Toward Implementing Primary Care at Chairside: Developing a Clinical Decision Support System for Dental Hygienists

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Abstract

Introduction: The goal of this project was to use the Consolidated Framework for Implementation Research (CFIR) as the theoretical foundation for developing a web-based clinical decision support system (CDSS) for primary care screening and care coordination by dental hygienists at chairside.

Methods: First, we appraised New York State education and scope of practice requirements for dental hygienists with input from health experts who constituted a Senior Advisory Board for the project, and reviewed current professional guidelines and best practices for tobacco use, hypertension and diabetes screening, and nutrition counseling at chairside. Second, we created algorithms for these four health issues (tobacco, hypertension, diabetes, and nutrition) using evidence-based guidelines endorsed by authoritative professional bodies. Third, an information technology specialist incorporated the algorithms into a tool using an iterative process to refine the CDSS, with input from dental hygienists, dentists, Senior Advisory Board members and research staff.

Results: An evidence-based CDSS for use by dental hygienists at chairside for tobacco use, hypertension and diabetes screening, and nutrition counseling was developed with the active participation of the individuals involved in the implementation process.

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Conclusions: CDSS technology may potentially be leveraged to enhance primary care screening and coordination by dental hygienists at chairside, leading to improved patient care. Using the CFIR as a pragmatic structure for implementing this intervention across multiple settings, the developed CDSS is available for downloading and adaptation to diverse dental settings and other primary care sensitive conditions.

Keywords: Dental hygienist, Primary care, Clinical decision support system, Implementation science, Health screening, Care coordination.

INTRODUCTION

A considerable body of evidence has long existed concerning the links between general and oral health.[1] The landmark 2007 guidance document, *Report of the Independent Panel of Experts of the Scottsdale Project* underscored the significance of oral health in promoting whole body health, and the importance of medical-dental collaboration in improving patient outcomes.[2] Since tobacco use is a leading cause of oral pathology,[3] there is compelling cause to involve dental providers in evidence-based cessation services. More than 3 decades ago, McCarthy made a plea for measurement of blood pressure at the initial physical evaluation of the adult dental patient, along with pulse, temperature, respiration, height, and weight.[4] Strauss and colleagues have been pivotal in demonstrating that gingival crevicular blood collected at chairside can be used to screen for diabetes and monitor glycemic control during dental visits.[5] Finally, in light of the demonstrated relationship between sugar-sweetened beverage (SSB) intake and caries risk, Marshall has argued that all dental practices should assess patients' SSB intake and tailor dietary recommendations accordingly.[6]

The 2009 Health Information Technology for Economic and Clinical Health (HITECH) Act provides financial incentives for use of certified electronic health records (EHRs) by eligible providers, including dentists.[7] This may potentially spur better coordination of patient care by the medical and dental professions, but evidence-based tools are needed to abet this desired outcome. We conducted formative research to explore dental hygienists' and dentists' perspectives regarding the integration of primary care activities into routine dental care, and assess the needs of dental hygienists and dentists regarding primary care coordination activities and use of information technology to obtain clinical information at chairside.[8] Findings were that dental hygienists are well positioned to facilitate greater integration of oral and general health care, but that challenges exist, including the lack of evidence-based knowledge, coordination with dentists, and systems-level support.[8]

Using the Consolidated Framework for Implementation Research (CFIR) as our theoretical foundation,[9] we built upon this formative research to approach the development of a web-based clinical decision support system (CDSS) for primary care screening and care coordination by dental hygienists at chairside (see Figure 1).

In essence, a web-based CDSS is an information technology-based system designed to provide expert support to improve clinical decision-making.[10,11] For this project, the intervention is a CDSS designed specifically for dental hygienists to aid in primary care screening and coordination at chairside. That is, the CDSS is intended to combine the tenets of evidence-based medicine and dentistry, provider knowledge, existing research, and patient values and preferences into a tool to aid dental hygienists in selecting the appropriate course of action for each patient.[12] Evidence-based clinical decision support tools have been previously used in dentistry not only to facilitate clinical decision-making around gingival recession, root exposure, caries, dental sealants, decay prevention, and topical fluoride guides, but also to enhance transfer of knowledge to patients at the point of care.[13]

In a systematic review of trials to identify CDSS features critical to their success, four features were identified as independent predictors of improved clinical practice: automatic provision of decision support as part of clinician workflow, provision of recommendations rather than just assessments, provision of decision support at the time and location of decision-making, and computer-based decision support.[14] In addition to incorporating these features into our approach, we also worked closely with dental hygienists at every stage of the research process, to ensure that the developed CDSS would meet both their standards for clinical dental hygiene practice[15] and workflow preferences.

METHODS

Overview

The sequence of developing the CDSS for use by dental hygienists at chairside is illustrated in Figure 2.

Toward ensuring the CDSS might be rigorously evaluated, used in clinical practice, and improve patient care, we elected to follow the recommendation to evaluate the CDSS in two stages: laboratory and field testing.[16] In