

Periodontal diagnosis and treatment planning: Case based computer assisted learning

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Abstract:

There is potential for variation among periodontal and restorative faculty in evaluating periodontal condition and formulating a treatment plan. Number of factors are considered during formulating periodontal diagnosis, prognosis and treatment plan of which many factors are subjective. The impact of variation among clinical faculty on student performance remains unknown. Students may benefit from witnessing several ways to approach clinical problems. This type of exposure may enhance their knowledge and technical skills needed to perform different treatment options they can offer to patients, but beginners are confused by varying philosophies conveyed by the experts. As a result, students who have limited clinical background, find learning difficult. The aim of the study was to evaluate the Computer Assisted Learning program (CAL) to guide the students in a generic framework of clinical decision making in periodontics. To address the educational void surrounding the teaching and learning of oral rehabilitation strategies, a CD-ROM 'Interactive learning in Periodontics: Decision making in periodontal diagnosis and treatment planning in adults' was developed and evaluated by interns from the Department of Periodontics. The disc emphasizes the distinction between 'doing'

and 'planning to do' in the decision-making process. After using the disc, the students were able to apply a generic framework to formulate a treatment plan for their own patient. Overall students' response was positive on the relevance, things learnt and ease of use of the program.

Keywords: Periodontics, Educational software, Case based computer assisted learning.

Introduction:

Inaccuracy and variability in clinical decision making among clinicians have been reported at many health care institutions. There is potential for variation among periodontal and restorative faculty in evaluating periodontal condition and formulating the treatment plan. Numbers of factors are considered during formulating a periodontal diagnosis, prognosis, and treatment plan of which many factors are subjective.

The impact of variation among clinical faculty on student performance remains unknown. Students may benefit from witnessing several ways to approach clinical problems. This type of exposure may enhance their knowledge and technical skills needed to perform different treatment option they can offer to patients. It is culmination of years of clinical experience with little or no conscious thoughts to the mental steps taken to arrive at the plan. Several experts can arrive on several treatment plans for a particular patient. Beginners are confused by varying philosophies conveyed by the experts. As a result, students who have limited clinical background find learning difficult.

The aim of this study was to evaluate the Computer Assisted Learning program (CAL) intended to guide the students in a generic framework of clinical decision making in periodontics. After using this CAL, the students should be able to apply this frame work in

formulating the diagnosis, prognosis and treatment plan for their patients and justify it with confidence (1).

Challenges:

Challenges in periodontal diagnosis and treatment plan consist of making interrelated decisions. Helping students to find a reliable protocol helps them to do this in a manner encompassing three main problem areas. Firstly, the term 'treatment plan' itself is poorly defined and may mean a number of things from diagnosis and decisions regarding treatment needs in isolated conditions, to making decisions regarding treatment of the whole oral cavity or to sequencing treatment once decisions have been made. The authors have therefore avoided use of this terminology and designated the area between diagnosis and procedural treatment sequencing as 'decision making in periodontics'. The phrase covers decisions about all the options and permutations possible for the treatment of each tooth, any area of soft tissues, each periodontium and each edentulous space in case of implants. Only some decisions are based on purely dental knowledge. Others deal with the recognition of the needs and wants of the patient as a person and the realistic limitations of treatment imposed by time, skill, equipment and finances. All these factors are interrelated and all have impact on each other.

This sequence of treatment procedures is based on sound dental principles of patient management. While 'urgent treatment' must stay first, the order of the remainder of 'planning to do' must begin with maintenance. What kind of work can the patient maintain? This will impact on the kind of reconstructive work envisaged, which in turn will dictate which structures should be conserved and thus allow a decision to be reached as to an appropriate disease control strategy.

The second issue is the educational one of promoting higher learning, which is the construction of meaning from experience (2). Undergraduate students have very little experience in completing cross-disciplinary rehabilitation plans in a logical manner, but usually have at least some experience in choosing options for discrete conditions. It is our observation that senior students, who have some clinical background, are willing and able to discuss possibilities and options in diagnosis and treatment planning, but that these discussions tend to be formless, repetitive and rarely progress to a definitive plan of exactly what treatment the patient will receive.

The main intent of the disc, therefore, is to provide a framework that follows specific guidelines in the decision-making processes that will be used to arrive at a diagnosis and treatment planning for each patient. Creating an environment of providing little information in a direct fashion, while at the same time eliciting this information from the students themselves and keeping a complex set of ideas on track, constituted the three biggest challenges we faced in creating the disc.

Materials & Method:

To address the educational void surrounding the teaching and learning of oral rehabilitation strategies, a CD-ROM 'Interactive learning in Periodontics: Decision making in periodontal diagnosis and treatment planning in adults' was developed. The disc was used and evaluated by 57 interns from the VSPM Dental College & Research Centre, Nagpur. Students were asked to use the CD-ROM and then they were given a questionnaire to be filled in anonymity. It had four structured questions and four open ended questions. The disc emphasizes the distinction between 'doing' and 'planning to do' in the decision-making process.

The program describes the full educational potential of computers by the use of graphic movement and three-dimensional visualization. It consists of seven figures, comprising 15 cases and a library (Fig. 1).

Serial	PatientName	Age	Address	ContactNo	Gender
1	gajanan agarwal	34	jaaital	8946700843	Male
2	ganesh kamble	45	jaitala	90346797543	Male
3	neeh kadam	45	ring road	8901368567	Male
4	nitin kadam	35	ramdaspath	7805345876	Male
5	pallavi atkare	23	jaitala	895526764	Female
6	rajendra kulkarni	42	hingna	7833578845	Male
7	rakesh joshi	33	ring road	890004244	Male
8	rekha yadav	56	dharampath	8708664537	Male
9	rupesh shende	34	dharampath	9823570864	Male
10	sheela jain	45	trimurti nagar	9823145797	Female
11	sneha gattani	29	hingna	76896863120	Female
12	vaishali jog	34	ramdaspath	8903456987	Female

Figure 1: Student has to select a patient from one of the available options

Students work through diagnosis and treatment planning for fifteen very different cases, using a generic framework as a guide (Fig. 2). The library deals with referrals, informed consent and history taking. Fig. 3 shows gingival examination and periodontal charting.

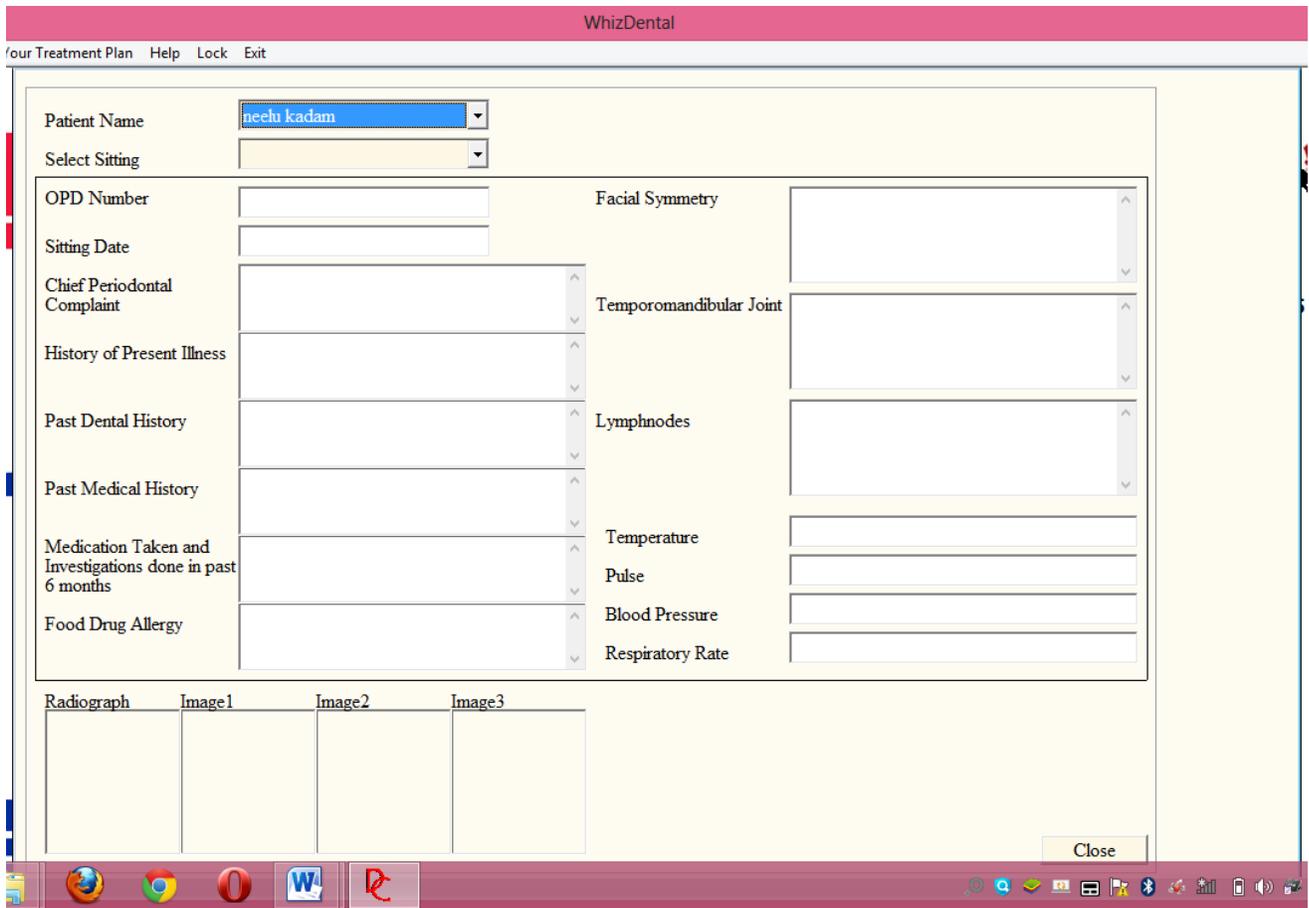


Figure 2: Relevant clinical details

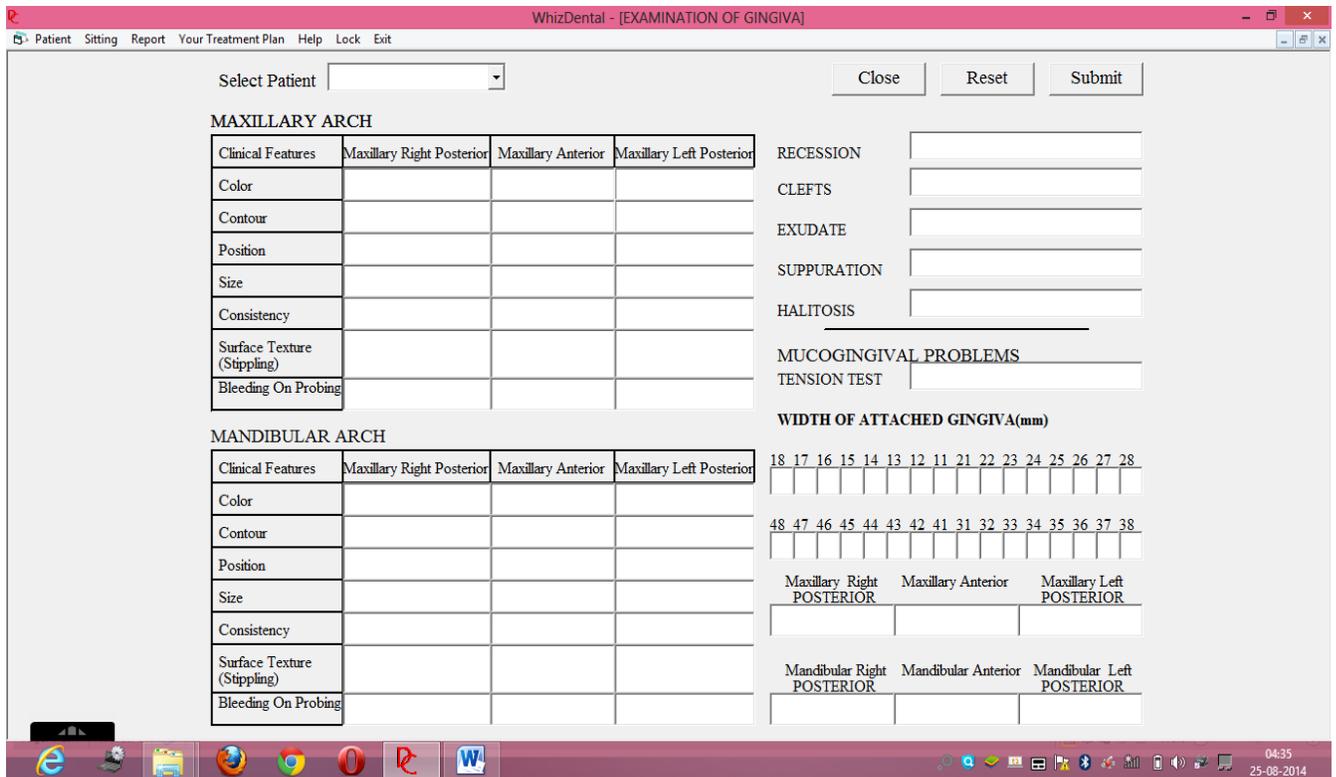


Figure 3: Gingival examination and periodontal charting

While all cases encompass all aspects of periodontics, the emphasis of each case is different. However, all progress within the same framework, with each decision reached impacting on the next one. Each case begins with the patient's history and proceeds briefly through gathering of data (history and examination).

Treatment plan has been divided into different stages (emergency, non surgical, surgical, restorative and maintenance) (Fig. 4).

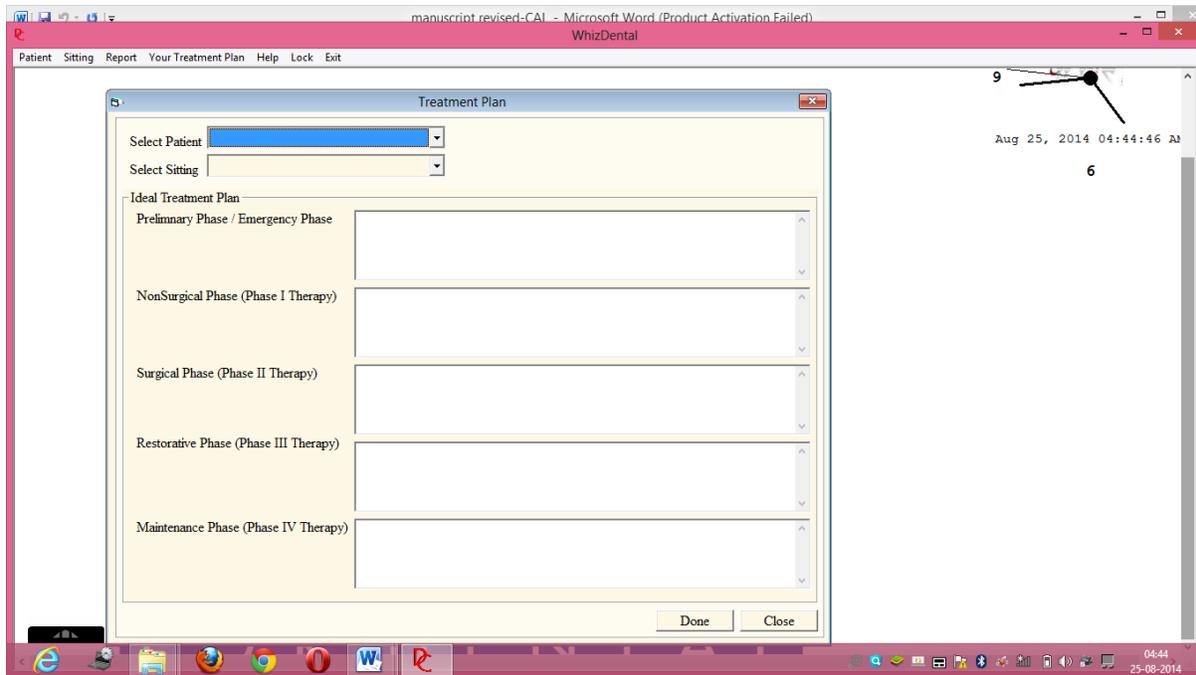


Figure 4: Templates for treatment planning

Screen design:

Screen 1: Student has to select a patient from one of the 15 available options (Fig. 1).

Screen 2: It has all relevant clinical details (Fig. 2). It has following tabs:

Chief complaint, past dental history, relevant medical history, relevant clinical examination, radiological (IOPA, OPG, CT) findings, medications, food-drug allergy and investigations:

Only upon clicking that particular tab, the relevant data was displayed. Easy navigation to other parts of the program, referring back to decisions already made, rechecking examination data and to 'learning more about' various points of interest. It was assumed that users would not be computer literate, and a text summary indicating how to complete the current stage of the sequence appears on the right of each screen.

Screen 3-5: Gingival examination and periodontal charting (Fig 3).

Screen 6: Treatment planning was structured in following sequence

- Preliminary phase
- Non surgical treatment
- Surgical treatment
- Restorative treatment
- Maintenance
- Prognosis

This screen also has tabs for templates for treatment planning (Fig. 5).

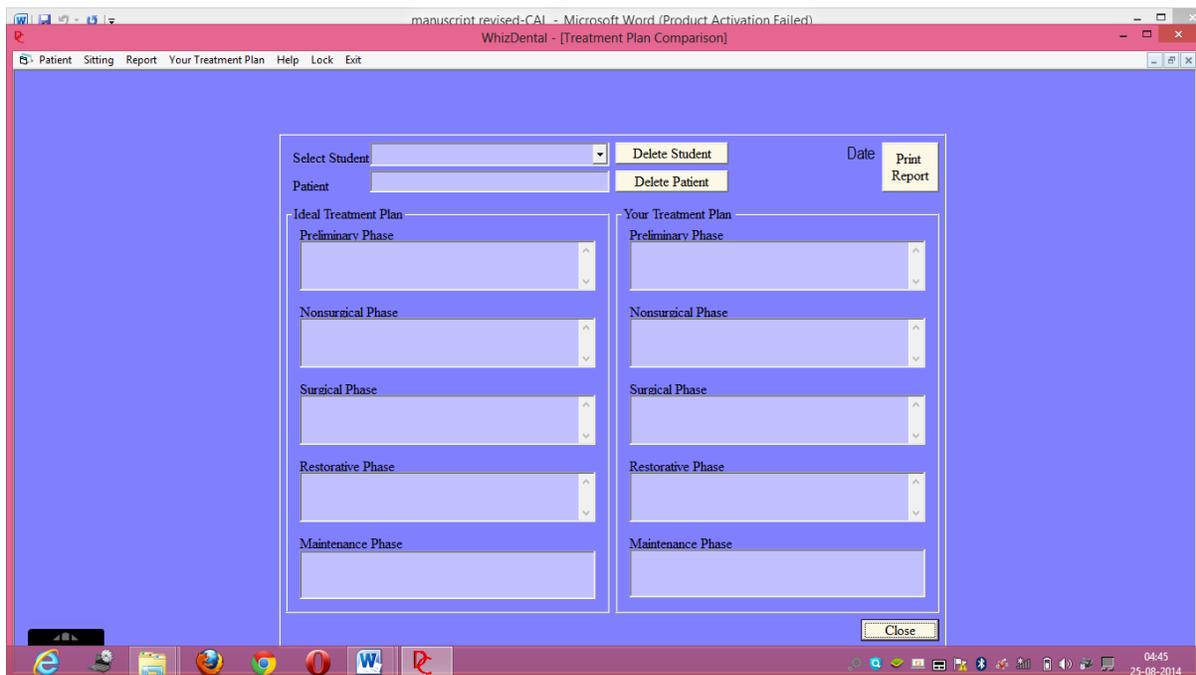


Figure 5: Ideal treatment plan (fed in the software) as opposed to one submitted by student

Screen 7: Ideal treatment plan (fed in the software) as opposed to one submitted by student is displayed (Fig 5).

One of the difficulties encountered in teaching this subject is that there is usually a diverse range of usable options in each stage of planning. For this reason, many of the screens

ask the student to type in their own answer rather than respond to a multiple choice question. When they have finished they can proceed to see an expert answer and the question is asked: 'Was your decision as good as, or better than, ours?' This keeps the program on track while allowing students the freedom to have their own opinions. Minimum requirements for using the program are 486DX or Pentium processor with Windows 95/98, QuickTime 3.0 (included), 16MB memory, 16-bit (High Color) video, Sound card, 4x CD-ROM drive or Macintosh, PowerPC processor, System 7.1 or later, QuickTime 3.0 (included), 16MB memory, 16-bit (Thousands) capable video, 2x CD-ROM drive.

Results & Discussion:

The authors were particularly anxious not to assume that the evaluation would determine actual learning outcomes, for two reasons. Firstly, it is not always possible to say objectively that one diagnosis and treatment plan is better than another. Secondly, current educational thinking is leaning away from quantitative research in the evaluation of learning programs, since true learning outcomes cannot be quantitatively defined (3-4). Thus, the focus of the evaluation was to determine whether the program was helpful and easy to use.

100% students felt that periodontal diagnosis and treatment planning is important in clinical practice. Out of 57 students enrolled in this study, 40% students agreed that conventional textbooks or teaching techniques do not provide adequate training to plan periodontal diagnosis and treatment planning, 63% strongly agreed that conventional textbooks or teaching techniques do not provide adequate training to plan periodontal diagnosis and treatment planning. 100% found the way through the program easy, 58% students felt that it enhanced their knowledge about periodontal diagnosis and treatment planning, 48% students felt that program will increase

their confidence about oral rehabilitation, 35% students would prefer lecture instead of using this

Sr. no.	No. of students (n=57)	Point of view
1	23 (40%)	Conventional textbooks or teaching techniques do not provide adequate training to plan periodontal diagnosis and treatment planning
2	36 (63%)	Conventional textbooks or teaching techniques do not provide adequate training to plan periodontal diagnosis and treatment planning

program, 35% students found the program innovative, 35% students found the program informative, 21% students felt that case can be better evaluated through this program, 21% students felt that case study can be better evaluated by this program, whereas 33% students felt it provided better understanding for undergraduates, 16% felt that program was good, 44% felt that case discussion can improve this program. 67% students strongly agreed that this program should be used along with conventional techniques regularly (Table 1 & 2).

Table 1: Point of view of enrolled students on referring conventional textbooks

Table 2: Point of view of enrolled students on computer based program

Sr no.	Number of students (n=57)	Point of view on computer based learning programme
1	57(100%)	The way of diagnosis through the program was easy
2	33(58%)	It enhanced their knowledge about periodontal diagnosis and treatment planning
3	27 (47%)	Programme will increase my confidence about oral rehabilitation
4	20 (35%)	Found the program innovative
5	20 (35%)	Found the program as informative
6	9 (16%)	Felt that program was good
7	25 (44%)	Felt that case discussion can improve this program
8	38 (67%)	Strongly agreed that this program should be used along with conventional techniques regularly

When asked to associate positive and negative experiences with the program, most of the feedback answers were related to the typing required throughout the program and the perception that it was too long. The 'best things about the program' were perceived to be the interactive and self-paced nature of the learning process, as well as the graphics and the screen design and layout. Students also described the program in their own words as 'interesting', 'comprehensive' and 'relevant'. In response to the open ended questions 'What was the main thing you learnt?', most answers referred to the logical progression of planning, the insight into decision making and the need for flexibility in planning treatment. As has been found in other studies (5) some students did not want to forgo human tuition entirely. In response to the question 'would learning about oral rehabilitation be better in lectures?' 54% answered 'no', 30% wanted a combination of both, but 16% felt that lectures would be better.

Conclusion:

Periodontal diagnosis and treatment planning is a complex activity that must take various factors into consideration. It includes treatment options, time constraints, limitation of operator skills, patient compliance, and financial pressure. This complicated process was simplified and presented to students in a logical sequence in a case based CAL format. Overall student response was positive to its relevance, things learnt and ease of use of the program.

References:

- 1 Lanning SK, Pelok SD, Williams BC, Richards PS, Sarment DP, Oh TJ, et al. Variation in periodontal diagnosis and treatment planning among clinical instructors. *Journal of Dental Education* March 2005; 69(3): 326-337.
2. Johnson SD, Thomas R. Technology education and the cognitive revolution. *Technol Teacher* 1992; 51: 7–12.
3. Lechner SK, Thomas GA, Bradshaw M. An interactive multimedia solution to learning removable partial denture design. *J Prosthodont* 1998; 7: 177–182.
4. Davenport JC, Pollard DJ. Aspects of partial denture design, version 2. Educational software. The School of Dentistry, University of Birmingham 1993.
5. Lechner SK, Lechner KM, Thomas GA. Evaluation of a computer aided learning program in prosthodontic. *J Prosthodont* 1999; 8: 100–105.