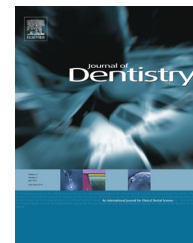


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Baseline caries risk assessment as a predictor of caries incidence



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ABSTRACT

Few studies have evaluated clinical outcomes following caries risk assessment in large datasets that reflect risk assessments performed during routine practice.

Objectives: From clinical records, compare 18-month caries incidence according to baseline caries risk designation.

Methods: For this retrospective cohort study, data were collected from electronic records of non-edentulous adult patients who completed an oral examination and caries risk assessment (CRA) at a university instructional clinic from 2007 to 2012 ($N = 18,004$ baseline patients). The primary outcome was the number of new decayed/restored teeth from the initial CRA to the ensuing oral examination, through June 30, 2013 ($N = 4468$ patients with follow-up). We obtained doubly-robust estimates for 18-month caries increment by baseline CRA category (low, moderate, high, extreme), adjusted for patient characteristics (age, sex, payer type, race/ethnicity, number of teeth), provider type, and calendar year.

Results: Adjusted mean decayed, restored tooth (DFT) increment from baseline to follow-up was greater with each rising category of baseline caries risk, from low (0.94), moderate (1.26), high (1.79), to extreme (3.26). The percentage of patients with any newly affected teeth (DFT increment > 0) was similar among low-risk and moderate-risk patients (cumulative incidence ratio, RR: 1.01; 95% confidence interval, CI: 0.83, 1.23), but was increased relative to low-risk patients among high-risk (RR: 1.28; 95% CI: 1.10, 1.52), and extreme-risk patients (RR: 1.52; 95% CI: 1.23, 1.87).

Conclusions: These results lend evidence that baseline caries risk predicts future caries in this setting, supporting the use of caries risk assessment to identify candidate patients for more intensive preventive therapy.

Clinical significance: Identification of patients at greater risk for future caries helps clinicians to plan appropriate personalized care. In this study, a multifactorial approach to caries risk assessment effectively stratified patients into groups of higher or lower caries propensity. Dentists can apply risk assessment in practice antecedent to patient-tailored caries management.

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1. Introduction

A widely supported expert- and evidence-based strategy for the treatment and prevention of dental caries involves collecting patient-specific caries risk information and using that information to guide individualized treatment decisions, with emphasis on minimally invasive and/or non-operative therapies, such as remineralizing or antibacterial agents, to manage caries as a disease process.^{1–3} However, there is not an extensive literature that evaluates the effectiveness of current clinical risk assessment strategies to classify patients into reliable risk categories. Prognostic stratification would allow the clinician to offer personalized caries prevention and management, with the most intensive preventive therapy reserved for those patients at the greatest caries risk.

A recent systematic review concluded that the evidence supporting the predictive ability of existing caries risk assessment (CRA) systems is limited and that whether identification of high-risk patients improves clinical outcomes is unknown.⁴ Of the few prospective studies to assess CRA-based caries prediction in adults, in one study of 100 young adults⁵ and in another of 148 older individuals,⁶ baseline caries risk was associated with future caries. In a seven-year retrospective analysis of 200 low-risk and 200 high-risk patients attending public clinics in Sweden (in which risk status was determined by the extent of carious lesions present at baseline), initially high-risk patients experienced a significantly greater increase in caries experience.⁷ Large-scale evaluation of systematic approaches to risk assessment is an essential step towards widespread incorporation of risk-based caries management into dental practice.

Caries Management by Risk Assessment (CAMBRA) is one approach for patient-specific caries management, of which the first step involves categorizing caries risk based on the clinician's overall assessment of the patient's disease indicators, caries protective factors, and caries predisposing factors.^{8,9} Thus, the CAMBRA approach considers both recent disease history (e.g., radiographically detectable lesions) and biological or behavioural predisposing conditions (e.g., salivary flow rate and snacking habits) as contributory factors to disease risk. CAMBRA clinical guidelines recommend that adults deemed at elevated caries risk are subsequently offered more intensive preventive treatment, such as antibacterial therapy and remineralizing agents.¹⁰

In this study, we aimed to assess the predictive capacity of the CAMBRA caries risk assessment tool by using electronic patient records at a university clinic where CAMBRA is emphasized. Previously, in a retrospective cohort study at the same clinic, higher baseline caries risk designation was associated with the recording of cavitated lesions at subsequent caries risk assessments.¹¹

Here, we assessed a more recent cohort of patients and compared caries occurrence by baseline caries risk category, using treatment and diagnostic codes entered into electronic patient records to measure caries outcomes. Specifically, we aimed to test the hypothesis that caries increment, defined as the number of new decayed/restored teeth from baseline CRA to the subsequent periodic oral evaluation,

will be greater with each increasing category of baseline caries risk.

2. Subjects and methods

2.1. Population

This retrospective cohort study drew clinical data from electronic patient records at the student dental clinic of the University of California San Francisco (UCSF). This study received approval from an institutional review board at UCSF to use retrospective patient data to evaluate clinical outcomes according to existing caries management practices.

Eligible for the study were all non-edentulous patients (≥ 1 teeth, third molars excluded), age 18 years or older, who completed at least one full oral examination (new patient or recall) between July 1, 2007 and December 31, 2012 ($N = 23,622$) (Fig. 1). Included for analysis were those patients with a designated caries risk status category associated with the baseline examination ($N = 18,004$). Of these patients, 4468 completed at least one follow-up periodic oral examination a minimum of 180 days after baseline (mean follow-up time: 539 days; SD: 257 days). Table 1 shows the characteristics of the baseline and follow-up samples.

2.2. Outcomes of interest

Across the four caries risk categories (low, moderate, high, and extreme), we compared two caries incidence measures from baseline to follow-up: the number of new decayed and restored teeth (DFT increment) and the presence of any new decayed or restored teeth (DFT increment > 0).

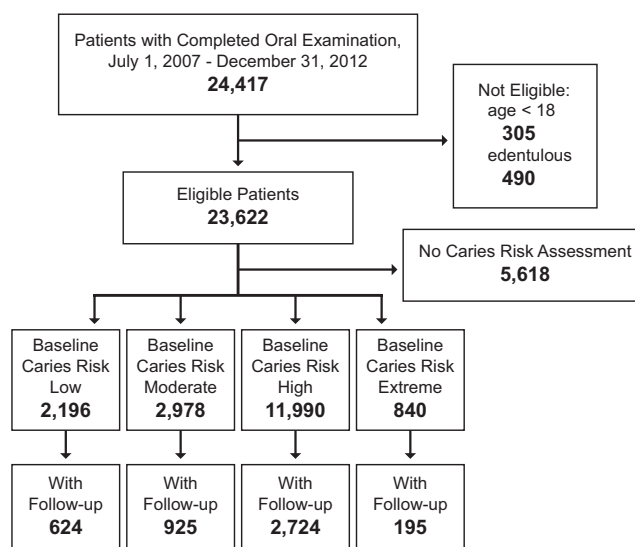


Fig. 1 – Participant flow diagram by inclusion criteria, caries risk assessment, and follow-up. Of all clinic patients with a completed oral examination from July 1, 2007 through December 31, 2012, the analytic sample included 18,004 eligible patients with a caries risk assessment.

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