



An analysis of adaptations to multi-level intervention strategies to enhance implementation of clinical practice guidelines for treating tobacco use in dental care settings

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ABSTRACT

Introduction: Our team conducted a cluster randomized controlled trial (DUET) that compared the effectiveness of three theory-driven, implementation strategies on dental provider adherence to tobacco dependence treatment guidelines (TDT). In this paper we describe the process of adapting the implementation strategies to the local context of participating dental public health clinics in New York City.

Methods: Eighteen dental clinics were randomized to one of three study arms testing several implementation strategies: Current Best Practices (CBP) (i.e. staff training, clinical reminder system and Quitline referral system); CBP + Performance Feedback (PF) (i.e. feedback reports on provider delivery of TDT); and CBP + PF + Pay-for-Performance (i.e. financial incentives for provision of TDT). Through an iterative process, we used Stirman's modification framework to classify, code and analyze modifications made to the implementation strategies.

Results: We identified examples of six of Stirman's twelve content modification categories and two of the four context modification categories. Content modifications were classified as: tailoring, tweaking or refining (49.8%), adding elements (14.1%), departing from the intervention (9.3%), loosening structure (4.4%), lengthening and extending (4.4%) and substituting elements (4.4%). Context modifications were classified as those related to personnel (7.9%) and to the format/channel (8.8%) of the intervention delivery. Common factors associated with adaptations that arose during the intervention included staff changes, time constraints, changes in leadership preferences and functional limitations of the Electronic Dental Record.

Conclusions: This study offers guidance on how to capture intervention adaptation in the context of a multi-level intervention aimed at implementing sustainable changes to optimize TDT in varying public health dental settings.

1. Introduction

In the field of practice improvement there is growing consensus for the need to balance intervention fidelity and adaptation in order to optimize the implementation and sustainability of evidence based practices in health care settings [1–3]. An exclusive focus on fidelity may result in poor fit and short-term gains that are not sustainable, however adaptations that change essential components of an intervention may not produce the results achieved in efficacy trials. Balancing this tension requires an understanding of how to deliver

interventions with appropriate fidelity while allowing for adaptations to fit local context [1].

Formative evaluations are often used to tailor interventions to different settings prior to program implementation [4,5]. However, there are often a number of unexpected implementation barriers within clinical settings that cannot be predicted prior to the intervention's initiation [1]. Unfortunately, effectiveness and implementation studies rarely capture the rationale, nature and number of implementation adaptations, and the process by which adaptations were made in a systematic or consistent manner [2,6].

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Our team conducted a cluster randomized controlled trial that compared the effectiveness of three theory-driven implementation strategies on dental provider adherence to tobacco dependence treatment (TDT) guidelines [7]. In this paper, we describe the process of adapting the implementation strategies to the local context in dental public health clinics in New York City (NYC) [2]. Stirman's framework offers guidance for classifying the types of modifications made when interventions are implemented. The current study provided an opportunity to apply Stirman's model in dental public health care settings in which there is little data on barriers and facilitators to achieving system changes for quality improvement (QI). Findings will contribute to the methodology for measuring adaptations to inform scale-up and sustainability of evidence-based practices for promoting adherence to TDT guidelines.

2. Methods

2.1. Study context and setting

This analysis was conducted in the context of a three-arm cluster randomized controlled trial, the DUET (Dentists United to Extinguish Tobacco) Project, that evaluated system-level strategies for implementing practice guidelines for TDT in 18 dental health clinics from 2013 to 2017. These strategies included: ARM 1) Staff training and current best practices (CBP) which included a chart system to prompt tobacco use screening, brief counseling and cessation pharmacotherapy, and a system to refer patients to cessation counseling resources; ARM 2) CBP + performance feedback (PF); and ARM 3) CBP + PF + pay for performance (P4P) [8–17]. Table 1 describes the characteristics of participating clinics and dental providers. Fifteen of the 18 sites used an electronic record, but these varied across sites. The mean number of dentists per site was 17.5. There was wide variation in the number of DDS/DMDs (SD 10.9), in large part because several sites included residency programs and residents were included in the DDS/DMD category.

2.2. Intervention (implementation strategies)

Table 2 highlights the core implementation strategies. All study sites were required to make dental clinic staff available for a 1 h training that included an overview of evidence-based approaches for treating tobacco use, a demonstration of how to use their chart system to screen for tobacco use and document cessation assistance (i.e., brief

counseling, referral) and how to refer patients to the state Quitline and/or their local cessation program. About midway (4.5 months) through the nine-month intervention, sites received a “booster” training to reinforce the tobacco treatment workflow, and to address questions or barriers experienced since the initial training in CBP. Sites randomized to ARMs 2 and 3 also received quarterly performance feedback reports on provider delivery of cessation services using chart audit procedures. ARM 3 sites additionally received \$20 for each patient with chart documentation that a tobacco user received cessation assistance (i.e., brief counseling, referral, and/or prescription). Details of the study design are described in a previous publication [7].

2.3. Data sources

We used a mixed methods approach, drawing from multiple data sources, to categorize and code modifications made to the DUET intervention/implementation strategies.

- (1) *Needs Assessment*: Upon enrollment, each participating Dental Director completed a baseline survey to capture organizational characteristics. For example, the survey captured staffing structures and whether clinics had a Dental Residency program. Furthermore, the DUET project coordinator met with each clinic's Dental Director, in addition to other relevant clinic staff (i.e. Clinic Manager, Administrator, Information Technology (IT) staff), to conduct a baseline assessment of current workflow (i.e., staff roles and responsibilities related to tobacco use and timing and process of documenting tobacco use and cessation assistance in the chart). The assessment also included a detailed review of the Electronic Dental Record's (EDR) functionality including the capacity to extract TDT quality indicators for performance reports and to evaluate the presence and location of a section that prompted screening and documentation of tobacco use. With input from the Dental Director and other members of the research study team, the Project Coordinator identified the initial modifications that were needed to ensure that sites could implement the prescribed intervention elements and what types of modifications were needed to maximize intervention fidelity.
- (2) *Site Observations*: Sites visits were conducted by the project coordinator at baseline, 4.5-months and 9-months post-intervention. We used a site observation tool which captured use and implementation of TDT clinical processes and workflows, such as location of smoking status documentation in the EDR, how Quitline referrals were made, and whether patient educational materials were visible and accessible.
- (3) *Field Notes*: During the intervention period, the DUET Project staff and dental clinic leadership discussed challenges that might have arisen in implementing the intervention components and made shared decisions about any necessary modifications. Extensive notes were taken during these discussions. The weekly DUET research meetings also included review and discussion of proposed modifications to the study intervention protocol. Additionally, we reviewed the training power point slides, feedback reports, and clinical workflow maps that were tailored for each site.

2.4. Coding of modifications

Through an iterative process, we used Stirman's modification framework to classify and code post-hoc modifications made to the DUET intervention. The framework considers the levels of modification delivery, including by and for whom modifications were made, and the context or content of each modification [2]. Two DUET team members (CK, AC) independently reviewed and extracted information from the study data sources to identify and categorize the types of content and context modifications made to the DUET intervention. This initial coding schema was first applied to a subset of six sites, allowing for

Table 1
Characteristics of participating dental clinics.

Dental Clinics Characteristics (n = 18)		
Dental Clinic Type	n	%
Hospital affiliated	5	28%
Federally Qualified Health Center	8	44%
Other	5	28%
Member of a Practice Based Research Network (PBRN)		
Yes	8	44%
No	4	22%
Don't know	6	33%
Type of Dental Record Used		
Paper	3	17%
Electronic	15	83%
Clinic Volume		
Small (100–400 adult patients per week)	11	61%
Medium (401–750 adult patients per week)	4	22%
Large (> 750 adult patients per week)	3	17%
Number of Full-Time and Part-Time Dental Care Providers	mean	SD
Dentists (DDS, DMD)	17.5	10.9
Specialists	2.4	4.8
Dental Hygienists	1.4	1.1
Dental Assistants	3.8	5.7

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