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Submission to the Research Review Committee at Fox Chase Cancer Center

A Web-based Multimedia Intervention for Head and Neck Cancer Patients

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1.0 SCHEMA

In 2010, cancers of the oral cavity, pharynx, and larynx (which comprise head and neck squamous cell carcinoma [HNSCC]) were estimated to account for 49,260 new cancer cases in the United States[1]. In addition, approximately $3.2 billion[2] is spent in the U.S. each year on treatment of HNSCCs. Treatment for HNSCC includes surgery or radiation therapy and can lead to considerable functional impairment, potential disfigurement, and emotional distress. As a consequence, HNSCC patients experience significant decrements in quality of life (QOL), poorer interpersonal relations, and increased social isolation[3]. Studies suggest that psychoeducational interventions can improve quality of life, reduce psychological distress, and enhance coping with cancer in various cancer populations[4-5]. However, few such programs have been developed for HNSCC patients. This empirical gap is surprising given that studies have noted that HNSCC patients have considerable informational needs that are not being adequately addressed[6]. In addition, due to the potential effects of cancer and cancer treatment on facial appearance and speaking ability, psychosocial interventions that are delivered in-person may be less appealing to some HNSCC patients who are reluctant or unwilling to engage in social interactions due to social anxiety or feeling stigmatized[7-9]. In addition, patients often find themselves having to manage extensive treatment and rehabilitation appointments, and therefore, they have little additional time to participate in or take advantage of any available psychosocial services. Indeed, previous studies have reported low attendance to be a common barrier to delivering interventions for HNSCC patients[10-11], and patients have also reported psychosocial services to be inaccessible to them[12]. Thus, the development of a widely accessible program that provides didactic information on treatment-related side effects, as well as cognitive and behavioral strategies to enhance psychosocial adjustment and QOL following treatment, would address this gap. In consideration of these factors, web-based interventions represent one option for delivering key information to this population in an efficacious, practical and acceptable format. If effective, this medium also has high dissemination potential.

Thus, the overall goal of the proposed project is to develop and examine the acceptability of a theory-guided, web-based multimedia intervention program for HNSCC patients who have recently completed radiation therapy. Our long-term goal is to evaluate the effects of such an intervention on QOL among HNSCC patients. As a first step, we propose to create appropriate content, including informational text, brief video scripts, and animated graphics. Next, we will develop a test website that includes prototypes for four components of the proposed web-based program. The specific aims of the proposed project are to:

Aim 1: Develop a prototype web-based multimedia program that includes four components (or topic areas), including: 1) Head and Neck Cancer and its Treatment; 2) Changes in Swallowing and Oral Care; 3) Changes in Speech; and 4) Coping with Cancer. During the first 7 months, we will create the content and develop a prototype web-based program that presents both didactic information and cognitive and behavioral strategies for coping with treatment of HNSCC. Usability testing will be conducted with 5 HNSCC patients. Revisions based on patient feedback will be incorporated.

Aim 2: Evaluate acceptability and satisfaction with the prototype web-based program in a sample of up to 75 HNSCC patients and 5 expert professionals. The web-based program developed in Aim 1 will be evaluated by up to 75 patients who are currently undergoing or have recently completed radiation therapy and 5 healthcare professionals who work with HNSCC patients. Satisfaction and acceptability will be demonstrated if mean ratings meet specified criteria (see **Section 12.2.b. Indicators of Success**).

Exploratory Aim 3: Obtain preliminary data on potential program impact in a sample of up to 75 HNSCC patients. Measures of psychosocial functioning and self-efficacy will be assessed at pre- and post-program assessment, in order to obtain preliminary data on potential intervention impact. These data will be used to calculate potential effect sizes and support a future large-scale, randomized trial to evaluate the effectiveness of the web-based program in enhancing QOL among HNSCC patients.

2.0 INTRODUCTION

2.1. Background

2.1.a. Quality of Life Following Treatment. Despite advances in diagnostic tools and treatment modalities, treatment for HNSCC often confers considerable functional impairment. Consequently, HNSCC patients must cope not only with the diagnosis of cancer, but also with the physical sequelae of treatment. Treatment can result in: changes in swallowing, speech, and social functioning; dry mouth; need for nutritional supplements; pain; difficulties in social eating; and impaired sexual functioning[14]. Routine daily activities can become extremely challenging as patients may experience speech difficulties or impaired eating ability (e.g., difficulty swallowing, problems with drooling and chewing food)[15-17]. Many patients report both physical and psychosocial complaints even after successful therapy[18], and long-term deficits in QOL have been reported up to 10 years post-treatment[19].

Given the broad-ranging effects of treatment, it is surprising that 73% of HNSCC patients reported receiving little or no information during or following the treatment period[20]. A perceived lack of information has been associated with posttreatment uncertainty, anxiety and depression[21]. In contrast, HNSCC patients who received more information about the disease and the treatment experience reported fewer psychosocial problems[21]. Because the perception of having obtained adequate information is an important predictor of positive rehabilitation outcomes in the 2- to 6-year posttreatment period[20], there is a clear need for HNSCC patients to be able to obtain information about their disease and post-discharge care[22] in an accessible format.

2.1.b. Interventions can Lead to Enhanced Quality of Life. Psychosocial interventions can significantly enhance psychosocial functioning in cancer patient populations[4-5]. Although many programs have been developed for cancer patients (notably, breast cancer patients[23-24]), few have been developed for HNSCC patients. The few interventions tested have generally yielded beneficial effects among HNSCC patients[25-26], particularly when they are provided immediately following treatment. However, barriers to participation have also been noted. Specifically, requiring HNSCC patients to attend **in-person** sessions is a major barrier to participation, and compliance with interventions that entail multiple in-person interactions is difficult to achieve[27]. Hence, web-based programs, which do not require an in-person session, may greatly reduce or eliminate such barriers. Greater confidence in the effectiveness of a web-based program is also derived from a study that compared different approaches for delivering a coping strategies intervention for HNSCC patients (in-person with a therapist vs. a self-contained workbook with no therapist sessions)[28]. In both formats, the intervention was comprised of a workbook that covered various topics on coping skills, effective use of social support, problem-solving techniques, goal setting, and relaxation training[29]. Overall, all patients receiving the intervention program (regardless of format) reported improved QOL compared to control group patients receiving usual care[28, 30]. Further, the home format was as effective in enhancing QOL as the therapist-delivered format, thereby suggesting that such programs can be appropriately adapted for web-based delivery. In sum, a web-based program would be responsive to patient preferences for the receipt of materials and interventions that can be viewed at home, as well as reduce barriers to participation in such programs. In turn, such programs may yield positive effects on QOL and psychological adjustment among HNSCC patients[26, 30-31].

Rationale for a web-based intervention. Web-based psychoeducational interventions are increasingly common[32-36], but not within the HNSCCC context. A web-based approach for this underserved population has several practical advantages: **First**, empirical evidence (and our pilot data, see Section 2.1.d.) suggests that patients prefer to receive materials that they can view at home[30]. There is often insufficient time for patients to absorb critical information during medical appointments[13] and it is difficult to retain such information under stress. **Second**, for patients who are reluctant to engage in social interactions following treatment[7-9], web-based content offers an interim approach for providing strategies to facilitate re-entry into social interactions when ready. Learning about and practicing strategies within

one's home and watching videos of how other HNSCC survivors have overcome concerns related to social engagement may increase confidence in re-initiating social interactions. **Third**, the Internet offers a functional advantage over print materials, particularly through the transmission of video. Videotaped vignettes can increase knowledge about cancer and treatments[37-38] and video modeling can improve patient self-care practices[39]. Web-based programs have yielded benefits ranging from decreases in pain to improved QOL[40-41]. **Fourth**, a web-based approach has high dissemination potential to the larger population of HNSCC patients. Over 73% of the US population reports Internet use[42]. Among home Internet users, almost 80% have high-speed Internet access allowing users to watch or download video online[43]. In sum, given the trend of increasing Internet use, it has become an essential tool for disseminating important health information[44-46].

2.1.c. A Theoretical Framework to Guide Intervention Development. Social Cognitive Theory (SCT)[60-64] has been widely used to guide health promotion interventions, and it proposes that behaviors are learned through information provision and vicarious process. Guided by SCT, interventions can teach skills through demonstration and physical rehearsal (e.g., exercises to increase active range of motion; oral care), which results in positive self-efficacy and outcome expectancies. A recent SCT-based intervention demonstrated that behavioral modeling was effective in promoting physical rehabilitation and reducing functional limitations in the injury recovery setting[65]. Patients who received the modeling intervention reported greater self-efficacy as well as greater objective functional outcome scores compared to controls[65]. Thus, the proposed program will attend to self-efficacy expectations of patients by providing them with various exercises to enhance coping and improve functional abilities (e.g., demonstrating exercise movements, teaching coping skills, modeling strategies for improving communication, providing tips for enlisting support from family and/or friends) and will include personal experiences of other survivors.

2.1.d. Preliminary Studies. With support from the Keystone Program in Head and Neck Cancer, the research team has been conducting work directly relevant to this proposal:

i) Psychosocial Functioning and Informational Needs in HNSCC Patients. The research team conducted a pilot study of HNSCC patients (n = 88)[52]. Participants were predominantly male (67.8%) with a mean age of 58.9 years (SD = 10.8). Over half (58%) was classified as having early-stage disease. Participants reported high levels of cancer-specific distress (M = 18.17, SD = 10.32) as measured by the Impact of Events Scale (IES[53]). Patients also reported high levels of general distress (M = 30.61, SD = 23.26) on the combined subscales of anxiety, depression, and anger from the Profile of Mood States (POMS[54]). Our findings are consistent with previous studies demonstrating significant levels of psychological distress among HNSCC patients[3, 17, 55] and support the need for developing psychosocial intervention programs for this population[13, 50]. Patients were queried about: 1) their levels of interest in receiving additional programs; 2) the type of program they desired; and 3) their preferred method for receiving such programs. All participants indicated that they would like to receive additional programming, particularly focused on treatment side effects. When asked about their preferences and needs, 89.7% of patients reported that they preferred to receive additional information they could read or view at home. The majority (79.3%) reported that they have a computer at home and 88% reported having Internet access (either at home or work). The majority of patients preferred to receive information either during treatment or shortly after treatment. The most requested topics included: 1) Basic information about HNSCC and treatment; 2) Information about changes in swallowing and speaking following treatment; 3) Tips and strategies to help make eating and speaking easier; 4) Tips for coping with stress and anxiety; 5) How to stay healthy after treatment.

ii) Psychosocial Interventions for Cancer Patients and At-Risk Populations. The research team will work closely with Triad Interactive to develop the proposed web-based intervention. Triad Interactive has extensive experience in developing multimedia interventions in the oncology setting. For example, Triad Interactive designed and developed an interactive multimedia intervention (delivered via CD-ROM) to enhance knowledge about Microsatellite Instability (MSI) Testing and decision-making about MSI testing.

The total development time of the CD-ROM, including modifications, was 6 months. Results were uniformly positive, with 92.5% of CD-ROM participants reporting that the educational information was presented clearly, and 87.6% reported that they learned new information. Although the program was delivered via CD-ROM, it was developed using Web-ready technologies including HTML, JavaScript, and Adobe® Flash®. Triad Interactive has also been involved in the graphic and instructional design, production, and programming for other NCI-funded studies including an interactive web-based program to facilitate decision making about prostate cancer screening (Lombardi Cancer Center); and an interactive computer-based program for decision making about *BRCA1/2* genetic testing (Mt. Sinai School of Medicine).

In sum, the preliminary findings suggest the following: 1) HNSCC patients report poor QOL and elevated distress, which supports the need for developing accessible intervention programs for this population; 2) most HNSCC patients (90%) noted that they would prefer to have informational materials that they could view at home, particularly on topics related to: cancer and cancer treatment; changes in speech and swallowing following treatment; and coping skills and communication training; and 3) the development of the proposed multimedia intervention is feasible to accomplish within the grant funding period. Finally, our team offers a diversity of expertise, including expertise in psycho-oncology and intervention development (Fang, Longacre), head and neck oncology (with Drs. Ridge, Burtness, and Galloway representing surgical, medical, and radiation oncology, respectively), biostatistics (Ross), pain management (Chwistek), physical rehabilitation (Bühler), and speech pathology (Ebersole).

Data obtained from this project will be used to further refine the web-based program and submitted as preliminary data in support of a randomized trial to evaluate the effectiveness of the web-based program in enhancing QOL among HNSCC patients. In that future study, it is hypothesized that use of the web-based program will contribute to enhanced patient QOL and psychosocial adjustment compared to a control group.

2.2. Rationale

Head and neck cancer and its subsequent treatment-related effects can have a significant negative impact on QOL, psychosocial adjustment, and interpersonal relations[3]. Psychoeducational interventions can be effective in improving QOL[4-5]; however, few programs have been developed for HNSCC patients despite preliminary data indicating a need for such programs in this patient population. The proposed project will be one of the first to develop a web-based intervention for HNSCC patients. At present, there are no similar existing programs for HNSCC patients despite the fact that such programs have yielded benefits for other cancer patient populations (e.g., breast, prostate). As such, building a theory-based resource for this patient population, and using the Internet to deliver such a resource, represents an innovative approach that may have a significant impact on QOL and psychological adjustment among a survivor population that experiences considerable morbidity.

3.0 OBJECTIVES

The objectives of the proposed study are to:

Aim 1. Develop a prototype web-based multimedia program that addresses four components, including: 1) Head and Neck Cancer and its Treatment; 2) Changes in Swallowing and Oral Care; 3) Changes in Speech; and 4) Coping with Cancer. We will create the content and develop a prototype web-based program that presents both didactic information and cognitive and behavioral strategies for coping with treatment of HNSCC. Material presented in the web-based program will include informational text, brief videos, and graphics and animation.

Aim 2. Evaluate acceptability and satisfaction with the prototype web-based program in a sample of up to 75 HNSCC patients and 5 expert professionals. Specifically, the prototype developed in Aim 1 will be

evaluated by up to 75 patients who are currently undergoing or have recently completed radiation therapy and 5 healthcare professionals who work with the HNSCC patient population.

Exploratory Aim 3. Obtain preliminary data on potential program impact in a sample of up to 75 HNSCC patients. Measures of psychosocial functioning and self-efficacy will be assessed at pre- and post-program assessment, in order to obtain preliminary data on potential intervention impact. These data will be used to calculate potential effect sizes and support a future large-scale, randomized trial to evaluate the effectiveness of the web-based program in enhancing QOL among HNSCC patients.

3.1 What are the dependent variables? Aim 1 is the development of the web-based program. For Aim 2, the primary dependent variables include satisfaction and acceptability of the web-based program among HNSCC patients and healthcare professionals. For Aim 3, exploratory dependent variables include psychosocial functioning and self-efficacy.

3.2 What are the independent variables? Independent variables include demographic variables (e.g., age, gender, education level, race/ethnicity, income, area of residence); medical and disease-related factors (e.g., tumor site, stage, grade of differentiation, and performance status); treatment-related variables (e.g., time since treatment), and prior use of the Internet.

3.3 Define endpoints. For Aims 2 and 3, HNSCC patients will be assessed at baseline (at study entry) and immediately after viewing the web-based program. Healthcare professionals will provide feedback only once, after viewing the web-based program.

4.0 SELECTION OF PARTICIPANTS

4.1. Aim 1 - Prototype Development

When programming is complete and approximately 50% of the content is in place, our collaborating experts will review the prototype and provide feedback as healthcare professionals who work closely with this patient population. In addition, we will recruit 5 HNSCC patients who have received radiation therapy within in the past 12 months to obtain their feedback on usability, using a modified version of the guidelines suggested by Usability.gov[66]. Eligibility Criteria: Patients with squamous cell carcinoma of the oral cavity, oropharynx, hypopharynx, or larynx will be eligible. Exclusion criteria will include: 1) inability to read and/or communicate in English; 2) head and neck cancers of non-squamous histology (e.g., adenoid cystic carcinoma, acininc cell carcinoma, adenocarcinoma, sarcoma); 3) blindness or severity of visual impairment that precludes one's ability to view images/text; 4) inability to provide informed consent. Potential participants will be identified by our collaborating physicians.

4.2. Aim 2 - Evaluation of Web-based Program

In light of our pilot data indicating that the majority of HNSCC patients prefer to receive information during or shortly after treatment, we will recruit up to 75 HNSCC patients who are currently undergoing or have recently completed radiation treatment (< 2 years). The same eligibility criteria as described in Aim 1 will apply to Aim 2. HNSCC patients who are eligible to participate will be identified by our collaborating physicians. Healthcare professionals (oncologists, speech therapists, physical therapists, social workers, etc.) who work with this patient population will also be identified by our research team members and recruited to participate and provide their opinions regarding the utility of this web-based program.

4.3. Aim 3 – Exploratoration of Program Impact

The 75 HNSCC patients recruited in Aim 2 will also serve as participants in Exploratory Aim 3.

5.0 REGISTRATION PROCEDURES

5.1. Aim 1 - Prototype Development

The prototype will be developed by Triad Interactive. The site will utilize W3C standards compliant HTML (HyperText Markup Language) and CSS (Cascading Style Sheets), Adobe® Flash®, ActionScript, and the Adobe® Flex™ framework. Encompassing the Website in a Flash-based site standardizes the code, eliminating the need to program workarounds for individual browsers. Triad has extensive experience developing similar Web-based projects, which includes user experience design, programming for Rich Internet Applications and other web-based projects, and quality assurance and testing. As the development process begins, the research team will meet with Triad Interactive to lay the groundwork for the development of the test website. Triad will develop the test website based on the design meeting. The test website will serve as a starting point for our discussions of interface "look and feel" and navigation elements. The research team will review the test website and agree to the interface design and functionality. Triad's instructional designers will work with the research team to identify appropriate illustrations, photographs, and other graphic content and to modify the content as appropriate for electronic delivery.

Program Content. The following units will be developed during this pilot study:

- How can I ease mouth and swallowing concerns? Participants will learn about potential changes in swallowing. Brief videos will describe strategies for managing swallowing concerns, including personal experiences of survivors.
- How can I keep my mouth healthy? Proper oral care and other potential side effects of radiation therapy (xerostomia, mucositis) will be described.
- How can I eat healthy? Tips for creating nutritious meals for people with swallowing disorders will be provided.
- How do I ease speech problems? This section will examine possible temporary or permanent changes in speech and the role of a speech language pathologist. Strategies for enhancing speech will be described, and physical exercises that involve mouth and tongue movement will be demonstrated.
- How do I cope with my new normal? This section will address challenges in various life domains (e.g., physical health, emotional well-being) and describe how other HNSCC survivors have met these challenges. Behavioral strategies, social skills training, and relaxation exercises will be demonstrated using brief videos.
- How do I manage my pain? Participants will learn about pain management techniques as well as strategies for dealing with side effects of pain medications.
- How can physical therapy help me? This section will address the importance of physical therapy in rehabilitation following treatment for head and neck cancer. Brief videos of various physical therapy exercises will be demonstrated by a licensed physical therapist.

When programming is complete and approximately 50% of the content is in place, our collaborating experts will review the test website and provide feedback as healthcare professionals who work closely with this patient population. In addition, we will recruit 5 HNSCC patients who have completed radiation therapy to obtain their feedback on usability. Patients will be recruited through physician referrals from radiation oncology at FCCC. Recruitment will occur either in-person or by telephone. Patients who consent to participate will be scheduled to view the prototype web-based program at FCCC. Following the guidelines suggested by Usability.gov, participants will be observed while using the program to evaluate navigation ease and usability. After each participant has viewed the test web-based program, they will be asked to complete measures assessing: (a) appropriateness of content, and (b) level of difficulty in using the web-based program (see Appendix A). If participants rate any particular section as not very useful or not clear, the research assistant or project manager will verbally solicit more detailed reactions and comments. Participants will also be interviewed after user testing to obtain more open-ended responses and reactions to the web-based program. Each participant will receive $50 for participating in the study. All web-based program content will be finalized based on the recommendations obtained from the usability pilot testing and necessary modifications (e.g., re-shooting video sequences, changing graphics, revising narration) will be made to correct any problems. These final modifications will then be reviewed and approved by the research team prior to further evaluation in Aim 2.

5.2. Aim 2 - Evaluation of Web-based program

For Aim 2, HNSCC patients will be recruited via referrals from treating physicians and healthcare providers or identified through the tumor registry at FCCC. A research assistant or project manager will speak with potential participants in-person or by telephone to describe the study procedures. Patients who are interested in participating will provide informed consent, complete a baseline assessment (see Appendix B), and be scheduled to view the web-based program at FCCC or at home, depending on the patient's preference. A member of the research team will be available for technical troubleshooting and assistance. After viewing the program, the participant will complete an evaluation and assessment form. In addition, the Project Manager will conduct a brief interview with participants to obtain additional feedback in response to open-ended questions concerning how one might use this web-based program, potential barriers to use, their preferences regarding the information provided, and satisfaction with the visual images and graphics, videos, and informational text. This will allow participants to elaborate on their reactions to the various sections of the web-based program. Each participant will receive $50 for participating in the study.

Based on physician estimates and tumor registry numbers, we anticipate that there will be a pool of approximately 6 patients completing radiation treatment per month at FCCC. In the first month of accrual, we will identify 12 patients (completed treatment in the past 2 months), and then 6 patients/month thereafter. We estimate that 85% of patients will meet inclusion criteria and 65% of eligible patients will agree to participate (based on our prior studies with this population). Over a 22-month recruitment period, we anticipate enrolling up to 75 patients (136 patients x 85% x 65% = 75).

In addition, our collaborating physicians will identify other healthcare professionals who work with this patient population. These individuals will be contacted and asked to participate in this study. For those who are interested in participating and who provide informed consent, we will schedule a time for them to review the program and complete a brief evaluation form (see Appendix C) and short interview with the Project Manager or other member of the research team. Healthcare professionals will be asked whether they believe the information will be useful to their patients, whether they believe the web-based program can be an effective tool for demonstrating various exercises, and whether they would recommend the program to their patients.

5.3. Aim 3 - Exploratoration of Program Impact

Same as above for Aim 2 (see Section 5.2). HNSCC patients will complete baseline assessments of QOL, psychosocial functioning, and self-efficacy (see Section 7.0). In addition, a subset of measures (psychosocial functioning and self-efficacy) will be administered again after patients have viewed the web-based program to obtain preliminary data on intervention impact. Given that patients will have only had the opportunity to review the program (but not engage in any practice), changes in functional status are not anticipated, and therefore, the QOL measures will not be re-assessed.

6.0 STUDY DESIGN

6.1. Study Overview

This study involves the development and evaluation of a web-based program for HNSCC patients who have recently completed radiation therapy.

6.2. Sample

For Aim 1, 5 HNSCC patients will be recruited to assess usability. For Aim 2, participants will include up to 75 HNSCC patients who are currently undergoing or have recently completed radiation treatment (< 2 years), and 5 healthcare professionals will work with this patient population. The 75 HNSCC patients enrolled in Aim 2 will also be used to complete Aim 3.

6.3. Procedures

Please refer to Section 5.0 for a description of the procedures.

7.0 MEASUREMENT OF EFFECT

7.1. Aim 1 – Prototype Development

Participants will complete a brief demographic survey and then measures assessing: (a) appropriateness of content, and (b) satisfaction with the web-based program. We will also interview participants after user testing to obtain more detailed comments regarding any sections that were rated as not very useful or not clear. Program content will be revised based on the recommendations obtained from the usability pilot testing.

7.2. Aims 2 and 3 – Evaluation of Web-Based Program

7.2.a. Baseline Assessment

Demographic variables including age, gender, race and ethnicity, education, income and occupation, and marital status will be assessed. In addition, participants' prior use of the Internet (both general use and for seeking health information) will be measured.

Disease characteristics including tumor site, disease stage, grade of differentiation, and Karnofsky performance status (KPS)[71] will be obtained by research staff from medical chart review. Treatment variables including length of treatment and dosage will be obtained by research staff from medical chart review.

To obtain preliminary effect sizes for future trials (**Exploratory Aim 3**), we will also assess quality of life, psychosocial functioning, and self-efficacy. Quality of life (QOL) and Head and Neck-specific QOL will be measured using the EORTC Quality of Life Questionnaire (EORTC QLQ-C30[72]) and the Head and Neck Module (EORTC-H&N35[73]), respectively. The EORTC QLQ-C30 is a validated cancer-specific self-report questionnaire[25,26,74-76] that consists of a global quality-of-life scale, 5 functional scales, and 9 symptoms scales. The EORTC QLQ-H&N35 is designed to be used together with the QLQ-C30 and has good reliability and validity among patients with head and neck cancer[77,78]. Psychosocial functioning (namely, general and cancer-specific distress) will be measured using the Brief Symptom Inventory-18 (BSI-18[79]), an 18-item instrument that has been used extensively with medical populations[80] and in our prior studies. The BSI-18 is highly reliable and valid and yields a composite score (Global Severity Index) and three subscale scores: somatization, depression, and anxiety. Cancer-specific distress will be measured using the Impact of Events Scale (IES), which is a well-validated self-report measure of avoidant and intrusive ideation[53]. Self-efficacy for coping with cancer-related stressors and activities will be assessed using the brief version of the Cancer Behavior Inventory (CBI-B)[81], which is a 14-item shortened version of the original CBI.

A subset of psychosocial measures (general and cancer-specific distress, self-efficacy) will be administered again after patients have viewed the website to obtain preliminary data on intervention impact. Given that patients will have only had the opportunity to review the web-based program (but not engage in any practice), changes in functional status are not anticipated, and therefore, the QOL measures will not be re-assessed.

7.2.b. Patient Evaluation of the Web-based Program

Patients will evaluate the web-based program in the following four areas: (1) Satisfaction with the web-based program; (2) Identification of material that patients liked and disliked; (3) Plans to use the web-based program and/or recommend it to others; and (4) Overall evaluation of program content and format. Sample assessment questions are: a) Overall, how informative was this web site? (rated on a scale from 1-Not informative to 5-Extremely informative); b) How useful was the section on treatment side effects? (rated on a scale from 1-Not useful to 5-Extremely useful); c) How useful was the section on changes in swallowing? (similar questions to be asked for each topic unit, e.g., changes in speech, coping with cancer); d) Were the physical therapy videos useful*?*; e) If you could access this web-based program at home, how easily would you be able to use this on your own?; f) Overall, I would rate this program… (from 1 – "Poor" to 5 – "Excellent"); g) Overall, I would be likely to use this web-based program... (1–"Not at all" to 5–"Frequently"); h) Overall, I wish I had access to a web-based program like this now (1–"Strongly disagree" to 5–"Strongly agree"); i) Was there anything that was unclear? If yes, please note which section; j) What other types of

information would you like to have available on this web site?.

7.2.c. Healthcare Provider Evaluation of the Web-based Program

Similarly, 5 healthcare professionals will be asked to provide ratings after viewing the web-based program regarding the usefulness of this program for their patients. Sample items include "The information presented in this program would be useful to my patients" (to be rated from 1 – "Strongly disagree" to 5 - "Strongly agree") and "I would recommend this program to my patients".

8.0 STUDY PARAMETERS

Table 1 presents the measures to be obtained at each assessment time point:

Aims 2 and 3: Measures and Assessment Time Points

Questionnaire Name	# of Items	Time to Complete	Baseline	Follow-up
Demographics	7	5 min	X	
Internet Use	4	5 min	X	
EORTC QOL & H&N35	65	10 min	X	
Brief Symptom Inventory	18	5 min	X	X
Impact of Events Scale	15	5 min	X	X
Cancer Behavior Inventory	14	5 min	X	X
Program Evaluation*	22	10 min		X
Total	143		35 minutes	25 minutes

* Healthcare professionals complete a 7-item program evaluation form only.

9.0 PHARMACOKINETIC STUDIES

Not applicable to the proposed study.

10.0 OFF-STUDY CRITERIA

The off-study criteria include the following: 1) participants who no longer wish to participate in the study; 2) participants who do not evaluate the web-based program.

11.0 DRUG FORMULATION AND PROCUREMENT INFORMATION

Not applicable to the proposed study.

12.0 STATISTICAL CONSIDERATIONS

12.1. Data Management

All participants will be assigned a unique study identification number upon entry into the study. Data will be collected onto hardcopy instruments and entered by project staff into a secure database using PRESAGE. Completed hardcopy instruments will be filed in locked cabinets.

12.2. Statistical Data Analysis

Descriptive statistics will be compiled to characterize participants' demographic and medical characteristics. Given that Aim 1 is the development of the web-based program, a data analytic plan is presented only for Aims 2 and 3.

12.2.a. Approach and Analysis. Descriptive statistics (e.g., means with associated two-sided 95% confidence intervals) will be used to characterize participant satisfaction, usage, acceptability of the program and the time participants spend in each section of the program.

Responses to open-ended questions will be categorized into themes and used to characterize issues that are consistently raised (e.g., 50% of patients commented that the actor in the first video was unattractive or unappealing to them). In general, this is not a qualitative study; however, any qualitative data that are obtained in response to the open-ended questions can be coded (e.g., combing the data for themes, ideas and categories and then marking similar comments with a code label so that they can easily be retrieved at a later stage for further comparison and analysis) to facilitate making comparisons (e.g., between male and female patients, older and younger patients) and to identify any patterns that require further investigation[82]. The process of coding (associating coding labels with the text) will be performed by the PI and the Project Manager. The PI has received training in qualitative data analysis and recently completed 2 qualitative analysis courses at Temple University (January, 2011). Themes that are identified will be discussed together with the research team. To provide information relevant to the further development of the program, we will also explore whether demographic factors (gender, age, education level) or disease characteristics (stage of disease, tumor location) are associated with participant ratings or time spent exploring the web-based program. Spearman's correlation or Kruskal-Wallis tests will be used to assess associations between satisfaction, usage and acceptance with continuous and categorical covariates, respectively.

For Aim 3, descriptive statistics (e.g., means with associated two-sided 95% confidence intervals) will be used to characterize levels of QOL, psychosocial functioning, and self-efficacy. As noted in section 5.2, the sample size for this study is based on the duration of funded recruitment provided by the grant. With data from at least 45 participants, the two-sided 95% confidence interval around a mean will be $\pm 0.29\sigma$, the two-sided 95% confidence interval around a binomial proportion will be no greater than 0.15, and we will be able to detect correlations of ±0.4 with 80% power using a test with 5% type I error. The preliminary data obtained from Aims 2 and 3 will be used to support future applications to evaluate the effectiveness of such a web-based program in enhancing QOL among HNSCC patients.

12.2.b. Indicators of Success. The following criteria will be used to indicate high satisfaction and acceptability with the web-based program: 1) **Satisfaction and acceptability** – Mean ratings of 4 or greater on a 5-point rating scale will indicate a high degree of patient satisfaction with the information presented; 2) **Amount of material that patients liked** - Mean patient ratings of 4 or greater on the "usefulness" scale for at least 3 of the 4 units presented (units that are rated lower will either be dropped or extensively modified); 3) **Plans to use the website -** At least 75% of patients indicating that they would use such a website, if available; 4) **Overall evaluation** – overall patient evaluation ratings of 4 or greater on a 5-point rating scale; 5) **Healthcare professional ratings** - mean ratings of 4 or greater on a 5-point scale indicating that the information presented will be useful to their patients and their beliefs that the website can be an effective tool for demonstrating various strategies and exercises. In addition, at least 80% (4 of 5 healthcare professionals) would agree or strongly agree with the statement that they would recommend such a web-based program to their patients. We will conclude that the web-based program is worthy of further investigation if at least 3 of the 5 criteria above are satisfied.

13.0 ADVERSE EVENT REPORTING

13.1. Data Safety and Monitoring. Two FCCC committees – the Research Review Committee (RRC) and the Institutional Review Board (IRB) – will monitor the protection of human subjects and the safe and confidential storage of data. These committees assess all proposed studies before initiation and then review protocols annually. The objective of these committees is to ensure the scientific, technical, and statistical soundness of the research and to guarantee that all necessary methods for the ethical and safe treatment of human subjects are utilized. These committees heavily scrutinize the scientific and ethical

aspects of protocols and provide an objective and ongoing assessment of the study's scientific and ethical integrity.

13.2. Adverse Event Reporting. The potential risks associated with the proposed project are minimal. Possible risks include: feeling worried, uncomfortable, or fatigued while viewing the web-based program; feeling anxious, uncomfortable or fatigued while completing the questionnaires or when speaking with the Project Manager. All participants are informed of the potential for possible adverse psychological reactions associated with participating in the study during the informed consent process.

Any unexpected or adverse event that occurs during data collection or study procedures is reported immediately to the Principal Investigator, who is responsible for documenting all adverse events with the FCCC Protocol Office or Institutional Review Board. For participants who are experiencing psychological distress reactions, the Principal Investigator will be alerted and the patients will be provided with a referral to appropriate services in the Department of Social Work or Psychiatry (in the Department of Medicine).

13.3. Commercial Drugs. Not applicable to the proposed study.

13.4. Investigational Drugs. Not applicable to the proposed study.

14.0 PATHOLOGY REVIEW

Not applicable to the proposed study.

15.0 RECORDS TO BE KEPT

FCCC Population Studies Facility (PSF) programmers will design, develop and maintain a relational database management system (RDMS) to meet the needs of this project. The software will run on a distributed computing system consisting of multiple Sun Microsystems computers and use the Oracle (V9i) database engine at the backend. All data will be entered by project staff via web-enabled data entry screens designed and developed by PSF programmers. Project staff will also use this interface to access tabular study event reports and accrual statistics and to manage activities specific to individual study subjects.

Every precaution will be taken to ensure that all data are kept strictly confidential. All collected data will be used solely for the purpose of the present research study and treated with full confidentiality. Specifically, each participant will be assigned a code number, which will be used in place of his/her name. The key that links each participant's name to his/her respective code number and all completed questionnaires will be stored in a locked cabinet in the principal investigator's office. All data will be analyzed using code numbers only. The results of the study will be presented in a summary fashion.

16.0 PATIENT INFORMED CONSENT

Participants will be recruited either in-person or by telephone contact. A staff member will describe the study rationale and procedures before obtaining informed consent. All eligible patients will be asked to review and sign the informed consent document (see Appendix D) prior to participation in the study. Participants will be informed that they can withdraw from the study anytime during or after the informed consent process without consequence for their current or future medical care.

17.0 REFERENCES

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18.0 MULTICENTER TRIALS

Not applicable to the proposed study.