

ORIGINAL ARTICLE

DEVELOPMENT OF CLINICAL PATHWAY FOR NON-SURGICAL MANAGEMENT OF CHRONIC PERIODONTITIS

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ABSTRACT

The vast range of treatment protocols available for non-surgical management of chronic periodontitis can affect the consistency of clinical decision-making for dentists. This is further compounded by the different case definitions for periodontitis used in various clinical studies. The aim of this paper is to describe the steps taken leading to an expert consensus of periodontitis case definition followed by the development of a clinical pathway for managing chronic periodontitis. To assist reaching a consensus on a standard case definition of periodontitis for clinical research, a roundtable discussion was held involving 13 dental specialists and researchers from universities and the Ministry of Health. Participants discussed clinical experiences in identifying periodontitis and related issues based on scientific evidence. A further expert panel discussion consisting of 8 periodontists was conducted at another session to review current management practices and evidence-based practices available from the literature and generated a clinical pathway for non-surgical management of periodontitis. The case definition derived from the roundtable discussion recognises differentiation of selected clinical parameters and their thresholds as well as the extent and severity of the periodontitis. As for the newly developed clinical pathway, experts collectively defined the appropriate goals to satisfy the multidimensional needs of the patients which are translated into detailed elements of care, including the sequence of events of patients at each dental visit over time. The agreed case definition will facilitate selection and recruitment of cases for clinical studies while the clinical pathway can be used to reduce variations between clinicians.

Keywords: Case definitions, clinical pathway, periodontitis

INTRODUCTION

As healthcare costs keep rising, the challenge of providing consistently high quality of care which is cost-efficient becomes a major concern for healthcare managers. One efficient approach to improve quality of healthcare delivery is to reduce variation in the process of providing a service. The use of care pathways or clinical pathways (CP) can reduce variation and has been proven to reduce the cost and time spent in hospitals while maintaining the provision of high quality services to patients¹⁻³. A CP is defined as an integrated plan of care for a homogenous group of patients with a particular diagnosis designed to avoid delays, optimally utilize available resources and provide high quality of care that are based on the best clinical practice where multidisciplinary aspects are taken into account⁴.

Clinical pathways have four main components: a timeline, the categories of care or activities and their interventions, intermediate and long-term outcome criteria, and the variance record (to allow deviations to be documented and analysed). They differ from clinical practice guidelines, protocols and algorithms as they are utilized by a multidisciplinary team and have a focus on the quality and co-ordination of care. The variance record is a unique feature of a CP and serves as a basis for future modifications and improvement of the CP. This demonstrates that a CP is dynamic and adaptable to changing needs - this is different than clinical practice guidelines.

In spite of its benefits to patients and healthcare providers, the use of CPs in Malaysia is still limited. In addition, studies looking into its effectiveness are

scarce. One such study was by Ismail et al who reported the impact of clinical pathways on four selected conditions: Total Knee Replacement (TKR), ST Elevation Myocardial Infarction (AMI), Chronic Obstructive Airways Diseases (COAD) and elective Lower Segment Caesarean Section (LSCS)⁵. The use of these four CPs demonstrates an improvement in intra and inter-departmental communication, improve patient outcomes, promote patient safety and increase patient satisfaction. These findings suggest that by adopting use of clinical pathways in oral healthcare settings, the same outcomes will be augmented with an improvement in the quality of oral healthcare delivery.

Of all oral diseases, periodontal diseases affect as many as 90-95% of the global adult population in the form of gingivitis or periodontitis. Chronic periodontitis is defined as inflammation of the gingiva and the adjacent attachment apparatus and characterized by loss of clinical attachment due to destruction of the periodontal ligament and loss of the adjacent supporting bone. In 2010, the Global Burden of Study involving 291 diseases and injuries found that severe periodontitis was the sixth most prevalent condition, affecting 10.8% or 743 million people worldwide⁶. This can easily lead to tooth loss, which is eleventh most prevalent condition in the same study. In Malaysia, about 48.5% of adults are affected by moderate and severe forms of periodontitis⁷. The huge burden of managing periodontitis on the oral healthcare system is further magnified considering the significantly higher risk of periodontitis patients having comorbidities such as diabetes mellitus, hypertension and cardiovascular disease - making periodontitis a shared concern for all healthcare practitioners.

In managing patients with chronic periodontitis, the initial therapy typically comprises non-surgical periodontics which includes scaling, root planing and oral hygiene instruction, as well as other cause-related therapies such as caries control, replacement of defective restorations, occlusal therapy, orthodontic movement, and smoking cessation. The major goal of non-surgical therapy is to control the factors responsible for the periodontal inflammations, the removal of subgingival bacterial deposits and the subsequent control of plaque levels by patients are particularly significant⁸. In this regard, different randomized trials and systematic reviews compared different nonsurgical options that included adjuncts treatment modalities to augment the bacterial eradication^{9,10}. This non-surgical phase may be

carried out at primary care or at specialist settings depending on the severity of the condition.

Continued, periodic assessment and prophylactic treatment of the periodontal structures permit early detection and treatment of new and recurring disease and is commonly referred to as supportive or maintenance periodontal therapy. Supportive periodontal therapy starts as soon as the periodontal disease has been control during the initial therapy. The objectives of supportive therapy to prevent or minimize the recurrence and progression of periodontal disease, to prevent or reduce the incidence of tooth loss and to increase the probability of locating and treating, in a timely manner, other diseases or conditions found within the oral cavity¹¹. Consequently, when patients are in the maintenance phase, non-surgical periodontics may still be necessary as a component of supportive periodontal therapy. The American academy of Periodontology (AAP) stated that 3-month intervals of supportive therapy have been found to be effective in maintaining the established gingival health in mild chronic periodontitis¹². However, there is no definite time interval documented for supportive therapy for moderate to severe chronic periodontitis patients¹². The systematic review by Farooqi and co workers conclude that there is weak evidence to support a fixed and specific periodontal maintenance recall interval (e.g. every 3 months) and the optimum frequency is unclear¹³.

Therefore the use of CPs for management of chronic periodontitis is worth exploring as its application can have a significant impact on quality improvement as well as cost-containment of oral health care. This is especially relevant in university dental clinics where government budgetary support is depleting while referrals for specialist dental care rise steadily. The objective of this study is to develop a clinical pathway for non-surgical management generalized moderate and severe periodontitis patients at university dental clinics. An expert consensus on case definition of periodontitis preceded the CP development considering its major significance on the pathway implementation. The precise diagnosis is of prime significance in the treatment of periodontal conditions hence, the majority of clinicians placed the classification system of Armitage¹⁴ to assign a diagnosis for different periodontal conditions. The diagnosis of chronic periodontitis based on this classification uses the clinical attachment loss to consider its severity and extent¹⁵, additionally other classifications^{16,17} assessed the diseases including the loss of attachment as an indicator for the disease presence and extent. Although the inclusion of periodontal probing depth alone would not be a

justification for the periodontal destruction in all cases¹⁶, its record in conjunction with the attachment loss will overcome the limitation of other classifications. The recent case definition by Eke et al 2012¹⁸ showed the significance of PD and CAL thresholds in the definition of periodontitis.

In a clinical research investigating effectiveness of various interventions, case definitions must be clearly defined and standardized. Diversity in case definitions will impact in different estimates of prevalence, diagnosis and classification disease severity, which eventually lead to a variety of treatment regimes, and subsequently different treatment outcomes which may or may not be the best option for a particular patient.

METHODS

Ethics

We obtained permission to conduct the study from the Institutional Review Boards of the five participating universities.

Expert Consensus on Case Definitions

A total of 13 dental specialists and researchers from local universities and the Ministry of Health participated in a roundtable discussion. This process aimed to discuss and reach a consensus on a standard case definition of periodontitis for clinical research. Participants discussed clinical experiences in identifying periodontitis and related issues based on scientific evidence. Key references used in the discussion were provided prior to the meeting. Issues related with variations in case definitions were highlighted based on past experiences and critical appraisal of the literature. A review of how international researchers dealt with this issue was done followed by exploration of which direction would be best for the local scenario. Considerations were made regarding: (1) use of most common clinical parameters in clinical research, such as clinical attachment loss, probing pocket depths and gingival recession; (2) cut-off measurements or thresholds of these indices; and (3) contemporary case definitions used in different settings.

Clinical Pathway Development

Two workshops were held in the process of developing the CP for periodontitis management. The first one was held over two days and consisted of introductory lectures to clinical pathways in general followed by the burden of periodontal disease. A total of 26 public health specialists, restorative dentists, periodontists, primary care dentists and dental nurses from various universities and the Ministry of Health participated in the expert panel group discussion. The discussion was

facilitated by two public health specialists from UKM Medical Centre who are experts in use of clinical pathways in healthcare. The deliverables for this workshop were identification of workflow for periodontitis patients seen at primary care clinics, steps taken in the course of patient care (types of procedures, care pathway algorithms and other inventory of actions) and progression/ sequelae of diseases in relation to course of care.

The second workshop involved an eight-member expert group comprising periodontists from five universities to further focus on needs of clinical training. Using the framework developed during the first workshop as the basis of CP development, participants reviewed current practices in comparison with those available from the literature as well as their own experiences in order to generate the CP. Collectively they defined the appropriate goals to satisfy the multidimensional needs of the patients. Results of the reviews were translated into detailed elements of care, including the sequence of events of patients over time.

The final version of the CP was reviewed and refined by the same group of experts after pilot sessions at the university clinics were conducted to test its usability and clarity. These pilot sessions consolidated findings and concerns from each study site which were minimal and related to ease of administering the forms for purposed of data collection. Upon implementation, the proposed CP will be monitored regularly among the five institutes and recorded based on the resolution of the patients' clinical periodontal parameters and these records will be discussed annually in future workshops between the panel of experts.

RESULTS

Case definition of chronic periodontitis

Having considered the various evidence and experiences, the expert group unanimously agreed that the following items are necessary to define a chronic periodontitis case: operational definition, clinical periodontal parameters, the severity and extent of the disease. First of all, chronic periodontitis is to be defined as an inflammation of the gingiva extending into the adjacent attachment apparatus and characterized by loss of clinical attachment due to destruction of the periodontal ligament and loss of the adjacent supporting bone¹⁰. Further to define a case, seven clinical parameters are to be measured, and they are full mouth bleeding on probing, periodontal pockets depths, recession, clinical attachment level (CAL), plaque score, furcation involvement and teeth mobility grades. Next, chronic periodontitis may be classified according to its severity namely mild,

moderate and severe. Mild chronic periodontitis is defined as ≥ 2 interproximal sites with CAL ≥ 3 mm and ≥ 2 interproximal sites with PD ≥ 4 mm (not on the same tooth) or one site with PD ≥ 5 mm¹². Moderate chronic periodontitis is defined as two or more interproximal sites with CAL ≥ 4 mm, not on the same tooth, or two or more interproximal sites with PD ≥ 5 mm, not on the same tooth¹². Severe chronic periodontitis is defined as two or more interproximal sites with CAL ≥ 6 mm, not on the same tooth, and one or more interproximal sites with PD ≥ 5 mm¹². Finally, the extent of chronic periodontitis may be categorized into either

localized or generalized. Generalised chronic periodontitis is when the disease distribution affects more than 30% of tooth surfaces, while localized chronic periodontitis is when the disease distribution affects 30% or less tooth surface¹³.

Clinical Pathway for Managing Chronic Periodontitis

Table 1 shows the general format for the CP which includes sections to record activities related to assessment, investigation, consultation, home and systemic care as well as professional care for patients in the study.

Table 1: General format for Clinical Pathway

Activities \ Date	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Visit 7	Visit 8
History taking								
Clinical examination								
Investigation								
Consultation								
Oral health education								
Counselling and control of risk factor								
Treatment								
Medication								
Referral								
Discharge plan								

The clinical parameters used to measure the outcomes of periodontal therapy were probing pocket depth, gingival recession, clinical attachment level, tooth mobility, bleeding on probing, plaque levels and furcation involvement. Investigations (as required) included radiographs, pulp sensibility test, diagnostic casting and selected medical-related clinical tests like blood pressure and random blood sugar measurements. Home care includes plaque control as well as control of existing risk factors like diabetes and smoking. Professional care involves non-surgical modalities, required medications, referrals as well as a discharge plan. There were two parts of the CP developed namely for baseline as well as reassessment. Baseline CP is to be implemented till the completion of initial root debridement while reassessment CP shall commence from the 6 weeks reassessment up to 24 weeks post instrumentation. Experts agreed that the reassessment period continues up to six months after non-surgical periodontal therapy (NSPT) to take advantage of healing capacity of periodontal tissues¹⁹.

DISCUSSION

This paper describes the necessary process leading to the development of a clinical pathway for NSPT.

The need for a precise diagnosis of chronic periodontitis was addressed upon reaching the consensus of a case definition before proceeding with the CP development. Additionally, the management of patients with this condition is highly influenced by the patients’ various treatment needs especially with regard to individual response to care. Therefore it is crucial for new clinicians who are exposed to the field of periodontics to be guided by a clinical pathway to effectively manage periodontitis patients through the non-surgical modality. Ultimately, the outcome at this stage will aid in determining whether surgery would be an option for any particular patient.

Experts deliberated on the instrumentation approach of surface debridement, as there is an option whether it should be limited to either one of the following: Full Mouth Disinfection (FMD), Full Mouth Debridement (FMD_e) or Conventional Staged Debridement (CSD). The different instrumentation protocols were meticulously studied and covered by the literature^{14,18,20}. There were controversial results in these systematic reviews and they could not provide a definitive answer to which treatment approach is more superior to another. Nevertheless, choosing the option of debridement between FMD, FMD_e or CSD for nonsurgical therapy was reported

to be basically subjected to the operator and patient preference which could hold a major part as the determining factor²⁰. Moreover, a successful clinical outcome is solely dependent on the patient's ability to adhere to an effective plaque control. Therefore, the panel of experts agreed that the CP in the present study will not limit this particular instrumentation approach by the clinician.

The decision to advocate the use of local antimicrobial delivery in the CP was discussed at length. Local antibiotic delivery could be a part of treatment option for the management of periodontitis patient, as an adjunct to debridement during the active phase of treatment, to treat reinfected or persistent periodontal sites among patients in maintenance phase. Local antibiotics are usually delivered in the form of fibres, gels, chips or microspheres²⁰. These local measures were found to be more advantageous over the systemically antibiotics because of the fewer side effects, non-compliance issues and less chances of developing bacterial tolerance to medications²¹. In spite of their effectiveness, it was reported in a study of cost estimation of periodontal treatment in public sector dental specialist clinics in Malaysia that cost of non-surgical periodontal therapy is on its own already considered expensive (full-mouth subgingival debridement costs USD 135) and it may increase when it is combined with locally delivered antibiotics²². Hence, our expert panel has decided not to encourage the use of local antimicrobial in the CP as it was deemed as not cost effective.

Related, experts argued on including the use of systemic antimicrobials in the CP. The use of systemic antimicrobials has shown gain in clinical attachment level with the effect being more prominent in deeper sites¹⁷. In addition, when systemic antimicrobials is used in conjunction with root debridement, it could provide further PPD reduction and reduced risk of CAL loss²⁰. Various systemic antibiotics were tested for their usage as an adjunct in periodontal therapy but between 2002 and 2013 the literatures were mainly looking at Metronidazole (MTZ), Metronidazole and Amoxicillin (MTZ + AMX) Azithromycin (AZT)²⁰. Two published large randomized controlled clinical trials that showed the long term clinical outcome of MTZ +AMX with 1 and 2 years of follow up respectively among chronic periodontitis patients had proposed a constant benefit of systemic antimicrobials. These two studies showed consistent clinical periodontal outcome even up to one or 2 years. It was mentioned that root debridement alone is usually effective, and the growth of antibiotic-resistant bacteria is currently an issue, therefore extensive use of such adjuncts for chronic periodontitis is

hardly justified²¹. However, when considering consistent CAL gain and PPD reduction as well as systemically involved patient, expert panels decided to list the use of systemic antimicrobials as one of the options under the medication section of CP. However, it will be made on an individual clinician basis and not part of the recommended clinical pathway protocol.

CONCLUSION

The agreement among the panel of experts regarding the selection of a case definition was an attempt to overcome the future limitation that clinicians may face during the CP implementation in respect to the periodontal patients treatment based on the interpreted diagnosis. Although no proposed standardised definition has been universally applied, the included one of Eke and co-workers¹⁸ will be monitored when the CP is tested locally within the institutional clinics. The outcome of this study provides a tool to implement and subsequently evaluate a clinical pathway at selected university dental clinics to improve the quality of dental care as well as to be used as a standardized and guided approach to clinical training for periodontists.

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