political determinants with particular reference to poor and disadvantaged populations.

The object of this current document set relates more specifically to the first domain of the project.

Documents of reference

- Programme of Community action in the field of public health (1998-2002).
http://europa.eu.int/comm./health/ph_projects/monitoring_projects_en.htm
http://europa.eu.int/comm./health/ph_projects/monitoring_projects_full_listing_en.htm
- Summary record of meeting of health monitoring project co-ordinators held in Luxembourg on 18-20 March 2003.
http://europa.eu.int/comm/health/ph_overview/previous_programme/previous_programme_en.htm
- Draft Mandate – Network of competent authorities in the Members States responsible for health information and knowledge
http://europa.eu.int/comm/health/ph_overview/previous_programme/previous_programme_en.htm
- Opportunity for further health gains – Chapter 9 – In: The state of health in the European Community in the year 2000. Final report
http://europa.eu.int/comm/health/ph_projects/2001/monitoring/monitoring_project_2001_full_en.htm#8

Conceptual Positioning within International Experience

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Indicators in Health.

The WHO Stepwise approach – a framework for surveillance

Ruth Bonita¹

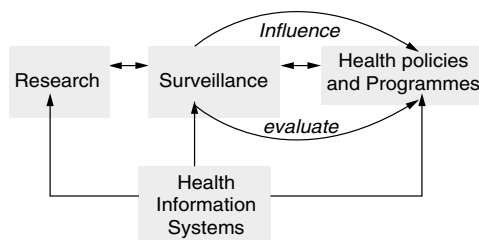
Introduction

Good quality health information is essential for planning and implementing health policy in all countries. Surveillance provides ongoing (continuous or periodic) collection, analysis and interpretation of population health data and the timely dissemination of this data to users. Properly conducted, surveillance ensures that countries have the information that they need to fight an epidemic now or plan strategies to prevent disease and adverse health events in the future. A systematic approach to data collection helps countries to monitor and evaluate emerging disease patterns and trends. The goal is to assist governments and health professionals to formulate policies and programmes to prevent disease and to measure the progress, impact, and efficacy of efforts to control diseases that are already effecting their populations.

Surveillance strategies

Surveillance of noncommunicable (chronic) diseases (NCD) such as cancer and heart disease, and for the purposes of this meeting, oral health status, usually requires a sustained effort over a long period of time. The policy implications of such information means that, in comparison to communicable diseases, which require a response in real time, a planned response is possible. The link between the data and action (health policies and programmes) is key (*Figure1*).

Figure 1. Characteristics of a Surveillance system



1. Director, NCD Surveillance, World Health Organisation, Geneva, Switzerland. Based on a presentation at the Meeting on Health SANCO Monitoring Programme in the implementation of the European Oral Health Indicators, Lyon, France 4-5 September 2003.

However, gathering data on morbidity of specific conditions and health states, including oral health, offers particular challenges. The oral health sector has been well served by standardised surveys for Adults and Children over the past few decades using specific age groups with the storage of that data in a databank facilitating comparisons between countries and trends within countries.

The attempt by the members of meeting to revisit the Oral Health Indicators for surveillance within the European setting is an admirable one. It is similar to the process recently undertaken at the World Health Organisation (WHO) for obtaining population level data in risk factors for NCDs, including oral health. The many and varied surveys and methodologies available have left countries in a quandary as to how best to establish methods to ensure that reliable and valid results would be achieved in measuring some of the major diseases and some of their associated risk factors.

The WHO surveillance program was charged with developing an approach to NCD surveillance which was globally relevant, locally useful, and sufficiently flexible to allow countries to contribute at a minimum level by the inclusion of a few key, standardised indicators. Reaching a consensus on what this “minimum level” or “core” level, is, in itself, is an important exercise.

Rationale for Surveillance of NCD risk factors

Surveillance of NCD has been neglected in modern public health. The population distribution of the major common risk

factors for chronic diseases is the key information required by countries for planning primary prevention programmes. Because of the relatively long time frame between exposure to a causal agent and disease, monitoring and surveillance of chronic diseases can be a costly exercise involving disease registers and legislation to ensure disease reporting. For this reason, most of the focus for surveillance of chronic disease involves surveillance of modifiable risk factors for disease.

The priority for surveillance of noncommunicable disease risk factors are those which have the highest avoidable burden of disease, can be changed through primary prevention, and are easily measured in populations. This common risk factor approach is a rational basis for promoting oral health as well.

Surveillance of risk factors

Surveillance of noncommunicable disease risk factors is becoming increasingly important to many countries as they try to control rising health care costs for an ageing population. The need for reliable, country-level information on the prevalence of risk factors for chronic disease is obvious if we are to avoid the predicted high burden of these diseases through timely population-level interventions. Unfortunately, country-level data on common, measurable chronic disease risk factors are sparse. This deficit seriously hinders efforts to combat the emerging epidemics of noncommunicable diseases especially in low and middle income countries.

Addressing data gaps and deficiencies

There are limitations to current existing NCD risk factor data collections. It is difficult to compare survey data across countries. Even within a country, where trend data are available, this data may not be comparable. Part of the problem is the use of different survey instruments, different measurement methods and different criteria for a clinical outcome. These problems can be solved by agreeing to standardised survey instruments and agreed upon indicators, definitions, methods, and sample size.

Surveillance underpins public health action and health promotion activities.

The WHO NCD global surveillance strategy includes several components:

- Identification and description of the common NCD risk factors, using recommended WHO definitions;
- A coordinated approach to conducting surveillance of risk factors that upholds scientific principles and that is sufficiently flexible to meet local and regional needs;
- Technical materials and tools, including training, to support the implementation of surveillance;
- Effective communication strategies for providing data to those involved in the design of policies and intervention programmes, potential funders, and the general public.

Two new WHO surveillance tools

WHO has developed two major new tools for NCD surveillance: the STEPwise

approach to Surveillance (STEPS) and the WHO Global NCD InfoBase. Both have relevance to oral health data already collected as well as the potential for obtaining new data on core oral health indicators by adding onto ongoing country level surveys or by their inclusion in surveys such as the World Health Survey.

The WHO STEPwise approach to Surveillance¹

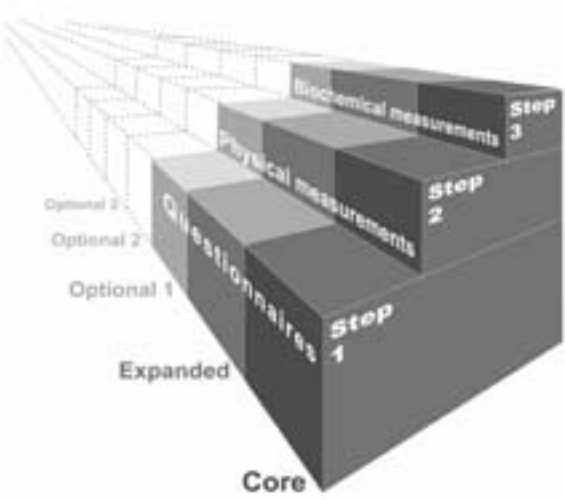
The STEPwise approach, allows for the development of an increasingly comprehensive surveillance system, depending on local needs and resources. By using the same standardized questions and protocols, all countries can use the information not only for monitoring within-country trends, but also for between-country comparisons. The questionnaires and methods recommended must therefore be relatively simple.

The assessment methods selected for STEPS for risk factors associated with NCD were chosen on the basis of their ability to provide trends in summary measures of population health. Hence they may not necessarily give a complete picture of each risk factor. Each country needs to determine which additional modules at the population level are appropriate and what can be accomplished in the context of an ongoing surveillance system.

For surveillance to be sustainable, the STEPwise approach advocates that small amounts of good quality data are more valuable than large amounts of poor quality data, or no data at all.

1. See http://www.who.int.ncd_surveillance

Figure 2.



The conceptual framework underlying STEPS is shown figure 2. The key feature is the distinction between the *different levels of risk-factor assessment*:

- information by questionnaire (Step 1),
 - physical measurements (Step 2), or
 - blood samples for biochemical analyses (Step 3);
- and the three modules involved in describing each risk factor:
- core
 - expanded core, and
 - optional.

Table 1. STEPS approach to risk factor assessment

Levels			
Modules	Step 1: Questionnaire-based	Step 2: Physical measurements	Step 3: Biochemical analyses
Core	Socio-economic and demographic variables, tobacco, alcohol, physical nutrition	Measured weight and height, waist girth, blood	Fasting blood sugar, total cholesterol pressure inactivity,
Expanded core	Dietary patterns, education, household indicators	Hip girth	HDL-cholesterol, triglycerides
Optional (examples)	Other health-related behaviours, oral health , disability, injury etc.	Timed walk, pedometer, skinfold pulse rate	Oral glucose tolerance test, urine examination thickness,

Step 1 – Questionnaire-based assessment

A Step 1 study is based on self-reported information. The core module of Step 1 contains as markers of current and future health status socio-economic data, data on tobacco and alcohol use, some measurements of nutritional status and physical inactivity. Standard WHO definitions for measuring the prevalence of tobacco use and alcohol consumption (9) and internationally devised measures of physical activity are recommended. Oral health indicators lend themselves to inclusion at Step 1 as an optional module.

Step 2 – Questionnaires and physical measurements

A Step 2 study includes as a minimum the Step 1 core module and *adds* simple physical measurements such as blood pressure, height, weight and waist circumference. Step 1 and Step 2 are desirable and appropriate for most countries.

Step 3 – Questionnaires, physical measurements and biochemical assessment

A Step 3 study incorporates as a minimum the core modules from Steps 1 and 2 and adds measurements obtained from blood samples. While most countries can manage Step 1 and 2 in a field setting, the additional information at Step 3 is of a biochemical nature and is therefore not recommended by WHO in less well-resourced settings unless low-cost technology is used.

Tailoring STEPS to suit local needs

One of the greatest challenges in developing WHO STEPS has been to achieve a balance between ensuring standardized tools and methods, and flexibility for use in a variety of country situations and settings. STEPS allows all countries to contribute to improving global information about trends in key measures of health. Expansion of the basic core questions is possible in settings where resources and local surveillance needs allow a more comprehensive assessment of these key risk factors. For both modules, core and expanded core, assessment guidelines and standard questionnaires are provided. Optional modules can also be added at Step 1 to include additional data on risk and protective behaviours, for example information on oral health status and health services use. The key recommendation is a limited set of key indicators for surveillance. Within the selected core variables, choices must be made which distinguish between surveillance purposes and research purposes. For surveillance to be sustainable, the cost of collection of data as well as its analysis, interpretation and use must be kept in mind when planning the implementation of STEPS.

Tailoring STEPS to include optional modules: oral health

The STEPS framework allows for the addition of add-on modules – intentional injury, unintentional injury, mental health, and oral health are all good examples. While most of these are Step 1 variables (by questionnaire), oral health lends itself to Step 2 (physical examination of the oral cavity) as well. In order for coun-

tries to ensure that the additional modules are not burdensome, the challenge is to identify – and agree upon – four or five key indicators for oral health. The World Health Survey conducted in 72 countries during 2003 offers a set of standard questions from which a number of key indicators can be derived.

Oral Health Care Questions from the World Health Survey^a

- 1 *During the last 12 months, did you have any problems with your mouth and/or teeth?*
- 2 *During the last 12 months, did you receive any medical care or treatment from a dentist or other oral health specialist for this problem with your mouth and/or teeth*
- 3 *What types of care or treatment did you receive for this problem with your mouth and/or teeth?*
 Probe for all types of care or treatment. Record in questions all types mentioned.
 - Medication
 - Dental work/oral surgery
 - Dentures or bridges
 - Information or counselling on dental care/oral hygiene
 - Other oral treatment
- 4 *Have you lost all of your natural teeth?*

a. [http://www.who.int/whs/P/instrumentandrel 8293.html](http://www.who.int/whs/P/instrumentandrel%208293.html)

Expanded indicators within the STEPwise framework are also possible and could, for example, refer to use of dental services, or a measure of the impact of a preventive health program.

The WHO Global NCD InfoBase

The second major surveillance tool is the WHO Global NCD InfoBase¹. In order to predict the future burden of chronic dis-

ease in populations and also for identifying potential interventions to reduce the future burden, data collection and reporting standards are needed to ensure that NCD data can be used effectively to inform prevention and control activities for health. This new WHO tool is now being used to help set data standards for NCDs and their risk factors.

Much time and effort has gone into deciding which type of information is most useful for surveillance of noncommunicable disease risk factors. Collection and storage of data has been limited to that which is strictly relevant to outcomes. The indicators chosen must reflect those that cause a large burden in the population, can be changed through primary intervention, and are easily measured in populations. The starting point was the collation and display of data on the major NCD risk factors which have been identified by the World Health Report 2002 and which are being collected as part of the STEPS approach mentioned above. The data entered comes from a range of sources including published reports or ministry of health reports or unpublished reports or wherever. The vision was to bring together in one relational data base, existing country level data stratified by age and sex, with complete source and survey information and each record linked back to its source, a necessity when the collection of such data involves so many different protocols and definitions.

The first report, for example, the SURF 1 Report - presents the most recent nation-

1. The data entry tool in a standard format and search and display functions are now on-line at www.who.int/ncd_surveillance/infobase/en.

ally representative data for 8 risk factors. It displays the prevalence, and/or the mean values by age and sex, and a measure of the uncertainty of the estimates. An accompanying CD ROM contains data for 170 countries, 50 000 data points, about 2 000 sources. In this sense it is a rich source of currently available information for many countries. Identifying country-level data and assessing its validity is the first step in developing better quality NCD data collections. The second step is the harmonisation of existing data by developing models to derive best estimates for any given risk factor or health state for each country, based on the amalgamation of the existing data. The InfoBase demonstrates how to use the assembled data to produce comparable, country estimates for NCD risk factors and diseases. For example, the Oral Health Indicators chosen, in consultation with the Oral Health program within the Noncommunicable Disease and Mental Health cluster, include the following:

- Decayed, missing and filled teeth;
- Edentualism, and
- Periodontal disease.

Disease specific modules are currently being added to the Global NCD InfoBase. It also has an Oral Health component which helps to identify a country's strengths in oral health data collection and also its gaps and deficiencies. Ultimately, the aim is to drive the sustainable collection of good quality risk factor data and promote the establishment of surveillance systems as an alternative to costly ad hoc "one time only" surveys which are often designed without consideration to the sample size required to provide robust estimates by age groups and sex.

Partnerships for the future

The SANCO Monitoring Programme faces a major challenge in streamlining complex and overlapping monitoring systems in the implementation of European Oral Health Indicators. The WHO offers two tools to encourage the collection of standardised data and the collation and display of this data in a manner which will allow measures of the changing oral health status in populations. There is widespread recognition of the need for oral health programmes to be developed and integrated with other population based health programs. A core set of Oral Health Indicators for use in a wide range of countries is best suited in the context of the surveillance of other population markers of risk, especially those common risk factors which impinge on oral health. In reaching consensus and through offering technical support and leadership, the solution will suffice not only for European countries, but also for developing countries who face enormous challenges in maintaining sustainable surveillance systems.

Above all, oral health professionals have a key role in forging partnerships with a wide range of agencies and professionals to ensure that improvements in oral health are achieved in the context of policies and programs which are directed at an integrated approach. The same benefits can be achieved by the integration of oral health indicators in new efforts to secure reliable and comparable data for measuring trends in population health status. This meeting to develop a set of Oral Health Indicators for the European region is an important step in the right direction.

Cross-country applicability of social survey indicators: the contribution of the Second International Collaborative Study on Oral Health Outcomes, the ICSII

Marie H el ene Leclercq¹

The broadening of oral health epidemiology

A major contribution, if not “the” major contribution of the ICS to oral public health is to have rooted a holistic approach to oral health in the field of international research. It is with the first ICS study in the 70s, that the traditional model of oral epidemiology restricted to clinical observation, expanded dramatically to include sociological studies and consideration of the entire oral health and health care systems. When ICS commenced in the mid to late 1970s, it was unique in relating oral health clinical and sociological data within and across cultures. Very few general health studies had been performed cross-nationally and none had made the clinical link at individual level. In an effort to better capture oral health determinants, the social interviews and the clinical examinations were conducted on the *same* persons in each of the age groups of the study samples. This is another specific feature of the ICS approach which, to our

knowledge, has not been replicated since in any other Oral Health Survey of that dimension. Even by the commencement of ICSII -around 1990-, few cross-national oral health or general health studies had been conducted, thus leaving wide and theoretical gaps. The wide-ranging social, political, economic and oral health care systems from ICSII study sites provided an excellent opportunity for each country to learn from other countries (a practical goal of the study), and for researchers to find ways to generalize the findings of single country studies to other countries (the theoretical goal).

Main descriptive aspects of the ICS series

The studies were initiated and conducted by the World Health Organisation in collaboration with the Public Health Service of the United States (USPHS) and the National Institute of Dental Research (NIDR, now renamed NIDCR).

ICS I took place from 1973 to 1981, in 10 different sites in 9 countries spread over 4

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continents: the USA, Canada, Australia, New-Zealand, Japan, Norway, Ireland, Poland and the Federal Republic of Germany. The ICS I report was published in 1985.

About 10 years later, some countries facing dramatic changes in their economic, political and health situation were willing to replicate the study in order to better adjust their Oral Health Care system and health-related legislation. As part of its mission, WHO has major interest in documenting epidemiological trends and further explore oral health determinants, two key research dimensions of the ICSs. In the ICS II WHO had the same scientific US partners and this time, the Centre for Health and Administration Studies of the University of Chicago (CHAS) as part of the coordinating team and to whom the social surveys were subcontracted.

ICSII was launched in an international meeting held at WHO in 1988 with participating countries representatives. Countries involved were: Poland, Germany, France and Latvia and outside the European continent: Japan, New-Zealand and three sites in the USA. It is interesting to note that more than half of the countries were in Europe and that a broad sample of health care systems ranging from entirely private to entirely public was offered for study comparisons.

Research objectives

ICSII established three major research goals. The first was to describe each of the study sites according to (1) oral health outcomes: oral health behaviour, oral health status and oral quality of life, (2) social group differences in oral health outcomes, and differences between individuals in

each of the oral health outcomes. For all of these dimensions, the sites were compared to gain a better understanding of the status of each site. The second goal was to investigate how the socio-environmental and oral health care system characteristics of the various sites were related to (1) differences in the status of their oral health outcomes (2) differences in the magnitude of gaps between social groups in these outcomes and (3) differences in the explanatory factors. The final goal was to test whether certain explanations for the three sets of oral health outcomes derived from previous single country studies could be generalized to all sites in the study. In practical terms ICSII was aiming at describing the oral care system and the oral health outcomes in each country, analysing the adequacy of the care system to respond to needs and demand of the population, providing cross-country comparisons so that public health decision makers and politicians could benefit from other countries experiences.

The ICS II theoretical model

A theoretical model was developed. It was used as a conceptual and practical tool in the research design, the development of the survey instruments, and the analytical process.

Although several theoretical models had been developed to explain determinants of oral health behaviour and oral health status, at the time of ICS II, they did not incorporate all three oral health outcomes. The factors affecting the oral health of a person can be found at individual level and at system level. The model postulates that individual oral health behaviour (including oral hygiene practices and oral

health service utilization) as the intermediate outcome variables is affected by his or her predisposing and enabling characteristics. In other words, characteristics such as sex, education, occupation, health beliefs predispose an individual to engage or not, in certain oral health behaviour, while enabling variables such as income, residence, having or not having a usual source of oral health care, represent conditions that might facilitate or impede the individual practice of such behaviours.

These personal characteristics are influenced by the system as a whole. The model also postulates that an individual's characteristics and oral health behaviour affect his or her oral health status, as measured mainly by dentition and periodontal status. As the model indicates, both personal characteristics and oral health behaviour operate under the influence of the system-level factors. Finally the model postulates that an individual's quality of life is determined directly or indirectly by his or her personal characteristics, oral health behaviour and oral health status, all of which are influenced by the system-level factors.

The impact of the system-and individual-level factors on an individual's oral health behaviour, oral health status and quality of life has been tested in all sites as part of the study hypotheses.

Major methodological and conceptual outcomes

Twenty-five years of ICS studies have highlighted many important findings which have had implication in the reorganization of oral health care systems. Especially relevant to the reflexion on the standardisation of oral health research in

Europe are some aspects of the methodological developments provided by ICS. ICS II has provided the research community with a set of data collection instruments on system characteristics, on oral health status, on social surveys including health beliefs, behaviour, and quality of life in relation to oral health. All of them have been designed, tested, used in various settings, practical conditions, cultural and political context. Methods for calibration of examiners, adjustment of instruments to local constraints, translation while keeping the conceptual content in different cultures, ensuring cross-country comparability and its limits, all these have been developed, used, tested.

A major result relates to the validation of quality of life as the ultimate outcome of any oral health care system. *"...dental research has been dominated by the measurement and study of two diseases which have coloured public health perception for the past 100 years. The quality of life dimension indicates that the scope of oral health is much broader and thus, it is imperative that oral health research should expand its spectrum to include that dimension in its mainstream, with important effects on approaches to oral health"* (Chen et al. 1997). This recommendation quoted from the conclusive chapter of the ICS II report is fully relevant six years later and oral health related quality of life is now widely accepted as an essential component of oral health research.

Recalling some major ICS II findings, imposes to mention the relationship between oral health and general health which states that "perceived general health is strongly correlated with oral health." Not to remain at the conceptual level, this finding leads to a strategic orientation for

the dental profession with a strong focus on high-risk groups and a broader role of the dental manpower as stated by Barmes in 1997 *“It is probable that a successful search for the fundamental factors that must be remedied would resolve not only many oral health problems, but also a broad spectrum of health and welfare defects. At the same time, a broader role for the profession as a strategic entry point may be found to intensify the cost-effective promotion of health. Only then would the phrase “general health and oral health are inseparable have a real and operational meaning.”*

Further research developments

The issue of data comparability is a major challenge of multi-country research. In the clinical field researchers are dealing with observation of the physical body made by trained professionals. Methods for calibration of examiners and calculation of variability have been developed, tested, applied for many decades; it is usually accepted that for epidemiological purposes the WHO pathfinder methodology should be recommended.

However, the problem is far more complex when dealing with socio-cultural variables. Researchers are then manipulating concepts, translated into words, expressed in various languages. They are no longer dealing with observation of clinical conditions, questions are asked and answers recorded.

A series of techniques and methods have been developed in ICSII in an effort to maximise the accuracy and comparability of the information collected. For example, the original questionnaires in English have been translated into the site language,

then back into English, Inter cultural adjustment of the survey instruments have been made to ensure the conceptual equivalence and to give space to cultural specificity while keeping meaning consistency, coding system for each item to categorize the information “universal” or “country-specific” have been used.

However, neither the measurement properties- i.e. validity and reliability- of the questionnaires, nor their international applicability had been scientifically evaluated.

Further research has been developed since, which partly fills in the gap of the methodological evaluation of the ICSII social survey instruments. In 2002 in a thesis presented at the University of Nancy, France, several domains of the ICSII questionnaires have been analysed for their psychometric properties: oral-health related beliefs, behaviours and quality of life as well as all the questions relating to patient satisfaction with oral health care (Tapsoba et al. 2000).

All the above-mentioned domains were analysed using similar statistical methods and provided similar results, therefore this paper will restrict their description to the analysis of the questionnaire on oral health related quality of life (ORHQOL).

The main dimensions of Oral Health related Quality of Life

Over recent years the concept of Oral health related quality of life has been introduced extending the assessment of oral health to include the social and psychological impact of oral diseases on individuals. Oral health related quality of life has been defined as a multidimensional concept including the following domains: sur-

vival of the individual (i.e. absence of oral cancer), absence of impairment, disease or symptoms, appropriate physical functioning associated with chewing and swallowing, and absence of pain or discomfort; emotional functioning associated with smiling; social functioning associated with performance of normal roles; perceptions of excellent oral health; satisfaction with oral health; and no social or cultural disadvantage due to oral health status. It has also been described as including self-perceived oral health status and treatment needs; assessments of oral pain or discomfort; the impact of disease on the mechanical functioning of the oral cavity (such as speaking or opening and closing the mouth); ability to perform self care (for example brushing and flossing); psychological issues (such as social discomfort in conversation or concerns about appearance); and limitations on activities related to role (such as the ability to perform work or other duties).

As mentioned earlier, the development of the ICSII – ORQOL was based on the three main dimensions of health-related quality of life: physical symptoms, perception of well-being and functional capacity. Self-reported oral disease symptoms, perception of oral well-being, and social and physical functioning were the dimensions adopted for use in the ICSII questionnaires at international level.

International validity and reliability of ICSII questionnaires

The first priority when developing a questionnaire to assess quality of life across nations is to determine the extent to which the concepts and dimensions hypothesized are universal. A minimum require-

ment for international validity and reliability is a clear factor structure replicated across countries with the same items and comparable variance.

The factorial structure of the questionnaires was analysed using the information collected on adults (35-44) and children (12-13) in three ICSII sites: New-Zealand, Poland and Germany.

The ORHQOL questionnaire for children was self-administered at school. It comprised 14 items categorized in three dimensions: self-reported oral disease symptoms; perceived oral well-being and social and physical functioning. Eight dichotomously scored items were designed to measure self-reported oral disease symptoms experienced in the year prior to the interview: broken tooth, painful or bleeding gums when brushing or flossing, tooth pain when eating or drinking sweets, bad taste or bad breath. Two items measured perceived oral well-being: perceived oral health rated on a five-point scale (excellent, very good, good, poor, very poor) and satisfaction with the appearance of the teeth on a similar scale. Four dichotomous items explored social functioning (avoiding meeting others, experiencing jokes being made about one's teeth, avoiding laughing or smiling because of unattractive teeth or gums) and physical functioning (missing school because of oral health problems).

Three dimensions of ORHQOL were also explored in the questionnaire for adults. The perceived oral well-being dimension include two items: perceived oral health rated on a 6-point Lickert scale (excellent, very good, good, fair, poor, very poor) and satisfaction with the appearance of the teeth (very much, quite a bit, they look ok, not much, not at all). The self-reported

oral disease symptoms dimension included the same eight dichotomously scored items as for children. However, the social and physical functioning dimensions differed. The physical component included two dichotomous items (usual activities limited because of oral pain or discomfort, and inability to chew hard food) and one item (trouble sleeping because of oral pain or discomfort) with four possible answers (very often, fairly often, sometimes, never). The social component comprised two items assessed using a 4-point Lickert scale, avoid laughing or smiling because of unattractive teeth or gums and avoid conversation because of unattractive teeth and gums or bad breath. Additional items for edentulous adults were satisfaction with the appearance of false teeth/dentures (a 5-point scale ranging from very much to not at all) and four dichotomous items related to problems with wearing dentures (talking clearly, eating, soreness and fit).

A detailed description of the statistical analysis can be found in the article referenced below. In summary, the factor structure was examined using principal component analysis, the reliability was assessed using Cronbach's alpha coefficient for measuring internal consistency and the Cattell's salient index was used to assess the factor structure similarities across countries.

The inter factorial similarity was demonstrated in all three countries, the reliability of the questionnaires ranged from moderate to excellent depending on the dimension and the country considered and a preliminary evidence of the cross-cultural stability of the ORHQOL questionnaires has been established.

Building upon international experience

As mentioned previously, similar work has been carried out on the other dimensions of QOL in relation to oral health status, with similar results. Further research might be encouraged in this direction to sustain researchers confidence in the ICS II methodological heritage.

Whereas ICS was carried out as a considerable human, practical and economical investment, a similar challenge could be taken up in Europe at a much lower cost in time, energy and consequently in financial terms. One way of reaching this objective is obviously to dramatically reduce the survey instruments and to identify a set of minimal essential and universal indicators. The ICSII questionnaires for adults and children are provided in *"Comparing Oral Health Care Systems: a second international collaborative study"* (Chen et al.1997). The core questionnaire for adults is attached, appendix 1. They were designed for international research purposes in an attempt to fill in mainly theoretical gaps and to provide further research directions. In this respect, the instruments have demonstrated their adequacy and their limitations. One reasonable way in considering the questionnaires for their reduction might be to identify the most cross-sites robust variables as indicated in the findings of the ICSII analysis (and similarly the least robust variables internationally). ICSII results demonstrated some strong and systematic associations.

These relationships observed repeatedly at ICSII sites with a wide – spectrum of oral care systems were found "conclusive enough for identifying target populations, designing new programmes or redesigning old-programmes". Special consideration

might be given to the following findings: females brush and floss more than males, residents of urban or more affluent communities brush and floss more than others, adults with higher education and income brush and floss more than others, those with a usual source of care visit oral health providers more than others, adults with a usual source of care have lower decayed to total teeth ratios, higher D components of DMFT are correlated with higher number of symptoms reported and with poor perceived oral health, prevalence of fluorides in a community predicts lower DMFT scores, perceived general health is strongly correlated with oral health.

Clearly, the issue of the standardisation of oral health information to be collected throughout the European Community calls for the identification of a minimum set of robust, replicable indicators. Important criteria for the methods to be used are their feasibility and cost-effectiveness.

Extensive research has been developed in the European region in the last decades of the past Century, which added to the ICS series, form the scientific experience on which new developments should be based. The always present temptation to reinvent the wheels should be avoided. Whether we refer to ICS, ORATEL, BIOMED, many international research projects have been carried out offering their results, methods and past experience as a compendium of knowledge which has enriched the community of oral public health. Much can and should be learned from what has been done in the past years. Building upon international experience is the most reasonable, cost-effective and ethical way to develop and implement new oral health research projects in the European Community.

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APPENDIX 1

International Collaborative Study of Oral Health Outcomes

WORLD HEALTH ORGANIZATION

Core Questionnaire for adults

*Developed by the Center for Health and Administration Studies
The University of Chicago – USA –*

ORAL HEALTH STATUS AND HYGIENE

1. Would you describe your oral health as excellent, very good, fair poor or very poor?
2. How would you describe the health of your teeth and gums? Is it excellent, very good, fair, poor or very poor?
3. During the past twelve months, did your teeth or gums cause any pain or discomfort? (yes, no, don't know, no answer)
4. During the past twelve months, has the pain or discomfort of dental problems caused you limit any of your usual activities? (yes, no, don't know, no answer)
5. How many days during the past twelve months, have you had to limit your usual activities because of the pain or discomfort from dental problems? (enter number...)
6. How often do you have trouble sleeping because of pain or discomfort from dental problems? (very often, fairly often, sometimes, never)
7. How often do you avoid laughing or smiling because of unattractive teeth or gums? (very often, fairly often, sometimes, never)
8. How often do you avoid conversation because of unattractive teeth or gums or bad breath? (very often, often, sometimes, never)
9. Are you able to chew hard things, such as hard bread or apples? (yes, no)
Please tell me if you have had any of the following problems during the last twelve months: (answer modalities are "yes" "no" from 10 to 18)
10. A broken or chipped tooth?
11. Gums that hurt or bleed?
12. Sores on your tongue or on the inside of your mouth or cheeks?
13. A bad taste in your mouth or bad breath?
14. Do you have any natural teeth at all?
15. Gums that frequently bled when brushed or flossed?
16. Teeth that hurt when you ate or drank hot or cold liquids or foods?
17. Teeth that ached or throbbled?
18. Teeth that hurt when you ate or drank sweet things?
19. How much do you like the way your teeth look? (very much, quite a bit, they look ok, not much, not at all)
If you had a dental examination tomorrow, do you think the dentist would say to you:
20. You need to brush your teeth better (yes, no)
21. You need to have your teeth cleaned (yes, no)
22. You need fillings (y, n)
23. You need to have a tooth pulled (y, n)
24. You need to have your teeth straightened (y, n)
25. Your teeth are good, nothing is wrong (y, n)
26. Do you brush your teeth? (y, n, don't know)
27. How do you usually brush your teeth? (5 modalities for frequency)
28. Do you use toothpaste containing fluoride? (y, n, don't use toothpaste, don't know what fluoride is)
29. Do you have any physical problems that make it difficult for you to brush your teeth such as opening your mouth or moving your hand? (y, n)

30. Apart from fluoride in toothpaste or in the water supply, do you use fluoride in any other way, that is in tablets or in a mouth wash? (y, n)

31. Do you use dental floss on your teeth? (y, n, don't know what that is, no answer)

32. How often do you use dental floss on your teeth? (six modalities for frequency)

33. Do you have any physical problems that make it difficult for you to use dental floss such as opening your mouth or moving your hand? (y, n)

Do you use any of the following to clean the spaces between your teeth:

34. Wooden toothpick? (y, n)

35. " " ? (y, n)

36. " " ? (y, n)

37. How often do you eat something in between your main meals? (five modalities for frequency)

Yesterday, did you eat any of the following foods: (y, n)

38. Bread?

39. Sugar-coated cereal?

40. Fresh fruits (apples, oranges)?

41. Pastry, such as biscuits, cakes, pie, doughnuts?

42. Soft drinks, cola drinks, soda flow (excluding diet cola)?

43. Nuts, cheese?

44. Jams or honey?

45. Dried fruits such as raisins, figs, prunes?

46. Chewing gum containing sugar?

47. Candy?

48. Do you smoke cigarettes?

Do you use the following type of tobacco: (y, n)

49. Chewing tobacco?

50. Cigars?

51. Pipes?

52. Snuff?

Now, I'd like to know how you feel about taking care of your teeth. Do you "strongly agree", "agree", "disagree" or "strongly disagree" with the following statements?

53. Brushing teeth with a fluoride toothpaste helps prevent tooth decay.

54. Brushing teeth helps prevent gum problems.

55. Using dental floss does *not* help prevent gum problems.

56. Eating sweet foods *does not* cause tooth decay.

57. Drinking fluoridated water helps prevent tooth decay.

58. Using fluoride is a harmless way of preventing tooth decay.

59. Going to the dentist will keep me from having trouble with my teeth, gums or dentures.

DENTURES/FALSE TEETH

60. Do you have any false teeth or dentures which you can remove? (y, n)

61. A partial denture? (y, n)

62. A full upper denture? (y, n)

64. Where did you get your last false teeth/dentures? (five answer modalities for place)

65. How many years ago did you get your last false teeth/dentures? (number of years...)

When you wear your false teeth/dentures, do you have any problem: (y, n)

66. Talking clearly? (y, n)

67. Eating? (y, n)

68. The way the false teeth/dentures fit? (y, n)

69. Soreness? (y, n)

70. How much do you like the way the false teeth/dentures look?: (very much, quite a bit, OK, not much, not at all).

Do you strongly agree, agree, disagree, or strongly disagree, with each of the following statements?

71. Tooth decay can make people look bad

72. Dental problems can be serious.

73. Poor teeth will affect people's work or other aspects of their everyday life.

74. Dental disease is less important than other health problems.

75. I place great value on my dental health.

76. It is *not* important to keep natural teeth.

77. Having dental problems can cause other health problems.

AIDS

78. Have you ever heard of AIDS: Acquired Immunodeficiency Syndrome? (y, n, don't know, no answer).

Tell me if you think that the following statement is true or false: (t, f).

79. AIDS is a disease. (t, f).

80. AIDS can cripple the body's natural protection against disease. (t, f).

81. AIDS can be transmitted through blood transfusion. (t, f).

82. AIDS can be passed from person to person through body fluids. (t, f).

Do you "strongly agree", "agree", "disagree" or strongly disagree" with each of the following statements?

83. Dentists are a good source of information about AIDS.

84. Dentists have a moral responsibility to treat AIDS patients.

85. Patients with AIDS should be given the same dental treatment as everyone else.

86. I would *not* mind if my dentist treated AIDS patients in his office.

87. There are safety measures dentists can use to prevent the spread of AIDS.

How much have you learned about AIDS from each of the following source: (a lot, some, a little, or none):

88. Radio/TV: (a lot, some, a little, or none)

89. Newspapers/magazines: (a lot, some, a little, or none)

90. Your doctor: (a lot, some, a little, or none)

91. Your dentist: (a lot, some, a little, or none)

92. Your friends/colleagues: (a lot, some, a little, or none)

93. Your church/religious leaders: (a lot, some, a little, or none)

94. Your family: (a lot, some, a little, or none)

95. National government agencies/authorities: (a lot, some, a little, or none)

96. Public health campaigns organized by the local health authorities: (a lot, some, a little, or none)

97. Other (specify)

DENTAL CARE

98. Is there a dentist's office or clinic that you usually go to for dental care? (y, n, don't know, no answer)

99. How long have you gone to that dentist's office or clinic for dental care? (seven answer modalities)

100. If you need dental care, do you know a dentist's office or clinic you would go? (y, n, don't know, no answer)

101. What is the name of the office or clinic where you usually go/would go to?

102. Do you see a particular dentist when you go there? (y, n)

103. What is the dentist's name?

104. What is the street address of the dentist's office or clinic?

105. Which of the following best describes... (name of the person/office in Q. 101) (six answer modalities)

106. How did you first find out about (Q. 101) (thirteen answer modalities)

107. What is the main reason that you continue to use... (Q. 101) (fourteen answer modalities: e.g. Care is free, staff is courteous, waiting time is short etc.)

108. Do any of the following sources cover any of your dental costs? (private insurance from employer, private insurance you pay yourself, government, dental clinic provides free care, other)

109. Do you or your family pay anything for the insurance/health plan? (y, n, don't know, no answer)

110. How often do you pay your dental insurance premium? (six modalities for frequency)

111. How much do you pay for your dental insurance premium each time?

Does your insurance cover all, part, or none of the costs of...

112. Examinations and X-rays

113. Cleaning teeth

114. Filling teeth

115. Oral surgery

116. Orthodontics

117. How long ago did you receive your last dental care? (six modalities)

118. What was the main reason you did not visit a dentist in the last two years? (cannot afford costs, don't want to spend money on dental care, etc... seventeen modalities)

119. At your most recent visit, did you go to the dentist's office or clinic you usually go for dental care? (y, n, no usual source of care)

120. What was the reason you made your most recent visit to a dentist? (four modalities)

At your most recent visit to the dentist, did you receive... (y, n)

121. An examination?

122. Cleaning?

123. Fillings?

124. Crown/cap work?

125. Root canal work?

126. Denture work?

127. Orthodontic work?

At your most recent visit to the dentist, did you receive...

128. Instruction in taking care of teeth and gums?

129. X-Rays?

130. Inlay work?

131. Extraction?

132. Bridge work?

133. Periodontal/gum treatment?

134. Fluoride treatment?

135. Any other treatment?

136. In the past twelve months, did you make any other visits to the dentist's besides this one? (y, n, don't know, no answer)

137. How many other visits did you make?

138. Were the additional visits for care? (y, n, no usual source of care)

During these additional visits, did you receive... (y, n)

139. An examination?

140. Cleaning?

141. Fillings?

142. Crown/cap work?

143. Root canal work?

144. Denture work?

145. Orthodontic work?

During these additional visits did you receive...

146. Instruction in taking care of teeth and gums?

147. X-Rays?

148. Inlay work?

149. Extraction?

150. Bridge work?

151. Periodontal/gum treatment?

152. Fluoride treatment?

153. Any other treatment?

154. Did or will dental insurance pay for the cost of the dental visits you made in the last twelve

months? (y, n, no dental insurance)

155. Apart from the cost paid by dental insurance, How much did you or will you pay directly for all dental visits you made in the last twelve months?

156. For your last visit to the dentist, did you have to take time off work? (y, n)

157. For your last visit, did you go directly to the dentist from either home or work? (y, n)

158. For your last dental visit, how did you travel to the dentist's office? (nine modalities)

159. The last time you went, how long did it take you to get to the dental office?

160. At your last visit for dental care, how long did you have to wait before you got to sit in the dentist's chair?

161. During your last visit to the dentist, how long did your treatment take?

162. For your last visit to the dentist, did you. (phone for an appointment, have a follow-up appointment... etc.)

163. How many days were there between the day you made the appointment and the day you actually received dental services?

164. Did you have to pay anything directly (that is out-of-pocket costs) for this last visit?

165. Could you have had the same work in another place at a lower out-of-pocket costs to you? (yes, definitely, yes probably, no, don't know)

166. Why did you choose the extra cost of getting the care where you did? nine modalities

for example: emergency, quality care, convenient location etc.)

During your last dental visit, were you “very satisfied”, “satisfied”, “dissatisfied”, “very dissatisfied” with:

167. Getting an appointment when you wanted it?

168. The time it took to get there?

169. The neighbourhood where the dental office is located?

170. The way you were made to feel welcome by the receptionist?

171. The way you were made to feel welcome by the hygienist/dental chairside assistant?

172. The way you were made to feel welcome by the dentist?

173. The information given to you about what was wrong with your teeth?

174. The information given to you about what treatment was provided to you?

175. The quality of care provided?

176. How up to date the dental equipment seems?

177. The amount of time you waited to see the dentist?

178. The cleanliness and neatness of the office?

179. The cost of your last dental visit (your out-of-pocket costs)?

180. In the last two years, was there any dental service recommended to you by a dentist that you were not sure you needed?

181. What was that dental service? (list of fifteen modalities)

182. Did you receive the dental service recommended?

183. What was the main reason you did not get the service recommended to you? (eleven possible reasons)

Now, I'd like to know how you feel about dentists and dental care. Do you “strongly agree”, “agree”, “disagree” or “strongly disagree” with each of the following statements?

184. Dentists are able to relieve or cure most of dental problems that patients have.

185. I am afraid of dental visits because of possible pain.

186. I will visit the dentist when I have dental problems no matter how busy I am.

187. Dentists are not always available when I have dental problems.

Now, I'd like to ask your opinion about dentists in the public sector

188. Public dentists explain a patient's problem to him or her.

189. Public dentists always spend enough time with the patients.

190. Public dentists are very careful to check everything when examining patients.

191. Public dentists prefer to fix up teeth rather than teach their patients to avoid problems.

Now, I'd like to ask your opinion about dentists in the private sector

192. Private dentists explain a patient's problem to him or her.

193. Private dentists always spend enough time with the patients.

194. Private dentists are very careful to check everything when examining patients.

195. Private dentists prefer to fix up teeth rather than teach their patients to avoid problems.

196. The cost of visiting a private dentist is too expensive for me.

197. In the last twelve months, did you make any visits to some place other than a dentist's office or clinic for advice on treatment of your teeth and gums? (y, n)

198. What type of person did you visit?

199. How many visits did you make to this type of provider in the past twelve months?

200. What is the main reason you visited (type of provider from Q. 198)? (Relief of pain, control of bleeding, tooth extraction, other)

201. What kind of treatment did you receive? (tooth extraction, medicine prescribed by doctor or nurse, traditional medicine, spiritual assistance or psychological counselling, traditional healing, other)

During your last visit to this provider were you “very satisfied”, “satisfied”, “dissatisfied”, “very dissatisfied” with...

202. The information given to you with what was wrong with your teeth and gums?

203. The information given to you about what treatment was being provided for you?

204. Your out-of-pocket costs?

205. The quality of the dental care provided?

206. The way you were made to feel welcome by the provider?

207. How much did you pay (out-of-pocket) for the treatment given to you?

Finally, we need some background information about you and your family.

208. Which of these best describes your current situation? (married, widowed, divorced, separated, never married, living with partner)

209. How long have you been living at this address?

210. How long have you been living in (DAU)?

211. Which of these groups do you belong to (specify ethnic group)

212. How many years of education did you complete?

213. Which of the following describes best your current employment situation? (thirteen modalities)

214. Did you ever work outside the home for as long as one year?

215. What type of work do (did) you do? Please, briefly describe your job. (ten proposed short description)

216. Are (were) you self-employed or do (did) you work for someone else?

217. Is (was) your main workplace your home or somewhere else?

218. Considering your present income (plus income from others who live in the household) please give me the number of the category that shows the household's total family income-before taxes and deduction- for the last twelve months (seven amounts in US \$ ranging from less than 5000 to between 50000 and 74 999).

Remark to the reader: *Skip patterns have not been indicated in this version of the adult questionnaire. Similarly, indications provided to the interviewer have been suppressed. The full version is published as an ANNEX to the ICSII complete report published by WHO in 1997.*

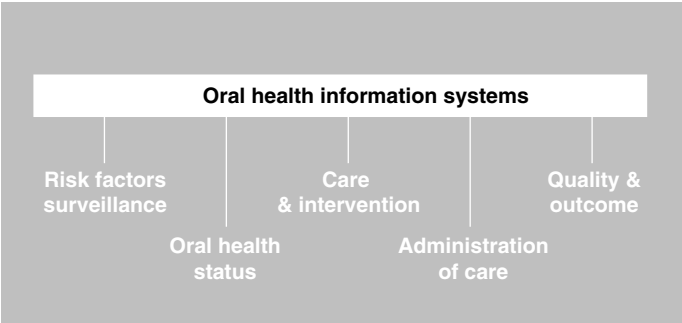
Basic indicators for development of quality of oral health systems in Europe – the approach of the World Health Organization

Poul Erik Petersen¹

This paper highlights the main experiences gained from WHO European projects to develop indicators for the quality of oral health systems and for the quality of oral health care, and suggests further initiatives in this direction as seen by WHO. These experiences were culled within the framework of a European project entitled “ORATEL” (telematic system for quality assurance in oral health care).

The European Region is however, only one of six WHO Regions which the global oral health programme serves. Therefore, when dealing with indicators for surveillance or for quality of care, WHO as an international (United Nations) organization must take into account the vast variations in systems and conditions across the world, and adapt any wider approach to the definition of health indicators to the given setting.

Figure 1. Oral health information systems



This figure shows what WHO considers important for information systems related to

oral health. Several European Member States have already established such systems

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including outcome measures. Others have health information systems which focus only on delivery of care and intervention.

The idea of the ORATEL project was to encourage the Member States of the European region to harmonise their information systems. Many East-European countries for example, traditionally record the number and type of services provided, the number of teeth extracted, the number of dental fillings but not outcomes, i.e. whether intervention contributes to health or not. Some western European countries have established more outcome-oriented information systems but neglect the processes. This WHO European project sought to stimulate the development of more comprehensive data systems.

Quality of care development and quality of health systems development projects were implemented by the WHO Regional Office for Europe to develop instruments in accordance with European Health for All targets. Target number 31 - to improve the quality of health care by use of appropriate health care technology and the provision of health information systems that are based on the use of information technology - was the most important policy basis of these projects.

In the late 1990's it was observed that many European countries direly needed to improve cost effectiveness and the quality of their health care. Patients were becoming increasingly aware of the treatment options available and health professionals were increasingly concerned with ethical aspects and provision of the highest possible level of care.

So when the WHO Regional Office for Europe embarked on the development of indicators for quality purposes, it began by

mapping the indicators used in European Member States and the philosophies behind them. Many countries have established schemes to monitor what dentists or providers of dentistry are doing by "looking over their shoulders", while few have established self-evaluation systems. The concept of the projects developed in the European Regional Office was to apply more modern approaches to quality development based on sharing the experience of others and more particularly to integrate these with state-of-the-art information technology.

The idea was to focus on how, by learning from each other, we can move the outcome curve from right to left, towards continuously improved outcomes. The above diagram illustrates this. At a practical level, WHO then developed a number of indicators that related to clinical performance and public health dimensions of providing care for populations. Indicators needed to be developed that addressed practice management and the inter-relationships between patients and providers, incorporating new quality aspects: what do the patients tell us, are they satisfied with their treatment and care, and how could community preventive programmes impact the population in terms of knowledge, attitudes and self-care.

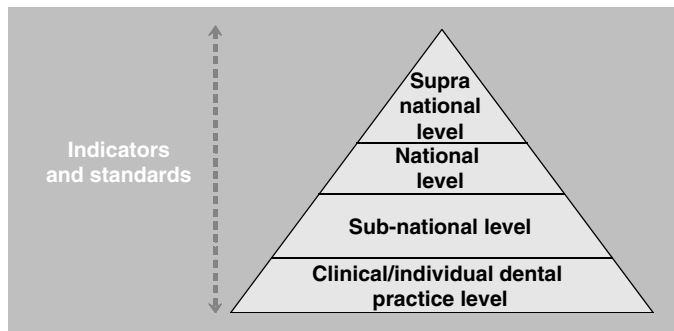
Obviously, the projects had to match the needs of the national oral health system, allowing easy day-to-day management and administration of oral health services. We also sought to achieve consensus on basic minimum datasets or sets of quality indicators. By reducing the number of indicators to a minimum, it would be easier to integrate these indicators into a software information system that could be used by providers of care across national boundaries.

ORATEL had three phases. First we developed a number of indicators and analysed the IT systems then available on the market which were suitable for developing the so-called “quality of care” tools we wanted to design; then, in phase two, we developed these tools; finally, in phase three, a number of countries participated in validating the relevance of the quality indicators developed and the information system itself, to allow an assessment of the practicality of the information gathered. Various reports - available to the current SANCO project - document a number of intercountry comparisons and activities in support of quality of oral health care in Europe (WHO 1992, Petersen 1994).

The most significant milestone in the process was a list of indicators developed at a consensus meeting hosted by WHO in

Copenhagen in 1992. The main objective of this meeting was to come up with indicators for proactive decision support and for retrospective evaluation or quality assurance which, in line with a new approach to quality measurement, comprised structure, process and outcome. Especially relevant to the SANCO project are the population related indicators developed for use at clinical level and various administrative levels, i.e. sub-national, national and supranational. In addition, an interactive teachware program was developed. A number of providers of care and health care administrators in the WHO European Member States were invited to work with the data produced at local, regional, national and supranational level in order to assess what indicators were practical for development of quality of oral health systems.

Figure 2. Indicators developed for use at clinical level and various administrative levels



The system was based on information extracted from a specially designed patient record which gives comprehensive information about the status and treatment provided to the patients as well as various follow-up mechanisms established at the clinical provider level. The list of indicators comprised five components: oral status, intervention or treatment procedures/processes, follow-up mechanisms, patient satisfaction and patient

administration. A total of 31 indicators for oral status were agreed upon, the philosophy being that oral status indicators would have to measure outcomes (Appendix 1). Other indicators related to process and structure or the organisational setting of care: indicators on intervention; indicators on recall and follow-up; indicators on patient satisfaction; and indicators related to administration and organisation.

Figure 3. WHO indicators for quality of health care development

WHO: Indicators for quality of health care development		
Structure	Process	Outcome
Organizational setting of care	Health care intervention	Effect of care and patient satisfaction

Figure 4. Oral health quality indicators in the ORATEL system

Oral Health Quality Indicators in the ORATEL system	
<i>Population-related indicators</i>	
* Oral status	A1-A31
* Treatment procedures/Intervention	B1-B27
* Follow-up/Recall visits	C1-C6
* Patient satisfaction	D1-D8
* Patient administration	E1-E15

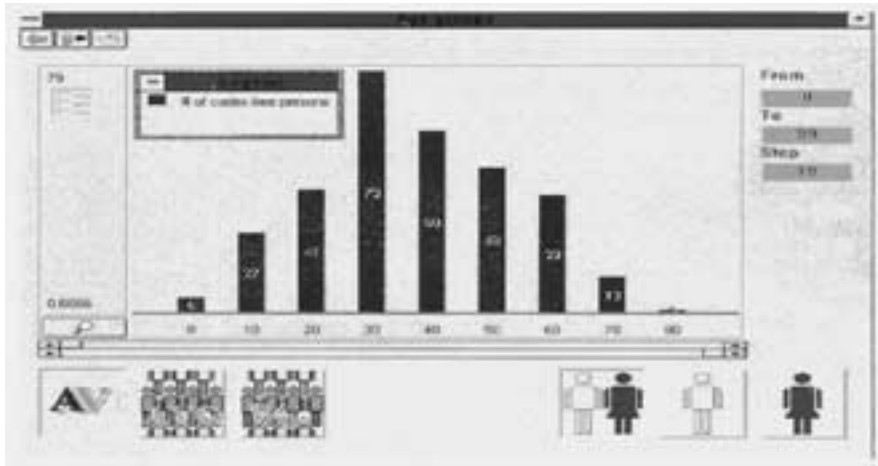
The software tool was then designed to compile information selectively, e.g. by year, age or region. A number of indicators from this database could be extracted for a European database. Below is an example (distribution of people by caries, whether they are caries-free or not) of the many indicators extracted and which were available to the individual provider, to health care administrators or authorities at supranational level.

After specifying these indicators, the WHO Regional Office for Europe developed other systems to serve the needs of eastern European countries, whose health systems at that time lacked software and particularly computers. "Paper-based"

data submission systems were designed for the so-called Oral Status EURO project (WHO 1996). Indicators were developed for access and equity, acceptability and user choice in health systems, and for best outcomes.

The establishment of surveillance systems is recommended in the World Health Report 2002. Two information systems have already been established in oral health that relate to the Global Databank of the 1960's and yet another information system, CAPP, is available on the internet. The basic indicators, which are detailed in these databases, relate primarily to the most prevalent of oral diseases and condi-

Figure 5. ORATEL software: example of indicators extracted



tions (i.e. dental caries, dentate status, periodontal disease, edentulousness), and in the future the list of indicators should be expanded to include other dimensions of oral health. The manual “Oral health surveys, basic methods” was first developed in 1973 to describe the dental disease profile in many countries or many regions and to assess trends over time, and needs updating as well.

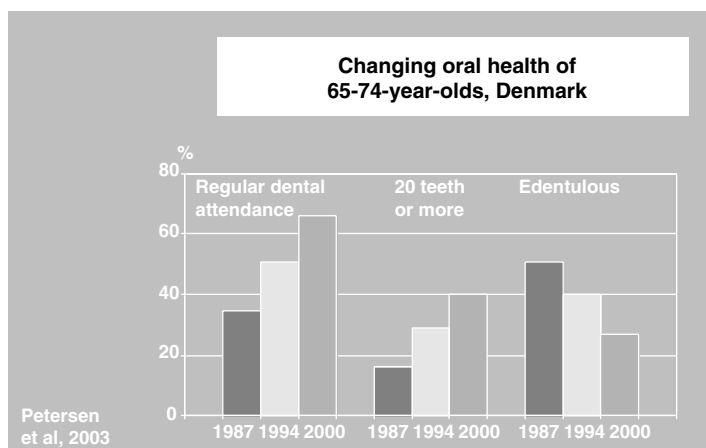
For all developed or developing countries epidemiological indicators can help us analyse disease trends and identify where intervention is needed. Standard age groups were specified for surveillance at intercountry and country levels, but users of the basic methods manual are encouraged to investigate other age groups relevant to community oral health care. There are very few data on the elderly, a population segment that requires special consideration particularly in a European context.

As one basic indicator it is recommended to record the number of teeth present. It is an open question whether a physical mea-

surement is really necessary, or whether we can rely on valid questionnaire data. With such information it may be more cost-efficient to answer questions posed by public health care administrators or policy makers: Do we strive for better oral health or do we tackle inequity issues? A recent survey in Denmark shows that inequity in health is still prevalent in terms of dentate status.

In the European context, the time has come to consider additional information as part of efforts to improve physical measurements. Risk assessment is one of these, and a model of risk factors in oral health is already detailed by the WHO ORH Programme in the World Oral Health Report 2003 (Petersen 2003). The WHO Oral Health Programme is currently assessing risk factors and linking these with existing data from individual Member States. It would also be of interest to discuss indicators related to impairment of function, oral illness, quality of life and relationships between oral and general health.

Figure 6. Basic indicator: number of teeth present



In conclusion, ORATEL is more than just another health information system. ORATEL is a “bottom-up” process, starting at the dental unit and ultimately serving as a tool for an international network for quality development in oral health care. It will both support management and administration of dental clinics and be an integrated part of a quality assurance system to promote a standard quality level for oral health care. It’s advanced educational and decision support tools can be used at all professional levels. Once ORATEL is operational, the results from its widespread use should result in: (a) lower incidences of oral diseases; (b) higher standards of public and private oral health care delivery; (c) cost effectiveness of public and private oral health care delivery; (d) equity in oral health care delivery; and (e) self-awareness and improvement of quality in oral health care by the providers. WHO is in the process of providing a data collection tool for countries which includes not only oral but also general health indicators in public health programmes. These efforts will strengthen surveillance instruments in the control of

noncommunicable diseases and health promotion. The outcomes of this work will be available to the European project in the near future.

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APPENDIX 1

List of quality of oral health care indicators for use at clinical (a), national/regional (b) and supranational (c) administrative levels

A.	Oral status	a	b	c
1.	Edentulous persons	X	X	X
2.	Teeth present per person	X	X	X
3.	Persons with 20 teeth or more	X	X	X
4.	Caries free persons	X	X	X
5.	DMFT/dmft per person	X	X	X
6.	DMFS/dmfs per person	X	X	
7.	Separate components (D, M, F, d, m, f)	X	X	X
8.	Tooth surfaces affected (mesial, distal etc.)	X		
9.	Teeth with untreated caries	X		
10.	Percentage of surfaces with secondary caries (recurrent caries)	X		
11.	Tooth surfaces with root caries	X		
12.	Restorations with marginal defects	X		
13.	Root fillings present	X	X	
14.	Insufficient root fillings	X		
15.	Teeth with pulpal diagnosis	X		
16.	Teeth with visible plaque	X		
17.	Tooth surfaces/sites with visible plaque	X		
18.	Sextants with gingival bleeding	X	X	X
19.	Sextants with calculus (supra and/or sub)	X	X	X
20.	Sextants with shallow pockets (4-5 mm)	X	X	X
21.	Sextants with deep pockets (6 mm or more)	X	X	X
22.	Teeth with loss of attachment (more than 1/3 of root)	X	X	
23.	Persons with functional dentition (natural and/or artificial)	X	X	X
24.	Type of extracted teeth	X		
25.	Teeth with occlusal interference	X		
26.	Persons with full dentures in upper and lower jaw	X	X	X
27.	Teeth with fractures (enamel, dentine, pulpal involvement)	X	X	
28.	Teeth with tooth wear into dentine (abrasion, attrition) per person	X		
29.	Persons with symptoms from TM-joints and/or muscles (subjective/objective)	X	X	
30.	Persons with malocclusions treated or referred	X	X	
31.	Persons with oral mucosal lesions	X	X	

B.	Treatment-procedures/interventions	a	b	c
1.	Persons having received professional plaque removal	X	X	
2.	Persons having received fluoride application (topical)	X	X	
3.	Teeth having received fissure sealing	X	X	
4.	Teeth having received restorations			
	a. One surface restoration	X	X	X
	b. Two/more surface restorations	X	X	X
5.	Type and brand materials used	X		
6.	Teeth with pulp treatment	X		
7.	Teeth with clinical complications during treatment (perforation, instrument-related overfilling, periapical lesions)	X		
8.	Crown restorations	X	X	
9.	Persons having received crown restorations	X	X	
10.	Bridge restorations	X	X	
11.	Persons having received bridge restorations	X	X	
12.	Persons having received removable partial dentures	X	X	
13.	Persons having received full dentures	X	X	X
14.	Persons treated by implants	X	X	
15.	Teeth extracted	X	X	X
16.	Persons having received scaling for periodontal treatment	X	X	
17.	Persons having received surgical periodontal treatment	X	X	
18.	Persons treated by oral surgical intervention (other than B17)	X		
19.	Persons having received medication for therapeutical reasons	X		
20.	Persons treated for benign oral mucosal lesions (denture stomatitis, candidiasis, aphtae, chelitis)	X		
21.	Persons with biopsy	X		
22.	Persons with correction of occlusal disharmonies/interferences (by grinding only)	X		
23.	Persons treated for orthodontic reasons	X	X	
24.	Persons treated by removable orthodontic appliances	X		
25.	Persons treated by fixed orthodontic appliances	X		
26.	Persons referred to specialist for premalignant and malignant conditions	X	X	
27.	Minutes per person spent on individual or group-based oral health instruction/education	X	X	

Basic indicators for development of quality of oral health systems in Europe

C.	Recall visits/follow-up	a	b	c
1.	Persons recalled for control of level of oral hygiene	X		
2.	Persons recalled for control of periodontal conditions	X		
3.	Teeth with replacement of restorations	X	X	
4.	Persons recalled for control of oral mucosal lesions	X		
5.	Persons recalled for control of occlusal and functional status	X		
6.	Persons with denture replacements	X	X	

D.	Patient satisfaction	a	b	c
1. ^a	Persons who felt oral health services accessible	X	X	X
2. ^a	Persons who experiences no excess waiting time in the dental office	X		
3. ^a	Persons satisfied with services rendered	X	X	X
4. ^a	Persons who felt informed about treatment alternatives	X		
5. ^a	Persons satisfied with physical facilities in dental office	X		
6. ^a	Persons who felt that the dentist had sufficient time for discussion	X		
7. ^a	Patients who felt cost of treatment acceptable	X		
8. ^a	Persons complaining of treatments performed per year	X	X	X

a. Special recording needed.

E.	Patient administration	a	b	c
1.	Persons with relevant social/medical history (diseases, medication, background data)	X		
2.	Persons classified by risk group (caries, periodontal diseases, based on clinical-biological tests)	X		
3.	Persons classified by social/behavioural risk factors	X		
4.	Total number of patients per dentist per year	X	X	X
5.	Number of patients in regular care (at least once a year) per dentist per year	X	X	X
6.	Number of patients in emergency per dentist per year	X		
7. ^a	Number of patients in public care programme free of charge per dentist	X		
8. ^a	Number of patients in public/national health insurance scheme per dentist	X		
9. ^a	Number of patients in private health insurance scheme per dentist	X		
10. ^a	Number of patients in mixed health insurance schemes per dentist	X		
11. ^a	Number of working hours per dentist per year	X	X	X
12. ^a	Number of working hours per dental hygienist per year	X	X	X
13. ^a	Number of working hours per chairside assistant per year	X	X	X
14.	Total number of patient attendances per year	X	X	
15.	Total number of new patients per year per dentist	X	X	

a. Special recording needed.

Efficiency in Oral Health Care. The Evaluation of Oral Health Systems in Europe

Helen Whelton¹

Introduction

Over the last 30 years interest in the relationship between the system of delivering health care and the health of those eligible for care under the different systems has increased. The late Archie Cochrane was the first to articulate the idea that the effectiveness and efficiency of a health care system was an important area of study and that much effort and resources could be wasted if a system and the procedures within a system were not subject to regular and rigorous study and evaluation (Cochrane 1972). He highlighted the fact that measuring activity alone without measuring the effect of that activity on the health of the population was seriously inadequate.

The concepts of cost effectiveness and cost benefit began to be frequently addressed in the international health services literature. The Archie Cochrane Centres for evidence based health care have been established in the US and UK to honour this great innovator in the field of

Health Services Research. In 1972, the World Health Organization in collaboration with the United States Public Health Services initiated a major International Collaborative Study (ICS) on Oral Health Care Systems (WHO 1995). This study, involving ten countries with widely varying oral health care delivery systems, attempted to ascertain whether there was a link between the characteristics of these different delivery systems and the oral health levels of those eligible for care within the different systems. The report of this study generated considerable interest and debate amongst researchers and those responsible for developing policies for oral health care delivery systems. A lively debate followed publication of the results, particularly those from the cities of Yamanashi in Japan and Canterbury in New Zealand. One outcome measure investigated in this ICS project was the level of edentulousness amongst representative samples of those aged 35-45 years of age. In Yamanashi this percentage was 0%, whereas in Canterbury it was 39%. A

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detailed analysis of the structures and processes of the oral health care delivery systems in these cities revealed major differences not only in the systems themselves but also in the attitudes to tooth loss. It was concluded that cultural factors were as important as the characteristics of the delivery system (e.g. payment methods) in determining oral health care outcomes.

A number of reports in the late 70s highlighted the wide variation in the structure and processes of the different oral health care systems worldwide (Ingle and Blair 1978, Kostlan 1979). In the early 80s major discussions were initiated in the United Kingdom regarding the NHS system of delivering dental care (Dental Strategy Review Group Report 1981) leading to fundamental change in the system in 1984 (Downer et al. 1994). These discussions highlighted the fact that whilst changing systems was both regular and widespread, the basis on which these changes were made often lacked an evidence base.

Health policy in the member states is required to address difficulties in the financing and delivery of health care. Systems design is required to pay particular attention to addressing pressures for rapid increase in expenditure, perceived deficiencies in coverage and access to services, and concerns about the efficiency of delivery. Systems design is also required to pay increasing attention to convergence of health care coverage and financing within the EU in order not to jeopardise the right of free mobility of persons and services between the Member States. Positively, the health care systems of all EU Member States should finally offer equal opportunities with respect to maintenance of health and treatment of illness for every EU Citi-

zen in each EU Member State. The policy problems to be solved for these purposes are heavily influenced by demographic and technological factors. These require that available policy instruments be employed to maximum effect in the interest of improved system performance.

Policy discretion applies principally to the areas of financing, payment and regulation. Considerable effort has therefore been employed by the Member States, within their distinctive national traditions, to improve health care financing and delivery systems. Policy reform has focused on changes in the funding mechanisms and the payment or recoupment arrangements. More recently, reform strategies have extended to a restructuring of the organisation of health care systems to strengthen control and review procedures while stimulating the search for greater productivity.

Within the reform strategies, particular emphasis has been placed on the design of systems for provider payment which reinforce the search for efficiency while achieving cost containment objectives. The effectiveness of alternative strategies in terms of cost containment is reasonably clearly established and has been the subject of an extensive literature. The impact of payment systems on the quality of care as well as on the effective utilisation of services is much more problematic. The measurement of final outcome as the ultimate test of quality is even more difficult both for the health system as a whole and for individual services.

Many fundamental differences exist between the health care delivery system of each EU Member State. It is reasonable to ask if these differences explain some of the

varying levels of health throughout Europe. If it does then it would be sensible to include those factors which promote health and exclude those which are detrimental to health in any policy changes being introduced on a Europe wide basis, for example as part of convergence of health care systems.

Oral health care systems share many of the structural challenges faced by health care in general. They have also been subject to review and redesign in terms of funding and payment policies. Outcome indicators are more accessible, however in the context of oral health care than in health care generally because of the existence of well-established measures of oral health status. These measures represent potential indicators of the impact of the design of an oral health care system on the content and outcome of interventions. They therefore represent an important tool for proceeding beyond process and cost evaluation to the level of the effectiveness of system design. In this sense, oral health care represents a marker for policy development with regard to health care systems as a whole. The fact that in each EU Member there are clearly established oral health care delivery system and the fact that there are now clearly defined measures of oral status makes oral health an ideal example in which to develop methodologies aimed at linking characteristics of a health care system with the health of those eligible for care under that system.

It was against the above background that the Oral Health Services Research Centre, University Dental School and Hospital, Cork, applied for funding in collaboration with six partners in the EU to conduct a project with the following aims:

- To develop a methodology designed to establish links between characteristics of a health care system and health outcome
- To determine the characteristics of oral health care systems which promote oral health and those which are detrimental to oral health

Essentially the project planned to harness information from the natural experiment created by seven different methods of delivering services in Europe, taking account of the background diversity in levels of oral health in the seven different regions.

Methods

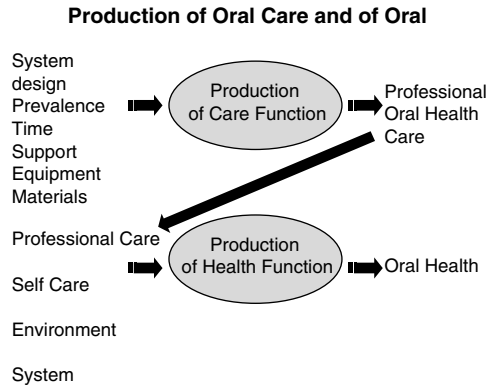
The Partners in this project were oral health services research groups from: Denmark, England and Wales, France, Ireland, Netherlands, Spain, Germany. Romania joined the consortium after the first year of the project and participated in some of the discussions and activities¹. Following a series of meetings of the consortium a detailed protocol, designed to achieve the aims and objectives of the project, were agreed. Initially a situation analysis of the seven participating countries was undertaken. This situation analysis included demographic variables such as population figures, percent of GNP spent on health services and

1. **Members of the consortium: Ireland Project Leader** D. O'Mullane, H. Whelton, A. Murphy, K. Neville, S. O'Hickey, M. Wiley, D. McCarthy, P. Flynn. **Denmark** P.E. Petersen, M. Vigild, L.B. Christensen **England and Wales** M. Downer, J. Todd (RIP), D. Parkin, J. Clarkson, M. Deverill **France** P.M. Cahen, A.M. Obry-Musset, V. Fabien **Germany** A. Borutta, W. Kunzel **The Netherlands** K. Konig, G.J. Truin, E. Bronkhorst **Romania** A. Illiescu **Spain** C. Manau, E. Cuenca, J. Echeverria, R. Artal.

on oral health services, number of registered dentists and the dentist population ratios. Data on oral health was also obtained, such as caries levels amongst 5 and 12 year-olds and the number of natural teeth present and levels of edentulousness amongst 35-44 year-olds and 65+ year-olds. These data were collected for 1980 and 1990. The results indicated considerable changes over time and wide variation in most of the parameters investigated. For example the dentist to population ratio varied from 1,353 in Denmark to 3,353 in Spain. Edentulous rates also varied widely, for example from 31% in Spain to 78% in the Netherlands amongst 65+ year-olds. During this initial phase also the demographic data and the data on oral health which was part of the management and administration of the different oral health care systems was assessed. It was found that there was considerable variation in the kind of data collected in the different systems and the method of collection was such it could not be adapted to suit the purposes of the project.

At this early stage of the project also, Dr David Parkin the Health Economist on the team led a subgroup of the consortium whose task was to develop a theoretical model which would dictate the information to be collected in order to achieve the aims of the project. This model is presented in figure 1. The model separates the production of Oral Health Care from the Production of Oral Health. In the upper part of the diagram the level of Professional Oral Health Care is subject to factors which relate to dental practice such as the chair-side time spent by the dentists and auxiliary dental workers, the type of premises, the equipment and the supplies used, as well as the characteristics of the

Figure 1. Model for the production of oral care function and for the production of oral health function



health care systems and the cultural or social environment in which oral health care was delivered. In the lower half of the diagram, there are other factors influencing oral health, such as self care, as well as the environment in which the health care system operates and the cultural and social environment in which the individual lives. Having developed this model the group then set about designing a number of data collection instruments for the many variables likely to impact on the agreed model. The two halves of the model were treated separately even though there is an assumption that any factors which increase the Production of Oral Health Care will have a positive impact on Oral Health itself. In other words, the more efficient the system is in delivering oral health care, the better the oral health of those eligible for care in that system. Data was collected from administrators of the different systems, from dentists practising within the systems (interview and questionnaire) and from patients who were being treated under the system (clinical examination and questionnaire). The data collection instruments were

piloted extensively taking account of the fact that the parent language of the participants varied. The questionnaire design team was lead by the Dutch group who had considerable experience in designing questionnaires for both dentists and patients (Eijkman et al. 1984, Hoogstraten & Broers 1987). The data collection instruments are attached, appendix 1.

Results

The results of the project are contained in the Report to the EU Commission (1997). Further details of the project including results have also been recently published (Parkin & Devlin 2002). Convenience samples of dentists and of patients were recruited in the different countries. In total 316 dentists participated in the project and 1,501 patients were clinically examined. In the case of the first part of the model, namely Production of Oral Health Care one dependant variable or outcome measure is selected for illustrative purposes namely average number of patients seen per hour worked in system by each dentist. The independent variables included in the stepwise regression analysis used to test the model are : average age of dentists in system, age of dental unit, average number of hours per week worked by dentists chair side, average numbers of hours per week worked by dentists, administration, number of chairs concurrently operated by dentist, time worked by reception staff, time worked by chair side assistants, time worked by hygienists, time worked by staff conducting health education, time worked on 'other tasks', average number of weeks worked per year by each dentist in sample, number of years spent practicing

since qualifying by each dentist, number of population per dentist in system, denture fee as multiple of filling fee, whether patient contributed payment to treatment or not, country of origin.

In the case of the second part of the model, namely the Production of Oral Health two dependant variables were considered namely the state of the oral health as perceived by the patients themselves and the number of sound unrestored teeth: Age, attendance pattern, tooth brushing frequency, whether they had a check-up in the last 2 years or not, had subjects consulted a non-dentist, educational level, employment status, satisfaction with service, gender, percentage of fees borne by patients, denture fee as a multiple of filling fee, sugar consumption in country (kg/per person per year), country of origin were included as independent variables.

In this study, the independent variables found to impact on the number of patients seen per hour (production of oral health care) were average age of dentists (positive, the older the dentist the more patients seen per hour by the dentist), dentist chair side hours (negative), dentist administration hours (negative), denture fee as a multiple of filling fee (negative), dentist population ratio (negative), whether patient contributes to treatment. The adjusted R-squared for this analysis was 0.49. The country of origin variable was not significant.

In the case of the production of oral health model, two outcome measures were included in the regression analysis in order to illustrate the potential of the model developed in this project. Namely the oral health status of the patient as assessed by the patient and the mean number of sound

untreated natural teeth as assessed by the dentist during the clinical examination. In the case of the latter, the factors having a significant impact on the factor were age (negative, the older the patient the less natural sound teeth present), attendance frequency (negative), consultancy in non-dentist for advice (negative), educational level (positive), gender (positive, females had more), percentage of fees paid by patient (positive), denture fee as a multiple of filling fee (positive). Country of origin was a significant factor in three samples, Germany (negative), France (negative), Spain (positive). The adjusted R-square for these significant factors was 0.34.

Discussion

One of the main objectives of this project was to establish a methodology for assessing the link between the characteristics of a health care system such as eligibility, methods and levels of payment and the health status of those eligible for care under the system. It was realised from the outset that any linkage between a health care system and the health of those cared for under the system would be complex and difficult to measure. Using oral health as a model, however, it was felt that because of the recent advances in defining oral health outcomes there was a greater likelihood of developing methods for assessing the links between structures and inputs of oral health care systems and outcomes, than for other health care systems in which outcome measures are less easily defined. Again it is important to emphasise that the comments made on the results obtained are purely illustrative of the kind of interpretations that could be produced if fully representative samples of dentists

and patients in the different systems were selected to participate in the project.

It was interesting that even though extensive data was routinely collected as part of the administration and management of each of the systems studied, these data were collected in many different formats and for many different reasons and therefore were not comparable between countries at any level and could not be used to achieve the aims of the project. The Oral Health Services Research Centre in Cork is currently engaged in a number of projects, the overall aim of which is to develop criteria for increasing the usefulness of routine data in measuring the efficiency of oral health care delivery systems.

The consortium devoted considerable time in arriving at a consensus on which clinical outcome measures were most suitable for comparing the efficiency of oral health care delivery systems. Whilst there was agreement that the number of natural teeth present was a measure which took into account not only the oral health status of the eligible population but also to some degree the extent to which treatment was impacting on oral health, the need to further consider this matter needs to be emphasised. The current project being undertaken by Professor Bourgeois and his team will hopefully achieve a consensus on this issue.

A method for establishing the possible link between the health characteristics of a care system and the health of those eligible for care under that system is the primary aim of this project. In order to simplify the conceptualisation of the possible link it was decided to consider separately the production of oral health care (sometimes referred to as "productivity")

and the production of health. In a health care system providers are deployed to carry out tasks such as fillings, crowns, etc, the underlying assumption being that the carrying out of these tasks will result in better oral health. Put in another way it is assumed that the more work a dental provider such as a dentist or hygienist carries out, for a given remuneration the more efficient that system is. The results of the modelling exercise developed in this project clearly show that the approach has considerable merit; from a conceptual point of view results show that considering production of oral health care and production of oral health separately is a useful approach and needs to be developed further.

It should be emphasised however that considering the models separately is one stage towards a more comprehensive view and does not in itself constitute the approach advocated. A further stage of modelling is required, in which the two models are jointly estimated, making explicit the links between them and enabling a proper view of the important relationships between them, of the important relationships between oral health care production, oral health production and factors which influence them. As stated, this additional complexity was not possible within this pilot project, but remains an essential feature of future work.

The decision to select the mean number of patients seen per hour by the dentist as the measure of production of oral health care or 'productivity' was an arbitrary one. No doubt other equally appropriate measures for the production of oral health care, e.g. the number of fillings relative to the number of extractions carried out per week, the number of specific items of treatment conducted per hour or week could be assessed.

However, the time available to the consortium for this project considerations of all of the various possible measures of 'productivity' was not possible. Nevertheless, by using the mean number of patients seen per week as a reasonable measure of 'productivity' the results illustrate the usefulness of the methods adopted.

It is interesting that the consortium in their proposal for this project to the Commission hypothesised that one characteristic which might have an effect on the production of oral care and as a result, possibly also on oral health was the system of payments to dentists for work undertaken. The results show that two of the independent variables concerned with payment which were chosen, namely the ratio of denture fee to single surface filling fee and whether or not the patient made a contribution towards payment of treatment, both had significant links with the number of patients seen per hour. In the case of the former it was found that the greater the fee obtained for full upper and lower dentures relative to the fee for a single surface filling the less patients seen per hour by the dentist. From a clinical point of view there is some sense in this relationship in that the higher fee for dentures might encourage more emphasis on work on dentures; perhaps the fitting of dentures might take longer to complete hence the reduced number of patients per hour. Whilst it is tempting to attempt to explain in this fashion the clinical sense of the relationships found between the dependent variable chosen (mean number of patients seen per hour), and the various dependent variables, the methodological nature of the project must again be emphasised. Further detailed work is required to consider further appropriate and relevant

independent and dependant variables for the production of oral health care model. The results presented show that the method chosen has considerable merit and future possibilities.

It was decided to derive two measures of oral health, one based on the patients opinion of their oral health status and the other based upon the clinical examination conducted by the dentist. The measure of oral health chosen from these two sources is again arbitrary, the choice being simply made to illustrate the method used. Future work in this area will need to focus on, for example, what combination of patient-based and clinician-based measures could be used to give a simple measure of oral health. One approach to this is to consider explicitly the weights to be attached to different aspects of oral health, using some variant of the utility index approach. This could be applied both to patients and to dentists.

As in the case of the production of oral health care model, the model of production of oral health outlined in this report has considerable potential and should be further developed. A particularly fruitful area for further work should be the development of the linkage between factors found to be significant in the production of oral health care with the level of oral health.

In summary a method for measuring the link between system of delivering an aspect of health, namely oral health, with the oral health of those eligible for care under that system has been developed. The background to the development of the proposed model is outlined. The complexity of the links between an oral health care system and the oral health of those eligible for care under the system required that separate models for the production of oral

health care and the production of health be developed. For both of these models a number of factors have both positive and negative influences. Further work is required on the data collection to devise appropriate combinations of independent and dependent variables for use in the model of production of health care and production of health. Furthermore, the relationship between factors affecting production of care and production health needs to be considered so that a further model can be developed to quantify the relationship between both.

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APPENDIX 1

Questionnaire Patients (1)



BIOMED
Efficiency in Oral Health Care
the Evaluation of Oral Health Systems in Europe

Dental Care in Europe

Patient Number

Questionnaire

Age in years Sex: Male Female

1. At what level did you finish your education?

Primary/Elementary school
 Secondary school
 Third level, Technical/University
 Other education

2. What is your current employment status?

Fixed
 Occasional
 Not in employment

3. Do you live alone?

Yes
 No

4. Do you have any of your natural teeth?

Yes
 No

How many natural teeth do you have at the moment?

5. How would you describe the general state of your teeth and gums?

	Teeth	Gums
Excellent	<input type="checkbox"/>	<input type="checkbox"/>
Good	<input type="checkbox"/>	<input type="checkbox"/>
Average	<input type="checkbox"/>	<input type="checkbox"/>
Poor	<input type="checkbox"/>	<input type="checkbox"/>
Don't know	<input type="checkbox"/>	<input type="checkbox"/>

6. Have you had any of the following problems during the last 12 months?

Tick all that apply

Gums often bleed when brushing my teeth

Teeth hurt when I consume hot or cold foods or beverages

I cannot chew hard things, such as hard bread or apples

I had tooth aches/teeth throbbing

Teeth hurt when having sweet or savoury drinks

7. How would you rate the appearance of your teeth at present?

Very good
 Good
 Bad
 Very bad

8. How often do you brush your teeth? Tick one

Less than once a day
 Once a day
 More than once a day
 Occasionally
 Never

9. Do you use toothpaste? Tick one

Yes
 No
 Don't know

What is the brand of toothpaste you use?

10. Do you use any of the following to clean your teeth? Tick all that apply

Toothbrush
 Toothpaste
 Interdental Brush
 Thermal (dental floss)
 Chiselstick/miswak
 Mouthrinse
 None

11. Do you have any removable dentures? Yes No

12. How long is it since you last visited the dental practice? Tick one

Less than 1 month
 1-12 months
 1-2 years
 More than 2 years
 Never

13. How many times have you been to the dental practice/clinic in the last two years? Tick one

Never
 Once
 2-4 times
 5 or more

13a. Did you visit the dentist for a check up in the last 2 years? Yes No

14. Why did you not visit the dentist for a check-up? Tick all that apply

I had no problem or need for treatment
 I have no natural teeth, so need to go
 I didn't know any really good dentist
 I became conscious of the idea of seeing a dentist
 I didn't have the time to see a dentist
 I didn't think the dental trouble I had was serious enough to go to the dentist
 I couldn't afford it
 I didn't want to waste money on dental care
 I have bad memories of my last visit
 The dentist's surgery was too far away
 I would have had to miss some work so I didn't want to go
 Other (specify)

15. What was the reason for your last visit to a dental practice? Tick all that apply

Something was wrong
 It was time for a check-up
 The dentist reminded me it was time for a check-up
 To have my teeth cleaned
 It was part of a course of treatment
 To remain within the payment system
 Can't remember/not applicable
 Never received dental care

Questionnaire Patients (2)

16. Why do you normally go to the dental practice?

For a check-up once every 6-12 months
 For a check-up once every 13-24 months
 When I feel I need treatment
 Only when I have pain
 To have my teeth cleaned
 Never

Tick all that apply

17. Did you expect any particular treatments at your most recent visit? Yes No If yes, tick all that apply

	Expected care	Received care
As examination?		
As X-ray?		
Cleaning?		
Instruction in taking care of teeth and gums?		
Fluoride treatment?		
Fillings?		
A crown?		
Root canal work?		
July work?		
Bridge work?		
Extraction?		
Removable dentures work?		
Periodontal/gum treatment?		
Orthodontic work?		
Any other treatment?		

18. During the last 12 months have you consulted a person outside of the dental profession for advice on, or treatment of, your teeth or gums? Yes No If yes, to whom did you turn?

Dental Technician
 Physician (but not a dentist)
 Acupuncturist
 Homeopath healer
 Pharmacist
 Naturopath
 Friends
 Other

19. Who provided your treatment last time you went to the Dental Surgery? Tick all that apply

Dentist
 Hygienist
 Dental Technician
 Dental Specialist
 Other (specify)

20. Please rate your level of satisfaction with the following aspects of service. Tick all that apply

	Very satisfied	Satisfied	Dissatisfied	V. dissatisfied
Appointment at a suitable time	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ease of getting to the surgery?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Helpfulness of staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dentist's attitude	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information concerning the state of your mouth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information about treatment options	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quality of treatment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standard of dental equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Time spent in the waiting room	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cheerfulness of premises	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21. In your own experience to what extent do you feel the following statements are 'Always', 'Sometimes' or 'Never' true for dentists in general?

	Always	Sometimes	Never
Dentists give patients enough opportunities to ask questions on dental matters?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dentists are more business people than carers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dentists devote enough time (attention) to their patients?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dentists prefer to fix up teeth rather than explain how to avoid dental problems?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Now we would like to ask you some questions regarding your degree of satisfaction with the PRSI system of providing dental care.

22. Are you satisfied with availability of information on the PRSI scheme or payments system concerning:

Please answer all questions Yes No

Where to find information on the system other than from the dentist?

Which dentists operate the system?

How to join the system?

How to remain eligible for treatment?

How your rights are protected within the system?

Where to complain if dissatisfied?

23. Now we would like to know whether you are satisfied with the services offered by the PRSI dental system.

Yes No

Is data were all treatments you required provided under the scheme?

Are you satisfied with the cost of care you require under the system?

24. As far as you know, does the system provide:

Yes No

Silver (amalgam) fillings

White fillings

Crowns

Bridges

Dentures

Cleaning of the teeth (Scale and Polish)

Surgery for gum problems

Instruction in oral health care

Preventive care (e.g. fluoride application, sealants etc.)

25. Do you feel the PRSI system makes you attend the dentist more frequently than you otherwise would? Yes No Don't know

26. Private Insurance Yes No Don't know

Do you have a private dental insurance policy?

Have you claimed under this insurance policy in the past two years?

To which private dental insurance group do you belong?

27. What is your estimated household income level per year? £ How many dependants do you have?

This completes our questionnaire. Thank you for answering.

Questionnaire to Dentists



BIOMED Efficiency in Oral Health Care
the Evaluation of Oral Health Systems in Europe

Dental Care in Europe

Dentist Number:

Questionnaire to Dentists

Sex: *Male* *Female*

1. Number of years practising as a dentist:

2. What is the age of your primary dental unit (equipment) in years?

3. How many dental chairs do you normally operate concurrently?

4. What is the average number of patients you see per week?

About how many of these patients are seen under the PRSI Dental Benefit Scheme?

5. How many weeks per year do you work?

6. How many hours per week do you work in total?

7. How many hours per week do you personally devote to the PRSI Dental Benefit Scheme?

i) in administrative time e.g. completion of patient records, payment forms etc.

ii) in chairside/clinical time

8. What is the total number of hours per week worked on the PRSI Dental Benefit Scheme by support staff?

Number of Hours Other (please specify)	At reception <input type="checkbox"/>	At the chairside <input type="checkbox"/>	Working as a hygienist <input type="checkbox"/>	Conducting Dental Health education <input type="checkbox"/>	Other tasks <input type="checkbox"/>
-------------------------------------------	------------------------------------------	----------------------------------------------	----------------------------------------------------	----------------------------------------------------------------	-----------------------------------------

9. Please complete the following estimates of time spent on patients of the PRSI system in the various categories of treatment given below. Please note this is only an estimate. However, percentages given should add up to 100%.

Treatment category	% time
Check up	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>
Preventive	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>
New Surgical Periodontal	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>
Periodontal Surgery	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>
Simple Restoration	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>
Advanced Restoration	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>
Extractions	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>
Orthodontics	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>
Other	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>
Total	100%

10. Please rate your level of satisfaction or dissatisfaction with the remuneration provided for

	Very satisfied	Satisfied	Dissatisfied	Very dissatisfied
<i>Preventive services</i>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>
<i>Restorative services</i>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>

11. Please indicate your level of satisfaction with the following items in relation to the PRSI Dental Benefit Scheme.

	Very satisfied	Satisfied	Dissatisfied	Very dissatisfied
<i>Speed of remuneration</i>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>
<i>Range of treatment covered</i>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>
<i>Speed of communication</i>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>	<input style="width: 15px; height: 15px; border: 1px solid black;" type="text"/>

12. Please rate your level of satisfaction or dissatisfaction with the quality of care which you can give to your patients under the PRSI Dental Benefit Scheme

	Very satisfied	Satisfied	Dissatisfied	Very dissatisfied
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13. Do you feel that there is enough emphasis in the PRSI Dental Benefit Scheme on

<i>Restorative dentistry</i>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
<i>Preventive dentistry</i>	Yes <input type="checkbox"/>	No <input type="checkbox"/>

Dental Manpower: Specific situation in Spain

Manuel Bravo¹, Juan Carlos Llodra¹ and Frederico Simón²

The International Programme conducted in 1989 by a Joint Working Group FDI/WHO was to list the factors influencing the balance between care needs and dental workforce needs for optimal oral health (WHO 1989). The objective of the JWG6 was to provide guidelines for planning and monitoring for oral health with a standardised working tool to analyse the situation and develop short, medium and long term planning for the necessary number of dentists sufficient to meet the required needs (*Table 1*). The philosophy of the Manpower Programme was that (i): many factors and/or indicators need to be taken into consideration to standardise the approach of professional demography; (ii) the optimal number of oral health professionals was not be rigid but will be evolutive in relation to variations of epidemiological, demographic, social and economical factors; (iii) the necessity to consider in manpower the essential notion of the development of oral conditions, the effect of health education and prevention strategies.

Manpower necessity

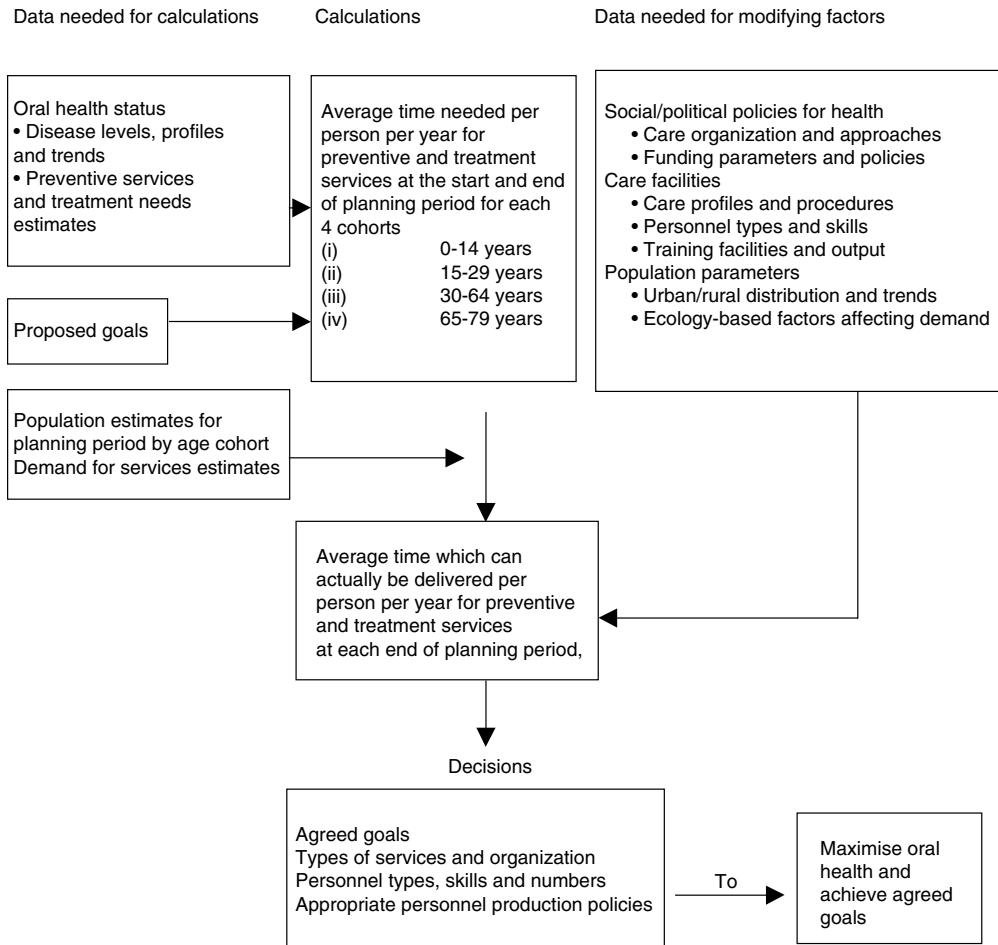
Historical data for the Dental Workforce in EU countries show an increase in the number of dentists compared to population, particularly for Spain and Portugal. The *Figure 1* is derived from OECD data bases (OECD 1996, 1998, 2000), and shows, from 1960 to 1998, the population/dentist ratio in 14 EU countries (Spain and 13 unidentified lines, with Italy excluded because dentists were included in the medical census up to recently). One should highlighted Spain and Portugal, where up to early 80s, the population/dentist ratio was higher than in the rest, but nowadays those countries are within the EU mean.

For example, the thick line representing Spain can be divided into two portions: from 1960 when the population/dentist ratio was 10,970 (30.6 mill. pop./2,788 dentists), to 1980 (ratio = 9,506; 37.5 mill. pop./3,946 dentists). This means an approximate constant ratio two to five

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Table 1. Planning flow chart (WHO, 1989)

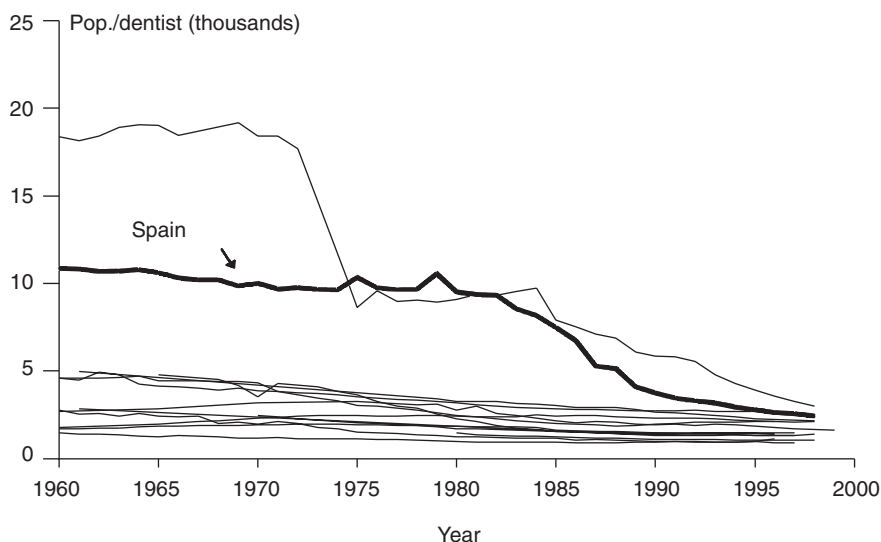


times greater than other EU countries (with the exception of Portugal, represented by the line above Spain). In striking contrast, the period from 1980 to 1998 (when the ratio was 2,440; 39.4 mill. pop/16,133 dentists), shows a limited increase in population (4.9%) accompanied by a huge increase in dentists (308%) and a large reduction in the ratio (74.3%) compared to the other EU countries.

There are, of course, two sides to this “growing” problem: the supply side (involving workforce analysis of the number of dentists, trends, etc.) and the utilisation side, which is determinant in measuring its magnitude.

As the market for dental services is modelled as a combination of supply and demand (Furino & Douglass 1990), any rapid increase in the number of dentists should bring about efforts in nationwide

Figure 1. Ratio Population/Dentist in EU countries, from 1960-1998.



co-ordination and monitoring of supply issues as well as certain workforce variables (workloads, practice management, productivity) (Brown 2001, Chisick 2001, Brennan & Spencer 2002, Brown et al. 2002, Higgs & Richards 2002, Brennan & Spencer 2003). It is also necessary to analyse information on population factors tied to oral health care, such as standard of living, dental needs, demand of services, percentage of population that is edentulous or elderly, impact of insurance plans, etc. In the United States and some EU countries an excess of dentists in the 1970s and 1980s led to the closure of dental schools (Committee on the Future of Dental Education 1995). There should be a movement from the emphasis in population/dentist to offer and demand issues. In this sense, a study of the European dental workforce in 1996 reported a mean ratio of 1,634 inhabitants per dentist for the EU overall, and underlining that Spain showed the highest ratio in the continent

(Anderson et al. 1998), should be interpreted with care.

To analyze the interactions between demand and offer (supply) is a complicated issue, and different authors deal by different ways with this problem [for a review, see ref. (DeFriesse & Barker 1982, Goodman & Weyant 1990, Bartholomew et al. 1991, Capilouto et al. 1995, Beazoglou et al. 2002)]. If no control is implemented, some effects would occur, according to Llodra et al.:

- Unemployment
- Subcontratations: a dentist is contracted to work as a hygienist
- Reduction in the number of hours worked per week, over treatment, reduction in quality, etc.

Since there are methods for quantify the dentists needed, it should be considered that, both, the excess and the insufficient number of dentist, is inadequate, producing costs that are assumed by the society.

Demand and supply

Since the concepts of workload and dentist – the two main concepts behind – are essential, some limitations are expressed below:

The most commonly applied measures of dentist workload are the number of visits provided, hours worked and income (Gift 1984, Petersen & Holst 1995). It has been suggested that “visit” be used where dentists are modelled as units with a capacity to supply a level of patient visits per year (Shuman & Loupe 1994). Yet other authors argue that the dental visit value does not reflect the number and complexity of services per visit (Committee on the Future of Dental Education 1995), and that different dental procedures should be attributed different values (Council on Dental Health 1968). In Australia, between 1983 and 1993, it has been reported a 18% reduction in the number of dentist attended per private dentist, but maintaining the number of worked hours, which indicates an increase in the time per visit (Brennan et al. 1996), and a slight change in the services provided (Brennan et al. 1998).

Although the dentist is usually considered the unit of analysis from the supply side, the characteristics of the clinical setting (general or specialised practice, rural or city location, employment of dental hygienists) (Brown et al. 1994; Brennan et al. 1998; Grembowski & Milgrom 1990) may have a substantial impact on the actual service supplied. Some studies have associated personal characteristics such as age, sex, or having young children with the hours per year worked (Boyle 1986, Spencer & Lewis 1988, Brennan et al. 1992, Murray 2002).

Manpower application in Spain.

The increase of dentists in Spain has received the attention from different perspectives:

- Studies evaluating the increase of dentists:

Different studies, from the early 90s, have studied the number and distribution of Spanish dentists and point to a possible excess of supply, aggravated by the low mean age of the practitioners, which could lead to unemployment in the future (Noguerol Rodríguez et al. 1990, Cordero Bulnes et al. 1993, Follana et al. 1994, Noguerol et al. 1999). These studies have not considered the dental needs in the population nor the dental demand

- Evaluation of the needed dentists. It is possibly, the only approximation that derived from the FDI/WHO methodology.

Using the normative dental needs and the FDI/WHO JWG6 computer program (a needs-based, demand-weighted method of workforce prediction applied in other countries as well), an optimal population/dentist ratio for Spain has been estimated at 2,350 to 2,800 inhabitants per dentist in 1993, and between 2,700-3,200 in 2000 (Llodra Calvo et al. 2002), figure already surpassed, particularly in big cities. Yet if the current trend continues, the number of dentists will be far in excess of this optimal proportion.

- Evaluation of future trends.

A 1996 Delphi prospective study conducted by the Spanish Dental Association (*Ilustre Consejo General de Odontólogos y Estomatólogos de España*) gathered opinions from 82 experts in different areas regarding the

future scenario of Spanish Dentistry up to the year 2005. A great increase in the number of dentists was foreseen, implying increased economic pressure for the private dental clinics (Libro Blanco 1996). It should be noted that while medical problems are treated mainly within Spain's national public health system, most people tend to resort to the private sector for dental care, where the fee-per-service or fee-per-item method of payment prevails.

- Analysis of workload per dentist. From 1987 to 1997, it has been estimated a 42% reduction in the number of private visits per dentist attended in Spain (Bravo 2002), as a proxy variable of workload per dentist.

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Oral Health Indicators: Major issues

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Factors Influencing Demand and the Perceptions of Individuals, Dental Professionals and the Funders of and Legislators for Oral Health Care in Europe

Kenneth A. Eaton¹

Introduction

Bradshaw (1972) considered that demand was synonymous with expressed need. However, individuals may express need(s) and seek, but not receive, help. When demand results in utilisation of services, it can be described as effective demand. A number of factors influence the three stages during which individuals become aware that they have a need for oral health care, whether or not they seek such care and then, whether or not they obtain it (becoming patients in the process). Individuals, those who provide oral health care (the dental professionals) and those who fund and legislate all influence the process of converting need into effective demand. The majority of the factors influencing the first two stages relate to the individuals (potential or actual patients). The influence of dental professionals, funders and legislators is more apparent at stage three. This paper will review the fac-

tors influencing demand and how demand for oral health care is influenced by the perceptions of individuals, dental professionals and funders and legislators.

Influences on and Perceptions of Individuals

The Andersen-Nyman Model

Several theories or models have been used to explain why individuals use health and oral health care services. The social-psychological model proposed by Andersen and Nyman (1973) has been used widely in hospital services and to some extent in dentistry (Suominen-Taipale 2000). In the model, three major groups of factors (predisposing, enabling and need-related) are suggested. These are then sub-divided into smaller groups. The model has been criticised on the grounds that it does not clearly differentiate between predisposing and enabling factors, puts too much

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emphasis on the use of formal health care and neglects informal health care and social support and that it only considers use or non-use rather than extent of use (Pescosolido 1991). Notwithstanding these criticisms, the model can be considered as a useful template for consideration of the factors concerned as they affect individuals. It is used in this section together with a consideration of the influences of social and psychological factors on individuals' perceptions of need for oral health care.

Predisposing Factors

These may be sub-divided into those relating to demographics and social structure (such as age, gender and marital status) and health beliefs/attitudes.

Demographics and Social Structure

Age, gender, marital status, ethnicity, educational level, occupation and social class have all been reported as influencing attendance patterns for oral health care. However, it is probably misleading to claim that any one of these factors in isolation consistently has an effect on attendance patterns. Historically, in the UK, it appears that older people visited a dentist less frequently than the young or middle-aged (Todd et al.1982, Todd and Lader 1991, Dental Practice Board 1992). This may well be the case in other countries (Suominen-Taipale 2000). However, the UK Adult Dental Health Surveys indicate a dramatic change in self-reported attendance patterns amongst those aged over 55 years during the 20 year period between 1978 and 1998. In 1978, there was a 32% self-reported attendance rate in those over 55 years of age, the lowest for

any age group. By 1998, the 66% self-reported attendance rate for those aged over 55 years had become the highest for any age group (Nuttall et al. 2001). During the same period the UK Adult Dental Health Surveys indicated that the percentage of over 55 year-olds without teeth halved for those aged between 55 and 74 years and fell by a third for those over 75 years (Kelly et al. 2000). Suominen-Taipale et al. (2001) reported that in two groups of Finns, aged between 65 and 74 years, number of teeth and income were the principal determinants for dental visits. The perceived treatment needs and attendance patterns of older adults have received some attention in the UK in the last decade. Tickle and Worthington (1997) studied two groups of 60-65 year olds, one of which lived in an affluent area and the other in a socially deprived area. Both showed similar perceived need for treatment or advice but those from the affluent area were significantly more likely to attend the dentist on a regular basis. The edentulous from both groups were less likely to attend regularly or to perceive a need for advice or treatment. Lester et al. (1998) studied a group of housebound adults aged 60 years or more and found that 93% attended for oral health care only when they had problems. A number of studies have indicated that females are more likely to be regular attenders for oral health care than males (Schwarz & Hansen 1976, Murtomaa 1983, Payne and Locker 1996, Kelly et al 2000) as are married people or those living together (Dolan et al. 1988, Österberg et al.1998). Ethnicity, ability to speak the language of the country of domicile and socio-economic deprivation can all influence perceptions of need and attendance for oral health

care (Widström & Nilsson 1984, Manski & Magder 1998, Kwan & Bedi 2000). Although social disadvantage is often associated with ethnicity (UK Census 1991) and poor oral health (Beal & James 1970, Bedi et al. 1991). Mandall et al. (1998) found that amongst a group of socially deprived teenagers oral health treatment need had a far greater effect on their oral self perceptions than ethnicity. Furthermore, Corrigan et al. (2001) have implied that, if educational level and ability to speak and understand the language of the country of domicile are discounted, concepts of oral health amongst those from ethnic minorities may not differ from those with similar levels of education and social status.

Health Beliefs/Attitudes

People need to believe that care personnel can help them to achieve health (Kegeles 1961). Without this belief they are less likely to seek help and, assuming that the help is available, change perceived need into effective demand. Ettinger (1992) has suggested that the development of attitudes to oral health can be influenced by economics, education and the environment in which the individual lives. A wide range of factors have been reported as influencing attitudes. Negative factors include: fear (Schwarz & Hansen 1976, Cohen 1987, Finch 1988, Davidson et al. 1999), lack of perception of need (Cohen 1987, Finch 1988, Davidson et al. 1999), laziness (Schwarz & Hansen 1976, Syrjälä et al. 1992) and frustration with past care (Gilbert et al. 1998). Positive factors include: putting a value on dental care (Petersen and Pedersen 1984), awareness of the positive effect of oral hygiene instruction (Schwarz 1996) and a healthy life style

(Payne & Locker 1996). It is also interesting to note that one study has suggested that people who attended for regular oral health examinations also demonstrate higher rates of other positive health activities such as attending for regular routine medical examinations (Hayward et al. 1989). The 1998 Adult Dental Health Survey included face to face interviews with participants to determine the oral health attitudes and behaviours (Kelly et al. 2000). Reviewing the results of these interviews, Bradnock et al. (2001) concluded that, in the UK, over the previous three decades there had been a steadily improving approach toward more positive dental health attitudes. However, they also expressed an underlying concern that those who had the greatest oral health needs and those from more deprived households still lagged behind in terms of their oral health attitudes.

Enabling Factors

Cost

A variety of factors relating to cost have been reported as influencing demand. The systems used to finance oral health care appear to play a significant role. When dental insurance is available and the costs of oral health care are paid for by a third party demand appears to be higher and those insured visit dentists more frequently (Locker & Leake 1993, Brodeur et al. 1996, Manski & Magder 1998). However, the extension of dental insurance in Finland and Norway did not increase utilisation of services by young adults in Finland (Arinen 1992) or Norway (Grytten et al. 1996). Cost factors may well have a greater influence on the utilisation of services by older people. A number of studies have indicated

that those without insurance visit a dentist less frequently (Dolan et al. 1988, Locker et al. 1991, Gift and Newman 1993, Gilbert et al. 1998). However, costs may be imagined rather than true costs (Clerehugh 1986). Furthermore, Lester et al. (1998) found that a group of functionally dependent older adults, who were likely to be exempt from costs, perceived costs to be a major barrier to seeking oral health care. A recent market research survey in England found that lack of clarity about costs, due to poor communication by dentists, was seen by some as a deterrent to seeking oral health care (Land 2000). There have been conflicting findings concerning the influence of travel costs on demand for oral health care in that Conrad et al. (1987) and Mueller & Monheit (1988) reported that they had an adverse effect, whereas Kirkegaard et al. (1987) and Grytten et al. (1993) found no such effect.

Supply of Services

It is unclear whether or not an increase in the number of dentists, in an area or country, is in itself a factor for increasing the probability of visiting a dentist. In Sweden, Olsson (1999) reported that an increase in the number of private practitioners increased the probability of visiting a dentist and also the number of visits. However, Sintonen & Maljanen (1995) could detect no such effect in Finland in the 1980s. Further studies in Scandinavia have indicated that the practice of dentists sending recall appointments to their patients can stimulate (or maintain) utilisation of services (Tuominen 1987, Sintonen & Maljanen 1995). Seeking care from one (the same) dentist over a number of years also appears to increase utilisation of services (Chen et al. 1997, Davidson et al. 1999).

In general, dentists work in towns and cities and availability of oral care can be a problem in rural areas. It is perhaps therefore unsurprising that a number of studies from various countries have indicated that people living in urban areas visit dentists more frequently than those living in rural areas (Schwarz & Hansen 1976, Petersen 1983, Gift & Newman 1993, Gilbert et al. 1998). Andersen et al. (1995) have suggested that a number of primary determinants of oral health lead to oral health behaviour such as effective demand (use) of available services. The system used to provide oral health care in a country is one such primary determinant. Others include cultural characteristics of the population and factors in the external environment, such as water fluoridation and relative wealth. Previously, Andersen et al. (1970) had suggested that health service systems (including oral health service systems) consisted of three elements: policy (including financing mechanisms and screening programmes), resources (including personnel and facilities) and organisation (including co-ordination and control, regulations and legislation). All three elements are invariably controlled by Governments or their agencies and/or third parties, such as private or state insurance organisations.

There have been few multi-national studies to compare the effects of systems for oral health care provision on oral health behaviour and effective demand. Reporting on the *First International Collaborative Study of Oral Health Care Systems* (ICS 1), which was carried out in the mid 1970s, Arnljot et al. (1985) noted wide variations in the systems. Sheiham (1995) commented that ICS1 showed that utilisation of dental services did not reduce dental

disease and that the availability and accessibility of even the best system did not ensure good utilisation by the public. A second ICS was performed in the early 1990s. The results indicated that, in the countries concerned, the uptake of oral health care was related to the organisation and delivery of the local oral health care system (Chen et al. 1997).

Need-Related Factors

A number of studies have shown that the number of teeth in an individual's mouth can be one of the major factors influencing demand. The edentulous or those with few teeth visit a dentist less frequently than the dentate (Schwarz & Hansen 1976, Petersen 1983, Gilbert et al. 1990, Gift & Newman 1993, Joshi et al. 1996). Similarly, edentulousness appears to reduce the perception of need for care and so decreases demand (Gilbert et al. 1990, Schwarz 1996, Österberg et al. 1998). Tickle and Worthington (1997) reported that in a group of elderly people perceived need was influenced most by being edentulous.

A number of studies have reported that individuals who perceive a high need for oral health care contact a dentist more frequently (Gilmore & Kiyak 1985, Gilbert et al. 1990, Tennstedt et al. 1994).

The Influence of Social and Psychological Factors on Individuals' Perceptions of Need for Oral Health Care

Traditionally, normative need for oral health care has been assessed in terms of disease-based measures of oral health in an approach derived from the medical model, in which health is equated with absence of disease (Sheiham et al. 1982).

This approach has been challenged and a number of workers consider that a far broader approach which takes into account an individual's functional, social and psychological well-being should also be considered along with the pathological processes of oral disease (Cohen & Jago 1976, Sheiham & Croog 1981, Reisine 1985). An assessment of these factors can help to explain why individuals' demands for oral health care, based on their perceptions of need, differ from normative need. A number of studies have aimed to assess the impact of oral disease on daily life and have developed indicators. These include the socio-dental indicator – the Dental Impact of Daily Living (Leao & Sheiham 1995) and the Subjective Oral Health Status Indicator (Locker and Miller 1994). Mandall et al. (2000) have suggested that the concept of consumer-based measures for assessing oral health need may be particularly relevant to aspects of oral health care involving aesthetics such as orthodontics. Locker and Miller (1994) have considered that such measures also have a role in targeting oral health care resources, so that they can be allocated to services likely to produce the most health gain in groups "disadvantaged with respect to oral health". Apart from factors relating to individuals' perceptions of the impact of oral disease on daily life, others such as fashion, media reporting and an increasing awareness of the importance of disease prevention may well influence individuals' perceptions of oral health care need.

Influences on and Perceptions of Dental Professionals

Cohen (1987) concluded that the factors associated with dental health profession-

als, in the FDI's classification of barriers to dental attendance, had to be considered if dentists were to provide accessible oral health care for patients. These barriers were:

- Inappropriate manpower resources
- Uneven geographical distribution
- Training inappropriate to changing needs and demands
- Insufficient sensitivity to patients' attitudes and needs

Freeman (1999) has suggested that for general practice these barriers must be considered in the same category headings as those suggested by the FDI for individuals (actual and potential patients). Thus "inappropriate manpower resources" and "uneven geographical distribution" equate with "lack of access" in the list of barriers to individuals. "Training inappropriate to changing needs and demands" equates to "lack of perceived need" and "insufficient sensitivity to patients' attitudes and needs" to the influence of the psycho-social factors for individuals of "anxiety and fear and financial considerations". All of these barriers influence effective demand for oral health care.

There have been a number of surveys of the public's perception of dental professionals. It seems that some of these perceptions cause patients to change dentists and may deter some individuals from seeking oral health care. Newsome and Wright (1999) classified patients' comments under five headings:- technical competence, interpersonal factors, convenience, cost and facilities.

Technical Competence

Newsome and Wright (1999) concluded that this was seen as a key determinant of

patient satisfaction in many studies. However, although this may be the perception of dentists, people find it hard to assess the technical quality of services with any accuracy (Zeithaml & Bittner 1996). A study in which the quality of restorations was assessed by dentists and patients concluded that simply practicing dentistry with a high degree of expertise did not necessarily convince patients that they had received high quality dental care (Abrams et al. 1996).

Interpersonal Factors

Communication skills, "caring" and information provision, including fully explaining procedures and costs, were the factors most commonly identified as being important to patients. In a recent survey in the UK, 90% of patients who responded, rated "care and attention" as very important, while the three other related factors of "pain control", "dentist puts you at ease" and "safety conscious" were rated as very important by 73% or more of respondents (Holt & McHugh 1997). In two large UK studies, poor communication was a common criticism by patients. This included a lack of clarity about whether patients were being treated under NHS or private contract and no publicised scale of charges in some practices (Finch 1988, Land 2000).

Convenience

A number of studies have investigated convenience (Handelman et al. 1990, 1996, Janda et al. 1996, Holt & McHugh 1997). Factors assessed included after hours clinics and nearness to shops and health centres. In general, this group of factors was not weighted as highly as

interpersonal skills. Janda et al. (1996) concluded that dentists should not emphasise location and convenient parking but should focus on professional competence, personality and attitude.

Costs

This topic has already been reviewed.

Facilities

In many studies this factor was not viewed by patients as very important. For example, "practice décor" was rated as the least important factor by respondents (Holt & McHugh 1997). However, in one American study comfort of seating in the waiting area, magazine selection and background music were shown to influence patients (Andrus & Buchheister 1985).

Influences and Perceptions of Funders and Legislators

Although patients frequently pay dentists directly for their treatment and as such could be described as funders, in this section the term is used to describe third party funders. In terms of the provision of care, such third party funders include insurance companies (both private and state) and government departments and agencies. However, although there are some totally privately funded dental schools, the education of dentists invariably takes place in institutions which are wholly or partially state funded. Governments also play a role in setting regulations for the practice of dentistry, through policymaking and legislation, even in countries where there is very little publicly funded provision of oral

health care. Hence the term "legislators" is included in the title of this paper.

The 1985 FDI general assembly considered the problem of converting unmet need for oral health care into demand and used the term "society" to describe funders and legislators. This is understandable as funders and legislators are in effect the representatives of society. Cohen (1987) reported that the FDI general assembly considered that society could create the following barriers to the conversion of unmet need for oral health care into demand:

- Insufficient public support of attitudes conducive to health
- Inadequate oral health care facilities
- Inadequate oral health manpower planning
- Insufficient support for research

The first barrier implies that the leaders of society should promote an improvement in attitudes to health and oral health. The second may well relate to the system for the delivery of oral health care. The third may be a result of poor oral health workforce planning and either training an insufficient number of oral health care workers or training them inappropriately. The fourth did not include education of the oral health care work force, which is directly related to workforce planning. However, most oral health care research takes place in or is co-ordinated by the staff of dental schools. It can therefore be considered that there is a close relationship between education and research in oral health. In order to address these issues reliable data are necessary. Two questions arise: do these data exist and are they reliable?

It is the role of the funders and legislators to try to minimise the barriers. The task of addressing the first barrier (changing public attitudes to health) inevitably leads to the development and publication of national reports and strategies such as *Oral Health in America: A Report of the Surgeon General* (Department of Health and Human Services, U.S. Public Health Service 2000). This sets out an action plan to change the perceptions of the public, policymakers and health providers regarding oral health and disease so that oral health should become an accepted component of general health.

In some countries pressure to address the consequences of the barriers may come via the parliamentary process. However, oral health care competes for public funds with all other aspects of health and other public services and change may be slow, as may be the publication of the results of oral health surveys in scientific journals. For example, in the UK there were some 564 parliamentary questions on dentistry during the 1994/95 session, of which 307 related to access to oral health care for either individuals or populations (Sarll 2001). A number of studies including Allen et al. (1992) had reported on the perceptions of patients that access to NHS oral health care was poor in some parts of the country. This view was reinforced by a postal survey carried out at the end of 1994 (Falcon & Hurst 1998). A further survey, carried out in the summer of 1999, indicated no improvement (McGrath et al. 2001). An estimated two million people were identified as having unmet demand for primary dental care in 2000 (Department of Health 2000). In response the Government have implemented a plan

which incorporates a number of initiatives, including the establishment of dental access centres (Department of Health 2000) and is conducting a review of the oral healthcare workforce.

Although membership of the European Union (EU) does not require states to modify their health care systems, Widström (2000) has suggested that in the long run there will be pressures for social and health policies to be co-ordinated. It is therefore important that dental professionals and planners have a clear understanding of the systems for the provision of oral health care and their relative costs in the different member states of the EU. There is also freedom for EU citizens to work anywhere in the Union suggesting that workforce planning should therefore be conducted at a European as well as a national level. For seven professions this freedom of movement is supposedly “underpinned” by comparable training standards in each member state.

Conclusions

A range of factors which have little to do with biology or pathology have influenced the prevention, diagnosis and treatment of oral diseases. They include national and local policies, costs, health beliefs and the attitudes and education of dental professionals and the public. The review set out in this chapter indicates that factors relating to demand for oral health care have been comprehensively studied. There have also been large numbers of epidemiological studies to assess normative need, which have historically been used as a basis for planning oral health care provision. There is now a view that social and psychological factors should also be taken

into consideration when such planning takes place. A number of questions, which effect policy makers and legislators at all levels (local, regional, national and European), should be considered. They relate to the reliability of epidemiological surveys and to the availability and quality of information on the following European issues: the comparison of systems for the provision of oral health care and the cost of this provision, oral health care workforce numbers and the education of members of the dental workforce. The problems relating to these issues are set out in the next section "statement of the problem".

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Surveillance, epidemiology and periodontal diseases

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Introduction

In the 1970s, the natural history of periodontal disease involved accumulating dental plaque, causing tartar, leading to the formation of pockets, with bone loss causing loss of teeth. Everyone was deemed to be exposed to periodontitis. Deficient hygiene and age were major risk factors.

Burt (1993) sums up the concept prevailing at the time:

- Gingivitis develops into periodontitis, with associated destruction of bone tissue and possible tooth loss.
- All subjects are exposed to periodontitis, which may develop to the point of affecting the teeth. The severity of periodontitis increases with age.
- Periodontal disease is the main cause of tooth loss after the age of 35.

Our knowledge of periodontal disease has made great progress over the last few years

(Baehni & Bourgeois 1998, Hancock & Newell 1993). It has in part been epidemiological data which have opened up new hypotheses regarding etiology, pathogenesis and management (Armitage 1996). New descriptive and analytic epidemiological methods – associated risk factor quantification, in particular – have played a role in improving the model. Microbiology studies have pinpointed the role of certain specific bacterial strains. New explanations have been put forward as to host-response and resistance.

Clinical research has come up with new treatment strategies to slow down disease development and to reconstruct the periodontal structures. Epidemiology has further enabled the distribution of periodontitis in various populations to be measured and certain risk factors to be identified (Beck 1990).

Among such risk factors, we can distinguish the innate and the acquired. Innate risk factors include gender, genetic fac-

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tors, congenital immune deficiency, phagocyte dysfunction and syndromes such as Down's syndrome. Poor hygiene, age (Ajwani & Ainamo 2001), certain medical drugs, smoking (Berstrom et al. 2000, Hashim et al. 2001), acquired immune deficiency, acquired endocrine disorder (Meyle & Gonzales 2000), stress, and nutritional factors figure among the acquired or environmental risk factors.

It has recently been suggested that mild untreated periodontitis constitutes a risk for general well-being and health, especially with respect to cardiovascular (Armitage 2000) and respiratory disorder, pre-term birth (Offenbacher 1996), and diabetes (Katz 2001). Current epidemiological findings have indeed pointed to a link between such risk factors and periodontal affections, but any causal relation as such still needs to be posited with the greatest caution.

It is also worth highlighting certain specificities of epidemiological research as compared to clinical studies and case reports:

- it is groups rather than individuals which are focussed on;
- subjects both with and without relevant conditions are included, the study aiming as it does at risk assessment (AAP 1996).

Methodological issues

Classification

Classification of periodontal disease has developed greatly over the last few years (Kinane 2001). The 1993 European Periodontology Symposium deemed the classification unsatisfactory as it then was, especially inasmuch as different pathologies presented important areas of overlap (Armitage 2000). There was also noted to

be a lack of precise information on treatment quality, patient acceptance and tissue response – especially as regards treatment-resistant periodontitis (Attström & van der Velden 1994).

Changes in the classification of childhood and teenage periodontitis are typical here. Saxen noted in 1980 that only the form localised in the incisors and first molars represents acute juvenile periodontitis as a clinical entity. It has recently been suggested that the distinction between early and adult-onset periodontitis is mainly epidemiological, based on the observation that periodontitis is less frequent in young children and young adults (Tonetti & Monbelli 1999). And finally, diagnoses of localised juvenile periodontitis, generalised juvenile periodontitis or epithelial attachment loss are now classified as aggressive periodontitis (Najib 1997).

The recent 1999 Workshop for a Classification of Periodontal Diseases and Conditions (AAP 1999) altered the previous 1986 American Academy of Periodontology (ADA 1998) classification, which had divided periodontitis between:

- aggressive periodontitis – previously known as early onset periodontitis (EOP).
- necrotizing periodontitis
- periodontitis associated with systemic disease
- adult periodontitis.

Case definition

In theory any epidemiological study should be founded on an updated and standardised definition of the pathology in question. In periodontology, unfortunately, no such definition exists, and the criteria have not been definitively laid

down. Epidemiological studies have deployed a variety of clinical parameters, such as gingival inflammation signs, pocket depth on probing, measurement of loss of attachment, or bone loss on X-ray. Diagnostic criteria tend to vary from one author to another. And then there is a wide variety of terms used to define a periodontal pocket as “deep” or “pathological” or again to define the “level of clinical attachment”. And finally, there is no agreement on how to define the various categories of periodontitis (e.g., aggressive periodontitis). Moreover, the number of surfaces which need to be affected for a subject to count as a clinical case – i.e., as suffering from periodontal disease – varies greatly from author to author. Such incoherence obviously vitiates data on the distribution of the disease (Papapanou 1996). Diagnostic criteria often differ from one author to the next. Examination conditions are variable. There is also a clear confusion in the utilisation of data between the relatively few epidemiological studies in the literature on the one hand and clinical research on the other.

Recommended case definition

The various forms of periodontal diseases are of infectious origin. Most present as chronic disease with a slow development which is irreversible in the advanced stages even if the infectious agent has been eliminated. The pathology is further characterised by repeated attacks, often affecting several sites neighbouring one or more teeth. Finally, the developmental pathway of the disease is not currently well established, which leaves many problems in measuring the active phase and in case definition (Beck & Löe 1993).

Number of sites measured

The previous concept of universal exposure has given way to one of *individual* exposure. Since periodontal disease has come to be seen as site-specific, clinicians and researchers have stressed the importance, from the point of view of the natural history of the disease, of monitoring as many different sites as possible so as to optimise the chances of detecting the disease under way. A broader case definition is in terms of one or more sites with at least 2 mm loss of attachment (NIDR 1987).

The most commonly monitored sites are proximo-vestibular, disto-vestibular, medio-vestibular, proximo-lingual, disto-lingual and medio-lingual. Cost, patient impact and intra- and inter-examiner variability, however, need to be taken account of. Priority should be given to directly visible sites, so as better to control for intra- and inter-examiner variability (Kingman 1991). Underestimation of prevalence does not seem to be directly proportional to the insufficiencies of measurement, inasmuch as certain sites are more liable to become sensitive to proximal and distal periodontal pockets and to medial recession than are others.

It is to be borne in mind that linear measurements of specific sites may fail to represent the true extent of the root's loss of conjunctive attachment. They are at best a record of disease history, and make no distinction between an on-going destructive process and a situation which has stabilised itself (ADA 1998).

The ability of partial recording to reflect the overall mouth situation is to be underlined. The logic of epidemiology calls for simplified partial indices (Barnes 1986). The WHO recommends data recording by sextant. The prevalence of subjects with at

least 4 mm attachment loss is probably underestimated by 13% in general or partial examination. In Diamanti-Kipiotti et al.'s study (1993), the partial recording system found a mean 3.2% of deep pockets per subject, and 19.5% of subjects with at least one such pocket, as against 5.0% and 47% respectively per overall recording of all the circumference.

Impact of missing teeth

Tooth-loss may be the terminal result of destructive periodontitis. Teeth lost as a sequela of disease tend not to be recorded as such, which leads to significant underestimation of prevalence and severity. Tooth-loss risk factors fail to be identified, and the role of periodontal disease underlying extraction is not fully acknowledged (Papapanou 1996).

Natural pathology studies

Longitudinal descriptive studies are rare, which – over and above a failure to describe the natural history of periodontal diseases – underscores the difficulty of estimating incidence. Research needs to be supported in view of the current issues concerning such diseases.

Beck and Koch (1994) studied the progress of attachment loss over a 3-year period in a sample of elderly persons in North Carolina. 13.2% of sites with deep pockets at the start of the study showed at least 3 mm attachment loss over the observation period, whereas only 4.7% of sites with pockets shallower than 3 mm presented attachment loss. The authors argue for a process of attachment loss by randomised active phase; sites losing 3 mm of attachment or more over the first 18 months of

the study were no more liable to lose 3 mm or more over the following 18 months than were sites which had undergone no attachment loss during the first period.

Indices

There is no consensus in the literature as to recommendations for the use of a representative epidemiological index of the periodontal situation (Baehni & Bourgeois 1998). Barnes (1986) listed and categorised the proposed indices under signs, symptoms and associated etiological factors, and concluded that, in 1986, there was no satisfactory public health index able to provide objective information as to distribution, prevalence, incidence and treatment needs in populations. Given the variety of indices used in periodontology over the last 20 years, comparisons between the available data are hard to draw (Skrepcinski & Niendorff 2000).

Present-day epidemiology assesses periodontal disease with periodontal indices measuring pockets and recording bone-loss on X-ray (Gilbert 1994). Pocket measurement provides reproducible quantification of periodontal destruction in international units (mm). Variation due to factors such as type of probe, pressure exerted, stage of pathology, examination site, or inter-examiner error, make standardisation and calibration necessary (ADA 1998).

Use of the Community Periodontal Index of Treatment Needs (CPITN) (Ainamo 1982) to assess prevalence of periodontal disease is controversial and indeed considered inappropriate by the scientific community (Baelum & Papapanou 1996). Such partial recording indices underestimate prevalence and severity (Papapanou 1996). Thus, Locker et al. (1998) excluded

publications using this index from their 1998 review of epidemiology and periodontal disease in older adults. The main objection is that the CPITN's partial methodology seriously underestimates the prevalence and severity of periodontal pockets in adults, failing as it does to detect a substantial proportion of affected subjects (Baelum 1996). Likewise, CPITN scores do not correlate strongly with attachment-loss scores, but tend to overestimate prevalence and severity in younger (15-29 year-old) subjects and to underestimate them in the older (over 50) population. Nevertheless, this index presently remains the WHO reference, enjoying its own standardised international data bank since 1982, with 1,000 references (Baehni & Bourgeois 1998).

The clinical attachment level is the vertical distance (in mm) from the enamel-cement junction to the clinical periodontal attachment point. Carlos et al. (1983) propose an Extent and Severity Index (ESI). "Extent" represents the proportion of examined sites presenting a clinical attachment level of a given threshold (classically, 2 mm or more); "severity" represents the mean level of clinical attachment per subject per site presenting this threshold.

Attachment loss represents the difference in clinical attachment measurements at two points in time, indicating the degree of additional loss during that interval.

Bone loss represents the total vertical loss of alveolar bone at the proximal or distal surface of the tooth, expressed in mm or as a percentage of the total root length (Papanou & Tonetti 2000). Like attachment level, attachment loss and bone loss can be expressed in terms of extent and severity.

Attachment loss indices have become popular in periodontal epidemiology; methodological research in 1995 and 1996, however, showed that the extent and severity of attachment loss varied significantly according to the tooth or the site measured, the type of probe used (Papanou et al. 1993, Mayfield 1996), and even the method of analysis. In methods used for national-level screening for pockets and attachment loss, sensitivity varied from 0.24 to 0.87 in high-prevalence populations (Fox 1992).

Inter- and intra-examiner quality and variability, rarely gone into in the literature, doubtless represent the most critical point with respect to this index, especially when used for data collection by site, with a possible $32 \times 6 = 192$ sites. Certainly valid in a context of clinical research, its usefulness – given its reliability and the costs inherent in its deployment – remains to be proved as far as population-based studies are concerned.

Recommended surveillance (WHO)

The reference method uses WHO recommendations with an exploratory-type sampling method. This is a stratified cluster survey technique intended to include the main population sub-groups liable to be affected to one degree or another and to cover a standard number of subjects per age-group, whatever the location. Such exploratory surveys may be classified as national, regional or local pilot studies.

The exploratory method is based on stratified sampling, including the main population sub-groups presenting different degrees of disease. This method provides a fast and economic means of estimating the overall prevalence of periodontal diseases

in the population and identifying the major variations in severity among the various subgroups.

In countries with well-developed dental healthcare systems, data are collected from sentry sites, dental clinics, insurance companies and national health information systems.

In communities with little or no dental health care, special community surveys are called for. A 5-year period is recommended for harvesting information at a national level.

Minimum information collection

Aggregate data

Attachment loss (WHO 1998)

Pocket depth gives an indication of the extent of periodontal attachment loss. But this measure is unreliable in case of gum retraction. When the enamel-cement line is not visible and the upper value of the community periodontal index for a sextant is less than 4, any periodontal attachment loss for the sextant in question is estimated at less than 4 mm. The degree of attachment loss is recorded in terms of the following codes:

0 – Periodontal attachment loss 0-3 mm (enamel-cement line invisible, and community periodontal index 0-3)

If the neck of the tooth is not visible and the community periodontal index equals 4, or if the neck is visible:

1 – Periodontal attachment loss 4-5 mm
2 – Periodontal attachment loss 6-8 mm
3 – Periodontal attachment loss 9-11 mm
4 – Periodontal attachment loss 12 mm or more

x – Sextant not included (less than 2 teeth present)

9 – Data not recorded (enamel-cement line is neither visible nor discernable)

Community periodontal index (WHO 1998)

Three periodontal status indices are used for this assessment: bleeding gums, tartar under the gums, and periodontal pocket. A light CPI probe, with a 0.5 mm spherical tip and marked with a black band at between 3.5 mm and 5.5 mm and black rings at 8.5 mm and 11.5 mm from the tip, is used.

Sextants. The mouth is divided into sextants, defined by the teeth numbers: 18-14, 13-23, 24-28, 38-34, 33-43, and 44-48. A sextant is only to be examined if it contains at least 2 teeth which are not due for extraction.

Index teeth: in subjects under 20 years of age, only 6 index teeth are examined: 16, 11, 26, 36, 31, and 46. In children under 15, only bleeding and tartar deposit are taken into account. In adults over 20, the teeth to be examined are: 17, 16, 11, 26, 27, 36, 37, 31, 46, and 47. The 2 posterior sextant molars are coded together and, if one is missing, it is not replaced. If there is no index tooth present in a given sextant, all the remaining teeth in it are examined and the upper value attributed to the sextant. The distal sides of the third molars are not assessed.

Codes for examination and data recording:

0 – Healthy tooth

1 – Bleeding detected on exploration

2 – Tartar detected during exploration, but the black band of the probe remains perfectly visible

3 – 4-5 mm pocket

4 – 6 mm pocket or greater

- X – Sextant not taken into account (less than 2 teeth present)
- 9 – Data not recorded

Case data for survey and notification

The information needed for effective and usable assessment of periodontal diseases prevalence relates to:

- Year of study, number of cases, region and population covered by the survey, information quality level (national, near-national, regional, local, informative), type of locality (urban, suburban, rural)
- Reference age-groups: i.e., 12 years (sub-gingival tartar and bleeding only), 15 years (sub-gingival tartar and bleeding only), 35-44 years, 65-74 years.

Recommended data analysis, presentation and reports (Benamghar et al. 1994)

- Percentage of subjects showing healthy periodontal tissue; percentage of subjects showing bleeding only; percentage of subjects showing tartar only; percentage of subjects showing 4-5mm pockets; percentage of subjects showing deep (at least 6 mm) pockets.
- Mean number of sextants with healthy periodontal tissue, bleeding or higher value, 4-5 mm pockets or higher value, and number of sextants excluded from examination.
- Number and percentage of subjects with attachment loss per highest score
- Mean number of sextants with attachment loss per highest score, mean number of sextants excluded from examination, and number of unrecorded sextants.
- Morbidity per age-group, ethnic group, place of residence, and type of locality.

Main uses of the data generated

- Assessment of the scale of periodontal problems at national, regional and local levels.
- Identification of population needs with regard to prevention and treatment for periodontal problems.
- Providing information on severity and development of disease, and an idea of whether it is increasing or diminishing.
- Identification of high-risk sub-groups.
- Assessment of how far existing dental health care services meet current needs.
- Assessment of type and scale of prevention and/or cure services required.
- Resources needed to set up, maintain and extend or reduce dental health programmes, including an estimate of the number and type of personnel required.

General results

Overall

New concepts have emerged from the development of epidemiological research. In the present state of the art, they may be summarised as follows:

- adult periodontitis is a multi-factor disease;
- periodontitis is caused by specific bacteria;
- the host's immuno-inflammatory response, while protective, leads to destruction of tissue;
- periodontitis develops over phases of attachment loss;
- sensitivity to periodontitis varies across individuals;
- innate and environmental risk factors contribute to sensitivity to periodontitis.

Gingivitis

Gingivitis varies widely from one study to another. Such differences are probably more a matter of methodology than of real differences in the disease itself (Jenkins & Papapanou 2001). Gingivitis is widespread. Prevalence, severity and extent in young subjects increases with age, beginning with milk-teeth, reaching a peak at puberty, and then declining somewhat during adolescence.

Cutress et al. (1986) found that 96% of a New Zealand sample of 15-19, 25-29 and 35-44 year-olds presented gingivitis. Gingivitis was found in 34% of all sites examined. Ganghwin et al. (1999) found a prevalence of 85% in 5-6 year-olds in Australia, and 24% in 6-74 year-olds. In the USA, 14% of 6-11 year-olds and 32% of 12-17 year-olds presented gingivitis, the percentage in adults varying from 29% in younger to 13% in older subjects (Albandar & Kingman 1999, Jenkins & Papapanou 2001).

Brown and Löe (1993), working from national probabilistic studies in the US and Denmark, reported 60% prevalence for teenagers and 40-50% for adults. Only 5-6% of gum sites showed inflammation. In comparison with studies dating from the '50s and '60s, they suggest gum health is improving, possibly due to the improved dental hygiene observed in industrialised countries as a whole, but also in a context in which no scientific or methodological guarantees exist.

At population level, the incidence of dental plaque and gingivitis is appreciably higher in boys than girls. Improved dental hygiene seems to have reduced gingivitis in a number of industrialised countries. Overall, available epidemiological data

do not enable the hypothesis of a reduction in periodontal disease to be confirmed, due to a lack of perspective on the natural development of these pathologies (Papapanou 1996).

Early-onset periodontitis

Epidemiological data on childhood, teenage and early adult periodontal disease are scarce, and the methodological context is precarious. There has in fact been no recent epidemiological programme that might serve as a reference for the validation of epidemiological hypotheses.

Regarding milk-tooth periodontitis, data are limited. Jenkins and Papapanou (2001) suggest a rate of 5% in Caucasian children. Only a few sites were affected, and attachment and bone loss were variable. Very rarely, severe generalised periodontitis can affect milk teeth. Such cases are classically associated with major systemic disorder.

Loss of periodontal support due to periodontitis is the norm among most teenagers. This tends to be a matter of minor attachment or bone loss. Early periodontitis shows a 0.1-3.4% prevalence among young adults (Wisner-Lynch & Giannobile 1993). It is thus relatively infrequent in the population as a whole (Papapanou 1996). In the USA, prevalence at 14-17 years is below 1%, and reaches 3.6% by 18-34 years of age (Oliver & Brown 1993).

Localised early-onset periodontitis is 4 times as frequent as generalised early-onset periodontitis. The proximal surfaces of the first molar are the sites most frequently affected by periodontitis and progressive destruction.

Non-normal periodontal destruction has been noted in teenagers. Stabholz et al.

(1998) reported 38.4% prevalence in a specific Israeli population. Such differences are attributed to race, ethnicity, variations in available preventive dental health care, and gender (Wagaiyu & Wagaiyu 1992). Thus, localised juvenile periodontitis is considered to be higher in non-industrialised (0.3%) than industrialised countries (8%). Prevalence and extent of attachment loss were greater in Indo-Pakistanis than in Caucasians (Clerehugh 1993).

Necrotizing periodontal disease peaks in young adults, but is infrequent in industrialised countries, although found more frequently in HIV-positive subjects than in the population as a whole. In non-industrialised countries, young children already suffering from infection and malnutrition are at high risk of necrotizing periodontal disease with possible loss of facial tissue. Finally, smoking has been identified as a risk factor for periodontitis in young adults.

Adult periodontitis

Moderate attachment loss has been reported in a relatively high percentage of adults and elderly persons, severe loss being confined to a minority of subjects. Severe loss is further limited to a few sites, and is found to affect only a certain proportion of these sites on examination (Burt 1994). Some 1 in 5 adults present more generalised attachment loss. The rate is higher among older subjects. Similar findings apply in the case of bone loss (Locker et al. 1998).

The few incidence studies suggest that 50-75% of adults experience attachment loss in at least one site over relatively short periods (Burt 1994, Norderyd & Hugoson

1998, Hugoson & Laurell 2000). However, relatively few sites examined showed additional loss, so that – despite the high incidence rates – extent and severity remain low.

Many factors have been found to be associated with incidence and prevalence. Most are more to be considered as risk markers than as risk factors as such. At present, the evidence that smoking and particular periodontal pathogens play a causal role is stronger than for most other suggested risk factors (Berstrom et al. 2000).

Most studies world-wide report a 10-15% prevalence for severe periodontitis, defined as 6 mm or more attachment loss on one or more sites. The main change with respect to the previously described model is that 5-20% of the population suffers from a severe generalised form, even if a mild form of the disease affects most adults. Severe forms are more commonly found in young adults.

Estimates of 80%, however, have been made for certain regions, although it cannot be affirmed that such diversity is real and not an artefact of methodological bias in sampling or examination.

In the USA, moderate periodontitis, with one or more sites presenting at least 3 mm attachment loss, was estimated at 44% at 16 years of age, and at 80% between 18 and 64 years. Advanced periodontitis, with one or more sites presenting at least 5 mm attachment loss, also depended upon age, and affected 13% of the population. In the USA, this rate means at least 20 million people affected by advanced periodontitis. On the basis of a national study run from 1988 to 1994, with a stratified sample of 9,689 persons aged

between 30 and 90 years, Albandar and Kingman (1999) estimated that 23.8 million persons had at least one dental surface with at least 3 mm recession; 53.2 million had gum bleeding; 97.1 million had tartar; and 58.3 million had sub-gingival tartar: i.e., 22.5%, 50.3%, 91.8%, and 55.1%, respectively. In Europe, the prevalence of severe forms never exceeds 9% (Hescot & Bourgeois 1999). In France, the 1993 reference study for the 35-44 year age group found that 12.5% of that population had a healthy periodontium, 27% had periodontal pockets of between 3 and 5 mm, and 2% had severe forms with mean sextant damage of 1.3 (Bourgeois et al. 1997).

The periodontal health of the 65-74 years age-group depends strongly on the rate of edentulousness, which varies widely from one country to another in Europe (12.8% in Italy, 16.3% in France, 58% in the U.K., and 65.4% in the Netherlands) (Bourgeois et al. 1998).

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The development of the extended youth consultation

Jaap P. Veerkamp¹

Introduction

In the Netherlands the preventive efforts of the last twenty years have resulted in a large reduction of dental caries prevalence in children. This achievement however results in cutting back the finances used for the national preventive campaigns. This project deals with the idea to reallocate the finances for preventive measures and its long term consequences.

Nowadays the 12-yr old Dutch children are amongst the dentally healthiest of Europe. The quality level of the teeth of the 5-yr olds however lies far behind that of their 12-yr old counterparts (Kalsbeek et al. 1994, Kalsbeek et al. 2000). The increase of dental caries in this young group seems to be visible in more western European countries (Haugejorden 2002). Between 1994 and 2000 the number of caries free 5-yr old children in the Netherlands went down from 55% to 51% and in the caries group the ds figure went up from 2 to 3, a 50% raise, where the percentage of restored teeth went down from 25% to 12%, a 50% reduction.

Now it can be hypothesized that the dentist general practitioner (GP) has an increasing difficulty in treating children. On the other hand it has been assessed that the dental situation at the age of 4-5 years is a predictive measure for the relative caries risk of children (Roeters 1992, Billings et al. 1994) and has to be considered as a starting point for further monitoring of its preventive measures. Children's poor dental health in the past led to a number of clearly well structured preventive measures.

Those measures (fluoride applications and – rinsing, group instructions, national campaigns and the use of fluoridated toothpaste) gave a maximum effect. Those large scale measures are a relatively simple and not expensive method to create results in large groups of people. When the dental health of the group increases the 80/20 rule will apply: with an original 20% effort an 80% result can be achieved. To reach the last 20% of the result, 80% of the effort is needed.

Preventive measures do minimise the morbidity, but increase the costs of national

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health. In the discussion on national health the comparison can be positively influenced by a better identification of groups at risk for illnesses and replace group measurements with individual strategies when the group measurements are not cost effective anymore. In the dental situation we do need an individual caries risk assessment. This will only be possible when the groups that need this increased attention can be identified (Powell 1998). Nowadays dentist it expected to “gives adequate information that is based on up-to-date scientific knowledge, informing the patient sufficiently enough for an informed consent” (Raadgevend Comité 2000). Translated to preventive measures the dentist should be able to answer questions like “How many cavities will my child have?” or “How many of those cavities can you prevent?” or, finally: “What are the costs of your preventive measures to prevent one cavity?”

Research shows us that the dentist’s clinical estimate of the condition of a person’s teeth differs widely. Variation in nominating a child “at risk” differs between dentists up to three times based on their clinical view (Alanen et al. 1994). For the patient this is difficult to understand, no matter he is in the group of false positives or false negatives (van Loveren en Veerkamp 2002).

Introduction of the EYC (Extended Youth Consultation)

Let’s go back to the preventive dental measures. When group preventive measures have to turn into individual preventive strategies, we will need to identify the groups that are likely to develop dental caries. The matter has been studied exten-

sively. This report focuses on the additional diagnostics tools that are needed, for instance by changing the half year check-up into a yearly extended youth consultation (EYC) to identify the children at (dental) risk.

In a committee, organised by the Dutch Dental Association (Nederlandse Maatschappij Tandheelkunde, NMT), the matter was studied extensively. Logistical and financial consequences were studied by a task group (POJG) and a test model was developed and applied in a try out project. The committee was asked to study on the following:

- Assessment of the dental risks for the child’s developing teeth that need further adjustment within a check-up period.
- How can the GP positively influence these dental risks?
- How often should the dentist see a child at risk to prevent further deterioration or even to improve the quality of the child’s teeth
- Can this be achieved by a yearly, more extensive check-up?
- Will a yearly check-up interval not be harmful for the children’s teeth?

The condensed aim of the evaluative study was to see if the caries risk could be assessed using appropriate parameters to *transfer the finances, (unnecessarily) spend to the healthy group, to the groups/individuals at risk.*

Age and dental risk periods: the Milky Way

In the development of the child’s teeth some repetitive aspects occur, needing close monitoring (e.g. oral hygiene). Some are related to growth and development of

the child, needing continuous attention, some others occur incidentally, but mostly within rather demarcated periods (e.g. nursing bottle caries, developmental disturbances in the first molars). After treatment they do not need further attention. Some of those aspects are important

parameters for the caries risk assessment of the child. The use of the parameters can be put into protocols.

Risk is an age related phenomenon. In the Milky Way schedule below the quiet periods can be found. The “red” periods will create a higher number of children at risk.

EYC attention areas

Age in years	1 yr	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Assessment caries risk) ^a	High alert	High alert	High alert	High alert	High alert	High alert	High alert	Close attention	Close attention	High alert	High alert	High alert	High alert	High alert	High alert	High alert	High alert	High alert
Preventive attitude) ^a	High alert	High alert	High alert	High alert	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention
Cooperation) ^a	Close attention	Close attention	Close attention	High alert	High alert	High alert	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention
Developm.l disturbances	Close attention	Close attention	High alert	High alert	Close attention	High alert	High alert	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention
Oral habits	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention
Approximal caries	Close attention	Close attention	Close attention	High alert	High alert	High alert	High alert	Close attention	Close attention	High alert	High alert	High alert	High alert	Close attention	Close attention	Close attention	Close attention	Close attention
Fissure caries	Close attention	Close attention	Close attention	High alert	High alert	High alert	High alert	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention
Feeding habits	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	High alert	High alert	High alert	High alert	Close attention
Periodontal problems	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	Close attention	High alert	High alert

High alert Close attention Normal attention

a. Parameter for EYC.

Individual criteria for dental risk

Using direct criteria the dental risk can be assessed easily. Evidence based criteria are:

- **Prevention:** level of personal preventive care. Brushing with fluoridated toothpaste works (Backer Dirks & Kalsbeek 1987). Without dental plaque no caries will occur, but solely brushing does not suffice. (Bellini et al. 1981, Levy et al. 2003, Schuller & Kalsbeek 2003,)

Score:

- 0: no plaque, no bleeding upon probing
- 1: limited amount of dental plaque
- 2: clearly visible plaque and bleeding upon probing

- **Cooperation.** Behaviour management problems/dental anxiety. Dental anxiety results in avoidance behaviour (Davey 1989). Dental anxiety is related to exposure to restorative treatment and newly developed dental caries. (Milgrom 1995, Ten Berge 2001). Repetitive dental

exposure leads to a sense of control of dental anxiety (Locker et al. 1996). Dentists are well able to assess dental anxiety on a simple scale (Ten Berge et al. 2002).

Score:

0: age appropriate behaviour

1: stress or anxiety during parts of the treatment

2: anxious. Overreaction on normal dental stimuli.

- **Caries.** Dental caries is the best known predictors of dental caries. (Pelkewijk et al. 1990, Roeters 1992, Vanobbergen et al. 2001). Therefore children with recently developed or filled carious lesions (e.g. within the year) need to be put into a higher risk category.

Score:

0: sound, no demineralisations

1: one or two demineralisations

2: recently developed or filled lesions

Each of the criteria above forms a separate risk category that can lead to a decisive risk assessment of the child.

- Caries risk: the highest score is decisive Application of the rules above leads to the following risk categories, with risk-related preventive therapy.

0: no risk: a yearly check-up interval is sufficient

1: some risk: simple measures can be taking during the check-up session or in a separate control session.

2: risk: additional preventive measurements are needed to positively influence the caries risk; several additional appointments during the coming year.

If a child scores a 2 (risk) for one of the three categories, the child is automatically considered as a child at risk for the forthcoming year, the risk interval. For that year

a higher level of preventive care is needed and paid for (*Fig 1*).

3 years	Prevention: 0	Caries: 0	Cooperation: 0	Risk: 0
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...3 years, brushing o.k., sound teeth, not afraid: risk 0...

4 years	Prevention: 1	Caries: 2	Cooperation: 1	Risk: 2
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...4 years, brushing mediocre, 1 cavity, afraid: risk 2...

Relative frequency of the EYC

The dental risk assessment is valid till the next EYC, after a year. Then the next risk assessment follows, resulting in a preventive planning for next year. From 5 years of age, bite wing radiographs are mandatory for refunding of the EYC. If no (initial) lesions can be found on the first x-rays, next bite wings can be made after 2-3 years. If the risk is assessed at level 2 preventive measures can be planned in the frequency the dentists considers necessary.

Clinical try out

The EYC was tested in a randomized group of 35 Dutch dentists. The dentist in total treated 1245 children in the period of 01-01-2003 to 01-03-2003. They assessed the caries risk for each individual child (*table 1*).

All dentists were well able to apply the risk assessment tool of the EYC adequately. The total reported risk group was 26,8%, which should be possible to reduce after closer instructions and guidelines. Risk assessment was related to patient's age, dental status and preventive pattern. The dentists did not use more time with the schedule and seemed to see the EYC as a

Table 1. Risk status, as judged by the individual dentist.(n=1245).

Risk level	Coöperation	Prevention	Caries	CPC
0	85.7%	53.3%	63.4%	41.4%
1	11.4%	36.0%	16.5%	31.8%
2	2.9%	10.7%	20.1%	26.8%
Total				

support in the routine check-up and oral care of children teeth. The clinical use of the risk parameters is interesting.

The task force reports to the board of the NMT. A positive advice on the EYC was given. The board has to further decide on the financial consequences: develop the routine treatments that are allowed to be done in caries risk children. A further evaluative study on the financial consequences is advised.

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Oral Health-Related Quality of Life (OHRQoL)

Review of existing instruments and suggestions for use in oral health outcome research in Europe

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Introduction

The term “health related QoL” has no strict definition, but there is a consensus that the construct is multidimensional and captures people’s perceptions about factors that are important in their everyday lives (Slade, 2002).

The oral health-related quality of life (OHRQoL) concept refers to self-reports specifically pertaining to oral health, and captures both the functional, social and psychological impacts of oral disease (Gift & Redford 1992). Shifting the purpose of measurement from disease conditions to the perceived impacts of oral diseases, the measures have varied from direct clinically based indices indicating normative needs to indirect measures of felt need in terms of self-report indicators. The measures have varied from instruments to measure single dimensions of oral health to scoring systems comprising composite socio-dental indicators or OHRQoL measures. Socio-dental indicators are defined as any measure to estimate the social

impact of oral conditions (Reisine 1981) or the extent to which dental and oral conditions disrupt an individual’s quality of life. The various OHRQoL indicators are to varying extent based on a conceptual framework derived from the International Classification of Impairments, Disabilities and Handicaps (ICIDH) developed by WHO in 1980 (Badley 1987), and that was subsequently amended for dentistry by Locker (Locker 1988). The ICIDH model consists of the following key concepts: impairments, functional limitations, pain, disability and handicap. It provides a theoretical basis for the empirical exploration of the links between various dimensions of health and oral health.

Clinical studies using patient-based outcome measures have shown that they can provide new information about the effectiveness of different treatments (Heydecke 2002), and such measures are now generally accepted as the ultimate outcome of the oral health care system (Inglehart & Bagramian, 2002). The concept of OHRQoL has been confirmed and validated cross-culturally by the

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ICSII study (*Comparing Oral Health Care Systems, a second international collaborative study*) in the context of a multinational investigation of oral health determinants and outcomes (Chen et al. 1997). However, the application of an increasing number of various socio-dental indicators makes surveillance and comparison of perceived oral health difficult, within and across different populations in Europe. If possible, a limited set of instruments should be recommended for use, and generally they should be efficient, easy to complete and easy to handle. The concept of oral quality of life is, however, imbued with values and thus varies according to social, cultural and political context, and therefore the efforts towards standardization of instruments are warranted in terms of agreeing upon instruments that can be recommended for use for different purposes (e.g. in population surveys, intervention studies).

A first step in selecting an appropriate OHRQoL instrument is to specify the exact purpose or aim in using such a measure in terms of being descriptive, discriminative or evaluative. The second step is to identify a measure whose properties conform to the intended study aims. In some cases there will be need for generic instruments and in other cases for more condition specific measurements. Instruments used in survey research will need specific qualities, while the use of questionnaires in longitudinal designs intended to measure change in OHRQoL on population- or on individual levels represents greater methodological challenges (Slade, 2002). It cannot be assumed that a measure proved to be reliable and valid in cross-sectional population studies will be suitable for the purpose of detecting meaningful clinical changes in a longitudinal intervention.

The latter purpose needs properties such as responsiveness and interpretability (Guyatt, Walter et al. 1987). To date, the responsiveness of many OHRQoL instruments has not been established, although there is an increasing tendency to use OHRQoL measures as outcomes in clinical trials and evaluation studies. Longitudinal studies assessing changes in OHRQoL as a time effect or in response to treatment and preventive procedures are needed (Chavers et al. 2003), to explore those qualities (Allen 2003).

For oral health related quality of life measurements, many different instruments already exist (*Table 1*). While most of the measures appear to be theory based and well tested for psychometric properties, only a few of them have been widely used by others in addition to the ones responsible for their development. There is need for an assessment aimed at presenting a priority of recommended instruments to be used for different purposes, and then plan for future research for further evaluations. The first step in this process should be to explore and evaluate existing instruments.

Aims

The present evaluation had the following aims: 1) Based on the existing literature, to evaluate currently used oral quality of life instruments in terms of the extent to which various psychometric properties have been established; 2). To include a few of the existing instruments in priority groups for measurement of the quality of life component of oral health in Europe; and 3). To recommend new research directions to further increase their qualities for future oral health outcome research.

Table 1. OHRQoL instruments used in research during the period from 1985-2004.

Instrument	Abbrev	# of Items	Original reference	Long/ Interv.	Studies used
Social Impact of Dental Disease	SIDD	14.	Cushing et al. 1986		Cushing et al. 1986
Oral Health and the Sickness Impact Profile	-SIP	73	Reisine et al. 1989		Reisine et al. 1989
Geriatric (General) Oral Health Assessment Index	GOHAI	12	Atchison & Dolan 1990	+	Atchison & Dolan 1990; Kressin et al. 1997 Dolan 1997, 1998; Jones et al. 2003 Locker et al. 2001, 2002; Wong et al. 2002
OHRQoL	The DELTA	6	Kressin et al. 1996 Jones et al. 2003		Kressin et al. 1996 Jones et al. 2003
Rand Dental Health Index		3	Dolan et al. 1991		Dolan et al. 1991
Dental Impact Profile	DIP	25	Strauss & Hunt 1993		Strauss & Hunt 1993
Psychosocial Impact Score		42	Locker & Miller 1994		Locker & Miller 1994
Oral Health Impact Profile	OHIP-49	49	Slade & Spencer 1994	+	Jones et al. 2003, Allen & McMillan 2003 Locker & Allen 2002 Allen & Locker 2002, Wong et al. 2002 Awad et al. 2000; 2003a, 2003b Broder et al. 2000 Allen et al. 1999 Allison et al. 1999, Slade 1998, Locker 1995
Oral Health Impact Profile	OHIP-14	14	Slade 1997	+++++	Llewellyn & Warnakulasuriya 2003 McGrath et al. 2003b, 2003c, 2003d Robinson et al. 2001,2003 Hegarty et al. 2002 Allen & Locker 2002 Locker et al. 2001, 2002b, 2004 Locker & Allen 2002 Awad et al. 2003a Ekanayake & Perera 2003 Perera & Ekanayake 2003
Oral Health Impact Profile (OHIP-EDENT)	OHIP-20	20	Allen & Locker 2002	++	Awad et al. 2003a Heydecke et al. 2003 Allen & Locker 2002

Table 1. OHRQoL instruments used in research during the period from 1985-2004.

Instrument	Abbrev	# of Items	Original reference	Long/ Interv.	Studies used
German version of the Oral Health Impact Profile (OHIP 49)	OHIP-G	53	John et al. 2002		John et al. 2002 John et al. 2003
Oral Health-Related Quality of Life Measure	OHQOL	3	Kressin et al. 1996		Kressin et al. 1996
Dental Impact on Daily Living	DIDL	36	Leao & Sheiham 1996		Leao & Sheiham 1996
Oral Impacts on Daily Performances	OIDP	9(8)	Adulyanon & Sheiham 1997		Astrom & Okullo 2003 Robinson et al. 2001, 2003 Masalu & Astrom 2002, 2003 Cortes et al. 2002 Tsakos et al. 2001 Sheiham et al. 2001 Melas et al. 2001
The Oral Health Quality of Life Inventory	OH-QoL	56	Cornell et al. 1997		Cornell et al. 1997
The Oral Health Quality of Life Inventory	OH-QoL	15	Cornell et al. 1997		Cornell et al. 1997
Subjective Oral Health Status Indicators		42	Newman 1999		Newman 1999
The Oral Health-Related Quality of Life Instrument for Dental Hygiene			Gadbury-Amyot et al. 1999		Gadbury-Amyot et al. 1999
Orthognatic Quality of Life Questionnaire	OQoLQ	22	Cunningham et al. 2000	+	Cunningham et al. 2000
UK Oral Health-Related Quality of Life Measure	OHQoL-UK	16	McGrath and Bedi 2001	++++	McGrath et al. 2003 a, 2003b, 2003c, 2003d Dini et al. 2003 McGrath & Bedi 2001b, 2002 Hegarty et al. 2002

Table 1. OHRQoL instruments used in research during the period from 1985-2004.

Instrument	Abbrev	# of Items	Original reference	Long/ Interv.	Studies used
Child Oral Health Quality of Life Instrument	COHQ OL				Jokovic et al. 2003 Tapsoba et al. 2000
Child Perceptions Questionnaire	CPQ 11-14	36	Jokovic et al. 2002		Jokovic et al. 2002
Parental-Caregiver Perceptions Questionnaire	P-CPQ	31	Jokovic et al. 2003		Jokovic et al. 2003
Family Impact Scale		14	Locker et al. 2002		Locker et al. 2002

Review

Table 1 shows a summary of available instruments that was used as the basis for further exploration of qualities. The overview of available instruments is based on a PubMed search covering the period 1985-2004.

Studies have shown that both additive and weighting standardized methods perform well for QoL instruments (Robinson al. 2003), but also that weighting not necessarily improves the psychometric properties (McGrath & Bedi, 2002). This methodological aspect has not been considered in this evaluation.

We believe that it might be difficult to identify one instrument that fulfils all requirements – and it seems reasonable to recommend a set of various indicators that can be used for different purposes.

Based on the review (Table 1), the instruments are therefore allocated to priority groups as agreed upon in the European Oral Health Indicators Project meeting (Lyon, September 2003):

Group 1: *Core indicators*. In this group we have decided to include generic instruments that have been widely tested. They have been shown to have the best qualities based on the research published so far, and are easy to use in population studies.

Group 2: *Expanded level of instruments*. In this group are included generic instruments that may represent supplements to the instruments in Group 1 as well as more condition or age specific instruments.

Group 3. *Optional level of instruments*. This group includes instruments that so far have been evaluated to a lesser extent. They may, however, by further testing show good qualities.

The selection of instruments in priority groups is shown in Table 2.

Our allocation of instruments to Group 1 and 2 is based on the following evaluation:

Oral Health Impact Profile

The original OHIP-instrument (OHIP-49) (49 items) was developed by Slade and

Spencer (Slade & Spencer, 1994) based on a conceptual framework of oral disease and its functional and psychological consequences. The instrument is divided into seven subscales (functional limitations, pain, psychological discomfort, physical disability, psychological disability, social disability and disadvantage) (Slade & Spencer 1994, Jones 1998). This instrument is widely used and tested, also in longitudinal studies to evaluate change in quality of life among elderly people (Slade 1998) and in patients with implant-retained dentures (Allen et al. 2001, Awad et al. 2003).

Shortened versions of the original scale have been developed, providing somewhat compromised instruments in terms of content validity. The OHIP-14 version is a shortened version of the original OHIP-49-item scale (Slade and Spencer, 1994). It is easy to use, and has been tested for psychometric qualities in several studies in different populations (*Table 1*). The OHIP-14 has been shown to have measurement properties comparable with the full 49-item version (Allen & Locker 2002).

The short version instrument has also been used in clinical trials (Awad et al. 2000) and shown to be sensitive to clinical effects of treatment (McGrath et al. 2003). The fully developed instrument (49 items) has, however, been shown to be better with respect to responsiveness than the shorter versions (Locker & Allen, 2002).

We are suggesting that both the Oral Health Impact Profile (OHIP-49) and the shortened version Oral Health Impact Profile (OHIP-14) could be included in the core group of instruments. They have both been tested extensively and shown to have good construct, discriminative and longitudinal validity.

The Oral Health Impact Profile (OHIP-EDENT) is also a modified shortened (20 items) version of the original 49-item scale. This modified version has been shown to have measurement properties comparable with the full 49-item version (Allen & Locker, 2002) and may be more appropriate for use in edentulous patients than the short version OHIP-14. We suggest that the (OHIP-EDENT) could be included as one of the Group 2 instruments (*Table 2*).

UK Oral Health-Related Quality of Life Measure (OHQoL-UK)

This instrument is also widely tested and used in different studies, both cross-sectional and longitudinal design. The instrument is easy to use, has shown good psychometric qualities and also found to be sensitive to clinical effects of treatment (McGrath et al. 2003d). We are suggesting that the instrument could be included in the core group.

Oral Impacts on Daily Performances (OIDP)

This instrument has 8 (9) items comprising one domain (the ultimate impacts or physical, psychological and social aspects of performance of daily living) and satisfactory psychometric qualities in terms of reliability (internal consistency and test-retest) cross-sectional construct and discriminative validity have been established in different cultural contexts (Adulyanon & Sheiham 1997, Melas et al. 2001, Tsakos et al. 2001, Masalu & Astrom 2002, Astrom & Okullo 2003, Masalu & Astrom 2003, Robinson et al. 2003).

Table 2. Proposed instrument in priority groups.

CORE INDICATORS			
Instrument	Abbreviation	Main domains covered	Recommended use
Oral Health Impact Profile	OHIP-49	7 domains: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability and handicap	Intervention Evaluation research Cross-sectional population studies
Oral Health Impact Profile OHIP-14	OHIP-14	7 domains: Functional limitation Physical pain Psychological discomfort Physical disability Psychological disability Social disability Handicap	Intervention Evaluation research Cross-sectional population study
UK Oral Health-Related Quality of Life Measure	OHQoL-UK	16 key areas: comfort, breath odour, general health, eating, appearance, speech, relax and sleep, smiling/laughing, confidence, mood, carefree manner, personality, work, social life, finances, romantic relations	Intervention Cross-sectional population research
Oral Impacts on Daily Performances	OIDP	1 domain: disability in terms of physical, psychological and social aspects of daily performances	Cross-sectional population study
Oral Impacts on Daily Performances	OIDP	1 domain: disability in terms of physical, psychological and social aspects of daily performances	Cross-sectional population study
Oral Health Impact Profile OHIP-14	OHIP-14	7 domains: Functional limitation Physical pain Psychological discomfort Physical disability Psychological disability Social disability Handicap	Intervention Evaluation research Cross-sectional population study
EXPANDED LEVEL OF INSTRUMENTS			
Geriatric (General) Oral Health Assessment Index	GOHAI	Physical function Psychosocial function Pain and discomfort	Cross-sectional population study
Child Oral Health Quality of Life Instrument (including subscales, see text)	COHQOL	Oral symptoms Functional limitations Emotional well-being Social well-being	Cross-sectional population studies
Orthognatic Quality of Life Questionnaire	OQoLQ	Social aspects of deformity Facial aesthetics Function Awareness of facial deformity	Intervention
Oral Health Impact Profile (OHIP-EDENT)	OHIP-20	Functional limitation Physical pain Psychological discomfort Physical disability Psychological disability	Cross-sectional population study
OPTIONAL LEVEL OF INSTRUMENTS			
The remaining instruments (not allocated to groups 1 or 2) may by further testing show good qualities, but we find no basis for any kind of priority assignment in this group.			

The instrument consists of eight items covering physical, psychological and social performances (eating and enjoying food, speaking and pronouncing clearly, cleaning teeth, sleeping and relaxing, smiling, laughing and showing teeth without embarrassment, maintaining usual emotional state without being irritable, carrying out major work or social role, and enjoying contact with people) (Adulyanon & Sheiham, 1997). The scale assesses the frequency and the severity of the impact. The scores are weighted for each item and then summed to a total ODP score. It is easy to apply in large population studies being short and in evaluating the ultimate outcomes of oral diseases. It is also easier to assess psychometric properties of behaviours compared to concepts like feelings, evaluations etc (measures reflect underlying phenomena). Recent research indicates that the instrument is responsive to change (Locker et al. 2004), and we find this instrument so promising that it is proposed as one of the core group instruments.

Geriatric (General) Oral Health Assessment Index (GOHAI)

This instrument was developed and tested by Atchison and Dolan (1990) for evaluating functional status, pain and discomfort, worry, ability to chew and swallow, and social functioning. The initial testing showed satisfactory psychometric properties, but correlated only weakly with some of the oral status indexes. The scale has been widely used, and also tested longitudinally for changes in perceived oral health among elderly (Dolan et al. 1998, Locker 1998). The instrument is age specific and could be one of the Group 2 instruments (*Table 2*).

Child oral health related quality of life questionnaires

The Child Oral Health Quality of Life Questionnaire (COHQOL) has been designed to assess the impact of oral and orofacial conditions on the quality of life of children and their families (Jokovic et al. 2002). The Family Impact Scale is one component of the COHQOL and consists of Child Perception Questionnaires (CPQ₁₁₋₁₄ and CPQ₆₋₁₀) and the Parental-Caregiver Perceptions Questionnaire (P-CPQ). Dependent on the age of the children, child oral health-related quality of life has to be measured either based on the caregiver's or the child's own views. Studies have indicated that both the views of the caregiver (measured by PPQ) and of the child itself (CPQ₁₁₋₁₄) should be included to fully represent child oral health-related quality of life (Jokovic et al. 2003). This child oral health related quality of life questionnaires could be included in the expanded level of instruments group as a supplement to the core group instruments.

Orthognathic Quality of Life Questionnaire

The OQoLQ is a condition-specific instrument for patients with severe dento-facial deformities requiring orthognathic treatment (Cunningham et al. 2000). We suggest that such condition specific instruments should be included in the expanded level of instruments group.

Directions for future research

No single instrument can be regarded as a standard, comprehensive instrument for measurement of OHRQoL. There will always be a need for generic and more dis-

eases-/condition specific instruments. Characteristics of a good instrument may differ for group comparisons for public health purposes compared to measurement of within-subject changes. The present evaluation clearly shows that there is need for more research to be able to recommend a final list of core instruments that should be used in different types of research exploring OHRQoL aspects. A lot of methodological issues are still not finally evaluated for the assessment of quality of life aspects in Europe. Future studies should be designed to test the instruments' discriminating qualities for different kinds of interventions in different age groups and European populations. The present list should be regarded as preliminary and as a basis for the selection of instruments for future studies.

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Oral Health Indicators: National views

National oral health information system, some Danish experiences

Lisa Boge Christensen

Concise review on the provision of oral health care, oral health status and oral health indicators in the Belgian population.

Joana C. Carvalho and Jean Pierre Van Nieuwenhuysen

European Global Oral Health Project - Critical analysis of oral health determinants

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National oral health information system, some Danish experiences

Lisa Bøge Christensen¹

Introduction

In 1972 a recording system was launched with the purpose of processing large quantities of dental health information obtained from the total population of school children in Denmark. The data collection system incorporates two important functions. It serves as a supplement to the patient's individual dental record at the local level, and also it serves as input for further statistical data analysis at regional and national level

Historical background

The background for developing such a recording system was the Act on Child Dental Health passed by the Danish Parliament in 1971. According to this law dental care shall be offered to all school-children in the country regardless of their residential area. According to the law all municipalities were made responsible of establishing dental clinics and employing dentists and auxiliaries in sufficient num-

bers to provide comprehensive dental care, preventive and curative services for all children 7-15 years of age.

The service was extended to include 0-18 year-olds in 1986. Before 1971 dental care of Danish school children was based on the initiative and interest of individual municipalities and there were no overall planning or national coordination. The Act of 1971 imposed the National Board of Health the responsibility of developing a system for recording and analysis of dental health data in order to provide information for planning, monitoring, and evaluation at regional and national levels.

Considerations were made on collecting epidemiological data from representative samples of children in selected municipalities receiving public dental care. However, it was found that such system would entail several disadvantages.

Thus, the recorded data could not be used for planning and evaluation of programme at the municipal level, and the data could not be used for treatment planning of the individual patients. Collecting data by

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sampling would imply that some staff would have an extra workload to obtain summary statistics of little relevance to the local clinic or local municipality. Such system might have a negative impact on the interest of staff involved, and it might affect the use and the quality of the data recording negatively.

Consequently, it was decided to base the data recording system on information from all children served (i.e. the total population of children) and thereby to stimulate providers of dental care to use the data and summary statistics for local purposes. Recordings of dental health status are made on duplicate forms partly to serve as a supplement to the patient's individual treatment record and partly as input for further data analysis electronically. Such dual function became possible with the development of computer input devices for Optical Character Reading (OCR). Handwritten symbols were scanned, identified and coded for direct data entry. By means of such system conventional punch cards (normally used at that time) were avoided. Since the National Recording System for the Child Dental Health Services was launched in 1972 it has been reviewed and updated. Due to the significant decline in caries prevalence registration is compul-

sory by now for selected age groups only (5, 7, 12 and 15 years of age). Since 1994 electronic registration has been available and to-day 40% of the municipalities transfer data via the on-line system.

The system has been in function for more than 30 years, it has been revised and some changes have been made. By now the system is not only a tool for organization development and goals for health policy but also a system for monitoring the health situation.

The recording system and oral health indicators

The registration of data is based upon a record form shown in *figure 1*. To enable the scanner to identify the input all data are entered as numbers written in a distinct way as indicated in the top-line of the record form.

Record form showing the findings at the examination of a girl born on March 26th, 1975. Municipality code 219; school code 003; school class not indicated; examination date 28th October, 1988: 8+, 2+ (congenital absence), +7, +8, 8-, and -8 have not erupted. 05+, 03+, +05, 05-, and -05 have not been replaced by their permanent successors.

Figure 1.



For DMF code numbers see text (*Table 1*). Gingivitis scoring upper jaw indicates healthy gingiva or only slight gingivitis, 2+ is missing, and recording can not be done on this specific tooth. Gingivitis scoring lower jaw indicates bleeding on probing. Pockets are not recorded (the child is only 13 years). Recording of rotation +2, deep bite, distal molar occlusion right site, mandibular midline displacement, crowding mandibular incisor segment.

The form includes boxes for recording identification of the child and for registration of disease conditions. Personal identification number includes ten digits (all Danish citizens have a unique identification number) containing information on date of birth and sex. Also, codes for municipality, school, and class are included in the form. Boxes are available for further individual classification such as social group, ethnic group etc. The largest part of the

record form is used for registration of caries status. The form is based on the Haderup dental notation system (8+ to +8 for the maxillary and 8- to -8 for the mandibular teeth). An erupted primary tooth is indicated by 0 and a permanent tooth is indicated by 1 (*Fig. 1*).

For each tooth a set of coding boxes are provided to enter observations relevant to the tooth surface level: Occlusal, mesial, facial (buccal/labial), distal, and oral (lingual/palatal). For canines and the incisors only four spaces are provided, the incisal edge not being counted as a separate occlusal surface. All sound tooth surfaces are left blank. For registration of caries and other conditions certain scores are specified (*Table 1*).

Criteria for gingivitis and periodontitis are shown in *Tables 2 and 3*. Twelve index-teeth per person are examined. In case the index tooth is not present the box is marked with X.

Table 1. Conditions, code, and diagnostics criteria for registration of caries, etc.

Condition	Code	Diagnostic criteria
Initial caries	0	The enamel has surface is rough with opacity, no cavity
Manifest caries	1	The enamel has surface is rough with opacity. Decay with cavity
Secondary caries or lost/defective filling	2	Manifest caries on a surface already filled due to caries
Chronic caries lesion (registration optional)	9	The enamel surface is hard, smooth, shiny, has whitish or brownish discoloration
Filling	4	Restorations made due to caries (fillings, inlays, crowns)
Trauma	3	Injuries due to mechanical trauma (treated or untreated) excluding infractions and enamel fractures.
Endodontic treatment due to caries	5	Pulp capping, pulpotomy or pulpectomy
Missing (due to caries)	6	
Missing (other reasons)	7	Missing due to trauma or orthodontic treatment
Fissure sealant (registration optional)	8	

Table 2. Registration of gingivitis (optional).

Condition	Code	Diagnostic criteria
Gingivitis	1	Bleeding after probing
Indicator tooth is missing	X	

Table 3. Registration of marginal periodontitis (compulsory for 12 and 15 year old children).

Condition	Code	Diagnostic criteria
Periodontitis	1	Loss of attachment observed by probing
Indicator tooth is missing	X	

Criteria for compulsory registration of dental anomalies, occlusal anomalies and space anomalies are shown in Table 4. The purpose of registration of those five types of malocclusion is to enable the authorities monitor the occur-

rence of such conditions, which normally entail orthodontic treatment and consequently high costs. Other types of deviations are optional and comprise vertical anterior open bite, diastema, antero-posterior molar relation, spacing etc.

Table 4. Registration of traits of malocclusion, compulsory for 12 and 15 year old children.

Condition	Diagnostic criteria
Anterior maxillary overjet	Overjet 6 mm or more
Deep bite	Vertical distance \geq 5 mm between incisal edges in upper and lower jaw
Crowding	2 mm or more in total either in upper or lower jaw
Hypodontia	Aplasia 1-5 permanent teeth
Oligodontia	Aplasia more than 5 permanent teeth

Statistical output

Once a year health statistics are produced at regional and national levels and forwarded to the municipal oral health planners and providers of dental care. Sets of standard tables are produced for each municipality, each country, and for the whole country. All municipalities are provided a set of standard tables (Table 6). Additional tables can be obtained if required. Standard tables

describe the prevalence of caries in the primary dentition (Table 1-3) and in the permanent dentition (Table 4-6). The tables present the distribution of caries quantitatively by the components of def-s and DMF-S, and qualitatively by caries distributions according to severity zones (Table 5). The descriptive statistics include parameters such as means and standard deviations. Medians are also shown and 1st and 3rd quartiles for def-s and DMF-S indices.

Table 5. Caries severity zones of individuals.

Condition	Diagnostic criteria
Zone 4	Caries in incisors and smooth surfaces
Zone 3	Approximal caries in canines, premolars and molars
Zone 2	Caries in pits and fissures
Zone 1	Caries free

Table 6. List of standard tables produced once a year and provided to the users of the system.

Primary dentition	
1.	Mean number of surfaces present, decayed, filled or missing due to caries per person by age
2	Percentages of persons distributed by def-s and age
3	Percentages of persons distributed by caries severity zones and age
Permanent dentition	
4	Mean number of surfaces present, decayed, filled or missing due to caries per person by age
5	Percentages of persons distributed by DMF-S and age
6	Percentages of persons distributed by caries severity zones and age
7	Occurrence of initial caries (code 0) in permanent teeth
8	Distribution of persons by number of permanent teeth with loss of attachment, injuries after mechanical trauma and teeth with endodontic treatment due to caries
9	Occurrence of malocclusions etc.

Conclusion

The National Recording System for the Child Dental Health Services has been in function for more than 30 years. The system has currently been updated on basis of reviews and evaluations. This epidemiological tool functions as an integrated part of the Municipal Dental Health Service in Denmark. A number of reports have been published by the authorities on basis of the aggregated data. At the local level the system has been applied for cohort studies and evaluation of local oral health programmes. In addition, the recording system has been applied in a substantial number of epidemiological surveys in countries outside Denmark.

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Concise review on the provision of oral health care, oral health status and oral health indicators in the Belgian population

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Introduction

Belgium is a Federal state with a population of 10.309.725 million inhabitants (National Institute of Statistics, 2002). There are three regional authorities of Flanders, Wallonia and Brussels and three language communities, i.e. Dutch-, French-, and German-speakers, representing 57%, 42% and 1% of the population, respectively (Carvalho et al. 2001b). The oral health care system is unique for the whole country and it is under the responsibility of the Ministry of Health and Social Affairs.

The organisation of the oral health system can be categorised as the Bismarckian inspired model, which is rooted in the principle of the National Health Insurance (Widström & Kenneth 1999). In order to be covered by the National Health Insurance one may pay a contribution. This contribution is obligatory for those who work in Belgium, except for employees of the European Commission, European Parliament, United Nations Organisations,

and Diplomatic Representations, that may have a private insurance. About 90% of the Belgian population benefited from the National Health Insurance (National Health Institute, 2003).

The contributions are paid to the National Health Insurance that refunds Mutual Insurance Associations. The Mutual Insurance Associations negotiate fees directly with dental associations and syndicates, every second year. The fees for selected dental procedures have to be agreed by 60% of the dentists, otherwise the fees proposal collapses (Widström & Kenneth 1999). The dentists who do not agree with the fees proposal have to inform it to the National Health Insurance by registered letter and may then establish their own fees.

The Mutual Insurance Associations reimburse their contributors based on the fees established by the agreement and contributor's characteristics. Widows, disabled, retired and orphan contributors are fully reimbursed while others get a reimbursement from 50-80%. The reimbursement is

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made on fee-per-service basis for selected treatments. Private insurances companies may either be responsible for the totality of the reimbursement of its contributors or offer a complementary reimbursement to those who already benefit from the National health Insurance.

The first part of this review deals with the provision of oral health care in Belgium. The second part describes oral health status in Belgian population. Finally, oral health indicators for the Belgians are discussed.

Provision of Oral Health Care in Belgium

In Belgium the delivery of oral health care is essentially private for citizens of all ages. There are no collective preventive programmes for children and adolescents. The water supply is not artificially fluoridated and most of the municipalities have very low levels of fluoride in drinking water, < 0.3 ppm F/l (Carvalho 1998). However, fluoridated toothpaste is prevalent on the market and one may find low-, conventional- and concentrated fluoridated toothpaste. Recent survey showed that 95% of 12-yr-olds used regularly fluoridated toothpaste and 91% of the children brushed their teeth with fluoridated toothpaste once or twice per day (Carvalho et al. 2001b).

On the other hand, all children under the age of 18 are enrolled in the School Health Care Service, which has been operating in the country for more than 40 years. This service, which depends on public subsidies, employs general medical practitioners who are responsible for counselling parents, children and school staff on topics like body hygiene, balanced diet, maintenance of sound teeth, weight

control, and physical activity. These practitioners carry out medical check-ups in schoolchildren in their 1st and 3rd grades of primary school and in their 2nd and 6th grades of secondary school. The medical check-ups include dental examination followed by a report on treatment needs, which are sent to the parents by letter.

According to Belgian law any non-operative or operative dental treatment must be carried out by private practitioners or university clinics. The ratio dentist/population is 1 dentist per 1200 inhabitants (National Health Insurance, 2002).

Within the framework of the agreement on fees between the Mutual Insurance Associations and Belgian dentists the following treatments are currently offered: 1) two annual oral examinations to children and adolescents and one annual examination to individuals 18-50-yr-old, 2) dental sealants and orthodontics for children up to 14 years old, 3) scaling once a year for individuals older than 18 years and for disabled people, and 4) dental restorations, endodontics, removable prosthodontics and some types of surgery for all.

Oral health status in Belgian population in the 90s and 00s

In Belgium, there is a lack of epidemiological studies on oral health in sub-populations, which are representative for the whole country. This is true for the entire population: children, adolescents, young adults and adults. Epidemiological surveys carried out in the individual regions of Wallonia, Brussels and Flanders give a general idea about dental health in the country (Van Nieuwenhuysen et al. 1992, Declerck & Goffin 1992, Lambert et al. 1997, Carvalho et al. 1998, Carvalho et al.

1998, Van Nieuwenhuysen & Carvalho 2000, Carvalho et al. 2001a, Vanobbergen et al. 2001a, 2001c, Bercy et al. 2002, Declerck et al. 2002), but only few studies document changes in dental caries and oral health habits in Belgian children, adolescents and young adults over a period of time (Van Nieuwenhuysen et al. 1998, Carvalho et al. 2001b, Van Nieuwenhuysen et al. 2002, Carvalho et al. 2003).

Children – Studies on caries prevalence in the primary dentition of Belgian 5-, 6 and 7-yr-olds documented that the percentage of caries-free children were 59% (Carvalho et al. 1998), 48% (Carvalho et al. 2003) and 44% (Vanobbergen et al. 2001, Vanobbergen et al. 2001, Vanobbergen et al. 2001, Declerck et al. 2002), respectively. The mean deft scores in these children were 1.6 (Carvalho et al. 1998), 2.4 (Carvalho et al. 2003) and 2.2 (Vanobbergen et al. 2001a, 2001b, 2001c, Declerck et al. 2002) and the defts scores, registered only in two studies, were 3.7 (Carvalho et al. 1998) and 5.1 (Carvalho et al. 2003). In the permanent dentition of Belgian 12-yr-olds, prevalence studies showed that the percentage of caries-free ranged from 25% in the early 90s (Declerck & Goffin 1992) to 50% in the late 90s (Carvalho et al. 2001b, Van Nieuwenhuysen et al. 2002) simultaneously with DMFT scores of 2.7 and 1.6, in that order. Data concerning DMFS scores were only registered in the later 90s with a mean value of 2.5 (Carvalho et al. 2001b, Van Nieuwenhuysen et al. 2002).

Cross-sectional investigations on changes in caries and oral health habits in Belgian children (Carvalho et al. 2003) and adolescents (Carvalho et al. 2001b, Van Nieu-

wenhuysen et al. 2002) during the last two decades showed the following: 1) a significant increase in the percentage of caries-free children in the primary dentition from 32% to 48% and in the permanent dentition from 4% to 50%, 2) a 40% caries reduction in deft scores and 78% in DMFT scores, 3) substantial improvement in home-based oral health care and dental appointments on regular basis (Carvalho et al. 2001a, 2001b, Van Nieuwenhuysen et al. 2002).

Young adults – a cross-sectional study carried out in 1989, 1994 (Van Nieuwenhuysen et al. 1998) and 1999¹ in samples of dental students, indicated a tendency to improvement. The percentage of caries-free young adults changed from 2.0% to 5.0% and DMFT scores decreased from 11.3 to 7.4.

Adults – an epidemiological study in Belgian 35-44 years, 45-55 years and > 55 years reported DMFT scores of 15.4, 15.6 and 16.4, correspondingly (Lambert et al. 1997).

Oral health indicators for the Belgian population

Within the limits of the published investigations on oral health indicators in the Belgian population, one may identify two main groups of studies. Firstly, those concerning oral health indicators to prevalence studies (D'Hoore & Van Nieuwenhuysen 1991, Declerck & Goffin 1992, Gizani et al. 1999, Vanobbergen et al. 2001a, 2001b, 2001c, Declerck et al. 2002) and secondly of oral health indicators to cross-sectional studies over a period of time (Carvalho et al. 2001a;

1. Personnel communication.

2001b, Van Nieuwenhuysen et al. 2002, Carvalho et al. 2003).

Children – in caries prevalence studies in children aged 7, starting brushing teeth with a fluoridated toothpaste at an early age, toothbrushing 1-2 times per day, fluoride supplements, geographic area of residence and high socio-economic status were considered as good oral health indicators (Declerck & Goffin 1992, Gizani et al. 1999, D’Hoore & Van Nieuwenhuysen 1991, Vanobbergen et al. 2001a, 2001b, 2001c).

Moreover, the prevalence of healthy gingivae in 12-yr-olds was linked to toothbrushing 1-2 times per day and to some extent to the use of electrical toothbrush (Carvalho et al. 2001a).

In cross-sectional studies, the oral health indicators associated with caries reduction in the permanent dentition were: toothbrushing with fluoridated toothpaste 1-2 times per day, dental appointments once or twice per year, early signs of fluorosis (Carvalho et al. 2001b) high socio-economic status (Van Nieuwenhuysen et al. 2002, Carvalho et al. 2003) and Belgian nationality (Carvalho et al. 2003).

Adults – an epidemiological study on prevalence of periodontal disease indicated that never smoking is a good oral health indicator associated with periodontal health (Bercy et al. 2002).

The health indicators identified in Belgian studies are supported by the international literature. The challenge is to determine their real impact on oral health and their practical implementation in public health. Most of all, it is important to appreciate that only the determinants, biological factors, are able to interfere with the rate of disease progression and development. Non biological factors derive their

association with dental diseases induced by microbial deposits only because they are associated with the determinants and through these determinants with the diseases (Thylstrup & Fejerskov 1994).

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European Global Oral Health Project - Critical analysis of oral health determinants

Carina Källestål¹

Introduction

For this analysis of oral health determinants, oral health is understood as no presence of the main oral diseases; dental caries and periodontal diseases. To be systematic a search for review articles was made in the bibliographic database Medline for the period 1995 until June 2003 with the search terms: Dental caries, Periodontitis, Determinant/s, Risk factor/s, Review. A list of 15 articles on caries was chosen and of these 12 was ordered and read in full text. For periodontal diseases were eight articles identified and five were ordered and read in full text.

Caries in small children, so called early childhood caries (EEC)

Low birth weight has, as a biological factor, been suggested as a determinant for caries later in life. The review by Burt & Pai (2001) failed to show any relationship between low birth weight and subsequent development of caries. They are however,

cautious because of the scarcity of studies and states that the question needs further research to be finally answered.

Different behaviours has been suggested as determinants for EEC as poor oral hygiene, limited exposure to fluorides and frequent exposure to sugary snacks and drinks (Ismail 1998a). Especially behaviours as frequent use of sweetened feeding bottle, drinking soft drinks, and eating sweets are pinpointed for development of EEC (Ismail 1998b). The question if prolonged breastfeeding is also a determinant for EEC has been evaluated by a systematic review (Valaitis et al. 2000). There are some indications that breastfeeding for over one year and at night beyond eruption of teeth may be associated with EEC but there are conflicting findings and at present no definite time at which an infant should be weaned can be determined.

A factor which must be considered structural is malnutrition which has been shown to lead to delayed eruption of primary teeth and possibly to increased caries prevalence (Ismail 1998b).

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Caries in children and adolescents

For children and adolescents the behavioural factor sugar intake, particularly sucrose intake is the most important determinant according to a comprehensive review by Sheiham (2001). Both the frequency of consumption and total amount of sugars are important in the aetiology of caries. Increase in frequency of sugary intakes of more than four per day increases the risk for caries. Teenagers and adults intake of sugars should not exceed 60g/person/day and for pre-school children it should not exceed 30g/person/day. Tooth brushing per se and thus, oral hygiene does not prove to be a determinant for caries. But the use of fluoridated toothpastes has been shown to be important for preventing caries.

Structural factors as socioeconomic level and ethnicity has proven to be strong determinants for caries (Sheiham 2001, Locker 2000). Several studies measuring socioeconomic level in different ways have shown that deprivation is associated with more caries. Also being an immigrant or belonging to a different ethnic group than the majority seems to be a determinant of dental caries.

As a determinant for caries the past experience of dental caries seems to be paramount. This parameter is probably the best predictor of future caries in children (Messer 2000).

Caries in adults

Knowing that adults have similar incidence in caries as children (Sheiham 2001) and thus, caries being a disease for the whole life it seems odd that almost no scientific articles are published either on

epidemiology or determinants of caries in adult populations. No review on caries in adults was found. There is however, no reason to believe that the determinants proven for adolescents should not be valid also for adults i.e., sugar intake and socio-economic determinants.

Caries in old and sick

Also for the old age groups there were no reviews identified. A problem most confined to older age groups is root caries. There are conflicting reports on the prevalence and incidence of root caries due to differing criteria and indices to express results (Clarkson 1995). The aetiology and thereby also determinants for root caries is not clarified.

A common clinical knowledge although not reported in a systematic review is the increased risk for caries in conjunction to certain diseases and also with medications. Diseases or treatment that impairs the salivary flow are increasing the risk for caries. So are also drugs that decrease salivary flow or contain sugar. If these diseases and drugs should be considered determinants is however, a matter of definition.

Periodontitis in children and adolescents

The definition of periodontitis is not clear (Jenkins & Papananou 2001) and new systems for classification are seen in the literature every other year. Albandar and Rams (2002) are however using four classifications when describing periodontitis in youth; periodontitis as a manifestation of systemic disease, necrotizing periodontal disease, aggressive periodontitis and chronic periodontitis.

Systematic diseases associated with periodontal disease have a genetic aetiology as Pappilon-Lefèvre syndrome, Down's syndrome, congenital neutropenia, leukocyte adhesion deficiency etc. Necrotizing periodontal diseases are associated with diminished host resistance to bacterial infection of periodontal tissues which may occur due to various environmental factors as malnutrition, psychological and physical stress, poor oral hygiene, alcohol use and smoking. Necrotizing periodontal diseases are more common in poor populations of undeveloped countries.

Aggressive periodontitis is characterised by rapid loss of periodontal tissues where there might be a genetic predisposition but local factors also play a significant role. These include certain bacterial species, particularly *Actomycescomitans* and *P. gingivalis*. Furthermore, immune defects, poor oral hygiene, local plaque retaining factors and smoking increase the risk of disease occurrence and progression. Aggressive periodontitis is more frequent in certain ethnic groups as African and Hispanics.

Chronic periodontitis is much more prevalent than the other three groups of diseases. It is believed to be similar to adult chronic periodontal disease. Poor oral hygiene, local plaque-retaining factors, and smoking are important etiological factors.

Periodontitis in adults

The definition of periodontitis is not clearer for adults but a definition based on clinical signs of lost periodontal tissue usually forms the basis for epidemiological research in the area. The principal etiological factors are microbiological dental plaque biofilms, whereas several other

local and systemic factors have important modifying roles in the pathogenesis.

Numerous behavioural and environmental risk factors are identified but only a few are what we could call determinants of the disease. The two factors having overwhelming evidence as determinants are smoking and diabetes mellitus (Albandar 2002, Genco 1996). For other factors are more research needed in order to establish accurately their contribution in the pathogenesis.

Conclusion

From the above cited reviews it seems that the main determinants for caries, irrespective of the age at which it occurs, are sugar intake and low socioeconomic level. For the sugar intake is both frequency and total amount of intake important.

To judge from the literature there is a shortage of aetiological epidemiological studies on adult caries. The influence of diseases, drugs and socioeconomic factors are not reported on as often as for adolescents. Also, for caries in the older age groups little is known of determinants for caries which is also true for root caries.

For periodontal disease it seems that smoking and diabetes mellitus are the main determinants except for some rare cases of periodontal disease at childhood which has genetic disorders as main determinants. The level of oral hygiene has equivocal associations with periodontal disease although it is an important factor for the aetiology. The main shortcoming for periodontal research is the lack of definition of the disease; it is unclear if there are several diseases or only one entity and how this should be defined. This is of course due to the aetiology not being clarified but it hampers the selection of determinants.

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Information needed for regulating oral health services: a Finnish perspective

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Introduction

In Finland, the organization and financing of health care has been considered a public responsibility for a long time. The state determines the general health policy guidelines and directs the health care system at the national level. The municipalities have the main responsibility for arranging health services. In general, legislation does not regulate in great detail the range and method of organizing the services. The municipalities can therefore arrange health services according to local circumstances and the population's needs.

The amended provisions of Primary Health Care Act and the Health Insurance Act, which entered into force on December 2002, abolished the age limits to publicly subsidised dental care. Before that the local authorities could limit the access to dental care on the basis of age, likewise the eligibility for reimbursement under health insurance was determined on the basis of age. The municipalities

have the main responsibility for arranging oral health care services as well as health services in general. At the same time all clients of private dental care are, irrespective of their age entitled to reimbursement from health insurance granted by the social Insurance Institution according to the confirmed prices.

Organizing public oral health care services requires careful strategic planning. Indicators used for collecting data of oral health determinants and oral health care systems should serve the health strategy and health goals of the oral health services.

The indicators need to be clearly defined. There are now differences between the European Union countries in defining the used indicators. The most important future task is the detailed description of useful indicators that enables the comparison between different EU countries. Technical data collection is also an important issue. For comparisons between different countries the data/used indicators should be available in Internet.

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This paper shortly describes the national health project proceeding in Finland, the indicators collected in national oral health surveys by the National Research and Development Centre for Welfare and Health (Stakes), the new strategic planning in oral health care services in municipalities. As a technical data collection example the Quality Recommendations for Care and Service for older persons project is presented.

The national health project

The Council of State initiated a national project to ensure the future health care in April 2002. The key areas of development are concerned with health promotion and preventive work, ensuring access to treatment, staff availability and the improvement of skills, reforming health care functions and structures and reinforcing financing. Concerning the access to treatment national guidelines for non-urgent treatment and queue management are being prepared.

The principles of access to treatment within a reasonable period of time will be embodied in legislation by the year 2005. The basic premises of preparation are access of preliminary assessment of health within three days of contacting the service, access to outpatient assessment by a specialist within three weeks of referral and access to medically justified treatment assured with the time specified by the national treatment recommendations. These basic principles will concern also oral health care but are being modified and developed in detail for oral health care. Measuring the access to treatment would be a useful indicator.

Supplementary training for health care personnel will be regulated and increased taking specific regional needs into consid-

eration. Supplementary training for health personnel will be mandatory. At the moment supplementary training is not mandatory for dentists.

The finances of health care will be augmented. The need for additional funding is a result of the increased demand for services caused by the change if the age structure of the population, the introduction of new technology and the additional costs arising from attaining the standards required by in-service training and quality recommendations.

Indicators used in national oral health surveys

In Finland national information of operation of the public sector oral health care and its effect on the oral health status of the population has been collected since 1970-1971. From 1980 national oral health surveys have been carried out every three years. The respondent rates from the health centers have been high (varying from 88% to 98%). Now that all Finns are entitled to subsidized dental care (since December 2002) information is gradually collected of entire population. Information is gathered of the number of oral health personnel (dentists, chief dentists, specialized dentists, dental hygienists, dental assistants) and the cost and financing oral health care. In the year 2000 survey the following indicators were used to collect total health status data: the age group and total number of age group, percentage of examined, dental visits, caries free, percentage of attending orthodontic care, d-index and dmf-index, CPI-index, sealants, fillings, percentage of edentulous, at least 20 functioning teeth, endodontic treatment, extractions, users of removable

dentures. The data has been summarized using the following age groups: 0-5, 6-18, 19-44, 45-64, 65-74, → 75.

These national oral health surveys have been very important in estimating efficacy of the public oral health services and in improving their performance

Organising public oral health care services requires careful strategic planning

The Balanced Scorecard method (BSC) has been proved to be an effective strategic planning tool in public sector oral health care. The idea is that crucial success factors based on vision and strategy can be used as indicators describing how well operations are being carried out, and these indicators can in turn be used for monitoring and measuring, and in comparisons between health centers.

The BSC method is based on four viewpoints: those of civic and political decision-makers, resource management and finance, the organization's performance and functionality, and the workplace community and staff. The essentials for strategic success from each of these viewpoints are crystallized as crucial success factors. These factors were defined according to four viewpoints: performance, resources, process and renewal. The evaluation criteria picturing the success factors in oral health care contain information that both describe and guides operations. This basic information can be used to create new derived indicators. Indicators can also be used to clearly express the desired direction or the desired standard aimed at. Indicators of this type are for example customer satisfaction index, DMF index, a service-use index illustrating the organization's conscious care policy plus indices measuring efficiency and productivity in the

production of services. In this method the use of common indicators in comparing organizations have been considered useful.

The technical data collection and follow-up

As an example of a technical data collection in Finland the quality indicators for evaluation of care and services for older persons project is presented. The Finnish Ministry of Social Affairs and Health and The Association of Finnish Local and Regional Authorities issued in May 2001 Quality Recommendations for Care and Service for older persons. To support municipalities in bringing these recommendations to practice STAKES (www.stakes.fi) has in collaboration with various municipal professionals collected these indicators. Included are 19 key indicators and various indicators covering 75 topics of data on most significant parameters of care and service for older persons. The indicator groups are the following: key indicators, demography, care structure, indexes for care load and disability, coverage of age groups by services, process and intensity of services, indicators on personnel, indicators on economy, planning and informing.

This information is available of all 451 Finnish municipalities. A demo version is available in the Internet.

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Oral Health Indicators: Achievements and Perspectives

Are the “Quality Adjusted Life Years” and “Disability Adjusted Life Years” indices trustworthy?

Gérard Duru

Oral Health Indicators in Europe: Preliminary consultation on the information available in 15 EU countries.

Nicolas Nicoloyannis, Marie Hélène Leclercq and Denis M. Bourgeois

Are the “Quality Adjusted Life Years” and “Disability Adjusted Life Years” indices trustworthy?

G rard Duru¹

Any action undertaken in the field of health uses resources and produces either positive or sometimes negative results. These results are generally described by two indices: an index of medical effectiveness considered relevant to the context of the action, plus either a quality-of-life (QOL) index or else an index of dependency.

One of the most widely used medical effectiveness indices is the number of years of life gained. There are, in contrast, a large number of quality-of-life indices, classified according to the “states of health” (also known as “states of life”) taken account of and how each such state is weighted. To simplify matters, there may be taken to be two main categories of quality-of-life index:

- Those in which states of health are defined in terms of response profiles on a closed, so-called “quality of life”

questionnaire. The value associated to each state is obtained by scoring.

- Those in which states of health are descriptive. They are classified according to patient preferences. The value associated to each state is a numeric code representing the ranking given by the patient. The process whereby this value is associated to the state of health is called a “utility function”, and the value itself is called the “utility” of the state of health in question^{2, 3, 4}.

The same holds true for dependency indices.

It is obviously a good idea to be able to compare results from two (or more) actions in the field of health. And this is easy to do when all of the results are expressed in terms of the same index, but becomes much more complex when two different

1. University Lyon I, France.

2. A. B eresniak, G. Duru,  conomie de la sant  [Economics of Health], collection des Abr g s, Masson, 5th  dition, 216 pages, Paris, August 2001.

3. G. Duru, Utilit , in Dictionnaire des Sciences  conomiques [Dictionary of Economic Science], C. Jessua, C. Labrousse, D. Vitry eds, PUF, 1096 pages, Paris, April 2001.

4. J.P. Auray, A. B eresniak, J.P. Claveranne, G. Duru, C. Murillo, Diccionario comentado de econom a de la salud [Dictionary of Health Economics, with Commentary], handbook, Masson, 351 pages, Barcelona 1998.

indices are involved. In point of fact, different indices can lead to different conclusions: action A may be deemed better than action B in terms of medical effectiveness, while B seems to be better than A in terms of quality of life. This is the whole problem of multi-criterion analysis.

One elegant way of solving this problem is to construct an index which performs a useful synthesis of the other two. Such an approach has given rise to two indices: QALY (Quality-Adjusted Life-Years), combining a QOL index on the one hand, and “years of life gained” as an indicator of medical effectiveness on the other; and DALY (Disability-Adjusted Life-Years), combining a dependency index with and “years of life gained” as a medical effectiveness index.

How is such a combination achieved? The procedure consists in weighting the number of life-years gained by the quality-of-life (or dependency) index associated with the state of health (or of dependency) in which they are going to be spent. The determination of the combination function is said to be *multiplicative*.

This is all very straightforward, not only mathematically but also from the point of view of interpretation. Take, for example, the case of an action which enables the subject to gain 10 extra life-years, which will be spent in a wheelchair. If the index value corresponding to the state of life referred to as “moving around in a wheelchair” is 0.5, then the combined index value will be given by $10 \times 0.5 = 5$. And if a state of life referred to as “disability-free” is indexed at a value of 1, then this combined value of 5 will also correspond to “5 extra years lived

without disability”. I.e., “living 10 extra years in a wheelchair” is equivalent to “living 5 extra years without disability”.

One should sometimes be wary of things which look simple, not to say *simplistic*. And such is the case with the specifications underlying the QALY and DALY indices¹. Two examples will serve to illustrate this.

The first example concerns the coming winter sports season. Being as we are a worried and anxious kind of person, we are thinking about the accidents which could happen to us. By the time the season is over, a bad fall may have us walking on crutches or with the help of a cane. Then again, we could fall over a cliff and either die, or end up bed-ridden, or confined to a wheelchair. Looking on the brighter side, we may equally well emerge from the coming season as from those that preceded it: i.e., with mobility unimpaired.

Any of these states of life and of health are possible consequences of our love of skiing. And we can, of course, rank them in order of preference. I imagine most skiers would agree with the following classification: “unimpaired mobility” is preferable to “using a cane”, which in turn is better than “being in a wheelchair”, which is preferable to “being bed-ridden”, not to mention “dead” – although there are those who feel that being bed-ridden is a fate worse than death.

Having drawn up this personal preference ranking, let us then ask ourselves what may seem to be a rather curious question: would we prefer to live 20 years moving around in a wheelchair, or just 10 years, but on crutches?

1. Duru G, Auray J.P., Béresniak A, Lamure M, Paine A, Nicoloyannis N. Limitations of the methods used for calculating Quality-Adjusted life-year values, *Pharmacoeconomics*; 2002 20 (7).

We are, we confess, unable to give an answer. So let us consult two of our friends who are experts in the matter, Robert and Claude, and ask them to design a protocol to help reveal our actual preferences as between these two outcomes.

Their advice to us is: “You should first construct a *utility* function associated to the preference relations or the ranking of health-states you have drawn up; this is to be done by means of a *standard gamble*, which is an experimental means of associating an utility value to each life-state.”

Having done this, our two experts suggest constructing an index taking account of the duration and of the value attributed to the various states of mobility, by weighting the life-years by the utility value of the state of health in which the years would be lived. This is how indices such as QALY and DALY are determined.

As scientists, we are rather reticent about any new method, and so we get the reproducibility of Claude and Robert’s method checked by asking them to carry out the experiment separately.

Here, then, is Robert’s experiment:

The *standard gamble* consists in offering two different contracts. The first states that: “Your accident means you have to walk with crutches”, and the second that: “There is a highly skilled surgeon who could operate and restore full mobility, although his operations are not always a success. There is thus a probability p of your recovering full mobility if you agree to the operation, but also of course a probability $1-p$ of ending up bed-ridden.” If p equalled 1, we should obviously not hesitate to take our chances in surgery. But, if $p = 0.99$, would we still risk being operated even with 1 chance in 100 of ending up bed-ridden? The experiment consists in varying p so as

to discover the p -value at which the two contracts seem to the subject to be equivalent. This is a technique widely used on the other side of the Atlantic.

Robert attributes a value of 1 to the state of “unimpaired mobility”: it is his chosen unit-value of measurement. And the state of being “bed-ridden” scores 0, as the point of origin for the parameter Robert chose for measuring the utility value of states of health.

In science, all measurement is made along a parameter defined by the choice of a point of origin and of a unit value.

The results of Robert’s experiment are as follows:

The two contracts are found to be equivalent when $p = 0.3$. Robert thus assigns a value of 0.3 to the state designated by “walking with crutches”.

The same procedure is followed for the state designated by “moving around in a wheelchair”. In this case, the contracts are found to be equivalent at $p = 0.1$, which thus represents the utility value of “moving around in a wheelchair”.

Now we simply have to calculate the number of QALYs for each situation, as the product of the number of life-years multiplied by the utility value of the state of health in question. “20 years in a wheelchair” thus scores $20 \times 0.1 = 2$ QALYs, which is the equivalent of “2 years of life with unimpaired mobility”. And “10 years walking with crutches” scores $10 \times 0.3 = 3$ QALYs, making it the equivalent of “3 years of life with unimpaired mobility”.

So Robert tells us, “You obviously prefer the idea of living just 10 years with crutches to 20 in a wheelchair.”

Claude runs the same experiment, but not with the same unit-value or point of origin. No problem: he has simply chosen a dif-

ferent parameter, with its origin at “death” and the unit-value corresponding to “walking with the help of a cane”.

The results of Claude’s experiment are as follows:

When the state of health in the first contract is “walking with crutches”, the two contracts are equivalent for $p = 0.7$; and when the state of health in the first contract is “moving around in a wheelchair”, the two contracts are equivalent for $p = 0.5$.

Thus the number of QALYs corresponding to “20 years in a wheelchair” and “10 years on crutches” are respectively 10 and 7.

And Claude tells us, “You obviously prefer the idea of living 20 years in a wheelchair rather than 10 years with crutches”. I.e., his conclusions run counter to Robert’s, although the same experimental design was used. All that changed was the parameter. This example goes to show how sensitive the QALY index is to the choice of parameter. You choose your parameter, and get your result!

A second example is intended to show that one should beware of so-called “league tables”¹, comparing series of interventions in terms of QALY cost-effectiveness.

Let us imagine 2 articles, published in international peer-review journals, presenting the cost-per-QALY of two interventions, one for pathology X and the other for pathology Y.

The first article estimates the cost-effectiveness (cost per QALY) of an intervention for

pathology X, from society’s point of view, with QOL measured on Rosser’s grid², and finds a ratio of €2,067 per QALY.

The second article uses the same method, and assesses the cost-effectiveness of an intervention for pathology Y at €1,770 per QALY.

The intervention for pathology Y is thus preferable to that for pathology X.

Both articles present a cost-effectiveness analysis for the respective interventions. And both have the same cost: €10,000.

The first intervention, for pathology X, gives a gain of 7 extra life-years: the first 3 years are spent in a state described on the Rossner grid as “slight physical dysfunction and no emotional suffering”; the next 2 are spent in a state of “significantly limited activity, and mild emotional suffering”; and the last two years are spent in a state of “significantly limited activity, and significant emotional suffering”.

The second intervention, for pathology Y, gives a gain of 6 extra life-years: the first is spent in a state of “slight physical dysfunction and no emotional suffering”, the next two in a state of “significantly limited activity, and mild emotional suffering”, and the last three in a state of “significantly limited activity, and significant emotional suffering”.

It is clear that the results of the first intervention are better in terms of medical effectiveness and quality of life. But, strangely, for the same cost the cost-effectiveness ratio gives the advantage to the second intervention. How is such a paradox to be explained?

1. Masson J., Drummond M., Torrance G., Some guidelines on cost effectiveness league tables, *British Medical Journal* 1993; 306: 510, 572.

2. Gudex C, Kind P, The QALY Toolkit, Discussion paper 38, Centre for Health Economics, University of York.

Are the “Quality Adjusted Life Years” and “Disability Adjusted Life Years” indices trustworthy?

The paradox is in fact more apparent than real. In the first article, the author uses Rosser grid health-state values derived from physicians’ preferences. The utility values which physicians assign to states of “slight physical dysfunction and no emotional suffering”, “significantly limited activity, and mild emotional suffering” and “significantly limited activity, and significant emotional suffering” are respectively 0.981, 0.760 and 0.187, which results in a QALY number of 4.837 and a cost-effectiveness ratio of $10,000/4.837 = 2.067$.

In the second article, the author also used the Rosser grid, but derived the corresponding values from preferences expressed by nursing staff. The utility values assigned here to states of “slight physical dysfunction and no emotional suffering”, “significantly limited activity, and mild emotional suffering” and “significantly limited activity, and significant emotional suffering” were respectively 0.992, 0.963 and 0.911, giving a QALY number of 5.651 and a cost-effectiveness ratio of $10,000/5.651 = 1,770$.

The apparent paradox is no paradox at all, but just the kind of stupid mistake a bad pupil might make by trying to compare, say, physics results expressed in divergent units of measurement.

The fact is that, in league tables, the parameter used in the calculation of cost-effectiveness is never stated; the results are therefore to be taken with the greatest prudence. Justifying QALYs by insisting, as is so frequently done, that “a QALY is a QALY”¹ is more like claiming that “a length is a length” than that “a metre is a metre”!

Just try to imagine what would happen to air traffic control if the altitudes of planes using altimeters in feet were to be set against altitudes of planes using altimeters in metres, without specifying which unit the altitude was being measured in.

These two simple little examples explain why the French pharmaco-economic guidelines² are so reserved as to the use of this kind of index. In conclusion, let us quote from guideline n° 25:

“The QALY approach consists in combining in a single dimension two dimensions describing the results of an action in the health field in terms of life-years gained and of quality of life. The combination procedure raises a number of issues, both methodological and philosophical

The lack of robustness in the approach means that the conclusions drawn from a study can be manipulated.

“This leads us to advise readers or users of studies with results presented in terms of QALY to look carefully at the following conditions:

“a) In each case it is vital to check whether the reference for the quality-of-life measure and the measurement method used are stated, and that the multiplicative combination function has been validated.

“b) The origin of the quality-of-life measures needs to be considered, and in particular whether they are psychometric or else derived from preference-revelation techniques such as TTO or standard gamble.

1. Williams A, Cost-effectiveness: is it ethical? *J. of Medical Ethics*, 1992; 18: 7-11.

2. La lettre du Collège des Economistes de la Santé, Juin 2003. CES Website: <http://perso.wanadoo.fr/ces/>

- “c) When versions of QALY are being used which rely on theories of utility or expected utility, the reader needs to consider whether the behavioural hypotheses and methodological and epistemological choices have been validated and what biases such choices may entail.
- “d) In all cases, any attempt to make comparisons between studies and pathologies (e.g., league tables) should be viewed with the greatest caution: for example, one should check whether the same systems of reference have been used in the various cases. Nor is it advisable to take the health-state valuation from one study and use it in another, without first carefully validating the equivalence of the states of health.
- “e) One should also be wary of the risk of distribution bias if comparisons are made between populations with very divergent socio-demographic characteristics or varying preferences for the treatments under analysis.
- “f) In the present state of research, it is unadvisable to base any public decision on study results expressed in terms of QALY, given the possibility of generating divergent results from the same observed data.”

Oral Health Indicators in Europe: Preliminary Consultation on the Information available in 15 EU Countries

Nicolas Nicoloyannis¹, Marie H el ene Leclercq² and Denis M. Bourgeois³

Introduction

The research project to set up a European Consultation on statistical methods for oral health, involving the availability of indicators has been instigated and earmarked by the group members of the EGOHDP, as a research field to be promoted in view of its potential utility for the elaboration of a long list of oral health indicators.

The improvement observed in the status of oral health in the population of the industrialized countries has prompted the scientific community, professional bodies and decision-makers to ask which indicators policy strategies ought to be adopted in relation to surveillance in the future. This transition period provides a timely opportunity for identifying precisely these future options and objectives in oral health surveillance. This project is part of the wider attempt to identify indicators for oral health (problems, determinants and risk factors related

to lifestyle), indicators for critical oral health care, the quality of care, for essential health resources and to identify the types of data generation and management problems within the health information system for long-term surveillance oral health among the European population.

The concept of development of operational indicators in oral health has been proposed in Europe (Biomed, Oratel, etc...) and in the world. So, in an unpublished WHO paper, Leclercq and al. in 1991 had already described the cornerstone and the need for an oral care management system. It was derived from four areas of concern:

- The lack of standard and reliable information for planning and monitoring care services;
- The change in the pattern of dental diseases and periodontal diseases and treatment and the implication for conventional epidemiological survey methods;

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- The need to expand the sources of information beyond the standard epidemiological type of survey;
- The variety of existing systems.

A high priority was to encourage the development of standards for the design and implementation of computerized systems for the management of oral health care. A goal was to seek a level of agreement sufficient to allow comparability of data that are conceptually equivalent and permit clear delineation of data.

Moreover, in 1992, the WHO Expert Committee on Recent Advances in Oral Health pointed out in the Technical Report 826 that the objective of informatics developments in the advancement of oral health was to encourage the development and implementation of standards for clinical records, so that the benefits of information management can serve the decision-making process and allow appropriate oral health care to be implemented.

Thus, the goal of this consultation is not intended to question the utility of indicators as a method of surveillance but to reconsider, in view of continuing scientific uncertainty in respect of this issue, how indicators should best be used within a community. Informed by the hard knowledge and grey areas surrounding this issue these recommendations replace current indications for indicators utilisation.

For instance, dietary habits that increase the risk of overexposure of infants and young children to fluorides from different sources should be identified and appropriate surveillance measures taken. The efficacy of all caries prevention programmes should be periodically evaluated. In Europe, where caries prevalence is moder-

ate to low, a cautious fluoride policy should be adopted. There are, however, some concerns: authorities may reduce their commitment to an oral health prevention policy that threatens to be the victim of its own success, scientists may question the validity of prevention in the light of its drawbacks, and consumer groups may then politicize this movement. As our knowledge stands at the present however, caries cannot be said to be eradicated. Should there be a loss of momentum in prevention, caries will again become common. We take the view that there remain many groups at risk for whom a specific approach is required. How is oral health surveillance likely to develop? What will be the attitude of future generations to dental caries when, like their parent's generation, they have no direct knowledge of caries? Is there not a risk that we will see inappropriate behaviour with regard to oral health prevention? There is therefore substantial thematic material to guide public health policy for administration. Oral health is clearly in a transition period, which is not to question the utility of indicators. This transition period provides an opportunity for identifying major trends and possible scenarios in oral health policy issues in the future. This initial consultation within the EU Oral health SANCO project should be considered in this light. Its terms are intrinsically part of the current debate but consensus should also move beyond this framework especially since a wide variety of indicators delivering products of comparable efficacy is currently available.

The objectives of this consultation were to facilitate the achievement of the EU Workshop on Oral health statistics by:

- Presenting a review of the current situation in respect regarding oral health indicators relating to health problems, risk factors and determinants as well as an initial evaluation of action undertaken.
 - Facilitating the reflexion of the various parties involved in the project in the EU region, on the availability of indicators at regional and national levels.
 - Stimulating critical thought on the part of public health administrators on the future role of indicators in relation to oral health policy.
- Bibliographic research to identify current thinking on methods of administering indicators and to identify emerging trends.
 - Methodological research to enhance and optimize the efficiency of consensus research fields applied to the topics previously identified.
 - European consultation involving correspondence, meeting between the Experts Working Group of the EGO-HDP.

This consultation took place from 10 May to 25 August 2003 within the framework of the preparation of the EU workshop on statistics in Oral Health held in Lyon in September 2003.

It was the first phase of the development process towards the elaboration of a long list of oral health indicators as described in the protocol of the EGHODP.

Methodology

Ideally, the prioritized indicators would already be routinely monitored in a majority of Member States, or easily added to current data. To ascertain what was already available, a questionnaire was devised to identify for which of the indicators information was currently available. The final first list of indicators thus, was able globally to reflect the current availability of information in the participating countries.

A search of relevant literature was undertaken to establish for which indicators a clear link with disease had been established. Methodologies available to meet the objectives of this project come within

the purview of so-called consensus surveys. Investigation comprised three phases:

- Bibliographic research to identify current thinking on methods of administering indicators and to identify emerging trends.
- Methodological research to enhance and optimize the efficiency of consensus research fields applied to the topics previously identified.
- European consultation involving correspondence, meeting between the Experts Working Group of the EGO-HDP.

Administratively, the study required a scientific project leader, a consultant for project implementation and follow-up. Technically, it comprised two phases: (i): a preliminary phase to decide on the working design and the technical procedures; (ii) a general development phase to define the main list of indicators and questions linked to future fluoride use.

The following took place during this phase: (i) Information collation provided by secondary sources (references, statistical sources) and provided by collection of qualitative information (interviews with specialists, symposia, etc.): (ii) Listing of factors determining methods of oral disease surveillance linked to indicators use. Indicators were recorded based on the following variables:

- Variables linked to risk factors;
- Variables linked to oral health status;
- Variables linked to quality of life;
- Variables linked to the oral health systems

Project planning was under the jurisdiction of the Group Leader committee, University Lyon, France. It comprised various

steps: (i) Defining administrative and organizational structures for the process; (ii) Defining questionnaire items; (iii) Drafting and publishing the questionnaire; (iv) Validation of an expert panel; (v) Mailing of the questionnaire and corresponding administrative work; (vi) Data analysis and final report.

Selection of participants

The expert panel group consisted of 15 persons, national members of the European Group. Nineteen different countries were represented. Each of the members received an explanatory letter attached to the questionnaire inviting them to join the consultation in May 2003.

The response rate was 100%. The national distribution was: Austria, Belgium, Denmark, France, Finland, Germany, Greece, Ireland, Italia, Netherlands, Norway, Portugal, Spain, Sweden, and United Kingdom. The Consultation study comprised one phase, beginning in May 2003 and finishing in August 2003. The study was co-ordinated and run from the EOHDP headquarters in Lyon. All questionnaires and study data were dispatched to the principal investigator by mail and/or electronic means (e-mail and fax).

Structure of the questionnaire

The technical committee decided, based on initial discussion and arguments from the participants, which items and questions should appear in the questionnaire. According to most of ongoing SANCO projects, table of essential useful information, guidelines and recommendations

were adapted from the “European Community Health Indicators Project” (ECHI), SANCO Project.¹. Similarly, the identification of four primary categories of indicators “Demographic and socio-economic; Oral Health Status and Well being; Determinants of Oral health, Risk and protective factors; Health Systems and Policy” was recommended.

Open questions related to the structured questions allowed due consideration to be given to arguments during the first phase. The target of this first questionnaire was principally to provide an overview of indicators in oral health and principal limitations to their administration.

Analysis

The analysis of the questionnaire focused on identifying problems and tried to establish which forms of indicators delivery might acquire future importance. 15 European countries are examined for their considerations of relevant indicators. This synthesis is based on the analysis of single country contributions channelled through the Group members according to the framework document provided. Both qualitative and quantitative analyses were made of answers to the consultation. Single country documents are not annexed. Detail of the results is available on requests to the co-ordinator Group Leader (DB).

Oral health indicators mentioned by the countries

All participating countries answered positively and 15 completed questionnaires

1. europa.eu.int/comm/health/ph_projects/monitoring_Project_en.htm

were received and analysed. A total of 66 indicators were proposed qualifying 4 areas related to oral health: Oral health determinants listing 10 indicators, oral health status – 14 indicators, Oral health systems – 23 indicators and oral quality of life based on recording 9 indicators. In addition 10 indicators on demography and socio-economic factors stratified by age-groups were indicated.

The results of the compiled information are presented in two series of tables:

- *The total number of indicators* available in each country from the list of 66 indicated
- *The number of indicators* available in each country, in each of the 5 domains: Demography and socioeconomic information, Oral health determinants, Oral

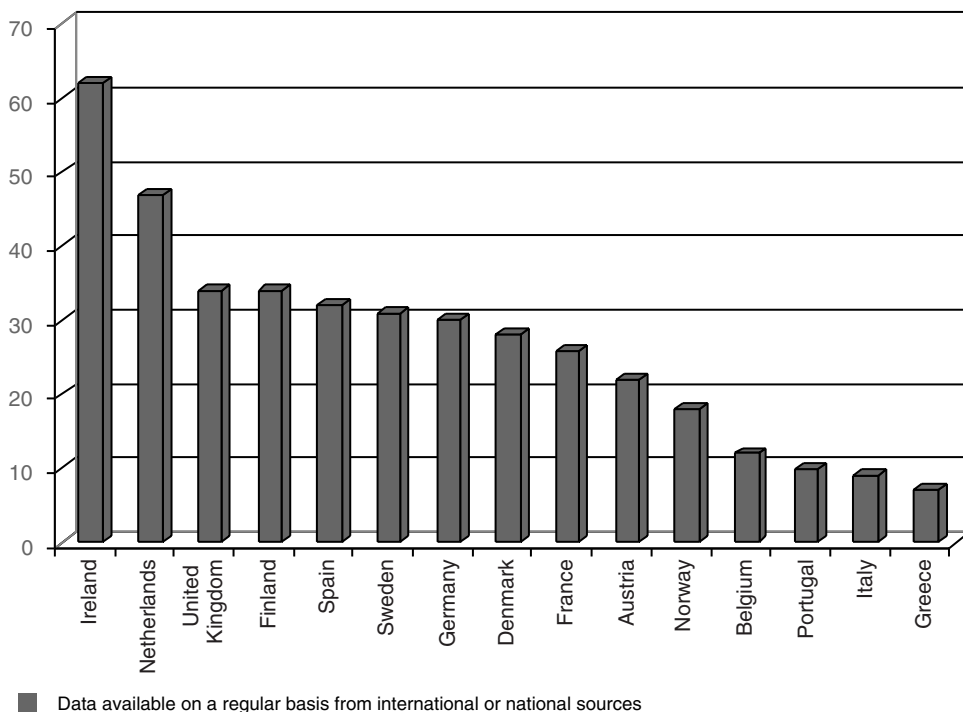
health status, Oral health systems, Oral health related quality of life. This information is illustrated by a series of bar-graphs.

- *The number of countries* declaring that information is available, by specific indicators. This information is shown in a series of tables incorporated in the text below.

The results have been computed on the basis of answers qualified by codes A and B as defined in the criteria proposed by the ECHI system: A- regularly available from inter national source, B- regularly available from national source.

The comments received stressed the need to better qualify the data source and at least to indicate the frequency and the geographical area in different categories.

Figure 1. Total number of indicators per country

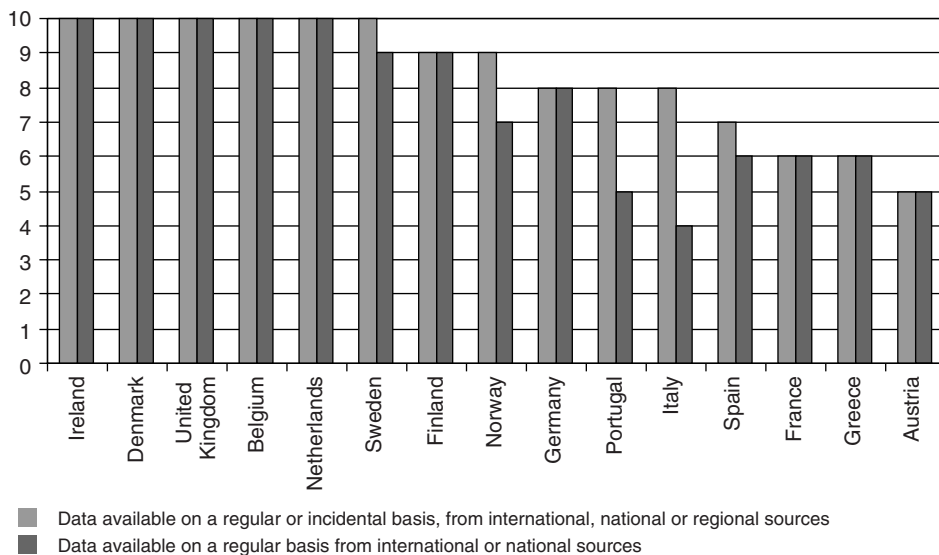


As illustrated by the bargraph, the total number of 66 indicators is out of reach for all countries. However, there are important discrepancies among the different countries, a group of seven claiming availability of 30 (plus or minus 4) i.e. about half of the group having less than half of the requested information. Two countries recording less than 10 and, at the other end, one outstanding value of 62. This reflects a) the relative scarcity of the information available b) tremendous inequalities in the oral health information systems in place in various European countries.

Looking at the same type of information, distributed by the 5 domains listed, provides additional information on areas where the biggest gaps can be expected, or on the contrary where information is reasonably available.

The section on Demography and socio-economic factors is an area where information can be obtained in all countries, 80% to 100% of the data set are found in 9 countries and there is only one country where only 40% is recognized to be available (Figure 2).

Figure 2. Demography and socio-economic factors, 10 indicators



The distribution of the availability of the **oral health determinants** indicators reflects a bigger discrepancy, ranging from 3 countries with 80% to 100% of the information available, to 3 countries claiming not having any information at all in this domain: Italy, Greece and Portugal. The other group of countries is distributed between 10 to 50%, as illustrated in figure 3.

The fourth graph shows the information that can be obtained by recording 14 indicators on **oral health status**. All countries with one exception – Greece – have information available on oral health status. The highest number of indicators available is 11 (out of 14 listed) available in 3 countries.

The fifth area investigated relates to **oral health systems** (figure 5) recorded by

Figure 3. Oral health determinants, 10 indicators

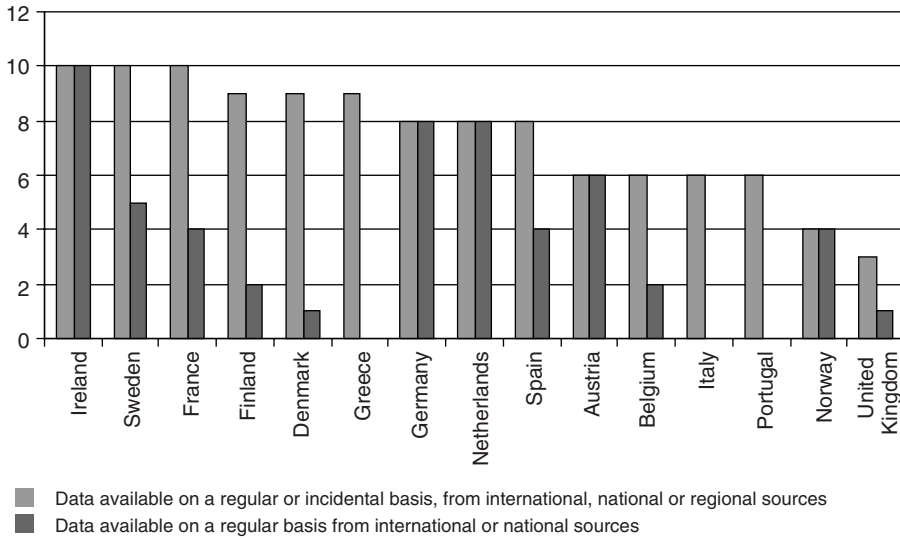
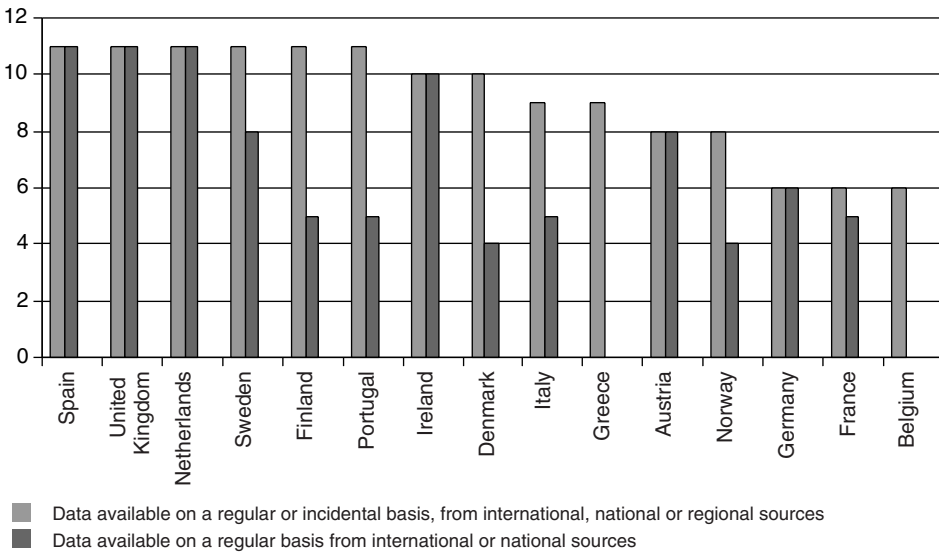


Figure 4. Oral health status, 14 indicators



23 indicators: 6 countries have 0 to 5 indicators only – Norway, France, Germany, Greece, Portugal, Italy and only 2 countries – Ireland and the Netherlands have accessible information with respectively 23 and 19 indicators recorded.

Lastly, looking at *figure 6* recording the availability of 9 indicators on oral health related quality of life reveals, as was expected, the scarcity of the information available. It is in this area that the gaps are most striking and deep inequality exists in

Figure 5. Oral health systems, 23 indicators

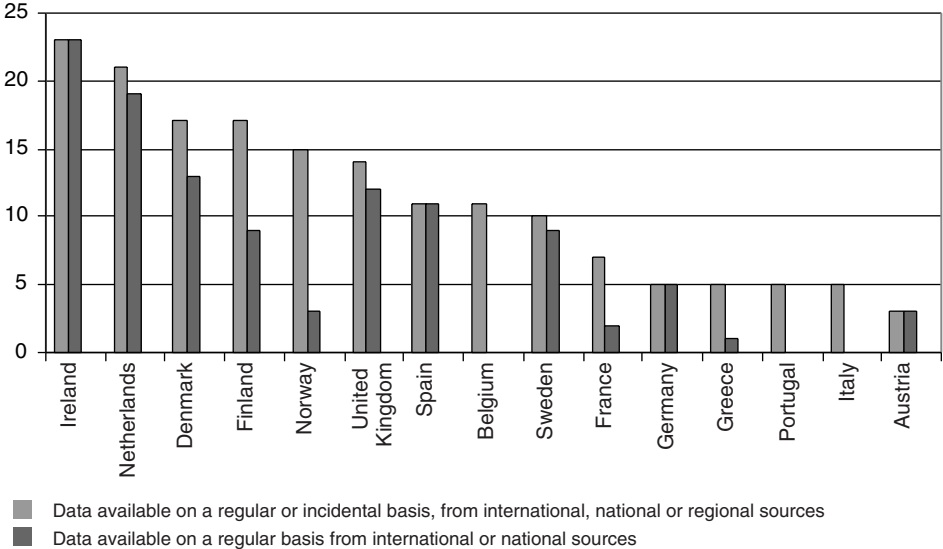
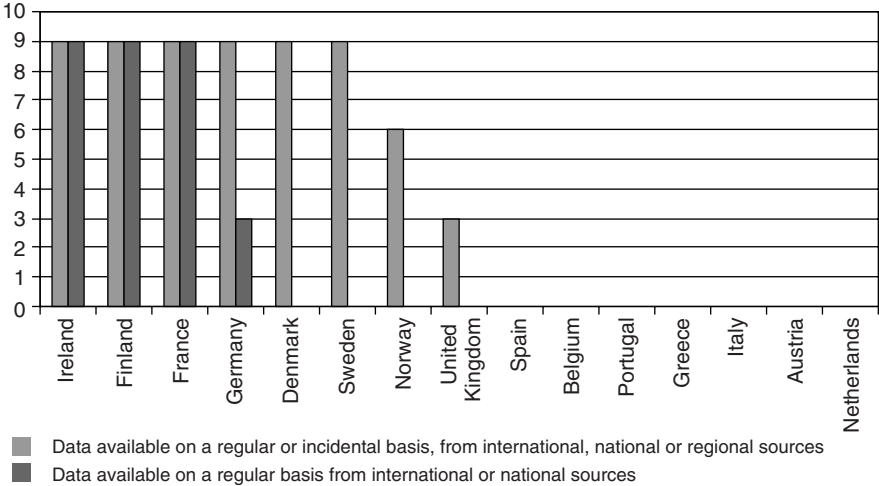


Figure 6. Oral health related quality of life, 9 indicators



respect of existing oral health information systems. As shown in figure 6, 11 countries have no information at all (coded a and b), only little information is available in one country and only 3 have all 9 indicators available.

Number of countries by specific indicators

A series of tables have been computed that are showing the information available by countries and each of the indicators in the five areas covered.

Clearly, whereas the previous set of bargraph provides in a nutshell an immediate picture of the areas where most or least information is available, the distribution by specific indicators provides a sharper approach to where the major problem in information collection may be. One of the important criteria that will need consideration in further developments of this work will be the feasibility of obtaining the information either from existing systems or from

surveys. These tables may be a help in providing initial directions of thinking.

As was expected, **demographic information** of general nature with no specific link to oral health is largely available in all countries (*table 1*). Nevertheless, important gaps in the area of socio-economic factors are recurrent in Italy, Greece, Austria, Spain, France when looking at indicators related to oral health care services.

Table 1. Demography and socio-economic factors

	Median age of population	% population under 15	% population 65 and over	Population projections	Employment/unemployment	% population by occupational class	% population covered by OH services	% population under 15	% population 35-44	% population 65 and over
Portugal		+	+	+	+	+				
Finland	+	+	+	+	+	+		+	+	+
Italy		+	+	+	+					
Norway		+	+	+	+	+	+			
Denmark	+	+	+	+	+	+	+	+	+	+
Sweden	+	+	+	+	+	+			+	+
Netherlands	+	+	+		+	+	+	+	+	+
Belgium	+	+	+	+	+	+	+	+	+	+
Greece	+	+	+	+	+	+				
Austria	+			+	+	+				
Germany	+	+	+		+	+		+	+	+
Spain	+	+	+	+	+	+				
United Kingdom	+	+	+	+	+	+	+	+	+	+
France	+	+	+	+	+	+				
Ireland	+	+	+	+	+	+	+	+	+	+
Total	12	14	14	13	15	14	8	8	8	8

The absence of information regarding the median age of the country population signaled by Portugal, Italy and Norway may be explained either by the absence of a direct source or could relate by a misunderstanding of the questionnaire layout. In any case this could easily be calculated by existing demographic information in all three mentioned countries.

Looking at the distribution of indicators on **oral health determinants** (table 2) provides a very different picture.

More than half of the group claim not having any information on perceived oral health, knowledge/attitudes and perception of the oral health system. This gap is noted in all Scandinavian countries except Sweden, in UK, and Greece. Adding Austria, Spain and Belgium, countries with only one indicator indicates that 10 countries have none or very little information.

Table 2. Oral health determinants

	Personal factors			Oral health behaviour						
	Perceived oral health	Knowledge /attitudes on oral health	Perception of oral health system	Adolescent smoking prevalence	Snacking prevalence	Total sugar consumption	Tooth brushing habits	Use of fluoridated toothpaste	Referral to preventive oral care	Reasons for the last dental visit
Portugal										
Finland				+		+				
Italy										
Norway				+	+		+	+		
Denmark				+						
Sweden	+	+	+	+		+				
Netherlands	+	+	+	+	+	+	+			
Belgium	+			+						
Greece										
Austria		+		+		+	+	+		+
Germany		+	+		+	+	+	+	+	+
Spain	+			+		+				+
United Kingdom						+				
France	+	+	+							+
Irlande	+	+	+	+	+	+	+	+	+	+
Total	6	6	5	9	4	8	5	4	2	5

Only four, Ireland, France, Sweden and the Netherlands have accessible information of this nature.

Interesting to note that on oral health behaviour, two important indicators are available in many countries: adolescent smoking prevalence and sugar consumption. Both are important for oral health as well as for general health. It was expected that information on **oral health status** (table 3) would be commonly available

across countries, especially in respect of the DMFT index and the CIPTN, both relating to the most prevalent oral conditions, dental caries and periodontal diseases.

This was confirmed for the carious morbidity indicators: caries free and the mean number of decayed, missing and filled teeth per person: the DMFT index. Both are available in 12 countries. This information is not available in Denmark, a

Table 3. Oral health status

	Caries free				DMFT/dmft		Sealants		Caries projections		Loss of attachment		CPITN		Oral cancer			DFA		Facial pain		Missing teeth			Edentulousness			Type of extracted teeth			Dental injuries from trauma		Xerostomia			
Portugal	+	+	+													+																				
Finland	+	+	+													+	+																			
Italy	+	+	+													+							+													
Norway	+	+														+							+													
Denmark											+					+	+						+													
Sweden	+	+														+	+	+					+	+	+				+							
Netherlands	+	+	+	+							+	+				+	+						+	+	+											
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Austria	+	+	+										+			+	+						+	+												
Germany	+	+	+								+	+											+													
Spain	+	+	+								+	+				+	+	+					+	+	+											
United Kingdom	+	+	+								+	+				+	+						+	+	+				+							
France	+	+									+	+											+													
Ireland	+	+	+	+							+	+				+	+	+					+	+	+				+	+						
Total	12	12	9	2							7	7				11	8	3				5	12	5							3	1				

country where other morbidity indicators are used within the oral health care system. Belgium and Greece are the two other countries with no information available on caries. Either because the information is indeed not recorded either in surveys or as part as the health information system, or because this information could not fit within the quality criteria (reminder: codes a and b) as required by

the instructions given to fill in the questionnaire.

Regarding the periodontal status only 7 countries, nearly half of the group, have relevant information, either on loss of attachment or on the CPITN index. In other areas of oral conditions, little information is available, with two notable exceptions, one for oral cancer, the second on the level of edentulousness in the population, both

Table 4a. Oral health systems: 13 indicators

	Prevention, protection, oral health promotion						Administration and financing						
	Children screening coverage	Children's health monitoring	Regulation on fluoride	Regulation on public smoking	Average price of toothbrush	Oral health promotion campaign	Total private/public OH expenditures	Number of patients in private practice	Total dentist income per year	Number of working hours per year	Total number of patients per year	Total number of new patients	Number of patients in regular care
Portugal													
Finland				+			+	+		+			
Italy													
Norway									+				+
Denmark	+	+	+	+			+	+	+	+	+	+	+
Sweden	+	+	+				+		+				
Netherlands	+	+	+	+	+	+	+	+	+	+	+	+	+
Belgium													
Greece													
Austria	+	+					+						
Germany								+					
Spain	+	+	+	+		+				+			
United Kingdom	+	+					+	+					+
France													
Ireland	+	+	+	+	+	+	+	+	+	+	+	+	+
Total	7	7	5	5	2	3	7	4	7	4	5	3	5

indicators available again in 12 countries. The information availability in oral health systems is shown in two tables, 4a and 4b. Table 4a covers “**prevention, protection and oral health promotion**” totalizing 6 indicators as well as “administration and financing” with 7 indicators. Apart from Ireland and the Netherlands offering complete sets of 13 indicators available, information

on oral health systems in these two areas is rarely collected or accessible. Denmark, Sweden and Spain have some reliable information especially on **administration and financing** for Denmark and on Prevention and oral health promotion for Sweden and Spain. All other sites are ranging from zero indicator (France, Greece, Belgium, Italy, Portugal), to 4 in Finland, 5 in UK, 3

Table 4b. Oral health systems: 10 indicators

	Interventions								Patient satisfaction	
	Fissure sealing	Crown restorations	Bridges	Implants	Scaling for periodontal treatment	Fixed orthodontic appliance	Number of teeth with replacement of restorations	Average time for endodontic treatment	Cost of treatment	Access to care
Portugal										
Finland	+	+	+	+		+				
Italy										
Norway						+				
Denmark					+		+			
Sweden		+	+	+						
Netherlands	+			+	+	+	+	+		
Belgium										
Greece									+	
Austria										
Germany	+	+	+	+						
Spain	+	+	+	+		+				
United Kingdom	+	+	+	+	+	+	+			
France										
Ireland	+	+	+	+	+	+	+	+	+	+
Total	6	6	6	7	4	6	4	2	2	1

indicators in Austria, and 2 in Norway. The situation is no better when considering the two other dimensions of oral health systems recorded by 10 indicators, 8 qualifying “interventions” and 2 for “patient satisfaction” (table 4b).

Ireland is the only one country with a complete data set. Again a large group is indicating zero or only one indicator: France, Austria, Greece, Belgium, Norway, Italy, Portugal and Denmark with two. Informa-

tion on “patient satisfaction” is totally absent except for Ireland. Greece being the only other site with data on “cost of treatment”. Whereas **quality of life** as become a recognised component of oral health outcomes and even the expression of the “ultimate” outcome of any health system, table 5 shows that this is the area in which the information is dramatically missing in most countries. The questionnaire articulated the oral health related quality of life around

Table 5. Quality of life

	Functional limitation			Physical pain			Physical/behavioural disability		
	Difficulty chewing	Trouble pronouncing words	Tooth does not look right	Painful gums	Uncomfortable eating	Uncomfortable dentures	Avoid smiling	Avoid eating some food	Speech unclear
Portugal									
Finland	+	+	+	+	+	+	+	+	+
Italy									
Norway									
Denmark									
Sweden									
Netherlands									
Belgium									
Greece									
Austria									
Germany	+	+	+						
Spain									
United kingdom									
France	+	+	+	+	+	+	+	+	+
Ireland	+	+	+	+	+	+	+	+	+
Total	4	4	4	3	3	3	3	3	3

three dimensions: function, physical pain, physical/behavioural functioning. Each section is comprised of three indicators. Three countries have all 9 indicators available, Finland, France and Ireland. Apart from Germany with the three indicators relating to “functional limitation”, the whole table is blank. This seems to reflect that with respect to data collection “quality of life” is either completely ignored or well accepted and documented in the three dimensions indicated.

Conclusion

This preliminary consultation on the information available in 15 EU countries has the merit to serve as a basis for reflexion on the ability of Member States to have available indicators on oral health at national or regional level. Without trying to give it too much scientific importance, it nevertheless reveals that the system is facing difficulties, most of them created by the scarcity of assigned quantitative public health objectives.

First, a quantitative dysfunction is noted: Ireland for example, stimulated by an operational surveillance system is recording almost all indicators proposed whereas, at the other end, some member countries seem to remain completely outside the surveillance system. From this angle, the inter-country variability on the amount of available information is important. Secondly,

qualitative discrepancies are shown, due to the difficulties encountered by some countries to adapt to new knowledge and new needs of their society. Obviously, indicators on “Demography and socio-economic factors” from general sources are generally available. However, information relating to quality of life, functioning of the health system, is for the majority poorly available. This situation brings forward the use of “historical” indicators, as is the case for France, indicators which have a priority focus on oral health status.

This document reflects the need to initiate a broad European reflexion in the domain of health indicators and more specifically in relation to priorities on the implementation of the health surveillance programme and public health activities. Similarly, the document underlines the need to update current knowledge and to harmonize regional oral health information in order to obtain comparable data on health surveillance in EU countries.

The quantitative and qualitative improvement of oral public health information should be linked to national health policies and public health objectives. Lastly, beyond the sole descriptive framework which provides a factual and perfectible picture of existing networks, a strong recommendation is emerging to identify the mechanisms – bridles and limits- of the system in relation to the production and the use of information.

European Oral Health Indicators Workshop on Oral health Statistics

**WHO International Agency for Research on Cancer, Lyon, France
4-5 September 2003**

Consensus Report

Summary Report

List of Participants

European Oral Health Indicators. Workshop on Oral health Statistics. Consensus Report

WHO International Agency for Research on Cancer, Lyon, France
4-5 September 2003

Introduction

The objectives of the EU/Project Global Oral Health Indicators Development, project within the EU Health Monitoring Programme, SANCO/G/3 Health Surveillance, 2003-2004, was to support the exchange of expectations and experiences among experts of oral health statistics and their audience, policy makers in particular. It is also to conduct a systematic review and to outline a process for identifying a set of core indicators for oral health that will help professionals to promote and improve the global oral health promotion, quality of care and surveillance of people in Europe. To facilitate the achievements of these objectives, an EU/Workshop on Oral Health Statistics will be convened at Lyon, France, 4-5 September 2003. The major objectives of the meeting focused on:

1. Identify of the health information system problems relevant to the use of oral health indicators.
2. Identify of the principles for guiding the selection and use of oral health indicators.
3. Identify of the recent oral health indicator selection efforts.

44 projects leaders from the Global Oral Health Development Project and representatives from oral health institutions attempted to the two-day meeting. Members or representatives from the steering group committee were present.

Representatives of the World Health Organisation, Geneva, representatives of Ministries of Health -Austria, France, Finland, Spain, Greece, UK-, delegates of the Council of European Chief Dental Officers, the European Association of Dental Public Health, the European Society of Periodontology assisted as the delegates – Latvia, Hungary – from EU candidate countries. Members from European universities – Italia, France, UK, Spain, Belgium- and officials from dental institutions were present. List members of participants are in appendix.

Content of the Group sessions

Working group 1 report: Oral health determinants, risk factors and factors of prevention

The discussion of the group addressed the following issues: terminology, what logic

should guide the selection of the indicators, which indicators should be retained and the selection of a “top five list”. In addition the group was asked to comment on the list of indicators, derived from the ECHI system that was provided prior to the meeting.

1. Definition of terms

The group had a long discussion on the definition of the terms “determinants”, “risk factors” and “factors of prevention”. Agreement was reached on the following definitions:

“Risk factors” are factors that are *directly involved* in the diseases process.

“Risk indicators” are the risks that are *associated* with the diseases.

“Factors of prevention” are those factors that can be changed i.e. tooth brushing habits.

Finally the group decided to leave out the term “determinant”.

2. Framework for selection

The group felt that the list distributed prior to the meeting was too constraining and it was decided to follow the framework proposed by WHO as the STEPWISE approach: three levels of sets of indicators are retained, the core, the expanded and the optional levels.

3. Selected lists of indicators

The first list restricts the number of risk indicator/factors to those related to one of the most common oral disease: dental caries. 8 indicators have been selected:

- *Social class*

- *Sugar consumption*: no agreement was reached as to whether sugar consumption should be recorded at individual or population level.
- *Past caries experience*
- *Use of Fluoridated toothpaste*
- *Water or Salt fluoridation*
- *Frequency of eating and/or drinking*
- *Brushing frequency with F. toothpaste*
- *General health* (General health included different diseases and functional disability)

Additional indicators were retained for risk of periodontal diseases

- *Use of tobacco*
- *Oral hygiene techniques*
- *Bleeding when brushing*
- *Number of teeth present*

In addition to *tobacco use*, two supplementary indicators would be necessary to record risk for oral cancer: *Alcohol consumption* and *use of oral drugs* (chewing betel for example).

Risk for attrition/erosions could be covered by recording: *Consumption of acidic drinks* or *substances of low PH, bulimia/anorexia*

Risk for Trauma/injuries: *use of mouth guards*

The final “TOP 5” list

If only 5 indicators were to be recorded what would be the selection of the group? The outcome of the group referendum was:

- *Social class*
- *Eating/drinking frequency (sugar containing food and drinks)*
- *Brushing frequency with fluoridated toothpaste*
- *Tobacco use*
- *General health*

It should be noted that the list is provided in this hierarchical order

5. Comments on the distributed list of indicators

The group felt that the form developed from the ECHI system and distributed prior to the meeting provided a list that was too long and too broad. It was found to be lacking clarity and precision in several areas. More specific definitions are needed on point a, b, c, and d. Quality criteria should be defined in a clearer and more hierarchical way. More detail on the sources should be provided. Finally, the group recommends that statement of certainty should be in line with the WHO S.U.R.F. model.

Report from Working Group 2: Oral health status and Quality of life

Introduction

The topics submitted to the group discussion cover the 2 major outcomes dimensions of the process of production of oral health: oral health status and oral health related quality of life.

1. Oral Health Status

- *ECHI derived questionnaire:*

The group discussed the relevance and the quality of the questionnaire on oral health indicators which had been distributed to each project team for completion. It was acknowledged that the questionnaire design and content had not been discussed and agreed upon collectively prior to the meeting. The data quality criteria were unclear and whereas everybody did their best to

indicate what information was or was not available in their site, the use of this documentation should be considered as working material and not be published.

- *Methodology:*

As for the definition of a list of indicators for recording oral health status the group felt that it should not try to come up with a list of indicators per se. Rather the group should try to identify the main issues and questions related to the development of such a list.

The first question discussed was should we record Oral health or oral disease status? The group agreed that whereas the ultimate outcome of oral care is Oral health, it is oral disease status that should be assessed. Healthy people are of no direct interest in terms of public health decision making regarding improvement of the health care system. Costs of care and its reduction or containment is related to assessing disease trends and effects of preventive care.

As for the methodology to be used in listing disease indicators, the group recommended that the WHO STEPWISE approach be used, thus listing three levels of sets: core, expanded and optional depending on the purpose and practical constraints of the information collection.

- *Issues related to specific diseases recording*

There are two main questions to answer: how much disease do we have? How do we assess diseases?

Dental Caries: should be assessed in population with prevalence studies of affected people with repeated follow-up studies. It was felt that only active caries should be taken into account not

early lesions. The assessment should be done using the DMFT index especially the D component. The F component criteria should be revisited considering the use of non metallic filling materials (glass ionomer and composites).

Periodontal diseases: Considering the current expert debate on the relevance of existing indexes for periodontal disease measurement the group agreed that there is a need for a consensus on a standardised and simple methodology to be used throughout European countries. It is compulsory that an assessment of major risk factors be made and general medical information be included.

For other oral diseases (i.e. mucosal lesions, cancer, TMJ disorders), the group referred to the WHO Basic methods.

- *Future directions*

The group suggests that all efforts be made at the level of the oral health system to include basic medical indicators and vice-versa, that the medical surveys include some basic information on oral health. Another important item for the future should be to prioritise oral health status indicators.

2. Oral Health Quality of life

- Background:

Oral Health related Quality of Life (OHQOL) is generally accepted as the ultimate outcome of the oral health care system. This concept has been confirmed and validated cross-culturally by the ICSII study in the context of a multinational investigation of oral health determinants and outcomes. ("Comparing Oral Health Care Systems, a second international collaborative study", Chen et al., WHO, 1997).

However, measurement of health related QOL and OHQOL is still an object of debate especially considering the difficulty of its assessment in an objective manner. Today, there is a broad consensus on the three dimensions of ORHQOL i.e. physical symptoms, perceived well-being, social and physical functioning.

- Issues addressed during the group discussion:

Is OHQOL a component of oral health that should be measured in the European context? If so, do we have already existing instruments that can be reliable and applicable in a multinational context, what are the measure issues/obstacles related to their practical applicability, what should be the next step to implement standardised data collection on OHQOL in European countries?

- Discussion outcomes

1. There was unanimous agreement that there is a need for measurement of quality of life in relation to oral health.
2. The multidimensional nature of OHQOL is acknowledged by the group. Consequently, there is a need for multidimensional instruments.
3. For measurement of OHQOL the group recognised that many instruments already exist. Most of them have been tested for their psychometric qualities including validity and reliability. However, only a few of the available instruments have been tested for their discriminating qualities – their sensitivity and their specificity. To this effect longitudinal studies are needed.
4. The group felt that an instrument that can measure OHQOL in different European populations is required.

5. The instruments selected must be easy to use.

A first step to the development of such instruments should start by exploring all existing instruments. This review could be done by a sub-group of project members. It should include a critical analysis of existing material.

Report from Working Group 3 – Oral Health Systems

Introduction

Working Group 3 concluded that, in general, the topics on oral health systems listed in the questionnaire distributed to national representatives before today's meeting were not those for which Pan-European indicators should be developed. The working group's members **agreed** that there were five areas within the topic of oral health systems that required indicators. All five areas could be considered as "first level" topics for oral health care systems. They were:

- Goals and Policies
- Access and Utilisation
- Effectiveness and Outcomes
- Workforce
- Costs

There was unanimous agreement that there is a need for anyone considering these areas to have knowledge of the current national systems for providing oral health care in Europe. Both the Council of European Chief Dental Officers (CECDO) European Liaison Committee (ELO) has published descriptions of the systems in the members states of the European Economic Area (European Union plus Iceland, Norway and Liechtenstein). The references for

these existing publications are Andersen et al. (1998) and Widström and Eaton (1999). Both publications are being updated. The new editions will include details of the systems for the provision of oral health care in the ten accession countries as well as the existing member states of the EEA when they are published in 2004.

Goals and Policies

The working group agreed that all future goals and policies for oral health should fit within goals and policies for all aspects of health and should be developed in collaboration with health planners to ensure that they were integrated into national and European health plans.

Within the European Oral Health SANCO project the working group concluded that two questions needed to be asked of all national planners. These questions were:-

- Is there an active national oral health policy in your country?
- If so what is it and what goals does it contain?

Once these questions have been answered, it should be possible to suggest "second level" indicators for national oral health goals and policies.

Access and Utilisation

Some countries (usually those with well developed publicly funded oral health care systems) are able to provide some data on these topics. However, they are generally far from comprehensive and the following "second level" indicators need to be developed in the future:

- For access to oral health care at area, regional and national level for the following groups:-
 - At risk patients
 - Priority groups

- Others
- For the time (as opposed to distance) that patients travel to access oral health care.
- For access to:-
 - “Preventive” care
 - “Curative” care
- For levels of access i.e. to:-
 - “Preventive” care
 - Basic (emergency) care
 - Care leading to disease elimination and oral stability
 - Total care (including “cosmetic” as well as “functional” treatment)
- For the percentage of the population using oral health care services within the previous 12 months.

Effectiveness and Outcomes

The working group were aware that the oral health care status group would be considering aspects of this topic and would be making recommendations on epidemiological indicators. It therefore sought to suggest second level indicators which would supplement the epidemiological ones and suggests that the following should be developed:

- For arresting the progression of caries.
- For the level of caries (from early enamel to pulpal lesions) c.f. the system used in Denmark.
- For the percentage of the population not requiring active oral health care (note – who decides this patients or clinicians?)

Workforce

Existing national data on workforce numbers reported to European organisations

such as Eurostat, the Organisation for Economic Co-operation and Development (OECD), the ELO and the CECDO are not comparable (Eaton, 2002). The reasons for this are due to a lack of universally agreed definitions and lack of time and understanding by some of those reporting the data. In view of the European Directives, which allow freedom of movement throughout the EU, accurate information on workforce numbers should be a key priority. A recent complication has been the development of a number of private dental schools in Spain and Portugal which are likely to increase the number of dentists graduating in these countries to some 2,500 per annum from 2008 onwards. The following information should be collected and reported annually by all EU member states for all members of the oral health care workforce (dentists, dental nurses, dental hygienists, dental technicians (clinical and laboratory), dental therapists and for any new groups which may develop in the future:

- Total numbers
- Gender
- Age profile
- Numbers working
- Hours worked per year
- Area of practice e.g. general practice, hospital, public dental service, university.
- Numbers of specialists by specialty

In addition there is a need for annual reports from each EU member state on:

- Numbers of dental schools
- Numbers of other schools training members of the dental team
- Annual intake to dental and other schools indicating gender
- Annual output from dental and other schools indicating gender

- Length of all training courses in hours
- Whether or not continuing professional education (CPE) is mandatory
- If CPD is mandatory, how many hours per year are required

Costs

The working group felt that the following second level indicators should be developed against agreed criteria and reported annually by all EU members states:-

- Total expenditure on all aspects of oral health
- Expenditure on “preventive” oral health care
- Expenditure on “curative” oral health care
- Expenditure on all aspects of education and training
- Expenditure on work produced by dental technicians
- Expenditure on oral health care in hospitals

Other Points

The working group were aware that most, if not all, of the suggested indicators are not currently in use within European countries and that they will need to be developed. None of the existing indicators for oral health systems are reliable. When developing indicators the following points should be borne in mind:-

- Agreement of definition of terms.
- An understanding of the oral health care systems in each member state.
- The tension between harmonisation and the reality of existing systems and a political will to maintain the status quo.
- Patients’ views conflicting with governments’ and other funders’ views e.g.

the need to fund “cosmetic” oral health care.

The working group was aware that it would be very difficult to gather information in some countries. It was suggested one way to overcome the problem might be to include questions on the cost and utilisation of oral health care services in house hold surveys. The working group also felt that it would be necessary to agree which of the many indicators it would like to see developed could be developed immediately and which ones would need to be developed in the future.

Final Point

The responses to the questionnaire on existing national oral health indicators which was distributed before today’s meeting were not discussed within the working group. However, both the Chairman and Rapporteur for the group suggest that because no calibration of respondents took place before the questionnaires were submitted, their accuracy may be doubtful and that, in their present form, they should purely be used for discussion within the project and not published.

Perspectives - Conclusions

The specific objectives of the meeting were reached on the following points:

- Strengthen the ability at the local, national, regional levels to measure, compare and determine the effects of oral health services and use of resources
- Identify indicators of oral health (problems, determinant and risk factors related to lifestyles) of critical oral health care
- Identify the types of data generation and management problems within the HIS

- Identify principles for guiding the selection and use of OH indicators
- Identify a set of core indicators for oral health
- Review the recent oral health indicator selection efforts

The next step of the programme is to produce end of 2003 a compendium issuing of the meeting under the auspices of the SANCO Monitoring Programme including all the presentations, discussions, contributions of the Group.

The Oral Health Indicators questionnaire must be, in accordance with the recommendation of the working groups, revisited in order to increase the precision especially in the field of the quality criteria which should be defined in a clearer and more hierarchical way.

The finalisation of the long list of the indicators – end of 2003- will introduce the processes of the Delphi consultation through the European network in order to submit an initial short list in the next European meeting held on Granada, 8-9 May 2004.

Summary Report

Purpose

By holding the first official international research team gathering of the European Global Health Indicators Development (EGOHID) project of the EU Health Monitoring (SANCO) Programme, to launch the dynamic consultative process.

Brief summary

The meeting brought together members of the EGOHD Steering Group, WHO and many collaborative institutions within the EU (agenda and participant list attached). The overall goal was to address the profusion of internationally recommended indicators for oral health which have led to unnecessary and costly monitoring efforts. The specific objectives of the meeting were to

- Strengthen the ability at the local, national, regional levels to measure, compare and determine the effects of oral health services and use of resources
- Identify indicators of oral health (problems, determinant and risk factors related to lifestyles) of critical oral health care
- Identify the types of data generation and management problems within the Health Information System
- Identify principles for guiding the selection and use of OH indicators
- Identify a set of core indicators for oral health

- Review the recent oral health indicator selection efforts

Recommendations/Action to be taken:

- Statement of list indicators should be in line with the WHO S.U.R.F, NCD Info Base model.
- International expert groups should review the effectiveness and relevance of the methodology at regular intervals and commission auditors of surveys
- All future goals and policies for oral health should fit within goals and policies for all aspects of health
- This will require agreement on a standard minimum set of indicators suitable to measuring population levels of adult oral health
- The outcome on essentials indicators for oral health determinants, risk factors and factors of prevention by hierarchical order was: Social class, eating/drinking frequency (sugar containing food and drinks), brushing frequency with fluoridated toothpaste, tobacco use, and general health.
- There is a need for measurement of quality of life in relation to oral health.
- Five areas within the topic of oral health systems that required indicators could be considered as “first level” topics for oral health care systems: Goals and policies; access and utilisation, effectiveness and outcomes, workforce and costs.

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