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The feasibility, acceptance and key features of a prevention-focused oral health education program for HIV+ adults

Lance T. Vernon, DMD, MPH,

Department of Biological Sciences, Case Western Reserve University School of Dental Medicine, Cleveland, OH, USA

Catherine A. Demko, PhD,

Department of Community Dentistry, Case Western Reserve University School of Dental Medicine, Cleveland, OH, USA

Allison R. Webel, PhD, RN, and

Bolton School of Nursing, Case Western Reserve University

Ryan M. Mizumoto, DMD

Department of Biological Sciences, Case Western Reserve University School of Dental Medicine, Cleveland, OH, USA

Lance T. Vernon: ltv1@case.edu; Catherine A. Demko: cad3@case.edu; Allison R. Webel: arw72@case.edu; Ryan M. Mizumoto: rmizumoto@gmail.com

Abstract

Poor oral health is common in HIV+ adults. We explored the feasibility, acceptance and key features of a prevention-focused oral health education program for HIV+ adults. This was a pilot sub-study of a parent study in which all subjects (n=112) received a baseline periodontal disease (PD) examination and provider-delivered oral health messages informed by the *Information-Motivation-Behavioral Skills* (IMB) Model. Forty-one parent study subjects were then eligible for the sub-study; of these subjects, a volunteer sample was contacted and interviewed 3–6 months after the baseline visit. At the recall visit, subjects self-reported behavior changes that they had made since the baseline. PD was re-assessed using standard clinical assessment guidelines and results were shared with each subject. At recall, individualized, hands-on oral hygiene coaching was performed and patients provided feedback on this experience. Statistics included frequency distributions, means and chi-square testing for bivariate analyses. Twenty two (22) HIV+ adults completed the study. At recall, subjects had modest, but non-significant ($p>0.05$) clinician observed improvement in PD. Each subject reported adopting, on average, 3.8 (± 1.5) specific oral health behavior changes at recall. By self-report, subjects attributed most behavior changes (95%) to baseline health messages. Behavior changes were self-reported for increased frequency of flossing (55%) and tooth-brushing (50%), enhanced tooth-brushing technique (50%), and improved eating habits (32%). As compared to smokers, non-smokers reported being more optimistic about their oral health ($p=.024$) at recall and were more likely to have reported changing their oral health behaviors ($p=.009$). All subjects self-reported increased knowledge after receiving hands-on oral hygiene coaching performed at the recall visit. In HIV+ adults, IMB-informed oral health messages promoted self-reported behavior change; subjects preferred more

Corresponding author at: Lance T. Vernon, DMD, MPH, Department of Biological Sciences, Case Western Reserve University School of Dental Medicine, 10900 Euclid Avenue, Cleveland, Ohio, USA, Phone: (216) 368-0712, Fax: (216) 368-4193, ltv1@case.edu.

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interactive, hands-on coaching. We describe a holistic clinical behavior change approach that may provide a helpful framework when creating more rigorously-designed IMB-informed studies on this topic.

Keywords

HIV; Oral Health; periodontal disease; Behavior Theory; prevention and communication

Introduction

HIV+ adults are at increased risk for poor oral health outcomes including tooth loss (Alves et al., 2006; Mulligan et al., 2004), gingival defects (Mulligan, et al., 2004), traditionally defined periodontal disease (McKaig et al., 1998; Vernon et al., 2009), dry mouth (xerostomia) (Nittayananta et al., 2010; Patton, Strauss, McKaig, Porter, & Eron, 2003; Reznik, 2005) and dental caries (Ram, Kumar, & Navazesh, 2011). Unmet dental needs are also high in this population (Freed et al., 2005; Heslin et al., 2001; Jeanty et al., 2012; Marcus et al., 2000), and underutilization of dental care services (Coulter et al., 2000; Marcus, et al., 2000; Shiboski et al., 2005; Vernon, et al., 2009) may further contribute to poor oral health outcomes. Greater attention to more effective, comprehensive dental care for persons living with HIV-infection is indicated (Badner, 2005; IOM, 2011; USDHHS, 2000).

Theoretical Framework

There is a general consensus that health promotion interventions should be driven by behavioral theory (Glanz & Bishop, 2010; Riddle & Clark, 2011). Patient education alone has had limited long-term success in changing oral health behaviors in adult populations (Renz, Ide, Newton, Robinson, & Smith, 2007). The *Information-Motivation-Behavioral Skills* (IMB) Model has been successfully used to understand HIV-related sexual risk behavior and to construct interventions to change behavior across a wide range of settings, populations and time (Fisher JD, 2009), including interventions involving breast self-examination (Misovich, 2003), motorcycle safety (Fisher JD, 2009) and adherence to antiretroviral therapy (Fisher, Fisher, Amico, & Harman, 2006; Starace, Massa, Amico, & Fisher, 2006). The conceptual underpinnings of the IMB model are based on strong theory (Ajzen, 1980; Bandura, 1989, 1994; M. Fishbein, and Ajzen, I., 1975; M. Fishbein, and Middlestadt, S.E., 1989; Schifter & Ajzen, 1985).

We applied constructs of the IMB model (see Methods) to promote individualized oral health behavior changes. In delivering health messages, we also drew from self-determination theory (SDT) (Deci, 1985), communication tailoring (Noar, Benac, & Harris, 2007) and the spirit of motivational interviewing (MI) (W. R. Miller, and S. Rollnick 2002; W. R. Miller & Rollnick, 2009; Ramsier, 2010; Rollnick, 2007). To our knowledge, no previous studies have examined IMB-informed oral health behavior change in HIV+ adults; thus we investigated the feasibility, acceptance and key features of an IMB-informed oral health education program for HIV+ adults.

Methods

Overall Approach/Philosophy: personalized oral health communication

Our philosophy was central to our approach. Since interpersonal interaction may be the most critical factor to influence motivation and behavior change (Najavits, Crits-Christoph, & Dierberger, 2000; Najavits & Weiss, 1994), our goal was to be relational with each subject

(Rollnick, 2007). Using a conversational approach can make a significant difference in terms of how suggestions are received (Salter, Holland, Harvey, & Henwood, 2007); thus, our communication style was open, flexible and conversational; however, interactions by one dentist were not audiotaped, so fidelity to this construct was not measured. We avoided a hierarchical patient-provider relationship and worked *with* or *alongside* the subject. Importantly, we acted as a patient advocate. Developing a deep bond of trust and support may, in itself, have therapeutic value in the health care setting (Scott et al., 2008; Scott, Scott, Miller, Stange, & Crabtree, 2009).

Overall, health messages were delivered in a coaching manner; we: 1) clinically evaluated each subject's periodontal disease; 2) assessed behavioral causes, asking questions to gauge subject's current knowledge and motivation; 3) evaluated the subject's oral hygiene skill most proximal to the risk for their oral conditions—and accepted this as a starting point from which to work forward; finally, we 4) broke down new behaviors into small, manageable changes (Bandura, 1998)—i.e., those most likely to positively impact one's oral health.

Study Design

Visit 1 (Baseline): Periodontal Disease Examination and Oral Health Message Delivery

—This was a pilot sub-study of a parent study (Vernon, et al., 2009) of 112 HIV+ adult volunteers. The parent study included HIV+ adults (age 18 or older), who did not have cardiovascular disease, cancer or diabetes; all subjects had 20 or more teeth. This study was approved by the University Hospitals Case Medical Center's Institutional Review Board; all subjects gave Informed Consent. At study Visit 1 (baseline), we performed an oral examination including complete periodontal probing at six sites per tooth as previously described (Vernon, et al., 2009). Each participant received from the same dentist a verbal explanation and hand-written document of clinical findings and suggestions (see Figure 1); this health message delivery from one dentist lasted approximately 20–40 minutes. Study subjects were seen from May 2005 through August 2006.

Visit 2 (Recall): Interview and Periodontal Re-Examination

—Of 41 eligible subjects, 22 HIV+ adults agreed to participate in the pilot study recall (Visit 2), 3–6 months after baseline. At visit 2, subjects were interviewed by one dentist (LTV) using a semi-structured questionnaire to assess behavior changes made after Visit 1. A periodontal disease re-examination was completed in the dental clinic by one dentist (Vernon, et al., 2009); because of time constraints and our definition of PD, only those tooth sites with a baseline clinical attachment level (CAL) ≥ 4.0 mm were re-probed; change in PD was determined as the percent of re-examined sites that improved (CAL of <4.0 mm), worsened (CAL >5.0 mm) or showed no change (CAL = 4.0 mm). Next, individualized hands-on oral hygiene instructions were delivered; afterwards, subjects were asked to comment on this instruction. At both study visits, no restorative dental care was provided and subjects were nominally compensated.

Data Analyses

Statistical analyses were performed using SPSS (V14.0), and included frequency distributions, determination of mean values, and chi-squared testing for bivariate analyses

Results

Twenty two (22) HIV+ adults completed the study. Table 1 lists cohort characteristics. The mean duration of time from baseline to recall visit was 5.9 (± 2.2) months. On average, at recall, 38 discrete periodontal sites with CAL ≥ 4.0 mm per subject were re-probed by one dentist; each subject, on average, had 41% of examined sites that improved, 33% of sites

worsened and 26% of sites remained unchanged. While clinical measures of PD improved modestly, improvements were not statistically significant ($p>0.05$) nor associated with receiving outside dental care, or changes in attitude or oral health behaviors (data not shown).

On average, subjects self-reported making a mean of 3.8 ($1\pm.5$) specific oral health-related behavior changes after receiving the baseline oral health messages. At recall, as per self-report, most subjects (95%) attributed their specific oral health behavior changes at least in part to the baseline oral health message delivery. Figure 2 lists specific changes made. As compared to smokers, non-smokers self-reported being more optimistic about their oral health ($p=.024$) at recall and were more likely to have changed their oral health behaviors ($p=.009$). All participants self-reported increased knowledge after receiving individualized hands-on oral hygiene skills coaching at recall. Between baseline and recall, 59% of subjects self-reported visiting a dentist with 18% receiving periodontal disease treatment (scaling and root planning).

Discussion

In this study, prevention-focused, individualized oral health message delivery was feasible and well accepted. Clinician-observed clinical improvement over time in PD was not associated with seeing the dentist, improved attitudes or changes in oral health behavior. Improvement in PD typically requires scaling and root planing (SC/RP) in addition to effective home hygiene, and, in this study, relatively few (18%) received SC/RP between the baseline and recall visit. Further, having re-probed only sites with CAL ≥ 4.0 mm, we may not have detected more subtle changes in PD or gingivitis that may have occurred. It is also possible that sites with CAL < 4.0 mm may have worsened. Measuring changes over time in bleeding on probing may have also been more useful to detect short-term PD-related changes.

As per self-report, HIV+ adults made specific oral health-related behavior changes following health message delivery. The self-reported increase in knowledge after hands-on coaching at recall may indicate that individualized skill training is an important focus for future studies.

Our self-reported findings are consistent with theory-driven published longitudinal reports. Outside of HIV+ cohorts, Weinstein et al, 2006 reported that MI-based approaches with mothers reduced tooth decay in their children (Weinstein, Harrison, & Benton, 2006) and a self-determination theory-based approach by Munster Halvari et al, 2012 reduced dental plaque and gingivitis. (Munster Halvari, Halvari, Bjornebekk, & Deci, 2012) Kakudate et al, 2009 applied a cognitive behavioral approach to enhance self-efficacy and lower plaque index in a 3-week study in adults with PD (Kakudate, Morita, Sugai, & Kawanami, 2009).

Our interaction style drew off of self-determination theory (Deci, 1985) and motivational interviewing (Rollnick, 2007). Although unmeasured, the manner in which messages were delivered was an important aspect of our approach.

This study has a number of strengths. It was holistic and innovative; we applied the *Information-Motivation-Behavioral Skills Model* to oral health behavior change in HIV+ adults with some promising results. Oral health message delivery was feasible. We outline an approach that was personalized to and well received by HIV+ adults. In our study, IMB-informed communication was effective in promoting self-reported oral health behavior change after one patient-provider interaction.

This study also has several limitations. The sample size is small (N=22) and our volunteer group may be prone to selection bias; recall participants may have been more likely to report behavior changes than those not recalled. We had no control group to which results from the group receiving IMB-informed health messages could be compared. We measured oral health behavior changes over time with self-report, which can be unreliable and prone to overestimation (Shi et al., 2010) and social desirability biases. Our follow-up period was relatively short. Finally, key constructs from the IMB model were globally operationalized, not directly measured; thus, fidelity to IMB theory cannot be determined.

Future studies require a reliable and valid measure of oral hygiene skill (i.e., tooth brushing, flossing and proxy brush use) —a central construct of our IMB-informed model—and would enable more rigorous future investigation.

HIV+ adults can present to outpatient dental settings with arguably some of the most complex, dynamic and challenging oral health concerns. Poor oral health can negatively impact an HIV+ patient's quality of life (Cherry-Peppers, Daniels, Meeks, Sanders, & Reznik, 2003). Findings from this study suggest that prevention-focused approaches in addition to routine dental care may promote more optimal oral health in HIV+ adults.

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K-23 Study

Date: 5/XX/20006

Subject # 341

Visit: Baseline

Oral Findings:

- 1) Chronic Adult Periodontal Disease: 11 of 22 teeth with probing depths ≥ 5.0 mm.
- 2) Maxillary partial denture—patient wears it except when he eats.
- 3) Retained root-sections (2) on #30.
- 4) Caries: #17; (possibly on distal of #29, occlusal #17 and occlusal #31).

Suggestions:

- 1) See dentist regularly: (at least twice per year).
 - a. Extract roots #30.
 - b. Take x-rays to verify vs. R/O caries: #29, #17 and #31; restore as needed.
 - c. Scaling and root planing (SC/RP) x 4 quads; follow-up with Rx Metronidazole x 10 days (* see hand out).
 - d. Rx. Chlorhexidine gluconate: take as directed (* see hand out).
 - e. Consider re-making partial denture—partial hits on anterior teeth, not posterior.

Home Care:

- 1) Use proxy brush daily (* have dentist or hygienist demonstrate).
- 2) Develop daily flossing habit (* have dentist or hygienist demonstrate).
- 3) Cut down or quit smoking cigarettes.
- 4) Brush and floss at least 1ce per day—in **PM**. (Key: * see hand-out for more information).

Note: The original form (above) was handwritten; it was transcribed for easier readability.

* A hand-out was given to patients that detailed specific topics in lay terms.

Figure 1.

Example of Written Baseline Oral Health Message

Self-Reported Change (N=22)

Figure 2.

Frequency of Self-Reported Changes Following IMB-Informed Oral Health Message (N=22)

Oral hygiene (OH).

* Note: Changes with asterisk are **not** included in the calculation of specific oral health behavior changes.

Table 1

Patient Characteristics of 22 HIV+ Adults at Baseline Visit

Variable	Mean ($\pm$ SD)	Percent	N
Demographics			
Age (years)	42.6 (6.9)		22
Male		77%	17
Black/African American		77%	17
Education some college		59%	13
Receiving Medicaid/Medicare, RW		82%	18
Medical Characteristics			
Living with HIV (years)	12.2 (6.4)		21
Time on HAART (years)	4.4 (3.0)		20
Nadir CD4+T cell count	183.7 (179.0)		22
CD4+ T cell count (cells/ μ L)	501.8 (353.9)		22
HIV RNA (log copies/mL)	2.2 (1.7)		22
HIV RNA (> 50 copies/mL)		68%	15
Oral Health Characteristics			
Clinical measures of periodontal disease (**)			
PPD 5mm	43.3 (21.2)		22
REC>0mm	63.0 (19.6)		22
CAL 3mm	74.3 (21.2)		22
Floss all teeth >1 time per week		45%	10
Ever smoked		72%	16
Currently smoke		45%	10
Did not visit dentist in past year		50%	11
Number dental visits in past 5 years	2.0 (0.8)		22
Reported dry mouth (xerostomia)		45%	10