

The Boundaries between Caries and Periodontal Diseases. What are the Implications for Education in Dental Public Health? Proceedings of EADPH/SESPO Pre-Congress Workshop held on Wednesday, 17 October 2018 at The Centro Cultural Sa Nostra Congress Centre, Palma de Mallorca, Spain

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Abstract

This document reports the proceedings of a workshop held in Palma de Majorca on 17 October 2018, the day before the congress of the European Association of Dental Public Health and the Spanish Association of Dental Public Health. It is taken directly from the transcription of an audio recording. The workshop explored the implications for undergraduate education in Dental Public Health that have arisen from the position papers produced as a consequence of the 2016 European Federation of Periodontology (EFP)/Organisation for Caries Research (ORCA) workshop on the boundaries between dental caries and periodontal diseases and the recently published Association for Dental Education in Europe (ADEE) guidelines on undergraduate dental education.

Background

In November 2016 a joint workshop was run by the European Federation of Periodontology (EFP) and European Organisation for Caries Research (ORCA). A series of reviews of the current knowledge on dental caries and periodontal diseases were presented during the workshop and have subsequently been published in the Journal of Clinical Periodontology. In December 2017, guidelines on the expected competencies of a graduating European dentist were published in the European Journal of Dental Education. The guidelines were produced by the Association for Dental Education in Europe (ADEE). These publications provide the latest evidence and raise the question: how can the current knowledge on dental caries and periodontal diseases be incorporated into curricula in dental schools to meet the ADEE guidelines.

Overview

Professor Jenny Gallagher -the co-author of Domain IV of the guidelines on the competencies of the Graduating European Dentist - summarised the guidelines for this domain and detailed the topics relating to dentistry in society which should be included in the undergraduate dental curriculum. Four speakers, who were each members of one of the four groups at the EFP/ORCA workshop, then each gave an overview of the content of the papers produce by the group that they took part in and how they may impact on education in Dental Public Health. After the first two presentations there were 5 small group discussions on the papers and their implications. After the second two presentations there were a further five small group discussions. Dr Paula Vassallo then presented a combined report which highlighted the findings of all the discussion group. The workshop finished with a discussion of how to take the work forward during a follow up pre-congress symposium to be held on 11 September 2019 in Ghent.

Schedule

09.00 Opening and welcome

Colwyn Jones - President EADPH

09.05 The aims and organisation of the day

Kenneth Eaton - Chair of the workshop

09.10 Competencies of a Graduating Dentist

Jenny Gallagher- Co-author of ADEE Guidelines for Dental Public Health

09.30 Role of microbial biofilms in the maintenance of oral health and the development of dental caries and periodontal diseases

Philip Marsh - EFP/ORCA Group 1

09.55 Interaction of lifestyle, behaviours or systematic diseases with oral health: dental caries and periodontal diseases.

Andreas G. Schulte - EFP/ORCA Group 2

10.20 Small group discussions* on first two presentations

11.20 Prevention and control of dental caries and periodontal diseases at individual and population level.

Kenneth Eaton- EFP/ORCA Group 3

11.45 Age-related effects on oral health, dental caries and periodontal diseases.

Jacques Vanobbergen - EFP/ORCA Group 4

12.10 Small group discussions on final two presentations

13.10 Lunch

14.10 Summary of findings from the discussion groups

Paula Vassallo - President Elect EADPH

15.00 Discussion

15.30 Closure of the workshop

Source Documents

Delegates to the workshop had been emailed the consensus reports from the four EFP/ORCA groups which were published in the Journal of Clinical Periodontology (JCP) in March 2017, Volume 44, Supplement S18 and the paper Gallagher J., Field J.C. (2017) The Graduating European Dentist - Domain IV: Dentistry in Society. European Journal of Dental Education, 21, issue S1, together with recommendations from the EFP for researchers and the oral healthcare team and asked to read them before the workshop.

Attendees

Including the speakers, 60 delegates attended the workshop.

Sponsorship

The workshop was sponsored by Colgate with an unrestricted grant. As a result of the company's generosity there was no registration fee and tea, coffee and lunch for delegates was provided at no cost to the delegates.

Opening and Welcome

Colwyn Jones - President of the EADPH opened the workshop and welcomed the 60 delegates who were present. He thanked the organisers of the workshop and Colgate for sponsoring it and handed over to Kenneth Eaton, who chaired the symposium for the remainder of the day.

Aims and Organisation of the Workshop

Kenneth Eaton thanked Colwyn Jones and briefly went through the programme for the day. He explained the background to the symposium which came from two recent series of publications. The first arose from a workshop held by the European Federation of Periodontology (EFP) and the Organisation for Caries Research (ORCA) in Segovia November 2016. Thirteen papers resulted from the Segovia workshop, which reviewed current knowledge on dental caries and periodontal diseases. There were four groups at the workshop, each of which produced a position paper (Chapple et al. 2017, Jepsen et al. 2017, Sanz et al. 2017, Tonetti et al. 2017). These position papers had been sent to delegates to today's workshop. He explained that the key points from each one would be presented during the morning by a member of each of the four groups.

The other group of publications arose from the work of the Association for Dental Education in Europe (ADEE) and outlined the curriculum and expected outcomes for newly graduating dentists in the European Union. He explained that Jenny Gallagher was the author of one of these papers, which particularly dealt with Dental Public Health (Gallagher & Field, 2017). This paper had also been sent to delegates for today's workshop and Jenny would be giving a presentation that covered the key points.

He then stated the aims of today's workshop were:

- To inform the delegates about the key points from these papers.
- To discuss how they're applied to Dental Public Health.
- To consider how they could be incorporated into the curriculum "in your dental school in your country and at European level".
- To produce recommendations as to how the change(s) could be achieved.

Curriculum change might be more difficult in countries with many dental schools and control by external bodies than in countries with only one dental school and more flexibility to introduce change. The intention was that at next year's EADPH congress, which will be in Ghent, there would be another pre-congress event at which delegates to today's workshop would report back on what did and didn't happen and if it didn't happen, why didn't it happen.

After the first three presentations, delegates would work in five small groups, each group would have a flip chart and an hour to discuss presentations and produce recommendations. Each group would have a facilitator, normally one of the speakers. After the second series of presentations there would be further group work. The comments and recommendations from the flip charts would be collated. Paula Vassallo, supported by Huda Yusuf, would then give an overview after which they would be discussed by all the delegates. The workshop was being audio recorded and it was proposed to publish proceedings of the workshop.

FIRST PRESENTATION - COMPETENCIES OF A GRADUATING DENTIST: GUIDELINES FOR DENTAL PUBLIC HEALTH: JENNY GALLAGHER - CO- AUTHOR OF ADEE GUIDELINES

Jenny Gallagher explained that there was a long history in relation to thinking about dental education in Europe and that one of the EADPH Special Interest Groups (SIGs), which she chaired was on the topic of education in Dental Public Health (DPH). Since 2012 during successive workshops at EADPH congresses, there had been the chance to debate this topic in a research-informed way so that all dental schools in Europe had the opportunity to contribute to the debate. The EADPH DPH SIG developed and tested a questionnaire, which was then circulated that to all dental schools in Europe and also copied to key colleagues in DPH. About half of the schools in Europe responded. Details of the responses were given during the DPH SIG session on the following afternoon.

The questionnaire explored six key areas which were as follows:

- o Having a dental public health philosophy and approach;
- o Population demography and health;
- o Understanding health promotion disease prevention;
- o Healthcare systems;
- o The dental workforce, and then;
- o To think about planning for health and oral health.

These areas were thus tested across Europe and there was essentially greatest support from respondents for the first three.

Jenny then had the opportunity to link into the ADEE programme on competencies and educational outcomes to work with colleagues on key documents, which were consulted upon and considered during the ADEE annual meeting in 2017. ADEE has been thinking about the European dentist. It has changed its emphasis from competencies to educational outcomes, which are grouped into four domains from professionalism through to dentists in society.

The resulting documents were published in the European Journal of Dental Education. Within the four domains competencies, methods of teaching and learning, methods of quality assurance which are two supporting documents, and learning outcomes are considered.

Jenny Gallagher then gave an overview of the content of the paper Gallagher & Field, (2017). She gave some definitions in relation to competencies and that they were professional behaviours and skills required by a graduating dentist, in order to respond to the full range of circumstances encountered in general, professional practice. Learning outcomes were a series of individual and objective outcomes with shared ownership between students and staff, designed to facilitate the learning and assessment processes.

She then briefly went through the other papers that ADEE had published in 2017 before presenting the paper on education in DPH (Gallagher & Field, 2017) in greater detail. The suite of ADEE papers reflect the new undergraduate European dentist and provide a curriculum framework. In good management terms, it's always very important to think "begin with the end in sight" and what should be achieved during dental undergraduate education and training. What are the outcomes that actually will categorise our European dentist? The suite of papers consist of an overarching document and then ones for the four domains, the four key papers. The first one is on professionalism. It is heartening to begin with professionalism and very appropriate to do so. Within the professionalism domain, there is an outline of professionalism as a commitment to a set of values, behaviours and relationships that underpin the trust that the public holds in all dental care professionals. Ethics, regulation and professional behaviour are covered within that paper. The second paper relates to safe and effective clinical practice and the key principle of doing no harm. It describes how dentists are required to ensure they're capable of providing appropriate care for their patients whilst also effectively managing and leading the wider team. It covers evidence-based practice, management and leadership, team-working and communication, audit and risk management, professional education and training. The latter being important because in many countries, the training, particularly of dental nurses within the team is actually undertaken in local dental surgeries or practices. It then moves on to patient-centred care and focuses on clinical care with the patient at the very centre of care. This should relate to today's our discussions. . This approach is becoming increasingly important, that is patient-centred care, within the literature, within policy documents and it's been defined by the Institute of Medicine as 'Providing care that is respectful of and responsive to patient preferences, needs and values and ensuring that patient values guide all clinical decisions.' This highlights the importance of a consultation,

a course of care being a joint partnership between dentists the dental team and patients. This represents a response to societal change that has been seen in Europe, with a move away from a patriarchal approach in relation to the delivery of dental care and a recognition that patients are experts on their health and that it is important for clinicians to work with them and support them in relation to their health. This involves applying the scientific basis of oral health care, really good clinical information gathering and diagnosis, getting that right, treatment planning and then establishing and maintaining oral health.

Moving on to Domain IV: Dentists in Society, which recognises that for all of us, our work is not just within a clinical setting but outside. We have a major role in society and when we think of public health issues and tackling some of the wider determinants of health, they need to be tackled in the context in which we work and live. So, this is recognising that in addition to treating individual patients, a dentist must be able to focus on promoting health, monitoring interventions and implementing effective strategies of care at community and population levels. A dentist must also understand population demography and health trends in the context of the healthcare system in which they work, because we recognise that depending on where you work, the challenges may be very different and that is critically important. Within the document there are four categories of dental public health, health promotion disease prevention, population demography, health and disease, healthcare systems, planning for health and oral health. There is a great focus on health as opposed to just oral health and it's recognising that when we are supporting oral health, what we do can also have a significant impact on general health, so where the term 'oral' has been dropped, there's a good reason. In terms of this Domain we don't expect an undergraduate to be able to work at the level that a specialist would work at, but if you think about other aspects of clinical care, when dental students graduate, they graduate as a generalist so they ought to be able to undertake appropriate work at that level. It is important to bear this in mind because specialist training in some countries across Europe is present and enables the acquisition of the skills, expertise and knowledge to be able to work at a much higher level. It should be emphasised that the ADEE documents relate to a generalist level and that they take account, that dentists must be fully aware of the wider context in which they practice, they don't just go into the surgery and close the doors. They need to integrate effectively with society and advocate for general and oral health and system change.

Focusing on the categories within Dental Public Health. Firstly, a graduating dentist must be able to describe Dental Public Health and discuss its implications for dental practice, describe effective public health strategies, discuss oral systemic diseases and their associated risk factors, which are recognised public health problems and advocate for oral and general health with patients and the community, including policy leaders. All policy leaders have dentists, it's a real opportunity to influence them, when they are sitting in the dental chair. The ADEE documents don't include that level of detail but its readers should understand this. The next topic is Health Promotion and Disease Prevention, again here there is a list of eight points, describing concepts and definitions of general and oral health. Discussing social determinants, praising the importance of context when applying the evidence-base for health promotion. Evaluating the importance and limitations of behaviour change at population level. Praising the importance of professional advocacy for population health in achieving change, describing and implementing inter-professional approaches to disease-prevention and promotion, including the training of non-dental healthcare providers. Discussing and advocating for a common risk factor approach in promoting health and being able to discuss approaches in relation to addressing inequalities in health. These are key elements in relation to health promotion and disease prevention. For many students we just want them to recognise that this is really, really important. And then to understand the demography of health and disease and to be able to describe the context of where they are and discuss the implications, describe the process of assessing population oral health using epidemiological tools and other indicators, discuss the trends, both local, national and global and their implications and then the political, social and economic trends which very much influence our health. The next topic is to be able to debate inequalities and discuss the promotion and promote the association of oral health with general health and quality of life, including common risk factors. So you see these themes being developed in more detail within this list.

For Healthcare Systems the proposed outcomes are an ability to think about equity, about access, quality and outcomes, to think about evidence-based population healthcare interventions, which might be out with the dental practice, to describe known oral health and wider health policies, recognising that we operate within a policy context and describing the general mechanisms of delivering healthcare in that context. A further aspect is to be able to think about remuneration and payment systems and to debate their merits or demerits. Next comes the ability to discuss examples of change in health services, recognising that we don't stay in a static context and how can we change in support of health, and then to think about career choices and training opportunities. So, again it's back to understanding the context. Then finally planning to provide examples of effective public health interventions, strategies for the best use of dental teams for oral health, discuss future research needed and principles of co-production of care with local communities. So, it's helping the graduating dentist to be able to discuss and to debate these particular issues. Describe, discuss and debate are the key elements. We're not asking them to actually deliver them at this point, but we want to give them some insight and recognition that their role in wider society is important. There is a separate paper in relation to competencies and methods of teaching, learning and assessment which may be useful for you to reflect on and there is a Table within that which highlights there is a range of different methods that can be used for the different domains. I think that it could probably be debated and discussed further.

At King's College London, Dental Institute there is an aim to get dental students, not just in the buildings but out of the buildings. This particular building in South London (pointing to a picture of a health and wellbeing centre) is very interesting because the dental students are working here alongside general practitioners, it's a health and wellbeing centre, which was developed with and for the local community, it's got a dance studio, it's got a swimming pool, it's got a gym, as well as the healthcare facilities and so the idea is that it's a context where they can integrate and relate to one another. Thus getting them out to understand the context is important and linking with a range of other institutions, whether it be schools and/or with other players is really important too.

In summary, there is a fantastic suite of documents in relation to the new undergraduate, European dentist. I am delighted that 'Dentists in Society' is a key Domain. There's a lot covered within it and I think it is a challenge to us as to how we might use it within our undergraduate curricula and to shape the future of European dentists. So, thank you very much for your attention and I look forward to the debate in our discussion groups.

The Chair thanked Jenny Gallagher for the presentation and asked her for permission to display the Table which was included in her presentation, whilst the discussion groups took place.

He then introduced the next presenter Philip Marsh who reported on the key points to emerge from Group 1 at the ORCA/ EFP workshop and how they might be relevant to the development of dental education.

SECOND PRESENTATION - THE ROLE OF MICROBIAL BIOFILMS IN THE MAINTENANCE OF ORAL HEALTH AND THE DEVELOPMENT OF DENTAL CARIES AND PERIODONTAL DISEASES: PHILIP MARSH – EFP/ORCA GROUP 1

Philip Marsh thanked the organisers and sponsors for inviting him to speak and explained that unlike the other speakers, he was a non-clinical research worker (microbiologist) who had spent most of his working career in the area of oral health. He explained that he would cover what was discussed in the Group 1 of the 2016 EFP/ORCA workshop. Group 1 produced three papers, one of which was the consensus report that had been circulated to delegates prior to today's workshop.

A number of definitions were presented in that consensus report and, because some of the terms may not be so familiar to the audience, Philip Marsh gave a number of the most relevant definitions. The first was the 'biofilm', which is of key importance because in the mouth all organisms have to be attached to a surface in order to persist and survive. The term 'microbiome' is now frequently used, and is the collective genomes of all the microbes, whether they be bacteria, viruses, fungi or protozoa, found in any habitat. The oral microbiome includes all of these types of microbe. Two terms that are now used regularly are 'symbiosis' and 'dysbiosis'. Symbiosis refers to the beneficial and natural relationship between our oral microbiome and the host. Dysbiosis is when this natural, beneficial relationship breaks down and disease is a consequence.

Philip Marsh then described some basic microbial processes to provide a context for some of the recommendations of the consensus report. He explained that it is now recognised that humans are made up of an equal number of microbial cells and human cells, "so we're 50% microbial and this human microbiome has co-evolved with us and we could not live without these organisms.". They exist on all surfaces of the body as structurally- and functionally-organised microbial communities and they live as biofilms on these surfaces. We gain essential benefits from this human microbiome. The primary one is that they help exclude the exogenous micro-organisms we come into contact with on a regular basis ('pathogen exclusion'), but they are also involved in regulating many of the key physiological functions of the body, including the development of the host defences, the cardiovascular system, the morphology of the gut, etc, and they also generate vitamins during the digestive process; thus our human microbiome is essential for our normal health and well-being. As in all relationships, however, sometimes they can go wrong; if we have a problem with our human microbiome, a number of detrimental activities follow and this is referred to as dysbiosis. Many autoimmune and inflammation-mediated diseases occur when our natural microbiome has a dysbiotic relationship with the host, including inflammatory bowel disease, Crohn's disease, rheumatoid arthritis and periodontal disease. Dysbiosis has also been linked in the gut to malnutrition and obesity, to allergies, and even neurological disorders and cancer.

As part of this human microbiome, we also have a characteristic oral microbiome and it is important to recognise that this is natural and beneficial for us, but it is a very complex microbiome, so any individual may have 100-300 different microbial species in their mouth, of which bacteria are the most common group, but also fungi, viruses and even protozoa can be present. Once formed the composition is relatively stable over time in health and because we have uniquely in the mouth, non-shedding surfaces, e.g. teeth or dentures, biofilms can form readily and can result in large accumulations of microorganisms unless these are controlled by oral hygiene. We get benefits from this balanced, oral microbiome, including pathogen exclusion, but if a patient is on long-term antimicrobial therapy that suppresses their normal bacterial microbiome, then this can lead to overgrowth by fungi or environmental organisms.

We now know that the oral microbiome is responsible for helping to develop the host's defence systems, to regulate the cardiovascular system and also is immunomodulatory and down-regulates the immune system to prevent the host over-reacting to its natural oral microbiome. In health, these organisms persist in the mouth as biofilms and these are both structurally- and functionally-organised. This organisation enables these communities to be able to break down the complex host molecules they require for growth (usually salivary mucins); they also modify the environment, and share an important feature of all biofilms in that they are far more tolerant of antimicrobial agents than would be predicted when the organisms are growing on their own and in solution (planktonic culture).

The organisms in these biofilm communities develop a range of complex metabolic interactions and that was the basis of one of the talks (at the EFP/ORCA workshop); these interactions ensure there is a dynamic balance amongst these organisms and this confers some resilience to change. Initially, the microbial composition of these oral biofilms was determined by culture techniques, although it is now accepted that only 50-70% of the oral organisms can be grown in the laboratory, even with the most sophisticated techniques. In recent years, there has been a shift to culture independent molecular approaches, in which the nucleic acid, usually DNA, is extracted from a sample; this DNA is sequenced and compared against several databases to identify which organisms are present. The outcome from numerous studies is that we now know that there can be several hundred species found in a single mouth, many of which have never been described before and cannot as yet be cultured. In the future, in addition to cataloguing the 'names' of micro-organisms found at a site, 'OMIC' techniques might be applied to determine the 'function' of these microbes within a community. This may lead in the future to an increased consensus of the composition and activity of microbial communities in health and disease.

In health there is a balance both among the microbes and also between these microbes and the host, and this is in spite of the diet, lifestyle, hormones, oral hygiene and status of the host defences. However, it is important to recognize that this is a dynamic balance and can change. Thus, in people with an inappropriate diet, poor plaque control, or if saliva flow is impaired, the host defences are compromised or they have lifestyle risks, like smoking, then that will alter the microbe-microbe interactions. As a result, the relationship between the microbes and the host will also be affected, and this can lead to oral diseases and even to systemic diseases (dysbiosis). Therefore, we need to actively manage and promote our oral microbiome in order to maintain health. Against this background, a number of consensus statements were generated. It was emphasised that the oral microbiome is natural, and has a very diverse composition although bacteria are the main group. This microbiome persists as biofilms which are structurally- and functionally-organised, and numerous interactions occur, both synergistic and antagonistic, among these organisms, and this ensures stability and resilience to change. Only 50-70% of oral micro-organisms can be grown in the laboratory, so many contemporary approaches now use molecular or culture independent approaches in order to determine the microbial composition of a sample.

These approaches have resulted in many new species being identified; some are unculturable and so their properties are inferred from genetic sequences. It was pointed out that many of these sophisticated, metagenomic studies have been of very few individuals, and studies should be larger in the future. The biofilm composition varies between individuals in health. Does this represent potential disease susceptibilities in the future? Furthermore, during life, the biofilm composition may change due to the developing, maturing and ageing oral anatomy, ecology and immune system. The subtext is that the environment of the mouth has a profound impact on the oral microbiome with the main source of nutrients for these bacteria being saliva and gingival crevicular fluid. In health, there is now a move to try and define a core oral microbiome, i.e. a set of organisms that are beneficial and found in virtually everyone in health, and these would be the ones that we want to promote and maintain. Group 1 recognised that this oral microbiome produces several key benefits, and yet, at the same time, the mouth is richly provided with components of both the innate and adaptive immune response. Therefore, there is a very complex relationship between the persistence of organisms that are beneficial to us and a set of host defences that tolerate those but exclude other deleterious organisms.

In disease, the microbiome is different; there is a shift away now from thinking that disease is due to specific or single pathogens, to a view that disease is a result of a change in the balance of the whole biofilm composition (dysbiosis). The challenge is now to identify those drivers of dysbiosis; the consensus is that the drivers or stressors in caries are different to those that occur in periodontal diseases. As explained earlier, functional studies of the biofilm may be more important in the future to get agreement between studies, rather than just cataloguing or producing lists of names of (unpronounceable) microorganisms. In caries, it was concluded that the microbiome shows a lower microbial diversity due to a more extreme environment but, within that, there are increases in microbes that make acid and tolerate acid, and some of the well-known organisms that have those properties include mutans streptococci and lactobacilli, but there are also many other types with similar traits. In contrast, in periodontal diseases, there is generally an increase in microbial diversity, together with the emergence of novel species, many of which are unculturable, which are undetected or in very low numbers in health. Disease is associated with complexes of microorganisms, such as *Porphyromonas gingivalis*, *Tannerella forsythia*, *Treponema denticola*, and many others.

In caries, the pathogenic traits are the rapid transport of dietary carbohydrates by microbes and their conversion to acid, the production of intracellular and extracellular polysaccharides (mainly from sucrose), but most importantly, a tolerance to the low pH that is generated. Many bacteria can make acid, but few can tolerate a low pH. In periodontal diseases the predominant bacteria are generally proteolytic and obligately anaerobic, often with a Gram-negative cell

wall. Some of the key organisms require haemin for growth which they obtain from host molecules like haemoglobin. These organisms are ‘inflammophilic’, and thrive under the conditions in an inflamed periodontal pocket. They subvert and de-regulate the host response so we get an exaggerated inflammation which causes the tissue damage we see in periodontal diseases. Thus, the drivers in caries are related to a sugar-rich diet, and/or an impaired saliva flow, so that the biofilm is frequently exposed to conditions of a low pH. In contrast, the drivers in periodontal diseases are the accumulation of biofilm that cause the host to raise an inflammatory response and/or impaired host defence factors that are unable to control the biofilm. If the host response is unsuccessful, then the communities of subgingival micro-organisms are provided with a regular supply of essential nutrients from the resulting increased flow of gingival crevicular fluid, leading to further inflammation.

What is the public health relevance of this new information? Well it is now clear that the oral microbiome is natural and delivers essential benefits for our health and well-being. Therefore, we should be promoting biofilm control and not plaque elimination. Disease is due to dysbiosis of this normally symbiotic relationship between these microbes and the host. Therefore, in any patient, the drivers or stressors of dysbiosis need to be identified and targeted so that health professionals deal with the cause rather than just the consequence of dysbiosis.

What are the consequences for dental education? Students, especially undergraduates, will now need to understand more about the human and the oral microbiome, including the novel methods needed to characterise it. The oral microbiome delivers important benefits which are essential for health. However, this symbiotic relationship is susceptible to change and a change to the environment could drive deleterious shifts in the biofilm. Caries and periodontal diseases have different drivers or stressors that cause dysbiosis. In the future, new avenues of control and prevention will seek to promote the symbiotic relationship between the host and the microbiome, while knowledge of the risk factors of dysbiosis can help clinicians advise patients on what strategies they should adopt to prevent disease. As a general point, oral health is considered more than the absence of disease; oral health is a very active process involving a number of processes. Therefore, students will need to understand the ecology and dynamics of the oral microbiome.

Section 4.1.3 ‘Discuss oral and systemic diseases and their associated risk factors’ in the ADEE recommendations (Gallagher & Field, 2017) aligns with the concept that disease involves a shift from symbiosis to dysbiosis. Similarly, the recommendation for ‘Health promotion and disease prevention’ implies the need to understand the general concepts of oral health and general health and the risk factors involved in driving the dysbiosis. ‘Population trends of oral diseases’ will require students to realise that some people are more at risk of disease than others. The association of oral health with general health, together with the fact that the oral and human microbiome play an essential role in our health and well-being, are also relevant topics.

The Chair thanked Philip Marsh for a very succinct report and for reminding the audience of the significance of microbiota in our mouths and introduced the next speaker.

THIRD PRESENTATION - INTERACTION OF LIFESTYLE, BEHAVIOURS OR SYSTEMIC DISEASES WITH ORAL HEALTH: DENTAL CARIES AND PERIODONTAL DISEASES: ANDREAS SCHULTE EFP/ORCA GROUP 2

Andreas Schulte thanked the organisers for inviting him to speak at the workshop. He explained that Group 2 had a very challenging topic to consider and its consensus report was produced by the many participants of the ORCA/EFP workshop. Prior to the ORCA/EFP workshop, various groups had to prepare literature reviews, both systematic and narrative from the available literature. These reviews were then presented and discussed during the workshop and consensus statements, based on these discussions were produced by each group.

Because he only had 25 minutes to make his presentation, he would present the main definitions and the main conclusions and recommendations from Group 2. All these conclusions and recommendations were based on the literature reviews.

One of the questions that was discussed and presented in the consensus paper of Group 2 was, whether there is evidence that particular gene variants may be associated with periodontal diseases? The first answer to this question was that no specific studies were found on genetic susceptibility to gingivitis. For three genes there is a strong level of evidence that there is an association with chronic periodontitis and these are the genes for vitamin D receptor, iron gamma receptor and interleukin-10. In addition, there is an emerging evidence for the role of whole genetic variants on sub-gingival, microbial colonisation, which needs to be explored further.

The second question that group 2 considered was, whether there is evidence that particular gene variants may be associated with caries? The answer in the consensus statement was that current evidence from independently, replicated results in multiple populations, suggest that those genes with the largest impact on caries susceptibility involve enamel formation, immune regulation, salivary function and dietary preference.

The third question that group 2 considered was ‘Are there common gene variants that predispose to both periodontal diseases and caries?’ The answer was that crosschecking genes associated with periodontitis with those associated with caries, revealed no conclusive evidence for gene variants common to both diseases.

The fourth question was, ‘Is dental caries related to diet?’ It is clear that there is a relationship between caries and diet. However, group 2 agreed that it was important to recognise that given the existing strong evidence base, it would be unethical to perform randomised, clinical trials investigating the impact of frequency, quantity and duration of dietary fermentable carbohydrate exposure for caries initiation and progression. Andreas Schulte suggested that this was a very important statement because “we have a lot of discussion, for instance in Germany when we want to change remuneration systems in dentistry and in medicine, the members of committees in charge of weighing arguments, always try to insist on evidence-based randomised, clinical trials. Therefore it’s really important that we have this statement because it helps in practical discussions about changing remuneration systems.”

The next question was ‘Are periodontal diseases related to diet?’ The answer came from reports of several studies in different populations which have shown an independent, inverse association between vitamin C intake and plasma vitamin C concentrations and periodontitis prevalence at a population level. Furthermore, lower serum magnesium, calcium levels, lower anti-oxidant, micro-nutrition levels, have also been seen to significantly correlate with higher levels of periodontal diseases. Also vitamin D supplementation, combined with calcium, has been shown to reduce tooth loss and improve periodontal health. Emerging evidence indicates that a carbohydrate-rich diet, increases the risk of inflammation and gingival bleeding whereas to switch to a diet from the Stone-Age times, results in a decrease of gingival bleeding.

At this juncture Andreas Schulte was asked “Do you mean uncooked food, raw meat, vegetables and fruit picked from the wild, is that what a Stone-Age diet is?” He replied that he was not familiar with all the details of what constitutes a Stone-Age diet because there are so many details that were condensed in the relevant paper.

Group 2 then reviewed other common risk factors for caries and periodontal diseases. Taking into consideration that the mechanism might be different for both diseases, fermentable carbohydrates were found to be the most relevant, common dietary risk factors for caries and periodontal diseases. For caries it is primarily related to the fermentation process, which takes place in the dental biofilm during which acids are formed. For periodontal diseases, the most likely biological mechanisms, involved glucose and advanced glycation end-products to delivering a hyper-inflammation state in leucocytes. There is evidence that vitamin D deficiency may result in enamel hyper-mineralisation or hypoplasia, which in turn, may result in an increased risk for caries. Vitamin D deficiency has been associated with periodontitis in cross-sectional studies so these are very interesting to see as common risk factors for caries and periodontal diseases.

The question considered by Group 2 was ‘What are acquired risk factors for caries and periodontal diseases, other than diet?’ The literature suggests they are hypo-salivation, rheumatoid arthritis, smoking and tobacco use, undiagnosed or sub-optimally controlled diabetes and obesity.

A large part of the consensus paper produced by Group 2 refers to recommendations for future research (Chapple et al. 2017). Andreas Schulte suggested that we have to decide that we not only have to teach our students that what he had presented to the audience as knowledge but also to encourage the students to undertake research in this field. In common with many studies in dentistry, such studies must be sufficiently powered, employ longitudinal design, so that they inform questions of causality and be conducted in diverse populations at different geographical locations and in different age groups. With regard to genetic research, there were two recommendations each stating that design hypothesis-driven studies or hypothesis-free studies of caries and periodontal diseases within the same population cohort should be performed and take into account the interaction between different factors. Attempts to unravel the mechanisms of the underlying genetic associations should be undertaken in search of the role of gene variants, including gene expression and other mechanisms of controlling gene function. Maybe this is also something for public health because it is part of, a special type of epidemiology.

Other recommendations for future research were presented with regard to acquired risk factors common to caries and periodontal diseases. They included undertaking research designed to improve understanding of potentially modifiable risk factors for both caries and periodontal diseases. Specifically in relation to the following:

- Hypo-salivation and reduced salivary flow
- Smoking and tobacco use
- Carbohydrates
- Impacts upon biological pathways to disease, specifically exploring the effects of sugar frequency or amount in relation to caries and periodontal diseases; and
- Micronutrient deficiencies and their impact upon disease initiation and progression, specifically in relation to vitamins C, D, K, B6, B12 and trace elements and minerals such as magnesium, calcium and phosphate.

Finally, the consensus report contains an even longer list of further recommendations which highlighted the following topics:

- Longitudinal, controlled studies focusing on the influence of dietary fats and fat types and proteins on caries and periodontal diseases should be planned
- Multi-centre intervention studies analysing the efficacy of micronutrient supplementation and carbohydrate restriction upon the disease status
- Metabolic syndrome, including diabetes and obesity and the impact of its management upon periodontal diseases and caries
- Conduct studies on caries in adults to better understand what the most important acquired risk factors are and whether their modification where credible, improved caries outcomes; and
- Conduct further high-quality research in the elderly in order to ascertain whether certain risk factors for periodontal diseases change across the life-course.

Group 2's consensus report also included recommendations for the dental team and the dental team. Communication and working with the dental team is now a part of the new framework for the graduating dentist. These recommendations were:

- Routinely question patients about the family history of periodontal diseases and caries
- Modern preventive practices should focus on the identification of risk in individuals using validated risk assessment tools
- Routinely include questions on dietary behaviour or habits in order to identify risk in individuals or groups
- Nutritional assessment should always be performed when there is disease activity
- Provide advice and support for a healthy diet according to national guidelines
- Advice on dietary starch reduction for individuals with root caries; and then
- Increase awareness of the importance of vitamin D and anti-oxidant micronutrients through natural dietary resources, especially in the elderly
- Refer to a dietician or general medical practitioner where necessary
- Engage the entire oral healthcare team in smoking cessation advice and support and refer when necessary to specialist services
- Engage in discussions on weight loss from the perspective of oral diseases like periodontitis
- Encourage [adherence] to glycaemic control regimes in diabetes patients from a periodontal health perspective
- And routinely examine intra-oral saliva production, moisture levels and consider fluoride supplements and/or saliva substitute for patients with reduced salivary flow.

The last group of recommendations from Group 2 concern public health and policy-makers. Andreas Schulte then presented the first paragraph of these recommendations, to encourage everybody to take the view that it is more vital to present the importance of oral health for society and for general health.

The relevant paragraph was:

Periodontal diseases and caries are ubiquitous, underlie virtually all tooth loss and are largely preventable. Maintaining healthy teeth improves nutritional status, reduces the risk of general health consequences of these oral diseases, helps reduce health inequalities, has significant, positive health economic impact and improves quality of life and general wellbeing (Chapple et al. 2017).

He suggested that this statement has to be presented very often to the public and to policy-makers, along with some specific recommendations for public health and policy-makers which were that, public policy should encourage:

- All nursing mothers to have their babies entered into regular dental care pathways
- All care homes to develop mechanisms and processes for maintaining the oral health status of their residents
- Immediately develop remuneration approaches that encourage prevention and individually tailored plans of care rather than intervention in dental contracts and payment systems
- Embed risk assessment and risk-driven care pathways into clinical care into clinical care; and
- Develop strategies to address oral health inequalities in areas of high socio-economic need.

In his last slide Andreas Schulte showed that Group 2 also made some specific recommendations for caries and periodontal diseases, which should inform today's discussions. They were to:

- Include prevention and the development of individually-tailored oral care plans in the reimbursement systems of countries
- Ensure remuneration systems focus on risk-based prevention and no longer solely upon remuneration by intervention
- Seek to provide a free dental check-up for key stages in life using 'touch points' such as for example at 2, 5, 12, 26, 40 and 70 years of age.

The final recommendation was due to the fact that in Europe there are about 40 countries with 40 different health systems and so it was really astonishing to see how many different ways there are to provide dental care and free dental care in different countries. It was to:

- Carry out counselling on dietary sources of vitamin D to pregnant women and parents of infants and children; and last
- Carry out counselling on dietary sources of anti-oxidant micronutrients such as vitamin C and vitamin D.

The first round of small group discussions then took place.

FOURTH PRESENTATION - PREVENTION AND CONTROL OF DENTAL CARIES AND PERIODONTAL DISEASES AT INDIVIDUAL AND POPULATION LEVEL: KENNETH EATON EFP/ORCA GROUP 3

Kenneth Eaton began his presentation by explaining that he was going to present the key points and recommendations from Group 3 of the EFP/ORCA workshop's consensus report and make some suggestions as to how it might influence the development of undergraduate education. He would also mention the very recent new classification of periodontal diseases (Caton et al. 2017) which has just been published and may well influence some of the recommendations on periodontal diseases that came from Group 3. This group's work reported was on the topic of prevention and control of dental caries and periodontal diseases. He stressed the 's' (in periodontal diseases) and explained that the term periodontal disease was very unclear as it covered a range of varieties of gingivitis and periodontitis. Group 3 did not use the term periodontal disease.

Group 3 was led by Søren Jepsen from Germany. It had 19 members and three were from Spain, including Elena Figuero. The group produced three systematic reviews in addition to the consensus report. The first one (Frencken et al. 2017) was titled Global epidemiology of dental caries and severe periodontitis. The second (Saltzer et al. 2017) was titled Socio-behavioural aspects of the prevention and control of caries and periodontal diseases at individual and population level. These topics are very relevant to dental public health when thinking about populations. The third paper (Figuero et al. 2017) was titled 'Mechanical and chemical plaque control in the management of gingivitis and caries' note gingivitis, not periodontitis, not periodontal diseases. So in summary, the sub-groups that produced the three systematic reviews looked at epidemiology, socio-behavioural aspects and plaque control.

He then presented the key findings of each of these sub-groups within Group 3. As far as epidemiology was concerned, the data on trends over time with periodontitis prevalence are sparse and riddled with methodological inconsistencies (Leroy et al. 2010). There's insufficient evidence to conclude that the prevalence of periodontitis has changed over recent decades. There is robust evidence that the prevalence of tooth loss and edentulism has declined over the last three decades (Kassebaum et al. 2014a) because of global population growth, ageing societies and increased tooth retention, the number of people affected by caries, and periodontitis, has actually increased and this is because our population is getting bigger and people are living longer and keeping their teeth. This is all public health of course. The increase has been estimated, we don't know exact figures, so there may be quite a large error in these percentages, but between 1990 and 2013, the number of people affected by untreated cavities into dentine, in permanent teeth, increased by 37% and severe periodontitis by 67% and a lot of this is due to those factors mentioned previously. The population of the world rose about 1.5 billion between 1990 and 2003. Today it is seven and a half billion plus and people are retaining their teeth longer, so the increase in the number of people with untreated cavities and severe periodontitis is probably in part due to this growth in population. Listl et al. (2015) estimated that world-wide the annual cost of oral health care was \$US 442 billion.

So it's a major cost, there's no doubt about that and that's what interests our politicians and it's what interests our patients, so never underestimate money. As far as socio-behavioural influences were concerned the consensus was that there is robust systematic review evidence of an association between low socio-economic status (level of education, parental education, income, social position) and having a higher risk of both dental caries and also periodontitis (Schwendicke et al. 2015) and it's particularly strong in developed countries.

Why do you think that is? It could be that in a poorer country, take somewhere like Mozambique for example, there are a few rich people and most are poor so therefore the socio-economic gradient is not quite so big at a population level. Whereas in a rich country, such as Norway, there are not too many poor (socio-economically deprived) people and many well-off so the poor people are more obvious.

Similarly there's good evidence of an association between low socio-economic status and high prevalence of periodontitis (Klinge and Norlund 2005). There is also robust evidence that the prevalence of periodontitis is lower in females compared to males (Shiau and Reynolds 2010), but little evidence of a difference in the prevalence of dental caries between males and females. I'm not sure about the quality of this evidence and this is one thing which I've noted while I was listening to the presentations (during the EFP/ORAC workshop).

It was that for some factors there was really good evidence from randomised controlled trials and big population studies, whereas for others there was not always a high level of evidence and I wonder about some of these statements.

A cry came from the audience: "More research needed."

Further points to emerge from the Socio-behavioural sub-group were that there's a major peak in the incidence of cavitated dentine lesions in young children. Also in adolescence and young adults, but at the age of about 40 years it declines and then it goes up again as people get older (Kassebaum et al. 2015). Most important behavioural factors affecting dental caries and periodontal diseases are: routinely performed oral hygiene with fluoride toothpaste, either by individuals or by their caregivers

The third sub-group considered population-based interventions that address behavioural factors to control dental caries and periodontitis through legislation, such as anti-smoking legislation, reducing sugar content in food and drinks. There has been some legislation, to reduce sugar intake, in Ireland, in the United Kingdom and in Mexico Has this happened in any other countries represented here, have you had laws passed to reduce sugar content in food and drink?

Reply from the audience: In schools, we've done it in schools.

The next factor was smoking and helping to bring the need for smoking cessation forward to patients and policy-makers so anti-smoking. Along with reducing the sugar content of food, taxes on sugar and tobacco and guidelines and campaigns, but their efficacy has not yet been evaluated. This is an important point.

Call from the audience: "and maybe include alcohol too."

Psychological approaches aimed at changing behaviour may improve the effectiveness of oral hygiene education, now that's a big area and more research is needed. Management of both dental caries and gingivitis, note gingivitis not periodontal disease or periodontitis, relies heavily on efficient, self-performed oral hygiene (tooth brushing with fluoride containing toothpaste and inter-dental cleaning). Tooth professional cleaning, oral hygiene instructions, motivation, dietary advice and fluoride application are effective in managing dental caries and gingivitis.

So the clinical recommendations from group 3's reviews are for both dental caries and periodontal diseases and are that both are preventable, dental practitioners are encouraged to educate and motivate patients to reduce intake of free sugars and to practice proper dental plaque control and not its total elimination. The effect of an individual's oral hygiene practice should be encouraged, taught and supported. Oral hygiene instructions should be enriched by motivational approaches, really engaging with the patient and motivating them, not just taking the military approach of 'Here's a toothbrush son, put this in your mouth, go like this, do you want cleaner teeth tomorrow?' At an extreme end of the scale, you may have come across colleagues who might have that approach in the past, so we want to be motivational and not use a dictatorial approach. Smoking cessation advice should be part of the management of gingivitis and periodontitis. There have been some studies in the UK looking at how many general practitioners are giving this advice and the results are not encouraging. I don't know how it is in other countries.

Clinical professionals should recommend toothpaste containing fluoride agents for the control of dental caries. Professional fluoride application should be used in individuals with high caries risk. In the management of gingivitis, for the primary prevention of periodontitis, fluoride can be supplemented by conjunctive, chemical plaque control agents such as Chlorhexidine for example. A regular, individualised risk-based prevention programme should be designed for each patient, geared to the individual rather than having a standard approach for everyone. Professional tooth cleaning needs to be incorporated in a thorough, structured prophylaxis programme, including oral hygiene instruction, motivation, dietary advice and fluoride application, in order to be effective in managing dental gingivitis and dental caries. Oral care providers should be informed on nutrition and be able to provide dietary modification and counselling advice.

Now the public health recommendations from Group3:

1. Tackling inequalities in oral health to prevent and control dental caries and periodontal diseases requires strategies tailored to the determinants and need of each group according to socio-economic status. How much do they understand? Some patients are able to understand better than others and there is a need to use simple language, which they can understand.

2. To encourage future oral health research, practice and policy towards the social determinants model, a closer collaboration and integration of dental and general health research is needed using the common risk factors approach.

I'm sure we'd all sign up to that but it's unfortunate that the word dental was used, rather than oral.

3. For health policy makers, prevalence data have to be translated into disease-burden and plan and allocate resources accordingly for the dental workforce.

So how is this going to influence the outcomes of undergraduate dental education? Well, Jenny Gallagher has gone through this in some detail and I'm really not going to dwell on this too much but we have those key concepts there.

So questions for the five working groups. You've already seen them and they were put up on a slide, so what about the classification of periodontal diseases? Well I think it's relevant to today's workshop because of the new concepts of periodontitis and its clinical assessment. Those of you who come to the periodontal epidemiology special interest group tomorrow will hear a presentation on the new classification and Elena Figuero will also be going into it in some detail during her presentation on Saturday morning. Essentially, the new concept really is that once there has been attachment loss due to disease, not due to mechanical things like adverse brushing, it is generally irreversible and the individual's periodontium is then either stable or unstable. If it is unstable, there are various stages within that degree of instability. So this is a new concept which probably, if the EFP/ORCA workshop had known about it, would have modified some of its statements. Hence its relevance.

Audience Member: "Can you repeat that again?"

Yes, the new concept is that once you have lost attachment, when it's been lost because of disease and not mechanical reasons, such as incorrect use of a toothbrush, the individual concerned should be considered as a periodontitis patient and then be classified into a sub-group. One of the sub-groups could be a now stable periodontium. Another could be that there is still bleeding on probing indicating that there may still be active disease going on. Active disease is then classified into one of three stages which also take the individual's age into account. For example, if you're 70 years old and you've got a 9mm pocket distal to a second molar but nothing above a 4mm anywhere else, then that is relative stability. Whereas in the previous system, because there was a 9mm pocket you might have been considered differently. Does that make sense to you?

Audience Member: "Yes, it does."

Is everybody happy with that concept?

Kenneth Eaton thanked the audience for their attention and introduced the next speaker.

FIFTH PRESENTATION - AGE-RELATED EFFECTS ON ORAL HEALTH, DENTAL CARIES AND PERIODONTAL DISEASES: JACQUES VANOBBERGEN EFP/ORCA GROUP 4

So, thank you very much for having the opportunity to be here in Majorca, in the more or less sunny weather that we've had in the last days, it's excellent. I'm happy to present to you the results of the EFP/ORCA workshop reported by the Group 4 (Tonetti, 2017).

Group 4 was about the management of periodontal diseases and caries in older age groups, let's say age-related dental caries and periodontal diseases. How can we manage this? First of all let's have a look at the focus of Group 4. There were two important aspects, the first one was the burden of disease from both caries and periodontal diseases over a lifetime and the second was to assess the evidence for age and effective strategies to prevent and treat for the management of caries and periodontal diseases. We started with the concept that the demographic changes drives us, drives the need to learn more about the burden of oral diseases. In particular, the focus was on caries and periodontal diseases in these older population groups and also that maybe that more research is needed to provide the foundation, the evidence for better prevention and management of these two diseases.

So let's consider the first focus that's about the burden of caries and periodontal diseases over a lifetime and we were looking for evidence available in 2016. I have also been lucky to have the support of our younger scientists in our department in Ghent to help me produce today's presentation and to complement my previous work with some

more recent data which has been published since November 2016. What do we know about the burden of caries and periodontal diseases over a lifetime? We know when that one of the conclusions from the EFP/ORCA workshop was that the damage caused due to both the periodontal diseases and caries is largely irreversible, the damage is irreversible and therefore it has to be considered as something that is cumulative over a lifetime.

There are also discussions about immune function in elderly population groups and there is some evidence that it alters with increasing age and this was an important question but there was really no answer to the question is there evidence for immune senescence? Immune function maybe more important for periodontal infections than for caries. So with age certainly the exposure to risk factors for both diseases changes and this resulted in a statement that in fact the disease experience is certainly increasing with age but it's not necessarily due to age, age is not a cause for that. Because there are a lot of risk factors that are in fact, typical, for older age groups but not because they are old. For example, the change in the composition of saliva, this immune senescence, is what we're all talking about, the importance of a lot of restorative care and with that of course, dental plaque retention, gingival recession with denuded tooth surfaces are important risk factors, along with oral hygiene and cariogenic diet, because it's reported more frequently in elderly populations than in younger groups. Disabilities, particularly intellectual and physical disabilities, decreased self-care is an important one and also an important one is the lack of professional care. We can see that in different European countries for this special groups, in particular institutionalised elderly people, it's amazing that there is a lack of professional dental care. It's also obvious that when looking at the burden of the caries prevalence over a lifetime for example, most of the time it stops at 65+ years and sometimes as at 75+ years but we do not have any differentiation between older age groups.

We see that most of the time the DMFT is used as an index when you're convinced that it's not particularly helpful, in particular for older population groups, where you see that it's around very close to a DMFT of 20 and a DMFS of 70, it's reported for the 74+ year-olds. We did some research in our own country (Belgium), analysing data from the United States and from Europe. They were all the same, around a DMFT of 20. We did some research in this population group of 74+ years and older and the differences between the over 75 to 84, 85 to 94 and 95+ and of course we found that the older you are, the higher your DMFT is, that is more or less logical, it's very difficult to decrease your DMFT. It is very close to the 32 which is the maximum and the problem is that when you are talking about is it represents the burden of caries over a lifetime, we do not know, because most of the time it's maybe an indication of edentulousness but not of caries because we do not know the reason extractions. So that's why it's an important aspect if we are looking of the burden of the disease related to caries.

The burden of periodontitis over a lifetime, it's also a difficult one. Here we are looking to the burden of severe periodontitis but the first problem is that it depends on the definition of severe periodontitis and you see that there is a difference between the definition from the Centre of Disease Control and the American Academy of Periodontology and the European Federation of Periodontology. Depending on the definition from these two groups... the overall prevalence of severe periodontitis is about 10-12%. However, what is the prevalence in the older age groups? You see that it's reported here in this Table (pointed to a slide) that with increasing age, the prevalence of severe periodontitis increases but it stabilises a little bit in the age group of 50-64 years. Maybe it's due to the, what we call 'the survivor effect' maybe that's the certain age when the most healthy teeth and the most healthy people survive, so it's a kind of stabilisation at that moment, but it's increasing. A very interesting figure is that next one. I think this is a very interesting one because I think it's worthless. Looking at this figure you see very strange things, huge differences for example between Belgium and the Netherlands. I am very familiar with these both countries and I cannot imagine that this difference is so huge, even between Belgium and France, so I think there is a problem with the validation of this (laughter). So, it's very colourful and it's very nice but it's worthless. I think it's really not useful (laughter). So, in this way, I mention only a lot of problems looking at the burden of the disease, not only in older age groups but also within the population and there is a need for a better standardisation of this. We looked at in all departments, our own researchers looked at the different section of the discussion section of the different papers and there were a lot of problems due to selection bias and information bias, in particular when we are talking about ageing population groups.

We do not have the time to go into detail but there are low risk countries, there is exclusion sometimes of subjects, for example, exclusion of patients with dementia, exclusion of institutionalised people, there are a lot of drop-outs. I already mentioned 'the survivor effect', a lot of information bias also because of examiner liability, it's very difficult to have a very good intra and inter examiner consistency, a problem of validity, we were talking about standardisation and comparability of the different studies, and sometimes also difficulties in doing the examinations because we are working sometimes in very difficult circumstances to do the examinations. However, we do not want to go in detail for this but it's important to notice that we have to be careful with these figures. Maybe more important are the conclusions of the workshop about the evidence for age-adequate effective studies and the management of both caries and periodontal diseases and let's start with the periodontal diseases. First of all, it has to be emphasised that the patient-performed control of the biofilm is one of the most important aspects and looking at these three, patient-performed control, professional, mechanical plaque removal and supportive periodontal treatment, these are very important aspects but not always easy to achieve in these older population groups. Nevertheless, there is a lot of evidence that when we are able to achieve these three items, then everything will be okay. We have a beautiful systematic review (Lee et al. 2015) stating patients adhere to both effective self-performing plaque removal and if it

is impossible, at least assisted when he is dependent and recall attendance during the supportive periodontal therapy are key elements for success and it is supported by this meta-analysis also. So the teeth in the regular compliance group had a significant less risk of being lost during the supportive periodontal treatment than they did in the erratic compliance group; it's important to emphasise this. We do not have so much, most of the studies are done with people with a mean age of 50 or 60 years but not really old, the older population and the older population groups. The conclusion of the systematic review of Needleman (2015) is also a very interesting one. Their conclusions were that there is little value in providing this professional, mechanical plaque removal without oral hygiene instructions to reduce gingivitis, so you have to combine this, not doing just the act but also giving oral hygiene instructions, that repeated and individually tailored oral hygiene instructions is the key element in achieving gingival health, with a high level of evidence and a high level of recommendation. So the professional, mechanical plaque removal, both supra and sub-gingivally, as deep as is necessary to remove all soft and hard deposits as required, to allow good self-performed oral hygiene so we have to take into account that just giving oral hygiene instructions is not enough, you have to combine again things. Furthermore, professional, mechanical plaque removal as the sole treatment modality is inappropriate in patients with periodontitis. These were interesting conclusions from the paper Needleman (2015), with different age groups. Do we have some evidence for the chemical control of the dental biofilm in particularly in the older people? There is a beautiful systematic review - Supranoto (2015), altogether the data showed that when daily oral hygiene cannot be performed, if it is not possible to perform mechanical plaque control, supported by this meta-analysis, Chlorhexidine mouthwash is the product of choice. Of course I think that you have to emphasise that besides the earlier mentioned items it's also important to look at, to have control for other risk factors such as smoking and diabetes where possible.

That's about periodontal diseases and their management. What about caries? Looking at both diseases, I think for caries it is a very important aspect to look at both in particular in these older population groups, the primary preventions for the caries onset prevention and also the secondary prevention, the arrest of already existing caries lesions. We all know that we have a lot of evidence, we have a very rich history of randomised controlled trials and Cochrane reviews involving adolescence and younger children but do we have the same evidence for older population groups. Do we have the same evidence for, for example, root caries? Takahashi and Nyvad (2016), reviewed the pathogenesis of root caries and enamel caries, coronal caries and concluded that there is a common etiology for both coronal and root caries so you should in fact treat them in the same way, there is only very important difference. It is that the critical pH is very important, so that means that even if the etiology is the same, root surfaces are more vulnerable to demineralisation and because they are more vulnerable to demineralisation, we need more efficacious preventive and therapeutic treatments in these cases of indicators of root caries. So do we have some evidence for primary prevention?

Primary prevention with oral hygiene instructions with daily brushing with fluoride toothpaste, 1,400- 1,450ppm. There is, as stated as a conclusion, that there is robust evidence suggesting that fluoride-based therapies are efficacious, the evidence that we have from younger patient cohorts in relation to coronal caries, can be mirrored by the evidence examining fluoride use in root caries in older adults. So there is a, really a lot of evidence for that. I do not want to go through all the meta-analysis and systematic reviews that we have for these older population groups, I hope that you believe me.

Let's now consider secondary caries because I think that there has been a change in the way of managing this problem, almost all over Europe. The only thing that dentists do is to try to remove the caries and place some very difficult fillings when there is already an existing root caries. I think that the future could be a non-operative approach to do this by boosting fluoride concentrations for improved control of root caries. So we looked for this evidence not only during the workshop but also with more recent research that has been reported in 2016 and 2017.

Let's now consider fluoride varnish with 5% sodium fluoride. (Ekstrand 2008), compared the use of 5% sodium fluoride varnish after brushing with 1,450ppm fluoride toothpaste. The fluoride varnish was applied by a dental hygienist after brushing with toothpaste and compared to the over-the-counter sodium fluoride toothpaste used daily by the patients. The remineralisation in the group with the 5% sodium fluoride was much higher than the remineralisation than was achieved with daily use of 1,450 ppm fluoride toothpaste. Another idea is to use, a fluoride toothpaste, a sodium fluoride toothpaste with a high concentration of fluoride, for example the 5,000ppm on a daily basis. Again (Ekstrand 2008) compared the 5,000ppm fluoride toothpaste used twice a day with to fluoride toothpaste of 1,450ppm also used twice a day. Again we see that there is a significant increase in the remineralisation effect of the 5,000ppm used daily, 54% compared to the 40% with the 1,450ppm toothpaste. Again, here we see the results of a more recent paper (Ekstrand, 2013), of elderly, disabled nursing home residents who had their teeth brushed by the nursing staff twice a day with the 5,000ppm compared to the 1,450ppm and the results are the same, the remineralisation, the number of surfaces that were remineralised was higher in the intervention group compared to the control group (Ekstrand et al. 2013).

A meta-analysis of (Wierichs, 2015) reported the same results, risk ratio for not reversing comparing the 5,000ppm to the 1,450ppm. With a lower risk for non- remineralisation, for not reversing of risk ratio of 0.49, 50% lower. So this, I think that we have enough evidence to advise people who are at risk for root caries, in particular for people who are at a high risk and having a lot of problems with brushing instructions, and the oral hygienist instructions, that the use of 5,000ppm can be advised in these cases. What about the silver diamine fluoride, it's already for a

long time that we had this 4433 preventative 28% silver diamine? (Wierichs, 2015) compared three monthly application of Chlorhexidine varnish with three monthly use of sodium fluoride varnish and annually applied 28% diamine fluoride. There was a difference and silver diamine fluoride was more effective with a lower risk of developing new root caries with a relative risk of 0.19 compared to 0.27 and 0.26. However, the conclusion was because there was no statistical difference between these three products that in fact no intervention was significantly superior to each other. In addition, one of the major disadvantages of the silver diamine fluoride is that it leaves black staining. Recently, new research involving a combination of the silver diamine fluoride with potassium iodides in a two-stage technique with silver diamine fluoride which has an anti-bacterial activity and arrests the progression of caries and then the application of potassium iodides, which is also bacteriostatic, reduces the risks of black staining (Hendre 2017).

So what are the conclusions related to caries?

The first conclusion is that root caries lesions' development can be controlled at the population level by brushing the teeth twice a day with a conventional fluoride toothpaste. Active root caries lesions can be converted into inactive lesions by twice daily brushing with a conventional fluoride toothpaste but combined with a professional application of 5% sodium fluoride or 2% sodium fluoride solutions three times a year. Alternatively, these lesions might be arrested by brushing twice a day with 5,000ppm fluoride.

Fluoride interventions should be combined with meticulous dental hygiene and sugar control to achieve a caries controlling effect.

The daily use of a fluoridated mouth rinse may help in controlling root caries lesions development in the elderly, medically compromised patient.

At least for caries, Chlorhexidine has no additional effect in combination with regular use of fluoride, in caries control

So I think that it's important for us in dental public health to change priorities on how preventative and therapeutic regimens may preserve oral health, quality of life and nutrition into older age as co-morbidities present a unique challenge to the delivery of intrinsically efficacious and effective strategies. That's also one of the conclusions of the paper produced after the workshop.

Because you know it's a very important challenge that we have with these older population groups and if we want to deal with these challenges, we should ask you to discuss again these questions:

- How can the findings and recommendations of Group 4 be transferred into the areas of competence suggested by Gallagher and Field (2017)?
- How can any recommendations from today's workshops be taken forward at a dental school, national and European level ?

I think there are significant barriers to implement this? Because they have very important public health relevance and the burden of caries and periodontal diseases is high and it's increasing as the population ages. They have to be convinced of this, so it's an important challenge. It is also important to have a good surveillance and that's also a problem. I have explained the different problems that we have with the data, but I think it's important to have this permanent surveillance. The prevention and management of both diseases should be extended to over lifetime. I remember that in the beginning we were talking about prevention for elderly population groups and to say that's stupid, why should we carry out prevention in elderly population groups? Well I think that more and more people in our population are convinced that this is very important. The integration of oral health care in daily health care for frail, elderly, institutionalised people is very important. Oral health status in older individuals is influenced by their level of dependence, rather than by their chronologic age. The oral health care team can advise on weight loss, smoking cessation, exercise and controlling diabetes and glycaemia in general. Looking at this public health relevance, I think also that it's very important to emphasise again this patient-centred care and this multi-disciplinary approach that we already discussed today before the break. One of my exciting experiences during the EFP/ORCA workshop was working together with the ORCA members. I was a representative of EADPH, not ORCA, nor the EFP. When we were talking about patient-centred care, all periodontologists, asked me 'What is patient-centred care? We never heard of patient-centred care, you see a pocket, you have to treat the pocket, that's it' 'That's nothing to do with patient-centred care'. We were happy to have the people of ORCA also, they knew what patient-centred care was but the periodontologists were not aware of a patient-centred approach, that was very amazing. What can we learn? What is the relevance for education? It's open for discussion though I do not want to go in detail, but I think that we have to consider the changing the changing epidemiology and demography as well as the changing needs of the older adults, when developing and delivering both the knowledge and competence-based curricula at undergraduate and postgraduate level, and also and we discussed before the break as a continuing education for all oral health professionals. Continuing education is very important because the science is evaluating, so we have to follow, to strengthen the knowledge and increase awareness of medical co-morbidities and medication relevant to the oral care of older adults. It is very important to emphasise the fact that it's not only for the dental professionals, both the dentist and the dental hygienists but also for general nurses and the nurse aides, it's very important that they have a good education in oral health. We also need to educate General Medical Practitioners and Geriatricians and emphasise the importance of inter-disciplinary programmes for all these groups.

We should focus on Domain IV of the ADEE recommendations (Gallagher and Field 2017). It has important implications for dental public health, for health promotion and disease prevention, for population demography, for healthcare systems, for planning health and oral health, every one of these categories has to be emphasised and the impact of ageing population groups is important to emphasise in the different categories within Domain IV but also in all the domains.

I want to thank you for your attention, also thank our young researchers for their valuable input because we work together and it's so important to work as a team.

The delegates then went into small groups to discuss presentations 4 and 5 and make recommendations.

Summary and Overview – Paula Vassallo

During the lunch break, Paula Vassallo and Huda Yusof summarised the findings and recommendations from the small group into a PowerPoint presentation which was given by Paula Vassallo.

Kenneth Eaton welcomed delegates back from lunch, thanked Paula Vassallo and Huda Yusof for their work and introduced Paula Vassallo, who thanked the delegates for their contributions, all the speakers during the day's workshop and Colgate for sponsoring the workshop.

One of the aims of today's workshop was to inform the participants of the key points from the EFP/ORCA position papers on dental caries and periodontal diseases together with the ADEE guidelines. More importantly, other aims were to explore how do we can apply them to dental public health and how they can be incorporated within the dental curriculum and finally to provide recommendations on how can we be successful in achieving this?

So why are these aims important? We've heard today that the number of people affected by dental caries and periodontitis has grown substantially, we know that the estimated number of people, affected by untreated caries into dentine and permanent teeth has increased between 1990 and 2010 by 37% and for severe periodontitis by 67%. The global cost of oral disease in 2010 has been estimated at \$442 billion and we know that the mouth is an integral part of the body, there's a plethora of evidence, different age groups, different social strata. Despite the evidence, the mouth is still not within the body. So I think the role of today's workshop is to consider the other aims in the context of how can we put the mouth back in the body? How can we put oral health on a par with general health and how can we integrate the curricula for all healthcare workers to achieve this, looking at the bigger picture of all NCDs and not only the oral diseases. So why is this important also? We know that periodontal diseases and caries are preventable diseases and their impact on quality of life. We talk about it, you hear a lot of public health practitioners who talk about the importance of a healthy diet. We hear about the benefits of the Mediterranean diet and the Nordic diet, but without good dentition we cannot have healthy nutrition, so the importance of a healthy mouth is so that we can have a healthy body.

Looking at the recommendations from the different speakers during the morning session, what were the recommendations from a public health perspective? Primarily, the importance of tackling inequalities, if we look at what are the determinants of health, the determinants of oral health we know that we need to talk about the inequalities that exist. We need also to encourage future oral health research, practice and policy towards a social determinants model and closer collaboration and integration of dental and general health research and addressing the common risk approach. For policy-makers, prevalence data have to be translated into disease burden data to plan and allocate resources for the dental workforce. We've heard about the economic impact and we know sometimes we have to talk the language of politicians and that, as they say, money talks, unfortunately mine keeps saying 'Goodbye' but we have to look at the economic perspective.

More recommendations were that:

- Public policy should encourage all nursing mothers to have their babies entered into regular dental care pathways.
- All care homes must develop mechanisms and processes for maintaining the oral health status of the residents.
- To establish and develop remuneration approaches that encourage prevention.

I know that this is something for which the Alliance for a Cavity-Free Future is already looking into ways of developing remuneration packages, because if we need to bring dentists on board in focusing also on prevention, the remuneration needs to be there to allow this to happen.

- We need to embed risk assessment and risk delivering care pathways into clinical care.
- We need to develop the strategies to address these oral health inequalities that exist.

We know the importance of surveillance. If we are going to target policy-makers, if we are going to target politicians, we need to have the data.

- We need to monitor the data and trends.
- We need to have the evidence because otherwise if we cannot go to policy makers and funders with the data, we cannot go with the evidence, we're not going to get an impact and we're not going to get the policy-makers on board.
- We need to look always at the life-course approach, prevention across the life-course throughout the life time of an individual.
- The importance of the integration of oral health into general health, in institutionalised people, in homes, in elderly and also the potential of dental practitioners in addressing NCDS.
- Addressing the risk factors in terms of caries and obesity, in terms of tobacco, in terms of exercise, diabetes, there is a big role for dental professionals to play in helping and improving general health as well.
- If we look also at the relevance for education, we have to consider also the changing epidemiology and demography, as well as the changing needs of older adults and delivering both knowledge-and-competence-based curricula at both undergraduate and postgraduate level.
- We need to strengthen knowledge and increase awareness of the medical co-morbidities and medications, relevant to oral healthcare, particularly in older adults.

Now we've heard also from Jenny about the graduating European dentists and the domains and the key concepts of evidence-based intervention, the role of health advocacy, health strategy, inequality and the oral health trends. And the areas of competence are dental public health, health promotion and disease prevention, demography, health and disease, healthcare systems, and planning for all health and oral health. Looking at the outcomes from the 2017 ADEE recommendations, they focus on professionalism, safe and effective clinical practice, patient-centred care; the patient has to be the centre of our care. We must decide how we can aim to integrate the education into all domains in terms of curriculum for dental professionals, the curriculum of nurses and nursing aides, the curriculum of GMPs, geriatricians, the inter-disciplinary programmes, which integrate all domains including dental public health within their domains.

The feedback from Philip Marsh's presentation is the influence, in terms of influence on dental education, the knowledge on the human microbiome. Looking at the current methods of characterising the microbiome, the beneficial functions, the host microbiome relationship and also looking at new avenues of control and prevention will seek to promote a symbiotic relationship between the host and the microbiome. Also the importance of knowledge of risk factors of dysbiosis, and keeping in mind that when we talk about health, and when we talk about oral health, it's not simply the absence of disease, it goes far beyond the absence of disease. We must look at the broader definition of health in terms of the social, physical, mental wellbeing.

Looking at the feedback from Session 1 on curriculum, school and community from the first small working group. What emerged is that there is no legislation to incorporate dental public health in Spain, Germany and Belgium into the curriculum for dental students and that this could be facilitated by amending the relevant EU training directive. The curriculum varies between countries but also within countries between universities. In the UK the regulation of dental education and the content of the dental curriculum is the responsibility of the General Dental Council. It is one of the few countries that does have direct involvement of either the Government or the Dental Association. Dental public health is not a core subject for many undergraduate curricula and only some prevention is incorporated into dental undergraduate curriculum. There's a lot of focus on the clinical subjects because this is what is seen as the breadwinner for the professional when they go out into practice and dental public health does not really attract funding. This is why the focus should be to develop remuneration systems which are going to focus on prevention and a dental public health approach. There is also the need to engage with dental associations, we need to get the professionals on board. If we're going to be successful, we need to get the dental professionals to be part of it, to feel ownership and they can also follow the concept of trainers passing on the message of the importance of having dental public health included within any treatment, any module, any curricula.

Looking at the points raised by the first small working group on session 2 which was on periodontitis and ageing and the practical problems for the caregivers. What are the problems you know, we try to get caregivers to be involved but what is the time-factor? What education do they have? What are the financial constraints? What are the incentives? What about the conflicting information that they receive from different professionals? Can they be experts in all the fields? Sometimes oral hygiene and oral health are not important both for the patient and their families so if it's not important then the nurse or the caregiver is not seeing it as important in itself. It's important that we give the caregivers the necessary training, the correct training, we give them one consistent message and also that we empower them

to actually include oral health in their training . Dental staff should provide this training on supervised tooth-brushing within the care homes. Ideally if there were European guidelines, this would facilitate the process. Looking at it from a broader view, the importance of changing the remuneration system. If we changed the remuneration system, a lot of the problems that we are seeing, also the challenges, could be overcome. Also, the dental curriculum should also include visits to care homes. We know that many countries within Europe have a growing elderly population so it is important that this is included. To give you an example from Malta from where I come, we actually have a student faculty within an old peoples' home. We've collaborated with the government public service and have teaching sessions within the old people's home and this gives students hands-on experience in dealing with elderly people and all the co-morbidities that they have. Is there anything that Group 1 would like to add to my summary?

Now I will give the feedback and recommendations from small working group 2. Firstly on the relevance to dental public health of microbial and lifestyle aspects and what the summaries were. Small group 2 highlighted the importance of nutrition counselling, the importance of lifelong learning, the importance of behavioural change and a team approach and skill mix. Patient-centred multi-disciplinary approach and here you can see we have the symbol of a flower with the patient at its centre (pointed to the image on a slide); the patient has to be at the centre of all our efforts. If the patient is not at the centre, we're not going to be successful in achieving all that we have been talking about. In primary care practice, it's important that we do share resources and counselling. Again, remuneration systems come up, so you can see the importance of having the remuneration system, which does support prevention and a public health approach.

Looking at education, the importance of shared programmes, of having programmes from people from different healthcare professions actually learning together, because this will allow for the more multi-sectorial approach if it is brought on within the education curricula itself. We talk about it but to be successful we always mention a multi-sectorial approach to health and oral health in all government policies but if we don't introduce this within the training programme ourselves, it's going to be more difficult to achieve. Again there is the importance of behavioural dietary aspects.

When looking at the second session the second small working group divided their thoughts and recommendations into what were the problems and how can we address them, what is needed in terms of education and what is needed at the community level. So, despite all the evidence we have on caries and periodontal diseases management, how do we actually implement them into dental education and in practice? We know what the problem is but how can we act upon it? How can we actually implement it? So looking at education, the education of dental professionals in different domains, elaborated by ADEE, incorporate oral health training for first-line care workers, it's got to be a symbiotic relationship. It's not only dentists who should have training in other NCDs and the role they play, but it's important that other healthcare workers have a role to play in the prevention of oral diseases. The importance of educating oral health care workers not only in the skills, in the training programme they have undertaken, but they need to also have marketing skills. Professionals, healthcare professionals are the future advocates of health and they need to learn how to market it, market it to their patients, market it to other stakeholders, market it to politicians. Looking at education, training in health outcomes and not just treatment, we don't just tell them, it's not about drilling and filling, it's learning how do we improve the wellbeing of our patients? Looking from a community perspective, putting the emphasis on professionalism. We heard from Jenny Gallagher of stressing the importance of professionalism in the dental curriculum but emphasising it in an ethical business model. Standards for oral care based on a healthy dentition in dental practice, nursing homes, residential homes, care homes and also the importance of shared responsibility between the healthcare professionals and patients.

Nowadays, we hear a lot about the importance of self-care but we have to be there as professionals to be able to support the patient. Also, the importance in the community of political lobbying. I liked a recent phrase from Susannah Jakob, that if you want to be successful health is a political decision. So I think that means we must summarise what health is, so we can use marketing skills and understand the importance of being able to lobby. So, that's the summary and the feedback from small working group 2. Would its members like to add anything?

Jackie Vanobbergen: Thank you for using the analogy of the flower but of course the patient is at the centre and that's important but but it's also important that you have to look at the petals as well.

This means that all the care professionals around this centre have to respect each other and to collaborate and believe that they are equals. We used to have a hierarchical structure with the doctor or the dentist at the top as the boss of everything but we also have to learn to respect the professionalism and the skills and the expertise of other professionals that work together. I think that's very important.

Paula Vassallo: Yes very much so, thank you Jackie. Now looking at the feedback and recommendations from the third small working group. From an individual and population level, the importance of microbiology and symbiosis balance. For prevention both at individual and population level, in terms of preventive and community from a one-to-one, but also the impact at a community level how can we do this? I think that is a rather big question which we're trying to address today. There is also the importance of translating health messages and conveying the risks to our patients according to their needs. We have to keep this in mind, when we talk about need, it is not what as a professional we feel is needed. We have to listen to the patient to understand what are the patient's needs? How do we

translate this into the education and training of undergraduates? Again, health is not the absence of disease, we have to look at health in the bigger picture and also in the language that we use, how do we translate these messages to the policy-makers? The issue of remuneration comes up again and also engaging with ADEE to influence the curriculum. From a public dental health perspective, the integration of oral health into general health. Again not teaching topics in silos, the mouth has to go back into the body. From a public health perspective, control not biofilm elimination.

Looking small working group three's feedback and recommendations on the second session. It's important to think of the periodontium as a dynamic field and looking at it from a holistic perspective and also when we think of the terminology of both periodontal diseases and caries, as active versus inactive for caries and stable versus unstable for periodontal diseases. The impact of legislation, it works well with tobacco, but it's much more challenging for sugar. Looking at the prevention and management over the life-course, and we know that prevention is easy, cheap and definitely simpler. The language, simple language to communicate the concepts to our patients, population and policy-makers and the importance, we have to use the same language, we have to explain using simple terms. If we go and talk to a policy-maker about *Streptococcus mutans*, he's going to look at us and say 'Yes, okay, move on' you know? Normally, our opportunity as dental professionals is five minutes in a lift. So we have to be prepared within those five minutes in a lift, how are we going to convey our message to policy-makers? Simple, to the point and that is music to his ears, with our outcomes, or her ears. As for the outcomes from the second session, small working group three looked at education about the merits of high-risk strategies versus population strategies. How do we change the behaviours of policy-makers, educators and patients? The importance of CPD, and also dissemination of the results. One area sometimes that we often fail in is that we have the information, we have the knowledge, we have results, but they stick on a bookshelf and are not disseminated. Knowledge has to be disseminated, translated into different languages and maybe disseminated to satellite meetings into other countries. We need to get everybody on board so that we are all giving the same message, we all have the same knowledge, it gives us more power.

Is there anything else that members of small working group 3 would like to add

Audience Member: Can we go back one slide?

The fifth or sixth bullet point, on prevention and management over the life-course and what you can't see on the screen is there's a big box round that, because it's the most important of all the statements and it actually said 'Prevention and management of caries and periodontal diseases over the life-course' because the group felt that all of the different strands, whether we're reporting to public health, reporting to education, it's that it is prevention and management, not just management. It's caries and periodontal diseases and it's not just for young children or the frail elderly, it's for the whole life-course and we felt that the words of one of the speakers, probably provided the best overview statement of what it is we're trying to communicate. If we can't do prevention as well as management of caries as well as periodontal diseases across the life-course, we've got a problem. So that came out of the group. I just wanted to embellish the excellent bullet points you've got there.

Paula Vassallo: so we need to ensure that there is a communication module within the dental public health part of the dental curriculum.

Audience Member: Yes.

Paula Vassallo: . Now the feedback from small working group four on dental public health within the curriculum. Nutritional knowledge was again highlighted and also the genetic basis for caries and periodontal diseases, together with risk factors. . Again, the integration of oral health into general health, the common risk factor approach and the importance of its promotion from a multi-disciplinary approach. This small working group also highlighted risk factors and micronutrients research and the dissemination of the evidence-based information. Evidence-based information is particularly important when promoting dental public health, in order to answer the question: what is the evidence? If you don't provide evidence, you're never going to convince any policy-maker. Another point raised was introducing the oral and intestinal microbiome in the university curriculum.

The small working group's comments on the second session on caries and periodontal diseases and again included that they had the multi-disciplinary implications for health professionals and enhancing community approaches to dental education. In particular, the new concepts on the microbiome and dietary habits, sugar reduction, the biofilm control, looking again at the evidence behind it. Also improving clinical records to ensure that risk factors were recorded.

No suggestions or comments were forthcoming from small working group four members when they were asked if they had anything to add.

Paula Vassallo then presented the comments and recommendations from the fifth and final small working group. This working group had considered dental public health within the curriculum and the EFP/ORCA position papers and the ADEE guidelines. It had discussed dental public health teaching in dental schools within EU countries, the differences between universities, the importance of incorporation of the dental public health within the curricula and looking at it from a wider social model. Health inequalities and the broader determinants of oral health and health were discussed. Along with the political awareness of the links between general and oral health. This group stressed general health before the oral health to highlight the bidirectional relationship between oral health and general health. They also stressed the need to reform remuneration systems, to get dentists on board to deliver a preventive approach.

With respect to food guidelines, we cannot just talk about sugar, we have to look at the bigger picture. To give an example, within one university the students to do a project on the sugar content of food, but salt and fat are also included because it's useless to recommend something which is low sugar but high in salt for somebody who has high blood pressure. The students are taught to understand the ingredients of different food products. When read the labels on processed food in a supermarket it is sad to see the reality of high sugar, salt and fat content. It is important that the students are aware because then they can give the correct advice and it also teaches them the skills of actually reading the food labels, because you tell your patient to do it but when you don't do it yourself you cannot understand the challenges, sometimes you see the font is so small you cannot read it. So as a student, learning this will make you a stronger advocate to actually say 'Listen, make my life easier, make the labels larger, provide front labeling', but when you're actually doing it yourself, it gives you a bit of ownership. Also tackling misinformation on the web. The minute as a dentist you tell your patient they have something, the first thing they do is 'Google' it. When you see the plethora of different information on 'Google', if you enter fluoride as a search term, so much misinformation is generated. So we have to see how can we address this?

Also health technology, how can we use Health Apps? and dissemination of research not only to the public but also to the professionals. The importance of continuing professional development and evidence-based training for the wider workforce, looking at doctors, nurses, midwives and these are all the petals in the flower.

Feedback from small working group five on session two, included that the care of the elderly and special needs patients also needs to be included in the curriculum, not only from a theoretical perspective but also from a practical perspective. With dentists out there in the field. The dental public health curriculum should include other health professionals, medical professionals, nursing professionals, the frontline workers. We also need to train the carers, the spouses of those with special needs and all professional carers. We have to look at lifestyle behavioural aspects and the importance of the patient-centred care. We have to look at the quality of life. Nowadays, when we think of health, we think also of quality of life, we look at the physical, the social and the functional components. We have to look also at teaching in terms of methodology and scientific methods and research on high fluoride products and the epidemiology of root caries. As the population ages they are keeping their teeth for longer, so we also need more information on root caries. Sometimes we have to think of any conflict of interest that there could possibly be. We need to assess the quality of journal manuscripts, guidelines. There are a lot of guidelines but how useful are they in the real world? How can we actually:

1. Know about them
2. Disseminate them, and
3. Put them to good use?

We teach in an ideal way but how does this work then with remuneration? Guidelines, the simple guidelines, sometimes some of the guidelines you have, have so many recommendations that when you actually come to put them into practice, they are not realistic. So I think the smart goals we also talk about should actually be included within a guideline document. They must be integrated into the payment systems. If we want them to be implemented then the recommendations of the guidelines should be linked to payment methods. Finally, we have to think of the dental skill mix, all dental professionals have an important role to play.

Was there any other feedback from small working group 5. None was forthcoming.

Paula Vassallo: A quick comment, misinformation on the web is a pressing issue. If you recommend a patient recommending the patient to visit a website to gain information, you must ensure that the website has good quality, evidenced-based information and perhaps an App that supports it. Just inviting a patient to Google a topic is dangerous as you have no idea what they will access or of their ability to assess it critically.

Summary by Paula Vassallo

We've identified a lot of problems today, as well as challenges, including the challenges for caregivers? We've talked about the problems with remuneration, the problems of the mouth being separate from the body. The problems of having dental public health within the dental undergraduate curriculum. So now we need to produce some points of actions which summarise all the feedback. We need to consider not only the integration of the key points from the EFP/ORCA workshop into curricula but all our recommendations, we have to put oral health into all relevant policies and I think there's a mistake in that it shouldn't only be health policies but into all policies because sometimes we have to think out of the box, if we want good health, we have to go out of health to get good health.

A common risk factor approach is important, oral diseases share common risk factors with all chronic diseases. We also need to understand the importance of a multi-sectorial approach, involving the whole of government and the whole of society, but it has to be done across the life-course. As Sir Michael Marmot has suggested in the book 'Working for Health Equity' the role of health professionals is to involve health in every area of human activity, so when we think about it we have to think very much of the bigger picture (Allen et al. 2013). We know that finance,

transport and protection of the environment are all sectors within a government and have a big impact on our health and our oral health. So every sector is a health sector. A key message that health is a political choice and every sector is a health sector.

There is also the importance of empowerment, we mentioned before the challenges faced by caregivers. The challenges for dental professionals to focus on prevention, we need to empower the professions, not only the dental and the medical, but all health and social services professionals, on the importance of prevention. We need to reach higher and wider go upstream to look at the root causes, again using the multi-sectorial approach and offering a framework for integrated and coherent interventions.

Looking at the WHO vision for the European region, in which all people are enabled and supported in achieving their full health potential and wellbeing and in which countries, individually and jointly, work towards reducing the inequalities in health within the region and beyond. Now my final slide to encourage you to come to the presentation on Friday morning by the President of the European Association of Public Health. She is helping to shape the future of European dentists, mainstreaming the dental workforce into preventing non-communicable disease using the life-course approach, building bridges with public health associations, seeking to integrate training for medical and dental care professionals. The common risk factors and joining forces in advocacy, sugar, alcohol and tobacco and if we do it altogether, we have more voice, more power and more likely to have a sustainable success. Thank you very much for your attention.

Discussion and Future Plans

A discussion on the points that had emerged during the day and the plans for a follow up workshop on the day before next year's EADPH meeting in Ghent then followed.

Kenneth Eaton thanked Paula Vassallo and Huda Yusuf for producing the summary of the points that emerged from the small working groups and Paula Vassallo for her presentation

Audience Member: "Excuse me, can we have the conclusions of all the five groups?"

Kenneth Eaton: Yes, all today's PowerPoints will go on the EADPH website (www.eadph.org). There is also an agreement to publish a supplement to the March 2019 edition of Community Dental Health, in which the whole proceedings will be reported, including the presentations and the conclusions.

Kenneth Eaton: The next topic to discuss is the continuation of today's workshop. I'm very conscious, that we're all enthusiastic but what can you do in your dental schools and countries, to actually try to get some of these things happening? Are you able to change curricula easily? Not usually? It's more difficult from country to country, but the intention is that in 11 months in the middle of September next year when we next meet in Ghent, that there will be a pre-congress session where everybody reports back on what did you get out of today in the long-term? Have you been able to do anything? If you haven't been able to do anything is it just because you're too busy? Or is it that you have all sorts of particular problems which you can share with us as collectively and which we may then be able to help you to overcome.

Paula Vassallo: I'd like to make a point, that if you can really make a difference to your university and have opportunity, I know Huda has also done some work in this field and I have also, we have also managed to introduce it in Malta so if you do need any help, we have a five-year dental public health curriculum starting from year one to year five, including practice management, including ethics and including a module on tobacco cessation. So if you need any help on the challenges that we faced but managed to overcome and how we run a mobile dental clinic, which our students go to as part of their training, please contact me.

Working in the mobile clinic has taught me that there is a need to teach students how to address the older generation because when you hear them calling 'Hi John' I think 'he's a 70-year old gentleman, you don't call him John'. For me this was the biggest eye-opener because it's also teaching them basic, simple etiquette sometimes, so I'm being very honest and open about it, that you learn the whole communication skills. This was also is an issue which was brought up today so if you do for, even, Jenny obviously has a lot of experience but anybody who would like to ask for any help, we hope that you will see some successful changes by next time, next year.

Kenneth Eaton: I think the basis for this is sharing good practice and if you hear from other people what they've done, what's worked and what hasn't worked, that can be a big help for everyone, so it's working collectively to try and achieve this. He then invited Irina Chivu (representative of Colgate the workshop's sponsor to comment)

Irina Chivu: I would certainly want to thank everybody for their contributions, because it was a very intense day and hopefully sharing experiences and learning what are the challenges and which are the things that everybody is doing, it's truly valuable for everybody. I think in terms of the outcomes we would definitely want to stream the conclusions into more actionable points because that was the idea and the purpose of it is how to move things, either it's going to be from the top-down or a bottom-up approach, but it has to happen so I guess in the publication, that's going to be something that's much more obvious. And other than that I wish you good luck and hopefully a lot of success with sharing what you have learnt today and sending the information further to your students. Thank you.

Kenneth Eaton: Well this is the last opportunity for anybody to say something if they wish to. Of course we will be with each other for the next three days so you know if you have afterthoughts we can discuss them, but I think we've got to the end of a very busy day and I'd like to congratulate you all.

Andreas Schulte: I think our group focused much more than what came out of the presentation, that we need some European guidelines or even rules from the European Parliament or the European Commission, otherwise the conflict within faculty, within dental schools or within countries diverts us and we can't make progress in a short time. So I think it is not only the personal individual efforts that we do in our schools but we also need some general pressure at the European level.

Jenny Gallagher: Thank you and I think what I would do on top of that is advocate for a bottom-up approach because actually in society, if we think about how social media works, actually there's a disruption from ordinary people in terms of how they behave. I think we've got two particular groups we ought to think about in terms of disruption, one is students in terms of them advocating for change, it could be very powerful and certainly some of our students have really embraced a population health approach, they may not always recognise the nuances but actually they are committed to that and I think that's good to encourage our students. The other area is actually how we work in partnership with populations in the community and one of the other pieces of work we've been doing in, and GSK have been helpful in supporting us, is some pilot work, is to actually work with older adults in community, in society and we put them together with the students in workshops and we make the students ask questions and listen and the students couldn't give the answers, but it was allowing the older people to set the agenda and to highlight what the very important issues were for them. So I think we perhaps need to think, just as my presentation was about dentists in society, we need to think about actually harnessing society to help us with some of those changes. But we can leave that for next year.

Philip Marsh: As a non-dentist is there any problem with having many voices representing dental aspects; you've got EFP, you've got ORCA, you've got this group, so is that a problem as you try and get a consensus view or consistent message when you approach key stakeholders, such as the EU, etc, to change things.

Kenneth Eaton: There is an organisation, which was mentioned on my first slide, it was formed to have a unified voice for the different oral health groups in Europe. It is the Platform for Better Oral Health in Europe. Its full members include the European Association of Dental Public Health, the Association of Dental Education in Europe, the Council of European Chief Dental Officers, the Oral Health Foundation and IADR European Division. EFP, ORCA and a number of European specialist groups and national organisations that promote preventive dentistry are associate members. The Platform meets in Brussels and regularly go to the European Commission and has discussions with civil servants and MEPs.

Kenneth Eaton then closed the workshop with the words "I think we've reached the end and we're three minutes before time, you've done fantastically, my congratulations to you."

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