Tailored Informatics for Diet and Exercise (TIDE): The design of a tailored obesity prevention intervention for pediatric primary care

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Abstract: The overarching purpose of this study was to design an intervention that delivers tailored printed material about obesity prevention behaviors (based on health recommendations) to parents and providers at the point-of-care. The present study focuses on the design of the tailoring system (computer application) and the tailored report (intervention content). The tailoring application compiles questionnaire data from parents of children aged 4-10 years and uses this information to generate a tailored report about obesity prevention behaviors. Health messages are tailored to a parent’s stage of change, self-efficacy and perceived importance of engaging in one of five possible behaviors (sugary drinks, fruit juice, fruits and vegetables, physical activity and television viewing). Mixed methods and rapid prototype testing were used to design the tailored report template. Major steps included 1) user-centered design of the report, 2) creating a library of messages, 3) design and programming of the tailoring system, and 4) acceptability and feasibility testing in a pediatric clinic. The results of the pilot may shed light on the potential for integrating the application with an EHR or patient portal.

Background: A common approach to delivering patient health education materials in pediatric practices is either by posting them in the waiting room or encouraging providers to hand-out materials during a visit. These passive methods rely on the motivation and memory of the providers. Practices with electronic health record systems (EHR) can include triggers to remind the provider to print participatory guidance and other patient education materials at the point-of-care. The content of these materials are typically targeted messages based on the age of the child or generic, one-size-fits-all messages for a specific disease or condition. While generic materials are more convenient and easily produced, they are less effective at changing health behaviors than tailored health messages. Tailored messages are those that are designed for a specific individual and use available information about the patient which is typically gathered from a questionnaire completed by the patient. The EHR could be used to track behavioral data and generate tailored health messages about disease prevention and management.

Public health efforts to prevent obesity have included encouraging pediatric clinicians to counsel patients on healthy behaviors using the 5-2-1-0 approach, i.e., 5 servings of fruits and vegetables, 2 hrs or less of screen-time, 1 hr of physical activity and no sugar sweetened beverages (Letsmove.org). The purpose of this study was to develop a message tailoring system for obesity prevention that delivers individualized patient education materials for 5-2-1-0 behaviors to parents and their child’s provider at the point-of-care, specifically the well-child visit. This paper describes the design of the tailoring system and the tailored report, called Tailored Informatics for Diet and Exercise (TIDE).

Description of the Tailoring System, Tailored Informatics for Diet and Exercise (TIDE): Theoretical constructs (readiness to change, self-efficacy and importance) were used to inform the intervention, i.e., message content. The TIDE system consists of three main components (1) a web-based, open source survey tool REDCap, (2) relational database which stores participant data, user reports, tailoring logic, and theory-based messages, and (3) web-based application TIDE, a set of software components to manage data, logic flow, and create and store participant reports. Both system components, REDCap and TIDE, are accessible on any internet connected device and both user interfaces are designed for persons with minimal programming experience. The system supports importing participant data, custom report templates, writing tailored messages, and creating tailoring logic. The Message Library
component of the application allows the user to create and edit tailored messages and the corresponding tailoring logic for message selection. The User Reports component supports uploading a custom report template and generates a tailored report using the uploaded template. Finally, the User Data component allows the user to import, view, and edit participant data.

**Study Procedures:** The following study was approved by the UMass Boston Institutional Review Board. A tailoring system requires data input to produce a custom report for an individual, i.e., the tailoring mechanism is based on scores from questionnaires which are used to pull the appropriate message from the message library. For that purpose, a separate study was used to develop a set of questionnaires that assessed 5-2-1-0 behaviors and the theoretical constructs of readiness, self-efficacy and importance. The next task was to design the look, feel and content of the custom report template. Six pediatric providers and eight parents were recruited to take part in the design phase as user consultants. Parents completed the 5-2-1-0 questionnaires in order to produce 3 prototypes of a report. Participants were asked to talk out loud about these prototypes to elicit feedback, and follow up questions included likes, dislikes, look, feel, meaning, and perception of the messages. The talk-out loud method was also used with pediatricians to get their clinical perspectives. Results of each interview were discussed among the study team and modifications were made when consistent themes arose. Prototype modification ended when saturation of themes and limitations of the format were reached. This feedback informed the custom report template and message content used in the TIDE application. Currently 28 parents with children 4-10 y/o have agreed to participate in a study that will assess the acceptability and feasibility of the tailored report within the context of well-child visit. Providers will be interviewed at the end of the study.

**Results:** The final design of the tailored report was a bi-fold, instead of tri-fold, printed report with gender neutral colors (blue-green) that included behavioral levels of the five behaviors, focus on one of those behaviors selected by the parent, strategies for change and white space to allow for provider notes and/or goal setting. A simple data visualization of a five-star rating system, Amazon.com-like approach, was used to indicate how well the child was doing on the five behaviors in relation to recommended guidelines. This visualization was selected based on providers wanting a quick way to identify how well the child is doing on each behavior. Additionally, providers overwhelming preferred positive framing of messages whenever possible to encourage parents and reduce defensiveness.

**Future Work:** This study will provide preliminary data for TIDE’s effect on 5-2-1-0 behaviors and the potential for integrating the application into an EHR or on-line patient portal.

**References:**