Group E Initiator Paper Interprofessional education and multidisciplinary teamwork for prevention and effective management of periodontal disease

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Introduction

Periodontology is one of the oldest dental specialties in the world that deals with the tooth-supporting soft tissues and alveolar bone in both healthy and diseased conditions. Periodontal disease usually consists of gingivitis and periodontitis (Armitage, 1999). It is arguably the most common disease in humans (Guinness World Records, 2001), partly due to the unique characteristics of the dento-gingival structure and the etiopathogenic nature of the disease (Socransky and Haffajee, 1997; Jin, 2008). Globally, gingivitis predominantly affects adolescents and adults, and advanced periodontitis occurs in 5 to 20% of adults in both developed and developing countries (Söder *et al.*, 1994; Papapanou, 1996; Petersen *et al.*, 2005; Jin *et al.*, 2011; Kassebaum *et al.*, 2014). Untreated severe periodontitis is the major cause of tooth loss in the adult population worldwide (Pihlström *et al.*, 2005; Beaglehole *et al.*, 2009; Jin, 2011, Jin *et al.*, 2011). Indeed, a large proportion of prosthodontic and implant patients have missing teeth, due to untreated and/or poorly controlled periodontitis. It is evident that periodontal infection and inflammation are linked to various systemic diseases, such as cardiovascular disease, diabetes mellitus, dementia, adverse birth outcomes, respiratory diseases and cancers (Pihlström *et al.*, 2005; Williams *et al.*, 2008; Li *et al.*, 2011; Tonetti and Kornman, 2013). Notably, periodontal disease remains a major oral health burden in both developed and developing countries, especially in underprivileged populations (Petersen *et al.*, 2005; Petersen, 2008; Jin *et al.*, 2011; Petersen and Ogawa, 2012). As such, periodontal disease has increasingly attracted the attention of health-care professionals and the public.

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Contemporary periodontology has been a highly dynamic and evolutionary field for many decades. Novel concepts in periodontal etiopathogenesis and innovative clinical approaches have been made available to periodontal educators, general dental practitioners, periodontists, medical professionals and government agencies. This article firstly updates readers on the major advances in clinical periodontology, and elaborates the common pitfalls and drawbacks confronting dental practitioners in periodontal practice as well as the potential risk and impacts involved in providing periodontal treatment. In addition, the key issues and proactive strategies for effective management of periodontal patients through interprofessional teamwork and a multidisciplinary approach are highlighted. Finally, directions and perspectives for innovative periodontal research are addressed.

Major advances in clinical periodontology

The past 20th century saw great advances in the discipline of periodontology. Revolutionary concepts and substantial new knowledge, balanced with clinical reality, were developed and verified, thereby laying down the contemporary periodontal paradigm and professional care strategies (Löe *et al.*, 1986; Kornman and Löe, 1993; Page *et al.*, 1997; Armitage, 1999 and 2002; Pihlström *et al.*, 2005; Kornman, 2008; Armitage and Robertson, 2009; American Academy of Periodontology, 2011; Jin, 2011; Jin *et al.*, 2011; Tonetti and Kornman, 2013). The key discoveries and advances are listed in *Table 1*.

Table 1. Key discoveries in periodontology in the 20th century.

- Role of dental plaque and plaque biofilms
- Natural history of periodontal disease
- Periodontal risk factors/assessment and concept of host susceptibility
- The reality of periodontal regeneration
- Periodontal medicine and integration of oral health and general health

Common pitfalls and drawbacks in periodontal practice

Low awareness of periodontal health and periodontal negligence

Oral health and oral care are highly neglected in both national and international health politics and agendas (Editorial, *Lancet*, 2009). Because periodontal disease is a relatively 'silent' infection and inflammation many patients are unaware of this common oral problem in their daily life. However, its overall impact on patients becomes increasingly noticeable during the long course of disease onset and development, starting with gingival redness, swelling, and bleeding during brushing at the early stage, followed by increased tooth mobility, pathological tooth drifting and migration, eventually ending with multiple tooth loss. These pathological changes seriously affect various oral functions, thereby causing psychological problems with low self-esteem and reduced quality of life, as well as creating a large financial burden for periodontal care and related dental treatments (Jin, 2008; Jin, 2010; Chapple, 2014) (*Figure 1*).

Unfortunately, a large number of patients in the underprivileged population suffer from untreated severe gingivitis and various forms of periodontitis, and these subjects have a relatively low awareness of their oral/periodontal health. These individuals usually do not seek periodontal care in the first instance; rather they make 'symptom-driven' dental appointments at a relatively late stage of disease development, and only if such professional care is available and affordable (Jin, 2010). It is anticipated that the required periodontal treatment and subsequent other dental care needs then become more complicated, costly and less predictable. Indeed, poor management of periodontal patients has emerged as one of the major risks in clinical practice. Moreover, there is a great variability in periodontal referrals due to various reasons (Ong, 1990; Buckley, 1993; Lee *et al.*, 2009). Considering the common occurrence of periodontal disease and the low awareness among the public, significant risk may often arise from periodontal negligence, with increased litigation and periodontally related legal cases (Zinman, 2001); e.g., implant failure due to severe peri-implantitis in periodontal patients and those with periodontal destruction due to poorly delivered and detrimental adjunctive orthodontic treatment.

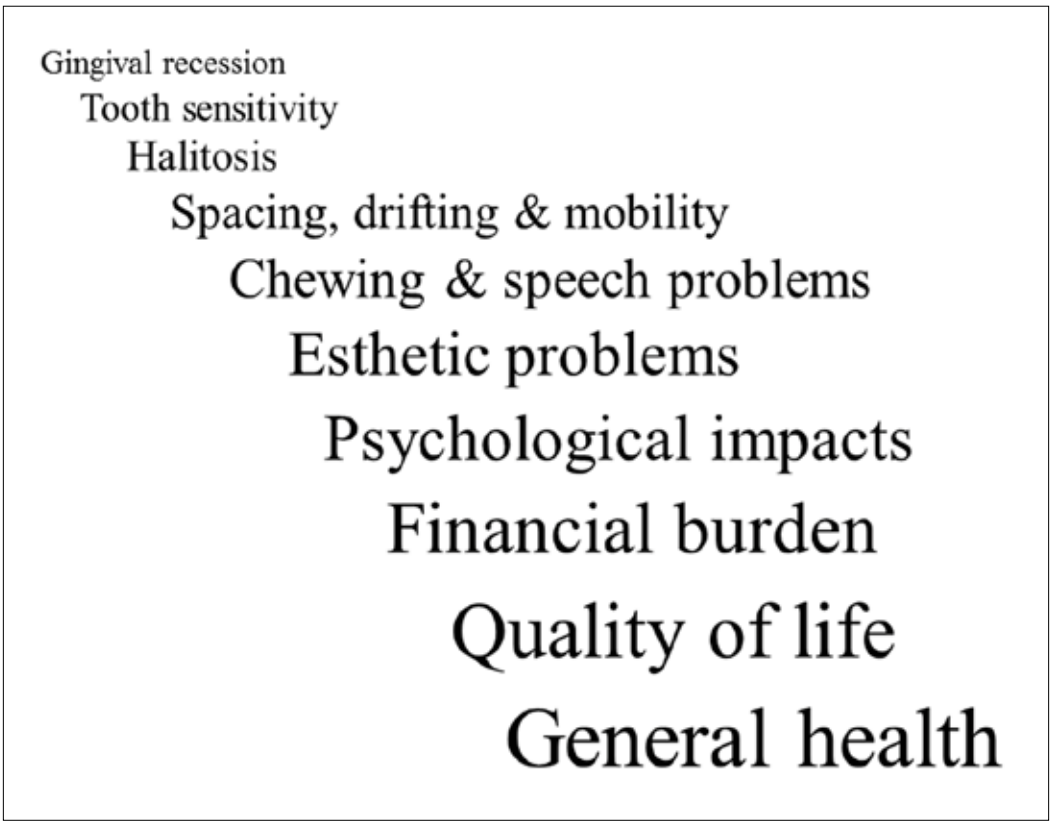

Figure 1. The increasing impacts of periodontal disease on affected patients during the disease course.

Non-evidence-based periodontal practice

In many developing countries, it is assumed that periodontal training in dental curricula remains inadequate and relatively poorly updated, partly due to limitations of well-qualified teaching staff and learning resources. Likewise, in addition to the issue of periodontal negligence, periodontal care in daily practice seems to be delivered through an empirically driven approach following outdated dogma, instead of evidence-based and scientifically verified approaches. The common pitfalls and drawbacks of periodontal care in general dental practice are listed in *Table 2*.

Table 2. Common pitfalls and drawbacks of periodontal care in general dental practice.

- Lack of updated concepts and knowledge in periodontal science
- Lack of patient communication on disease prevention and health promotion
- Lack of assessment and control of risk factors (e.g., smoking)
- Inappropriate diagnosis, prognosis and poorly sequenced treatment planning with a focus on restorative/reconstructive treatments (e.g., dental implants)
- Limited non-surgical periodontal treatment without appropriate re-evaluation and long-term regular supportive care even in managing susceptible patients
- Undertaking non-evidence-based certain 'adjunctive' periodontal treatments
- Inadequate communication and inappropriate decisions on periodontal referrals
- Lack of multidisciplinary management of complex patients through teamwork with specialists in endodontics, orthodontics, prosthodontics and implant dentistry
- Low awareness and engagement in periodontal care through integration of oral and general health

Key issues for effective management of periodontal patients

Effective periodontal care should be the primary and essential component of general dental practice; otherwise any dental treatment for periodontal patients may be greatly compromised or ultimately fail (Pihlstrom, 2001). Unfortunately, general dentists tend to show less interest in treatment of periodontal diseases and prefer to focus on restorative procedures (Ong, 1990; Buckley, 1993). Thus, the problem arises that they may eventually have to deal with the consequences of periodontitis-related tooth loss or edentulism, rather than effectively controlling the 'root' cause of the problem – uncontrolled periodontal infection and inflammation. In recent years, evidence-based, common risk factors-targeted, health-integrated preventive and care strategies have been advocated and implemented in dental education and clinical practice. Some of the key points for prevention and effective control of periodontal disease have been well addressed (Baehni and Giovannoli, 2004; Jin, 2010), and these critical issues are updated and presented in *Table 3*.

Table 3. The key issues for prevention of periodontal disease and effective patient management.

- Patient motivation, awareness of oral/periodontal health and reflection of holistic health
- Early prevention through effective plaque control at home and regular professional care
- Routine periodontal screening and recognition, record keeping and appropriate risk assessment through a patient-centered approach
- Appropriate diagnosis, prognosis and formulation of individualized treatment planning through addressing the causes, risk and host susceptibility factors
- Setting achievable treatment goals through good communication with patients
- Avoiding and controlling periodontal risk factors via a common risk factor approach
- Assurance of controlling the 'root' of the problem (periodontal disease) and achieving 'periodontal clearance', prior to undertaking corrective, regenerative, restorative and prosthodontic treatments
- Long-term, regular periodontal and implant supportive care
- Appropriate arrangements for periodontal referral
- Multidisciplinary management of complex patients through good teamwork and collegiality

One of the most critical issues to be considered is recognition of patients' risk profiles through appropriate risk assessment and effective control of these risk factors. Identification of the risk is essential, and this strategy should be fully incorporated in clinical practice (Lang and Tonetti, 2003; Nunn, 2003; American Academy of Periodontology, 2008; Jin *et al.*, 2011). This approach has important clinical implications and enables clinicians to address the underlying risk for periodontal disease, and thereby carry out individualized and clearly targeted treatments for more cost-effective therapies and ongoing regular supportive care (American Academy of Periodontology, 2008). A periodontal risk assessment system has been proposed and validated in a longitudinal study (Lang and Tonetti, 2003; Matuliene *et al.*, 2010).

Common non-communicable diseases (NCDs) such as cardiovascular disease, cancer, diabetes and respiratory disease collectively account for about 60% of human deaths worldwide (Ash *et al.*, 2012; Ezzati and Riboli, 2012; FDI, 2013a). Periodontal disease as a common oral NCD shares an array of common risk factors with other NCDs (United Nations General Assembly, 2011; FDI, 2013a,b,c; Jin, 2013), such as tobacco usage, obesity, unhealthy life style and socio-economic factors. From the general health perspective, it is crucial

to incorporate periodontal health issues into the general health agenda, through the Common Risk Factor Approach (Sheiham and Watt, 2000; Petersen, 2008; FDI, 2013b,d; Jin, 2013) for optimal oral and general well-being of the population.

Management of periodontal patients via multidisciplinary teamwork

It is well recognized that periodontology is closely interlinked with other dental specialties, and periodontal care and patient management should therefore be undertaken on a multidisciplinary basis, especially in complex cases, involving various experts in medicine, endodontics, orthodontics, prosthodontics and implant dentistry (*Figure 2*). Comprehensive, well-sequenced treatments and properly conducted multidisciplinary care are crucial for optimal treatment outcomes, especially in medially compromised patients, susceptible individuals (e.g., heavy smokers) and those with severe periodontitis. Some important issues should be highlighted to address the specific interdisciplinary interactions in effective management of periodontal patients. Taking the periodontal-restorative interface as an example, some critical points need to be carefully elaborated and executed to achieve the best treatment outcomes. These key issues have been well addressed by Goldberg and colleagues (2001), and they are modified and summarized in *Table 4*. The interactions of periodontics with other specialties such as endodontics, orthodontics and implant dentistry, as well as the relevant clinical implications, have been intensively discussed and presented elsewhere (Yi *et al.*, 1995; Zachrisson, 1996; Gunne *et al.*, 1999; Sanders *et al.*, 1999; Jorgensen and Nowzari, 2001; Nowzari, 2001; Witter *et al.*, 2001; Harrington *et al.*, 2002; Ong and Wang, 2002; Zehnder *et al.*, 2002; Esposito *et al.*, 2003; Reddy, 2003; Rotstein *et al.*, 2004; Levin *et al.*, 2012; Raj, 2013; Sgolastra *et al.*, 2013).

Table 4. The critical issues related to periodontal-restorative interface in clinical practice.

- Assurance of controlling periodontal disease prior to restorative treatments
- Protection of the biological width via crown lengthening procedure when necessary and appropriate
- Obtaining excellent dental impression and model-making
- Precise design for crown, denture and implant treatments
- Refining crown contour and emergence profile in harmony with gingival tissues
- Appreciation of the clinical value of fabricating provisional restorations for predictable outcomes
- Periodontally friendly placement of restorative margins, selection of compatible materials, achieving optimal marginal fit and undertaking effective plaque control daily
- Recognition of the critical role of occlusion in periodontal and implant treatments
- Mucogingival considerations on the attached gingiva close to the restorative margins
- Critical consideration of the option of shortened dental arches in periodontitis patients

Perspectives and future directions in periodontal research

Periodontal disease is recognized as a major global oral health burden in connection to oral and general health, and it significantly accounts for the global oral health inequality, which is of significant concern to the leading international organizations, such as the World Health Organization (WHO), International Association for Dental Research (IADR) and FDI World Dental Federation (Jin *et al.*, 2011; Petersen and Ogawa, 2012; FDI, 2013b). Although considerable progress has been made in understanding the complex nature and pathogenesis of periodontal disease, as well as its effective management strategy (Page *et al.*, 1997; Kornman, 2008; American Acad-

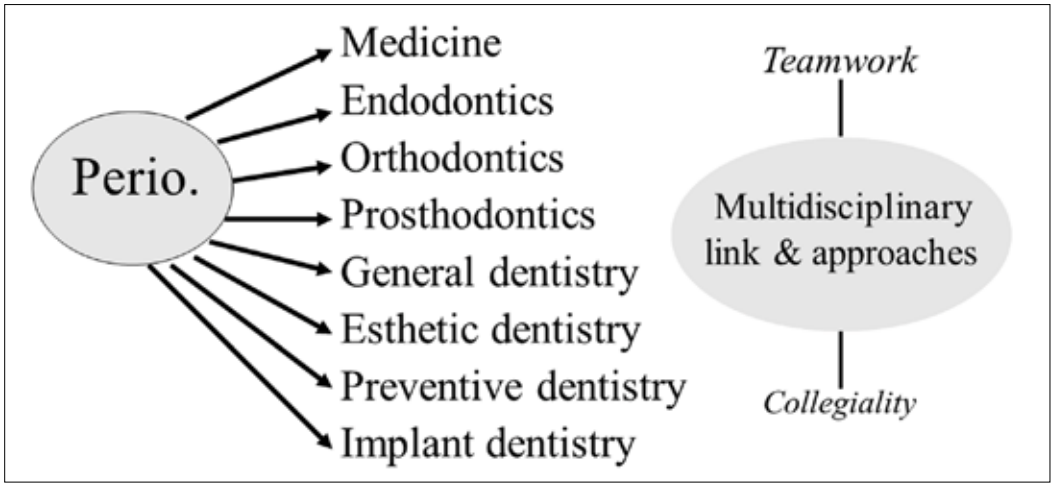

Figure 2. The periodontal specialty is interlinked with medicine and other dental disciplines, and periodontal care should be undertaken comprehensively through a multidisciplinary team approach for optimal treatment outcomes.

emy of Periodontology, 2011), a substantial knowledge gap remains that needs to be addressed through further basic, translational and clinical studies. Future research directions and needs in periodontology could be further explored and identified on the basis of current knowledge, good evidence and scientific perspectives (Pihlström *et al.*, 2005; Jin *et al.*, 2011). Hopefully, new discovery and innovative approaches in oral/periodontal science could further enhance the effectiveness of prevention and control of periodontal disease in the near future for optimal oral health and general health.

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