ORIGINAL ARTICLE

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FDI Vision 2020: shaping the future of oral health

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PREFACE

The initial idea for this document came to light in the aftermath of the FDI General Assembly in Mexico in the autumn of 2011, when it was observed that, at the present time, the dental profession is lacking an overarching long-term vision of the main challenges oral health is facing and direction as to how the profession can grow in order to make a significant contribution to the improvement of global oral health during the next decade. As a first step, the concept of this document was informally discussed within the FDI leadership. Shortly after, a task team was nominated under the name FDI Vision 2020. Great care was taken to ensure balanced representation from Academia, Research, Education, General Dentistry, Government and Industry in order to foster an overall view of all the issues discussed.

Under the chairmanship of Prof Michael Glick, the FDI Vision 2020 Task Team was given the mandate to identify the main challenges and opportunities oral health and its workforce are facing today, with a specific focus on issues with a legislative, regulatory or advocacy dimension. In an inclusive and iterative process, all FDI member associations were invited to nominate an official representative to provide input and comments on the task team's groundwork. Further comments and feedback were collected from FDI leadership, through its committees, and from a panel of industry leaders. The task team met twice, resulting in two rounds of consultation. The draft Vision was then circulated to all FDI committees and member associations for feedback and finally presented to FDI General Assembly.

The FDI General Assembly during its meeting in Hong Kong on August 31st, 2012, adopted the following resolution: 'It is resolved that FDI General Assembly support the objectives of Vision 2020 as a working document, to drive forward the future priorities of FDI in accordance with the mission of 'Leading the World to Optimal Health'; and further, that FDI believes that only the dentist is the competent and responsible leader of the dental team. In this regard, FDI underlines the principle: 'Delegation – yes, substitution – no".

The present document is therefore the result of a wide consultation process and reflects priorities which we hope are valid in various countries, regions and settings.

For the sake of clarity, let us briefly delineate what this document is, and what it is not. It is, as its name says, a Vision, which paves the way for a new model of oral health care led by dentists in collaboration with a wide range of other stakeholders. It roughly sketches the possible look of oral healthcare by the year 2020 if we tackle the challenges and seize the opportunities that arise in a timely and adequate manner. As a Vision, this document is meant to be aspirational and inspirational; it is NOT meant to be operational. It provides avenues which will need to be further explored and discussed, but, intentionally, it does not provide any specific strategies, tactical approaches, implementation tools or ready-to-use formulae, as those will depend largely on local needs and circumstances in the spirit of the United Nations Development Programme's report: 'Think globally act locally'. This document is the beginning of a continuous process aimed at generating discussion and collaboration between FDI and all its partners.

EXECUTIVE SUMMARY

Oral health is an essential component of good health, and good oral health is a fundamental human right. The role of the dental profession is to help the population and decision makers to achieve health through

good oral health. FDI and its member associations need to be in the forefront to identify challenges and opportunities and advocate for the benefit of our patients, our profession and our governments.

Among those demanding appropriate and timely consideration and action, we can enumerate persisting oral health inequalities; lack of access to oral healthcare; unaffordability of dental treatment in many places; a growing and ageing population; workforce migration; dental tourism; the emergence of new educational models; the evolving distribution of tasks between members of the oral healthcare workforce; ongoing legislative actions targeting hazardous materials; and the increasing use of information and communication technologies in all segments of our lives and professions. These, we believe, are two sides of the same coin and can be looked at as either overwhelming and threatening challenges or unique opportunities to reshape our profession to better equip our workforce for the future, while the fully trained dentists, as leaders of the dental team, retain full responsibility for diagnosis, treatment planning and treatment.

A heavy disease burden

Historically, the approach to oral health has focused overwhelmingly on treatment rather than on disease prevention and oral health promotion. This approach has, however, limitations. Globally, the burden of oral diseases remains high and the traditional curative model of oral health care is proving too costly, in terms of both human and financial resources, to remain viable in the light of the increasing demand. Worldwide, oral disease is the fourth most expensive disease to treat; dental caries affects most adults and 60–90% of schoolchildren, leading to millions of lost school days each year, and it remains one of the most common chronic diseases; periodontitis is a major cause of tooth loss in adults globally, and oral cancer is the eighth most common cancer and most costly cancer to treat. With oral infection has been associated with issues ranging from pre-term birth and low birth weight to heart diseases, it is now established that poor oral health may be an important contributing factor of several preventable diseases. In addition, stark inequalities of access to oral healthcare subsist. One of the main reasons for this is that too little attention has so far been paid to the social determinants of oral health.

Political agendas

For decades, oral health has failed to be considered as an issue worthy of being moved to the top of the agendas of governments and international organizations, perhaps because poor oral health primarily affects morbidity rather than mortality. In recent years, however, there has been a growing realization that oral health constitutes an integral part of overall health, and a very positive move has been observed towards the inclusion of oral health into general health strategies. This movement was initiated with the US Surgeon General's report in 2000. It was taken up by WHO in 2002, when the policy of its Global Oral Health Programme emphasized that oral health is integral and essential to general health and a determinant factor in quality of life. More recently a WHO resolution called for oral health to be integrated into chronic disease prevention programmes.

The dawn of new area

Building on this momentum, we believe that the time is now right for developing a new model for oral health care, which considers oral health as an integral part of general health and addresses the needs and demands of the public and the right of each individual to good oral health. We believe that, by shifting the focus of our model from (i) a traditionally curative, mostly pathogenic model to a more salutogenic approach, which concentrates on prevention and promotion of good oral health and (ii) from a rather exclusive to a more inclusive approach, which takes into consideration all the stakeholders who can participate in improving the oral health of the public, we will be able to position our profession at the forefront of a global movement towards optimised health through good oral health. Furthermore, we will be much better equipped to address the burgeoning demand of governments and non-governmental organizations (NGOs) for constructive solutions to reduce social inequalities in oral health and to assist the public in achieving health through good oral health. In short, we will be able to play a leading role in bringing oral health to the forefront. To bring our Vision to life, we have defined five areas of priority as cornerstones of a new, responsive and fair model:

1 Meet the increasing need and demand for oral healthcare.
2 Expand the role of existing oral healthcare professionals.
3 Shape a responsive educational model.
4 Mitigate the impacts of socio-economic dynamics.
5 Foster fundamental and translational research and technology.

Meet the increasing need and demand for oral healthcare

Oral health is a basic human right and its contribution is fundamental to a good quality of life. There

are, however, persistent stark inequalities of access to proper oral healthcare. These might be due to different reasons: an unequal geographical distribution of qualified professionals worldwide, but also within countries; the unaffordability of treatments for some segments of the population; lack of utilization of existing oral healthcare offerings; or a mismatch between the offer in oral health care and the real needs of the population.

Improving oral health literacy of the public, optimising overall workforce planning, providing adequate resources for education and training, devising effective workforce retention strategies in underserved areas, and scrutinising the effectiveness and appropriateness of different workforce models are challenges and opportunities which need to be addressed to meet a current unmet needs and growing demands in coming years.

Expand the role of existing oral healthcare professionals

As highlighted in the recent United Nations Political Declaration, there is now broad recognition that oral health shares the same social determinants and risk factors with other Non-Communicable Diseases (NCDs). This means that oral health cannot be dealt with in isolation from other health issues. Furthermore, the emergence of a new type of oral health workers provides an opportunity to reshape and expand the role of existing oral healthcare professionals.

The profession has a unique opportunity to actively participate in efforts to improve patients' overall health by taking on new tasks such as screening for and monitoring of non-communicable diseases (NCDs) (e.g. glycemic control), playing a leading role in patient education and disease prevention, and guiding and supervising teams of oral healthcare workers. A stronger integration of dentists into the overall health system will reinforce the recognition of their clinical competence and provide for an expanded leadership role towards health workforce team members working under a dentist's direction and advice.

Shape a responsive educational model

Current traditional models of dental education have not yet been able to address adequately disparities in oral health. Moreover there is a growing disconnect between dental and medical education, despite oral health now being widely recognized as an important part of general health. To better equip members of the oral healthcare workforce for the challenges ahead avenues worthy of investigation include revising educational curricula to take account of a stronger focus on public health and epidemiology, as well as placing more emphasis on critical thinking, team management, interprofessional education and interprofessional practice. A further opportunity for us to embrace is in the field of advocacy for global standards of competence to educate and train an oral health workforce up to the task of optimizing its community's oral health.

Mitigate the impacts of socio-economic dynamics

Fluctuations in socio-economic circumstances have a significant impact on oral healthcare resources and policies. In times of economic hardship, resources tend to be drawn from oral healthcare and redirected towards areas and diseases where lack of treatment leads to faster and more visible consequences, notably mortality. Furthermore, patients tend to delay consultation and treatment during economic downturns. Conversely, economic upturns tend to foster an increase in demand that must be met. To ensure the sustainability of oral healthcare delivery and of our profession through economic ups and downs, the responsibilities we need to take on in the coming years include advocating for oral health in all policies.

Furthermore, evidence-based oral healthcare models, which bring fairness in remuneration for care that delivers beneficial and measurable health outcomes, must be developed. Finally, the capacity to contribute to ensuring that the public is able to access and utilize oral healthcare services at all times, must be addressed.

Foster fundamental and translational research and technology

At present, the field of oral health is experiencing substantial difficulties in disseminating and implementing research findings and technological innovations in a timely fashion into daily practice. There is therefore an opportunity to develop a consensus and science-based approach to oral healthcare. A proactive and innovative use of available dental technology and materials could be encouraged. Links could be facilitated between ongoing changes in types of oral healthcare deliverables and ongoing research efforts. E-Health technologies (E-Health means the 'application of internet and other related technologies in the healthcare industry to improve the access, efficiency, effectiveness and quality of clinical and business processes utilized by healthcare organizations, practitioners, patients and consumers to improve the health status of patients') can be used to foster communication between members of the health team and speed-up processes. By seizing these various opportunities, oral healthcare professionals will be able to foster fundamental and translational research and technology in the next decade.

The way forward: oral health in all policies

The relevance of oral health is not about to fade despite a significant proportion of oral diseases being preventable. Each of the five areas of priority identified in this document contributes towards shaping a new model of oral healthcare which seeks to be inclusive, participative, adaptive and effective. Its focus on oral health promotion and oral disease prevention reflects trends observed in other areas of healthcare and priorities set by international agencies. It is now up to dentists to reach constructive solutions to respond to these trends and needs. This is a unique opportunity for members of the profession to become true leaders and role models. In line with the principles of the Adelaide Statement on Health, we strongly advocate for the inclusion of Oral Health in All Policies; and for the engagement of oral healthcare professionals with leaders and policy-makers at all levels of government and NGOs, i.e. local, regional, national and global. The emphasis is on the fact that government objectives are best achieved when all sectors include health and well-being as key components of policy development. We believe that this advocacy will help to increase oral health literacy and awareness among the public, thereby supporting a community-driven demand to governments for better access to oral healthcare services. In conclusion, we have a significant role as health advocates: it involves educating and influencing decision makers, including senior government officials, national and international agencies, community leaders and the public. Should our profession shirk its responsibility of taking the lead other parties lacking the necessary professional knowledge and expertise in dentistry are likely to step in to take it on our behalf in the years ahead.

MEET THE INCREASING NEED AND DEMAND FOR ORAL HEALTHCARE

Where we are now

All over the world, population growth and ageing have led to an increasing need for oral healthcare. Furthermore, a gradual increase in awareness as well as mass media exposure to 'perfect smiles' have led to an increased demand for high quality oral health. At present, neither the need nor demand is fully met on a global level, despite the fact that oral health is a basic right and its contribution is fundamental to a good quality of life and overall health.

Oral diseases, despite many of them being preventable, represent the most common diseases worldwide. Poor oral health has a profound impact on quality of life and well-being, as well as significant economic impacts. Root causes of oral disease are varied but relate predominantly to persistent inequities in access to oral healthcare. Although there are more than a million practicing dentists worldwide, their unequal geographic distribution results in an over-supply in some wealthy urban areas, which starkly contrasts with a critical shortage in many of the world's poorer and remote areas. Globally, roughly only 60% of the population worldwide enjoys access to proper oral healthcare, with coverage ranging from 21.2% in Burkina Faso to 94.3% in Slovakia. Between countries, the density of qualified dentists varies from one dentist per 560 people in Croatia to one dentist per 1,278,446 people in Ethiopia; and distribution within countries also strongly varies. Reflecting a strong social gradient, wealthier adults in almost any given country enjoy a higher coverage compared with those less wealthy.

Increased globalization, which facilitates the migration of dentists to more affluent areas or countries, is also a source of concern as it can lead to domestic shortages. For instance, in the UK 22% of dentists are foreign-born, while the Philippines is current world leader in dental workforce export with two-thirds of its dental graduates migrating to the USA.

Already in 2006, The World Health Report 2006: working together for health, recognized that insufficient numbers of appropriately trained health workers represented a significant threat to achieving the health-related Millennium Development Goals (MDGs) and the issue therefore would need urgent attention.

Furthermore, with more than one billion of the world's population living on one dollar a day or less, the affordability of oral care for the world's poor poses a serious problem even within a geographic area where dentists are available.

Lastly, there is a serious need for awareness-building of the necessity of preventive oral health care and 'self health' among underserved and at-risk populations, requiring health literacy on a culturally competent basis.

The way forward

The current shortage and unequal geographic distribution of qualified oral healthcare professionals, which tends to affect poorer countries and regions more than wealthier ones, remote areas more than urban ones, combined with challenges in terms of globalization, migration and ageing, calls for firm and targeted actions and gives rise to a series of opportunities our profession must now seize.

First, we believe there is a significant opportunity for our profession to take on a leadership role in tackling the social determinants of oral health and in generating constructive solutions with regard to the problem of the current unmet need and demand for oral healthcare. Taking on a leadership role means, for us as a profession, to work together to raise awareness at all levels; to identify suitable solutions to achieve equity in oral health; and to advocate their implementation at local, regional, national and international levels. Persistent inequities in access to oral healthcare and the unmet need and demand for oral healthcare services have different root causes that will need to be addressed. One of our first efforts should be to promote advocacy aimed at improving the oral health literacy of the public. This represents a first and crucial step in helping communities realize their right to oral health by increasing their ability to adopt healthy oral health behaviours and demand care when needed.

Second, we believe there is a role for us in advocating for increased resources to be allocated for education and training of dentists and of the oral health team. This goes hand-in-hand with a call to authorities and administrations to optimize health professional workforce planning and provide a sustainable economic environment to educate, train and retain sufficient numbers of oral healthcare workers to work in the places and settings where a need has been identified.

Finally, acknowledging the fact that the prevalence of trained dentists, the composition of the oral healthcare team, and the educational pathways to becoming an oral healthcare worker vary widely depending on local circumstances, we believe that there is a crucial role for our profession in leading and participating in efforts with multiple stakeholders and to examine the effectiveness and appropriateness of oral health workforce models in different geographical settings. This represents a unique opportunity for our profession to define the roles and responsibilities of the oral healthcare workforce, while considering specific local needs, resources and desired outcomes. This is also an opportunity to spearhead the development and implementation of oral health education for all different members of the health care workforce team with appropriate structured formal education within approved educational institutions. We can shape a new model of oral healthcare delivery which relies on a team-based collaborative approach where fully trained dentists take responsibility for supervising a team, provide sufficient training to the healthcare workforce and delegate specific tasks as deemed appropriate while retaining full responsibility for diagnosis, treatment planning and treatment.

> Our Vision is that by 2020, inequities with regard to access to oral healthcare will be substantially reduced and the global need and demand for oral healthcare more largely will be met thanks to increased oral health literacy, the development of rational workforce planning, education, training and retention strategies, and an improved collaboration between members of the health workforce on issues pertaining to oral health promotion, disease prevention and treatment.

Summary

Status

- Lack of oral health care professionals results in increased demand for appropriately trained professionals.
- Uneven geographic distribution of oral health care professionals worldwide but also within individual countries.
- Need for enhanced oral health literacy.
- Lack of access to oral health care among vulnerable and poor populations.

Opportunities

- Play a leading role and generate constructive solutions for tackling the social determinants of oral health and the problem of the unmet need and demand for oral healthcare.
- Advocate for:
  - improved oral health literacy.
  - increased resources for education and training of dentists and the oral health care team.
  - an optimized health professional workforce planning.
  - a sustainable economic environment to educate, train and retain dentists in areas of need.
- Participate in and lead efforts with multiple stakeholders to
  - examine the effectiveness and appropriateness of oral health workforce models in different geographical areas;
  - define the roles and responsibilities of the health care workforce based on
  - appropriate and approved formal structured education and training which is
  - aimed at delivering a health care workforce to achieve a desired outcome, whilst
  - taking into consideration local needs and resources.

— spearhead the development and implementation of oral health education of the health care workforce.

EXPAND THE ROLE OF EXISTING ORAL HEALTHCARE PROFESSIONALS

Where we are now

The traditional role of dentists is facing new challenges from increasing and evolving needs of patients, advances in technology, economic constraints in various parts of the world, as well as ongoing debates about the distribution of tasks and responsibilities between different workers involved in the provision of oral healthcare. In addition, associations between oral health and communicable diseases, maternal and child health and NCD call for a shift in the focus of our profession. At present, more than 60% of deaths worldwide are due to NCDs, which kill 36 million people each year. Low- and middle-income countries are disproportionately affected and, in 2010, 80% of NCD deaths occurred in those countries, highlighting once again the importance of tackling the social determinants driving the NCD epidemic.

According to the World Economic Forum, the global economic impact of the five major NCDs – cardiovascular disease (CVD), chronic respiratory disease, cancer, diabetes and mental ill-health – could amount to a total of 47 trillion US dollars over the next 20 years. This represents approximately 4% of annual global GDP. In recent years, there has been a growing realization that oral health is an integral part of overall health. In addition, there are associations between oral disease and major NCDs, the two share common risk factors and there are indications that oral disease in itself represents a risk factor for NCDs. Altogether, connections between systemic disease and oral manifestations have been identified in over 100 diseases, such as diabetes, cardiovascular diseases, respiratory infections, cancer or nutritional problems. This growing realization led the WHO to re-orient its Global Oral Health Programme in 2002 in order to foster its integration with chronic disease prevention and general health promotion. Five years later, in 2007, the World Health Assembly's resolution on 'Oral health: action plan for promotion and integrated disease prevention' urged Member States to adopt measures 'to ensure that oral health is incorporated as appropriate into policies for the integrated prevention and treatment of chronic non-communicable and communicable diseases, and into maternal and child health policies'. In September 2011, this reorientation culminated in a High-level Meeting of the General Assembly of the United Nations on the Prevention and Control of Non-communicable Diseases, whose final statement expressly recognizes that: 'Renal, oral and eye diseases pose a major health burden for many countries and that these diseases share common risk factors and can benefit from common responses to non- communicable diseases'. As documented in its NCD Advocacy Guide, FDI has been at the forefront of this initiative.

The way forward

The increasing recognition that oral health plays a pivotal role in general health and quality of life represents, for our profession, a set of unique opportunities to play a central and leading role in patient education and disease prevention; to strengthen our integration into the overall health system; to reinforce the recognition of our clinical competence; and to shoulder an expanded leadership role towards health workers under our direction and advice.

First, as stated in FDI's Guide to Advocacy, because of the shared risk factors with other NCDs, we believe we can play a central role by sharing our experience in prevention and by actively contributing to early NCD diagnosis, screening and monitoring. Through regular access to 'healthy' or at least 'asymptomatic' patients during check-ups, dentists are in a unique position to raise awareness of risk behaviour and thereby increase prevention, but also to screen, monitor and evaluate patients for conditions such as CVD or diabetes and refer them to their physicians for further action. As an active partner of worldwide health- check-programmes, oral health professionals can contribute to the cost-effectiveness and feasibility of primary and secondary prevention.

Second, as scientifically valid oral fluid-based diagnostic tools become available, there is an opportunity for us to take on a leadership role in health screening and surveillance based on these new techniques. Implementing such cost-effective and non- invasive tests into our daily practice, and referring patients to a physician for appropriate care, treatment and follow-up whenever necessary, will allow our profession to reinforce the recognition of its clinical competence and integration in the general healthcare system. This calls for a proactive, positive and affirmative collaboration with colleagues from the medical arena, which will reflect the reality of our medical role and relevance, and will enhance our credibility as professionals.

Third, as the composition of the oral health workforce team evolves and encompasses workers with different backgrounds, knowledge, skills and competencies (dental assistants, dental hygienists, dental therapists, dental technicians, but also primary care workers, community nurses, or even educators and teachers), there is a need for our profession to shoulder an expanded leadership role towards health

practitioners working in oral health under our direction and advice. As stated previously, we strongly value a team-based collaborative approach where fully trained and skilled dentists remain the primary contact persons for all questions about oral health and take the exclusive responsibility for supervising and leading a team of health workers. Such collaboration and delegation of tasks can be particularly powerful in the field of oral health promotion and prevention strategies, where joining forces with primary care providers and teachers, as well as other members of the community, can contribute to reduce lack of access to care in areas of need and foster rapid dissemination of targeted prevention and promotion messages. Such collaboration may focus on achieving the objectives of the MDGs. We strongly insist, however, that responsibility for diagnosis, treatment planning and rehabilitation and treatment plans must always remain in the hands of the dentists in order to ensure optimum safety and care for patients.

Our Vision is that, by 2020, oral health will be fully recognized and accepted as a crucial part of overall health and well-being. The credibility and relevance of our profession will be enhanced thanks to our significant contribution to addressing major health issues, such as NCDs; our leadership role in prevention and promotion strategies; and our capacity to guide and supervise teams of health practitioners working together to improve oral health, and thereby overall health, in our communities. In a similar way that the oral cavity is the visible gateway to the human body, our vision is that our profession will be an universally acknowledged, recognized and valued gateway to better health through improved oral health.

Summary

Status

- Increased recognition that oral diseases share common risk factors with other NCDs.
- Increased recognition that oral diseases cannot be dealt with in isolation from other diseases.
- The role of dentists is changing due to the emergence of different oral health workforce models.

Opportunities

- Become leaders of oral healthcare teams; Lead efforts in prevention and patient education.
- Become an integral part of overall health and perform new tasks, such as screening and monitoring of common risk factors for NCDs by for example oral fluid-based diagnostics. In addition, influence these common determinants by using the common risk factor approach.
- Become highly specialized experts in prevention, diagnostics, health consulting, biotechnology and functional rehabilitation with high technology.

SHAPE A RESPONSIVE EDUCATIONAL MODEL

Were we are now

Dentistry emerged as a profession with its own system of education at the end of the 19th century. Since then, it has been increasingly separate from medical teaching in various parts of the World. In countries such as North and South America, Northern and Western Europe, Japan, India and Australia, dental education is recognized as an autonomous discipline according to the so-called 'odontology model' or 'dental medicine model'. In contrast, the stomatology model, which considers dentistry as a specialty of medicine, prevails in some other countries. Both models cover, with a different focus, theoretical and practical training, including anatomy, physiology, biochemistry, pathology, behavioural sciences and dental materials science, as well as clinical skills. However, dental education and training is often disproportionately focused on restorative care, neglecting oral health promotion, disease prevention and public health. Moreover, new knowledge and technologies become available at an ever increasing pace, in areas ranging from connective tissue biophysics/mechanics, tissue engineering, biotechnology and molecular engineering, to informatics and biomaterials, with the potential to transform dental care. So far, however, the integration of information related to new knowledge and technologies into dental education has been rather slow.

From a statistical point of view, the current disparity in the number of dental schools and dental graduates is enormous. The countries with the most dental schools in 2006 were India (206), Brazil (191) and China (93), whilst many African countries such as Sudan, Tanzania or the Democratic Republic of Congo, have just one, or no dental school. As a result, while Brazil trained approximately 10,000 newly-graduating dentists in 2008, all 46 WHO/AFRO member states combined managed only to train 168 new dentists in 2002. Many countries and regions worldwide suffer from a critical shortage in the number of qualified oral health professionals (see Section 1).

Globally, the burden of oral diseases remains high and the viability of the predominantly curative approach to oral health care taught in universities is being challenged. Current traditional models of dental

education have not yet been able to adequately address disparities in oral health. In addition, despite the fact that oral health is now widely recognized as an important part of overall health, there is often a growing disconnection between dental education and medical education.

The way forward

There is a growing realization that leading the world to optimal oral health means addressing its underlying social determinants. There is also an increased recognition of the fact that oral health is a crucial part of overall health, and associations between oral disease and major NCDs are increasingly acknowledged. These factors, in conjunction with recent advances in medical education theory and with the emergence of new educational models, call for a concerted action to revitalize and adapt our own educational models in order to ensure their responsiveness and adequacy with regard to evolving trends and needs in oral health and systemic health.

In recent years, medical education has received a lot of attention, which led to the publication of various reports in countries like Canada, the UK and the US. Beyond the acquisition of specific knowledge and facts, these reports all focused on common generic competencies such as patient-centred care, interdisciplinary teams, evidence-based practice, continuing professional development, use of information technology, integration of public health and research skills, as well as the acquisition of competencies in policy, law, management and leadership. Acknowledging the exponential speed at which our society evolves, and therefore the growing importance to learn how to learn, and how to find and interpret information rather than remember facts, the Education of Health Professionals for the 21st Century report advocates a shift from informative learning to transformative learning, with the purpose of teaching students 'to learn how to learn', to develop leadership attributes and finally to produce 'enlightened change agents'.

First, even if their prime focus lies in medical education, the outcomes of these reports also apply to a great extent to dental education. We believe investigating these recommendations and adapting them in a creative, innovative and inspired way into our own curricular reforms will allow us to train and educate graduates who will be much better equipped to deal with the challenges they will face throughout their career. Drawing inspiration from transformative learning techniques, focusing our attention on fostering critical thinking among learners and providing them with sufficient tools to become effective team leaders are among the priorities we must consider.

Secondly, considering the need to address the social determinants of oral health, we believe there is a strong argument for reinforcing the public health focus of dental education, with a view to widening the perspective of our students and graduates and preparing them to become leaders in health promotion and disease prevention efforts and strategies. We also believe that supporting trans-professional education, in an effort to break professional silos, is of paramount importance in order to bring an appropriate answer to WHO and UN calls for integrated disease prevention, in connection with NCDs in particular. Fostering greater collaboration between dentists and physicians at an early stage will without a doubt help counter the growing disconnection between the two professional bodies and encourage future closer collaboration for the ultimate benefit of the public.

Finally, we believe that providing standards of competence to educate and train an oral health workforce capable of optimizing the oral health in their community is a further opportunity for us, as this implies for our profession to take responsibility not only for our own education and training, but also for that of all health workers who participate in oral healthcare.

> Our Vision is that by 2020, our newly minted graduates will benefit from responsive, dynamic and modular curricula, which contents reflect state-of-the art knowledge and technologies that can be used to provide optimal oral healthcare and, in addition, provide learners with extensive critical thinking and analytical skills training as a foundation for a career based on life-long learning and continuing professional development. We further envision that a stronger focus on public health and inter-professional education will greatly ease collaboration with medical professionals and hence strengthen the recognition of our profession as mentioned in Section 2. Similarly, taking on the responsibility for the oral health education of health workers will promote our profession into a position of natural leadership, which will aptly highlight our relevance.

Summary

Status

- Existing educational models have not adequately addressed disparities in oral health.
- Increasing gap between general medical education and dental education. Lack of emphasis on public awareness with regard to the importance of prevention.
- Need active involvement to show that our profession is critical for public health.

Opportunities

- Develop an educational system which focuses more on public health issues and on the recognition of oral health disparities.
- Include more emphasis on critical thinking, interprofessional communication at an early stage and throughout the professional career.
- Advocate education and training to the oral health workforce, which can help optimize the oral health of the community.
- Promote application the application of new technology during the process of professional educational for both treatment and prevention.
- Educate the whole profession to be more active in terms of their social responsibility to promote dental public health rather than their mere passive involvement.
- Advocate sufficient continuing professional development.
- Encourage all dental educational institutions to include a 'green dentistry' dimension in the curriculum.

MITIGATE THE IMPACTS OF SOCIO-ECONOMIC DYNAMICS

Were we are now

According to WHO, oral disease is the fourth most expensive disease to treat worldwide. For example, total expenditure for dental care in the United States was estimated at more than 100 billion dollars in 2009, and the market for dental supplies in China alone is due to reach 3.1 billion dollars in 2012, with an 11% annual growth rate. In addition to these direct costs, there are also indirect costs to consider, including lost productivity for individuals suffering from oral disease. Oral diseases cause an untold number of school and work hours to be lost around the world. In terms of benefits, dentistry and the related oral healthcare industry generate, at least in developed countries, significant contributions to a country's employment and economy as a whole.

Nevertheless, fluctuations in socio-economic circumstances have a strong impact on oral healthcare resources and policies. In times of economic hardship, resources tend to be drawn from oral healthcare and redirected to areas and diseases where lack of treatment leads to faster and more visible consequences, notably mortality. Patients who experience deterioration in their financial situation during economic downturns tend to delay consultation and treatment. This can, however, have disastrous financial consequences, as illustrated by Californian statistics where the average price of a routine check-up amounts to 41 dollars, while the average cost of emergency treatment with hospitalization sky-rockets to over 5,000 dollars. Furthermore, given the increasingly recognized link between oral health and general health, decreased resources for oral health, including caries, periodontal disease, and oral cancer, may result in an increase in other health concerns, such as heart disease and diabetes. Conversely, economic uptrends tend to foster an increase in demand for oral healthcare that must be met, implying the availability of an appropriately trained workforce.

The way forward

To guarantee the long-term sustainability of our profession throughout the ups and downs of the economy and the public's ability to access and utilize oral healthcare services, we need to focus our attention on further integrating oral healthcare into overall healthcare. We need to shift from an insular perspective to one of integration and collaboration.

To achieve this, we need to be at the forefront of advocacy efforts to include Oral Health in All Policies at all levels of governmental and non-governmental agencies: local, regional, national and global. By emphasizing that governmental objectives are best achieved when all sectors include health and well-being as key components of policy development, we will be able to strengthen the position of oral health. Furthermore, we believe that advocating Oral Health in All Policies will help increase oral health literacy and awareness among the public, thereby supporting a community-driven demand of governments for better access to oral healthcare services. Grassroots demand can be a powerful way of promoting our stand and play a key role in shaping government agendas.

Second, it is our responsibility to develop evidence-based models of oral healthcare, which bring fairness in remuneration for care that delivers beneficial and measurable health outcomes. This, we believe, implies considering oral health promotion, a risk factor approach to disease prevention, and treatment as three equally important cornerstones of oral healthcare.

Third, we believe there is a need to foster partnerships between the private and public sector to address the right to universal access to oral healthcare, irrespective of individual financial situations. Taking this into account, there is also a role for us to play in advocating the inclusion of oral care in corporate health insurance schemes and health promotion activities.

Our Vision is that, by 2020, collaboration and partnerships between the private and public sector will have led to the inclusion of Oral Health in All Policies and that new evidence-based models of oral healthcare will be available to ensure fair and appropriate remuneration for care that delivers measurable health outcomes, thereby shifting the focus from a preliminarily procedure-based remuneration model to models which foster a holistic approach to oral healthcare and consider promotion, prevention, and treatment as equally important.

Summary

Status

- Fluctuations in socio-economic circumstances have a significant impact on oral healthcare resources and policies.

Opportunities

- Ensure integration of oral health into overall health policies.
- Develop an evidence-based model of oral health care which brings fairness in remuneration for care that delivers beneficial and measurable health outcomes.
- Contribute to ensuring the ability to access and utilize oral health care.

FOSTER FUNDAMENTAL AND TRANSLATIONAL RESEARCH AND TECHNOLOGY

Were we are now

Poor oral health remains a major issue in all countries – contributing significantly to the overall burden of disease and costs of healthcare - and major inequalities in oral health exist both within and between countries. This is despite the fact that most oral disease is readily preventable through simple and effective means. Enormous advances have been made in understanding the basic cellular and molecular mechanisms of oral disease and in developing novel, effective treatments, yet there are major gaps in the implementation of this research into day-to-day patient care. Together, these facts constitute two major research challenges for the oral health community. How can we shift the emphasis of oral disease management towards effective prevention and away from treatment in a clinical setting, which is unaffordable and impractical in many global regions? And what should we do to ensure the better implementation of research findings at all levels for the benefit of the global community?

The emphasis of oral disease management is overwhelmingly directed at treatment in a clinical setting, and this is reflected in the research that is undertaken. By contrast, much less effort is directed at research into the effective prevention of oral disease at the population level; understanding the social determinants of oral health; and integrating oral healthcare into wider programmes targeting a reduction in the global burden of NCDs.

We currently live in an era characterized by a wealth of advances and discoveries in research and technology. In dentistry, these are predominantly directed toward connective tissue biophysics/mechanics; tissue engineering; biotechnology, including gene therapy, and drug delivery, transport dynamics; and molecular engineering (macromolecular structure, protein structure, and molecular therapies). Dental technologies are also evolving, especially with regard to biomaterials and dental materials. The results of this research effort mean that the outlook for patients with advanced oral and dental disease has been revolutionized. However, it is recognized that practitioners use the knowledge, products and technologies they were exposed to during their education and training and tend to be less aware of innovations that become available once they are established practitioners. As a consequence, there is a major gap in the timely implementation of research findings and technological innovations into daily practice.

The dental profession has been rightly proud of its achievements in improving the world's oral health, but this has been accompanied by a relative isolation from thinking in mainstream medicine and healthcare, and a lack of awareness of wider environmental and political issues that have implications for oral healthcare and how it is practised. For example, environmental issues are currently high on the agenda of national and international agencies, and international environmental protection institutions are increasingly targeting dental products and materials as hazardous. Although amalgam waste discharge from dentistry is estimated to be responsible for <1% of the total amount of mercury discharged each year into the environment as a consequence of human activity, there is currently pressure to ban its use in dental restorations. This activity results less from concerns about the immediate effect on individual patient health than from a concern with the potential adverse effects on public health from the environmental consequences of inappropriate mercury disposal. In many parts of the world, alternatives to amalgam are either not available or are unaffordable. Thus, whilst the FDI and other oral healthcare organizations support the continued availability of dental amalgam for use in public health care (FDI 2010), there is an urgent need to develop a safe, effective and affordable alternative for global use.

Further, information technology is increasingly impacting the way we work, interact, communicate, inform ourselves and learn. There is therefore a great need to foster, as well as regulate and monitor, the use of information and communication technology (ICT) in oral healthcare to ensure that the benefits it can bring to society are realized.

The way forward

We believe that it is time for a concerted call to action to ensure that oral health research priorities receive sufficient attention and resources, and that research outcomes are widely and swiftly disseminated and implemented. The current significant delay in implementing research findings and technological innovations into prevention and practice is hampering the achievement of improved oral health at a global level and the reduction of oral health inequalities. We need to be in a position to influence and work effectively with agencies concerned with safety and compliance issues pertaining directly to oral health. We also need to ensure that the drive to position oral health in the wider context of general health is based on sound scientific evidence.

First, with regard to research, it is time to work with partner organizations to develop a science-based approach to oral healthcare, using agreed definitions and methods for data collection and analysis. By working cooperatively, there is also an opportunity to define a consensus research agenda and broad research priorities. In this regard, we share the view of the International Association for Dental Research (IADR) that it is vital to emphasize the importance of multi-, inter- and trans-disciplinary research and translational research, seeking input from a range of social scientists and health professionals. We need to better understand the full range of oral health determinants that include not only genetic, biological and environmental factors, but also the behavioural and social determinants of health and well-being. This will help us develop disease prevention strategies that are based on upstream prevention rather than downstream treatment, and promote the integration of oral health into general health. This has particular relevance with regard to NCDs, where our profession is in a strong position to work on a broad common research agenda and to advocate the allocation of additional resources and funding for oral health research projects and priorities. It is crucial that the strategies to emerge from this research are capable of local interpretation in a way that respects cultural sensitivities and socio-economic constraints.

Second, in view of the increasing importance of external policies that examine dental technologies and materials and pass judgement on their sustainability and safety, we need to adopt a proactive approach. We need to develop a research agenda that will position us to effectively advocate measures to improve oral health and maintain patient safety in a timely and constructive manner. This presents a unique opportunity for our profession to take a leadership role in advocacy towards public authorities and our industry partners for environmentally safe manufacturing standards in dental industry and oral health care practice. It also presents an opportunity to integrate environmental considerations into our agenda and to be at the forefront of the development of policies and strategies that support effective and sustainable 'green dentistry' initiatives, which emphasize the lifecycle approach.

Third, while it is crucial that we strongly encourage quality and innovative research, we also believe that we need to encourage and foster a timely implementation of research findings into daily practice. It is therefore our belief that stronger connections and iterations between research and daily practice need to be developed. While there is traditionally a time lag of several years between original research and its incorporation into common practice (estimated at an average of 17 years in medicine), it is our conviction that concerted educational and communication efforts can contribute to a significant reduction, for the benefit of patients. In order to facilitate two-way communication between research and clinical practice, we strongly encourage all dental medicine faculties to perform research- scientific, educational and social – in order to cultivate a good understanding among all oral health professionals of research mechanisms, and to enhance their life-long learning behaviour, skills and attitudes as well as widen their perspective.

Finally, access to ICT is spreading quickly on a global scale. Because of the rapid spread of technology, E-Health is rapidly becoming a reality. Through E-Health, the potential to disseminate and collect targeted and accurate information quickly is very high and there is a huge opportunity for oral healthcare professionals to be at the forefront of an innovative, rational and ethical use of new technologies. However, the use of E-Health technologies to disseminate and collect health-related information will increasingly need to be carefully monitored in order to prevent abuse, ensure the quality of the information provided and respect the confidentiality of patient data. We believe that, properly controlled, E-Health will allow us to strengthen professional and inter-professional collaboration through tools such as electronic health records and professional forums; improve access to oral healthcare services through telemedicine and telediagnosis; assist in disseminating prevention and promotion messages through electronic media; and foster universal access to professional education through online learning tools accessible from anywhere to anyone with an internet access. These are all

approaches that could have a major beneficial impact on oral health, but it is evident that considerable research is needed if this is to be achieved in a properly regulated way.

Our Vision is that, by 2020, major improvements in oral health will have been achieved and inequalities will have been reduced through research-led strategies for more effective disease prevention, with the integration of oral health into healthcare in general. The credibility of our profession will be reinforced thanks to a solid, balanced and forward-thinking research agenda, which will encompass broad common priorities. We believe that sustained educational and communication efforts will have greatly improved the effective, rapid translation of research findings into daily practice. State-of-the art use of E-Health technologies - and of mobile E-Health technology in particular - will have fostered a more collaborative approach to oral healthcare as well as an improved access to expert knowledge to all, in urban and remote areas, in developed and developing countries alike.

Summary

Status

- Poor oral health remains a major issue in all countries and major inequalities in oral health exist both within and between countries, despite the fact that most oral disease is readily preventable through simple and effective means.
- There is insufficient effort directed at research into the effective prevention of oral disease at the population level; understanding the social determinants of oral health; and integrating oral healthcare into wider programmes directed at reducing the global burden of NCDs.
- The dental profession is relatively isolated from thinking in mainstream medicine and healthcare, with a lack of awareness of wider environmental and political issues that have implications for oral healthcare and how it is practised;
- In spite of advances in understanding the basic cellular and molecular mechanisms of oral disease and developing novel, effective treatments, there are major gaps in implementing this research into day-to-day patient care and the time lag in implementing research findings is too long.
- There is a need to develop a science-based approach to oral healthcare using agreed definitions and methods for data collection and analysis, to ensure that current research efforts are not fragmented.
- Technology evolves very quickly and its use in oral health needs to be monitored and regulated to ensure it benefits patients;
- Information and Communication Technology is changing the way we work, learn, and communicate.
- International environmental protection institutions are targeting dental products as hazardous materials and may affect the future of the profession.

Opportunities

- Engage in a concerted call to action to ensure that oral health research priorities receive sufficient attention and resources, and that research outcomes are widely and swiftly disseminated and implemented.
- Work with partner organizations to develop a science-based approach to oral healthcare, using agreed definitions and methods for data collection and analysis. By working cooperatively there is also an opportunity to define a consensus research agenda and broad research priorities.
- Promote the integration of oral health into general health. We will, through better understanding the full range of oral health determinants - including genetic, biological and environmental factors, as well as the behavioural and social determinants of health and well-being - able to develop disease prevention strategies based on upstream prevention rather than downstream treatment.
- Develop effective oral healthcare strategies at a global level capable of local interpretation, in a way that respects cultural sensitivities and socio-economic constraints.
- Advocate an innovative and proactive use and application of available dental technology and materials.
- Encourage all dental medicine faculties to perform research, including scientific, educational and social research.
- Ensure a strong link between ongoing changes in the type of oral healthcare deliverables and research efforts.
- Develop policies and strategies to support effective and sustainable 'green dentistry' initiatives which emphasize the lifecycle approach.
- Advocate:
  - continuous development of international dental standards to enable appropriate levels of quality and safety in oral health care;
  - environmentally safe manufacturing standards in dental industry and oral health care practice;
  - clean water and energy preservation practices among oral health professionals;
  - a state-of-the-art use of Information and Communication Technology in all aspects of oral healthcare and delivery.

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Disclaimer

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Conflict of interest

S. Kess is an employee of H. Schein Inc.

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