SPECIAL COMMUNICATION

Charting a Course for Implementation Research in Oral Health

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Knowledge Transfer Statement:

This article provides an overview of implementation science and outlines NIDCR's interest and commitment to research that decreases time from development through implementation of evidence-based oral health interventions.

Keywords: implementation science, oral health research, evidence-based interventions, de-implementation, dental health services, diffusion of innovation

As part of the National Institute of Dental and Craniofacial Research (NIDCR) efforts to encourage research on effective strategies for promoting widespread use of evidence-based oral health practices, we convened a meeting in April 2015 to seek recommendations from a multidisciplinary group of experts on building a science of implementation research in oral health. Discussion centered on 4 main topic areas: differentiating implementation research from effectiveness research, determining when clinical practices are ready for scale-up or de-implementation, identifying potential levers for practice change, and assessing existing infrastructure to support implementation

research. Implementation researchers with experience in other health care fields provided important “lessons learned” to ground the discussion (NIDCR 2015). This article describes the discussion as well as opportunities for implementation research in oral health at NIDCR.

The dental, oral, and craniofacial (DOC) research community has a long history of developing interventions designed to help patients and providers in prevention, detection, and treatment of DOC conditions. Emerging evidence on effective interventions is usually disseminated through peer-reviewed publications, conference presentations, training programs, and professional networks. Likewise, professional associations develop and disseminate clinical practice guidelines and promote the use of consensus best practices. While these dissemination efforts have led to some successes, there continues to be a large gap between research and practice that suggests new approaches are needed to change the standard of care. As in other fields of health care and public health, delivery of DOC care does not always reflect timely, optimal, or consistent adoption of evidence-based

interventions. Alternative strategies are needed to realize the full potential of scientific research.

Implementation science endeavors to close the research-practice gap by developing replicable, scalable strategies to promote widespread uptake and use of interventions with proven efficacy in real-world clinical settings. Just as clinical (preventive or treatment) interventions target known genetic, behavioral, and environmental determinants of disease, implementation strategies target known barriers—or leverage known facilitators—to change behaviors of systems, settings, practitioners, and/or patients in ways that promote the use of evidence-based interventions. Longstanding reliance on continuing education training as a stand-alone strategy has proven to be insufficient for effecting change; systemic, multicomponent strategies need to be developed to address the multilevel contexts in which care is delivered.

In dentistry, pit-and-fissure sealants provide an illustrative example of implementation challenges. Placement of sealants on pits and fissures of permanent first molar teeth is supported by many professional organizations,

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including the American Dental Association, American Association of Public Health Dentistry, and the American Academy of Pediatric Dentistry. Placement of sealants is included in the ADA Clinical Practice Guidelines and in the Healthy People 2020 goals. Yet, according to the most recent National Health and Nutrition Examination Survey (NHANES), only 40.5% of children aged 6 to 11 y received sealants on their permanent teeth (Dye et al. 2015). Having defined the scope of this implementation gap, what are the factors that explain it, and what strategies could be used to address it?

Distilled to their common components, most conceptual models of implementation attend to 4 domains: characteristics of the evidence-based practice (EBP) to be implemented; actors implicated in the implementation process (providers and consumers); service delivery context, writ large and small; and multiple phases of the implementation process (Damschroder et al. 2009). Identifying key facilitators and barriers to adoption of dental sealants in each of these domains may suggest a road map for developing potential implementation strategies to increase their uptake.

Characteristics of the Evidence-Based Practice to Be Implemented

Rogers (2003) identifies several characteristics of interventions that increase their chances of adoption: compatibility with current practice; relative advantage over existing options; complexity of use; “trialability,” or ability to test out the intervention on a trial basis; and observability—ability to see that the intervention has the intended result. Any target EBP can be assessed against these characteristics to identify potential implementation barriers and suggest implementation strategies. For example, if dental practitioners elect not to use sealants because their personal experience leads them to doubt their effectiveness, then an implementation strategy might provide opportunities to observe the long-term outcomes of

sealants in patients with and without routine follow-up visits. If apparent complexity is a barrier, then user-friendly guides made available at point of care may be an important implementation component.

Sealants and other EBPs might also be assessed relative to real or perceived quality of the evidence base; perceived weakness in the evidence may undermine efforts at widespread adoption. If new recommendations contradict a provider's years of professional experience, then implementation strategies should include communication activities to not only disseminate the new guidance but also summarize the scientific evidence invalidating outdated practices. Finally, acceptability should also be assessed; if the EBP is not acceptable to providers, implementers should further assess these barriers and whether and how acceptability might be addressed—for example, through hands-on experience (leveraging the trialability and observability domains) or peer mentoring programs.

Patient Characteristics and Preferences

While much of the focus in implementation research is on changing the behavior of health care providers and organizations, less attention has been paid to including the patient in the implementation process. Implementation strategies that can effectively educate consumers about current clinical practice guidelines, state-of-the-art treatments, and availability of insurance coverage or other cost-saving programs may influence uptake of EBPs by creating demand for them. This requires research on patients' understanding of sealant safety, efficacy, and availability. To the extent that consumers receive mixed messages about sealants, strategies to help them evaluate these messages (e.g., to differentiate evidence from advertising) can further shape demand. If programs prioritize sealants for children deemed to be “high risk,” then parents may need to be educated about how

risk is determined and what it means. If affordability of sealants is a concern for parents, strategic placement and availability of school-based sealant programs may help to close the implementation gap.

Provider Knowledge, Support, and Self-Efficacy

Successful implementation of EBPs and clinical practice guidelines depends on the willingness and ability of health care providers to change the way care is delivered. Certainly curriculum design and continuing education programs—as well as incentives to participate in them—are a critical tool for disseminating current and correct information about state-of-the-art clinical practice. While continuing education is often the de facto implementation approach in many areas of health care, implementation strategies that rely on clinician training alone are generally less effective than multifaceted, multilevel approaches.

Service Delivery Context

Implementation strategies must adapt to the local context in which EBPs are to be adopted. Contextual factors include such issues as the physical organization of practice settings and the division of labor. Implementation strategies might include work redesign to facilitate the use of EBPs. For example, in states where dental assistants are authorized to place sealants, implementation strategies might address efficient division of labor within a dental practice to integrate sealant placement into the routine workflow. Other contextual factors include local policies, which may facilitate or constrain certain implementation options. For example, where school-based sealant programs are available, implementation strategies might promote interorganizational coordination between dental practices and schools to achieve consistent messaging about oral health and caries management. Other interorganizational coordination strategies might effectively

address the provision of services—or referral to services—of patients who lack insurance coverage or require a more flexible means of payment.

Stages of Implementation

The adoption of EBP and clinical practice guidelines can be viewed as a staged process, in which practitioners move from general awareness of new recommendations, to an evaluation of this new evidence and consideration of the pros and cons of implementing changes in current practice, to an active planning and adoption process, and finally to full and sustained implementation. Effective implementation strategies should match the stage and readiness of the provider, and variations in stages across settings and over time should be taken into account.

Dental sealants are of course only one of a number of EBPs and guidelines that may be the subject of an implementation effort. But the domains (or levels) described here are common across all potential clinical practice changes. Any identified barrier to the widespread adoption of an EBP is a potential target for an implementation intervention—and in grantsmanship terms, it is an opportunity for theoretically grounded, hypothesis-driven research to develop and test one or more implementation strategies. The domains detailed above can provide the scaffolding for the design of implementation research studies. Investigators are encouraged to ground their study designs in a conceptual framework and to develop implementation strategies according to one or more established theories of organizational, clinician, or patient behavior change. Research should balance the influence of local context with the goal of creating replicable, generalizable, scalable strategies that can have a sustained impact beyond a single organization. Measures and methods—both qualitative and quantitative—should be selected to ensure rigorous tests of prespecified hypotheses. And implementation strategies should be

clearly specified in terms of content, dose, sequence, and duration—and their fidelity assessed—such that they provide us a look inside the black box of implementation to understand how practice change is achieved.

Dental sealants represent only one example of the research-to-practice gap in dental, oral, and craniofacial health care. Other examples at the patient level include low compliance with topical fluoride use by irradiated head and neck cancer patients and inadequate daily oral hygiene practices. At the provider level, dentists vary in their recommendations for adults to use caries preventive agents, as well as in the provision of in-office caries-preventive agents to adults. Dentists with a conservative approach to caries treatment are the most likely to use and recommend the use of caries-preventive agents. The use of existing implementation science methodologies, as well as the development and testing of rigorous new methodologies, is needed to close this temporal gap between establishment of the evidence base and uptake/adoption in clinical practice.

NIDCR has a strong commitment to supporting basic, translational, and clinical research to develop and establish the efficacy of DOC interventions. Implementation science is closely aligned with the NIDCR mission, which emphasizes the timely transfer of knowledge gained from research to the public, health professionals, and policy makers. This is evidenced by NIDCR's strategic plan to support the best science to improve dental, oral, and craniofacial health (NIDCR 2014). We hope this commentary on implementation science in DOC health serves as an invitation to the research community to focus efforts on understanding how best to move evidence-based DOC interventions into practice.

Author Contributions

D.B. Clark, contributed to conception, design, and data acquisition, drafted and critically revised the manuscript; L. Ducharme, contributed to conception,

design, data acquisition, analysis, and interpretation, drafted and critically revised the manuscript. All authors gave final approval and agree to be accountable for all aspects of the work.

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