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Does the teaching of caries risk assessment foster preventive-minded dental students?

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Abstract

Introduction: Nurturing preventive-minded dental students has been a fundamental goal of dental education. However, students still struggle to regularly implement preventive concepts such as caries risk assessment into their clinical practice. The objective of this study was to identify areas in the cariology curriculum that could be revised to help address this.

Methods: A total of 10 individuals participated and were divided into two focus group discussions. Thematic analysis was conducted, and key themes were identified based on their frequency of being cited before the final report was produced.

Results: Three major themes emerged: (1) Greater need for integration between the pre-clinical and clinical components of cariology; (2) Limited time and low priority that the clinical phase allows for practising caries prevention; and (3) Differing personal beliefs about the value and effectiveness of caries risk assessment and prevention. Participants cited that while didactics were helpful in providing a foundation, they found it difficult to link the concepts taught to their clinical practice. Furthermore, participants felt that they lacked support from their clinical supervisors, and patients were not always interested in taking action to prevent caries. There was also heterogeneity amongst students with regards to their overall opinion of the effectiveness of preventive concepts.

Conclusion: Nurturing preventive-mindedness amongst dental students may be limited by the current curriculum schedule, the prioritisation of procedural competencies, the lack of buy-in from clinical supervisors, and a perceived lack of relevance of the caries risk assessment protocol and should be addressed through curriculum reviews.

Keywords: *Dental Education, Caries Risk Assessment, Cariology, Preventive Dentistry, Qualitative Study, Clinical Teaching, Cariogram*

I. INTRODUCTION

According to the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2019, dental caries in permanent teeth affects an estimated 2 billion people globally yet it is largely preventable. Thus, nurturing preventive-minded dental students has been a fundamental goal of dental education, and a recurring topic of discussion among dental educators (Pitts et al., 2018). Apart from the operative management of dental caries with fillings, dental students are taught to conduct caries risk assessments for their patients. This enables students to construct a tailored caries prevention plan leveraging the use of fluoride varnishes or dietary advice to prevent the onset or progression of carious lesions. However, studies have reported that while students are taught to assess patients' risk for dental caries and customising preventive plans as part of the Cariology

curriculum, they struggle to regularly incorporate prevention into their clinical practice (Calderon et al., 2007; Le Clerc et al., 2021).

The objective of this study was to identify areas in the Cariology curriculum that could be enhanced to help dental students become more prevention orientated in their clinical practice.

II. METHODS

A. Cariology Curriculum at NUS

The Faculty of Dentistry, National University of Singapore offers a four-year Bachelor of Dental Surgery (BDS) programme, mainly divided into pre-clinical and clinical phases. The Cariology curriculum begins in Year 1, where pre-clinical students are equipped with an

understanding of the aetiology and pathogenesis of dental caries, along with its preventive and operative management. In Year 2, behavioural science and oral health education and promotion strategies are introduced. Commencing the clinical phase, Year 3 students are taught to utilise the Cariogram electronic assessment tool (D Bratthall, Computer software, Malmö, Sweden), to systematically assess a patient's caries risk by using self-reported information on plaque control, dietary habits, fluoride exposure, and other caries-related risk factors. From the Cariogram results, a patient's caries risk profile is generated to guide the development of a targeted caries prevention plan for the patient and aid in the delivery of patient education. A summative assessment is held during the final term of Year 4 where students are required to submit three patient case logs with caries risk assessments and prevention plans documented for one-to-one discussion with faculty members involved in the Cariology curriculum.

B. Study Design

An e-mail invitation was sent to the cohort of 2020 (N=55) within a month after the final examination results were released. Ten individuals responded, willing to participate and giving consent. Participants were divided into two groups where focus group discussions (FGDs) were conducted, held on a teleconferencing platform (Zoom Video Communications), facilitated by one study team member using a discussion guide. Audio recordings of the FGDs were transcribed by the facilitator and two other study team members. All the study team members conducted the thematic analysis. Key themes were identified based on their frequency of being cited.

III. RESULTS

Three major themes emerged from the FGDs.

A. Greater Need for Integration between the Pre-clinical and Clinical Components of Cariology

Participants felt that the pre-clinical lectures provided a foundational understanding of dental caries that they could draw from during their clinical phase of training. However, they suggested that the clinical application of Cariology, such as the use of the caries risk assessment (CRA), can be further emphasised at the beginning of the clinical phase of the BDS programme to reinforce its relevance and significance in the context of overall patient care.

"...not really on our mind when we enter clinics. Maybe the staff can run through the CRA assessment forms before entering clinics."

[P6]

Participants also highlighted that the three cases due in Year 4 could be submitted and discussed with faculty staff earlier in the clinical phase of the course to concretise concepts and allow an opportunity to implement suggested modifications to their patients' preventive plans.

"But CRA presentation could have been done earlier like in Year 3. Only after the discussion did it really stick in."

[P10]

"By the time it made sense, clinic was over."

[P6]

B. Limited Time and Low Priority to Practice Dental Caries Prevention in the Clinical Phase of Training

Participants shared that the main emphasis of a dental student's limited clinical time was on operative procedures, as it would mean fulfilling clinical competency requirements essential for graduation.

"As students, we're slow, so we want to maximise time for treatment rather than talking about prevention."

[P2]

"...there are other more important requirements."

[P9]

The low priority dental students accorded to dental caries prevention was also influenced by their clinical supervisors. Some participants noted that their clinical supervisors did not appear keen to discuss caries risk assessment findings during the clinical sessions and did not provide guidance on developing caries prevention plans.

"It is just a two-way thing between patients and students, and not with assessors"

[P3]

"In the clinics no one really checks our caries risk assessments."

[P1]

Participants also perceived a lack of interest among patients regarding prevention which discouraged them from providing advice.

“Out of the 30 (patients) I saw, only one was interested in oral hygiene instructions and good oral practices.”

[P2]

C. Differing Personal Beliefs about the Value and Effectiveness of Caries Risk Assessment and Prevention

There was a diverse spread of beliefs among participants about the value and effectiveness of caries risk assessment and caries risk management in clinical practice. Several participants saw the value of caries risk assessments and preventive management as necessary tools to help patients prevent the onset and progression of dental caries.

“Caries risk and prevention is what dentistry is about. It would shape preventive strategies and conversations.”

[P10]

“Knowing how to assess risk for the individual is meaningful as it helps employ more time-effective approaches to managing the patient.”

[P5]

Contrastingly, some participants felt that performing caries risk assessments had little added benefit in guiding their preventive advice as,

“...in the end the advice given is the same regardless...”

[P1]

“I didn’t really have to go through the caries risk assessment to tell them what good habits to have.”

[P7]

IV. DISCUSSION

The findings present several perceived barriers that students face from having a more prevention oriented clinical practice. As dental schools focus heavily on procedural competencies, students will place a larger emphasis on fulfilling these requirements and less on assisting their patients with preventive regimes. Furthermore, the duration of the clinical phase of dental training is insufficient to see the results of the preventive advice given, such as a reduction in incidence of new carious lesions, resulting in students finding its impact

less meaningful or tangible as compared to placing a filling or extracting a tooth. One solution is to implement formative grading systems in place of the current summative assessments where students would actively identify patients at risk of caries and conduct one-to-one case discussions with their supervisors throughout the clinical phase and be graded accordingly. This system allows for opportunities to reinforce caries prevention concepts and patient management skills throughout the duration of the clinical training instead of only at the end. To address the scepticism some of the students may have with regard to caries risk assessment, steps to address misconceptions may need to be established (Maupome & Isyutina, 2013). A clearer delivery of concepts at the lecture sessions and opportunities during one-to-one case discussions could be implemented in the revised curriculum.

A frequent theme that emerged was the lack of buy-in from the clinical supervisors about carrying out caries risk assessments and preventive management in the student clinics. This may not be surprising as similar sentiments were reported in a recent qualitative study among practising dentists (Leggett et al., 2021). Majority of clinical supervisors are not involved in teaching Cariology and hence it may be necessary to align them with the teaching of caries management paradigms and their roles in informing preventive treatment plans. This can enable them to reinforce such concepts when they supervise the students in the clinics.

The lack of interest in preventive advice among the participants’ patients is similarly observed in other countries - patients know about prevention but are not interested to change (Leggett et al., 2021). Clinical supervisors can encourage dental students to consider different methods of patient engagement through techniques such as Motivational Interviewing, or even take the opportunity to exploit behavioural change models to effect a more pro-prevention lifestyle. In so doing, patients may appreciate better the importance of prevention from various perspectives including the associated cost savings with a reduction in the operative management of dental caries.

The issues highlighted through the FGDs are summarised in Table 1 together with possible modifications.

Issues identified in the focus groups	Proposed modifications to address issues
Students are not able to implement concepts taught in the pre-clinical phase of the Cariology curriculum during the clinical phase.	Conduct routine and timely revision of preventive concepts, including scheduling case discussions earlier in the clinical phase of the BDS programme.
Students place a high priority on procedural competency and less emphasis on preventive considerations.	Formative assessments of preventive plans integrated into clinical training processes instead of an end-of-programme assessment.
Clinical supervisors do not offer sufficient support for students to practise caries risk assessment in the clinic.	Greater involvement of supervisors in the Cariology curriculum so there is a common appreciation of the contemporary caries risk assessment and management paradigms.
Patients may be more interested in receiving restorative treatment than learning preventive strategies.	Greater emphasis on behavioural change strategies and improving patient communication and engagement skills.
Some students remain sceptical about the effectiveness of implementing caries risk assessment into their practice.	Improve the delivery of concepts at the lecture sessions and provide opportunities during one-to-one case discussions to address misconceptions.

Table 1. Issues identified in the FGDs and possible mitigating modifications to the current Cariology curriculum

V. CONCLUSION

Nurturing preventive-mindedness among dental students may be limited by the current curriculum content and delivery, the prioritisation of procedural competencies, the lack of buy-in from clinical supervisors, and a perceived lack of relevance of the caries risk assessment protocol. Nevertheless, prevention remains the best cure for dental caries and the issues raised through the FGDs can be addressed through curricular modifications discussed earlier. This will, in turn, enhance the preventive-mindedness of the dental students.

Notes on Contributors

GLKY conceptualised the study, participated in data collection, analysis, and interpretation, drafted the manuscript, and approved the final version to be published.

LYH conceptualised the study, participated in data collection, analysis, and interpretation, critically revised the manuscript, and approved the final version to be published.

WML conceptualised the study, critically revised and approved the final version of the manuscript

CGE designed the methodology, participated in data collection, analysis, and interpretation, and critically revised and approved the final version of the manuscript.

Ethical Approval

This study was approved by the NUS Institutional Review Board (IRB No: S-20-141E).

Data Availability

The transcripts/data of this qualitative study are not publicly available due to confidentiality agreements with the participants.

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Declaration of Interest

The authors have no conflicts of interest to declare.

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