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Development of an Internet Self-Management Intervention for Intermittent Urinary Catheter Users with Spinal Cord Injury

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Abstract

While web-based interventions have proliferated recently, information in the literature is often lacking of how the intervention was developed. In response to that gap, this is a report of the development of a web-based self-management intervention for intermittent urinary catheter users and the pretesting with four adults with spinal cord injury living in the community. Two websites were created, one for recruitment and the other for the intervention itself. The intervention involved developing new web-based technology, including an interactive urinary diary (with fluid intake/urine output and a journal), extensive catheter products information, three intervention nurse phone call consultations, and user-community discussion forums. Study participants completed an online survey and were interviewed twice about the enrollment process and their perceptions of their involvement in the intervention. Suggestions from the pretesting participants were used to revise the website applications prior to the next stage of research (a feasibility study). Numerous recommendations and comments were received related to content, interactivity of components, and usability. This paper provides a description of how the websites were developed (including the technology and software programs used), issues encountered and what was done to address them, and how the web-based intervention was modified for improvements.

Keywords

nursing interventions; intervention studies; intermittent urethral catheterization; self-management; nursing informatics

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The bladder management method of choice for people with spinal cord injury (SCI) is intermittent catheterization (IC), often about 4–5 times a day. In recent years, the Internet has made it easier for people with SCI to interact with one another. Researchers from Stanford University's Chronic Disease Self-management (SCDS) Group have pioneered peer-led self-management studies and recently found equivalent results in similar Internet-based interventions.¹ While some health problems have generated large numbers of Internet studies, e.g., smoking cessation,^{2, 3} diabetes self-management,^{4, 5} diet and exercise,⁶ and chronic illness,^{7–9} no web-based IC self-management interventions have been developed and tested in people with SCI. While there is a wealth of information on the Internet, no information was found online about how to address specific types of needs related to IC, such as balancing fluid intake to activities and travel.

In a recent review of literature¹⁰ Chee and colleagues indicated that little information is available on developing web-based interventions, and their team found only a few articles and book chapters on the subject. Based on a review of literature, they suggested guidelines for developing web-based interventions which include meaningfulness, target population, theoretical basis, focus, components, technological aspects, and user logistics.¹⁰

While web-based interventions are becoming common, literature is often lacking about how online interventions were developed. While phone and web-based interventions can be combined successfully,³ little is known about whether there is synergy in combining peer and professional coaching with web-based interventions.

This is a report of the development of a new online intervention which was pretested and modified based on feedback from four people with SCI who use IC for bladder management. The study was designed to improve IC self-management, prevent adverse effects from IC, promote symptom recognition, and improve quality of life. The intervention was built on the first author's previous research related to self-management in people with long-term indwelling urinary catheters^{11, 12} as well as specific knowledge from the first author's qualitative study with 34 IC users in which their experiences in using IC and associated issues and problems were described.¹³ The intervention entailed creation of new web-based technology with extensive website information, an online urinary diary (including fluid intake and urinary output and a journal), three nurse phone call consultations, and peer-led discussion forums. We recognize that web-based interventions are likely to continue to expand in number, particularly for populations who are more restricted in travel like those with SCI. Therefore, the purpose of this paper is to describe the development of this new web-based intervention, including challenges encountered and how they were addressed, which should be of value to others using or planning to use similar methods in their research and practice.

The first two stages of the study (reported herein) were to: (1) develop the web-based intervention and (2) pretest it with four persons with SCI to refine/improve it prior to a larger pilot study to explore feasibility of the web-based intervention. The first two stages were conducted from June 2013 through December 2013. The pilot study (full feasibility study, Stage 3) was completed recently (January 2014–April 2015), and results are in review currently. The University's Research Subjects Review Board for protection of human

subjects approved all activities of the study, including recruitment documents--fliers, letters from the investigators, and the recruitment website.

Development of the Two Websites for the Study (Stage 1)

Technical Issues related to Creating the Websites

Two websites were needed for this study (Recruitment and Intervention) and they were developed and housed on the University School of Nursing webserver. All data collected through the websites were stored on an internally secured School of Nursing database server. Access to the Intervention website was controlled via an assigned user id/password verification that had its own administrative website for the creation and maintenance of the individual user accounts.

The websites were produced using a previous website design for a former study which was created by the Principal Investigator (PI, MW) and the web designer (DT). However, modifications were made to add menu navigation, graphics, hyperlinks to specific pages and additional content (e.g., urological companies' vendor websites).

Webpages were created and tested; then the feedback from the four pre-testers was used to modify the pages for further testing. "Walk-throughs" of the site were done by research team members to test that each hyper-link was working and that the menu navigation was inclusive (not missing any information) and easy to traverse. Test data were constructed, and each feature on the webpages was tested by the web programmer (BP) for ease of use, clarity of purpose, and data accuracy.

The websites were created in HTML5 (Hypertext Markup Language) with additional features being implemented in CSS style sheets and Javascript routines. Django, a Python web framework, was utilized to implement secure forms and connect them to the user accounts. (See Table 1, Glossary of technical terms for web-applications). Internet security used on the websites included: SSL/HTTPS, XSS (Cross site scripting), CSRF (Cross site request forgery), and SQL injection protection. A PostgreSQL database internally isolated from the public internet was used to store all personal health information data. GIT, a version control software, was used to track changes, manage the code, and deploy the site to the production servers.

The Web-based Intervention

We conducted weekly team meetings for five months, then bi-weekly, to facilitate development of the intervention websites, communication, and testing of the programs. The Information Technology (IT) team included the director of our IT program at the School of Nursing, a website developer, and a programmer who created the interactive features of the website, including the urinary diary. Two trained intervention nurses (both PhD students), our Project Coordinator (PC), and Data Analyst were also a part of our team meetings led by the Principal Investigator (PI, first author). Our two consultants on the study, a nurse researcher with experience in online research and a technical associate with experience in development of online interventions, assisted us with development of the website and with advice about conducting web-based research at various times during the pretesting of the

intervention. Several parts of the web-based intervention required extensive IT expertise, time for creation of the sites, and response to feedback from the researchers.

The Recruitment website included six main topics on separate webpages: a home page of introduction, eligibility requirements, a detailed description of participant activities, consent page with a link for downloading the form (Explanation of Research), compensation information (\$25 for each of the two interviews), a “contact us” page with information for reaching the PI and PC, and the funding source.

The Intervention website (see Fig. 1) included: the Home Page, Continence Product Advisor, Commercial Products, Educational Materials, Personal Data, Forum, Contact Us, Help, and Logout. The Continence Product Advisor was available through collaboration between the International Consultation on Incontinence and the International Continence Society (<http://www.continenceproductadvisor.org/>) which provided detailed information about a range of continence products, such as catheters and absorbent products. In the Commercial Products section, we added a page of website links related to various types of intermittent catheters and other products which could be useful to people self-managing IC. The 23 page educational booklet focused on self-management information, such as frequency of catheterization and balancing fluids with activities. It was a modification of a face to face intervention conducted with indwelling urinary catheter users. The manuscript fully describing the intervention, with multiple screen shots, is currently in press.

A major feature of the Intervention site involved interactive components with controlled drop-down selections and individualized display of their urinary diary data. In addition, on the Intervention site, a forum was created so the enrolled study participants could initiate and exchange posts on topics of their choice related to their catheter. The Forums were moderated by one of the intervention nurses and the PI who routinely read entries every week and provided feedback as needed. The Help page was designed to support the “refresh” option which could be confusing to people not familiar with this feature on their web-browser. Instructions with “screen shots” (pictures) were provided for Firefox, Internet Explorer, Safari, and Google Chrome.

Intervention Nurse Contacts

The intervention nurses made three telephone call consultations with pretesting study participants in a two month period to explain the web-based intervention (while the participant had the website open), teach self-monitoring with the online urinary diary, and follow up on advice and goal setting. The first and second consultations were about a week apart, and the third was about two months after the first. Intervention nurses were trained together using our Training Manual during a series of several half-day meetings with the PI and PC over about a month’s time. The Training Manual was modified from our team’s previous research with indwelling urinary catheter users to address intermittent catheter users’ unique needs. Bandura’s self-efficacy theory¹⁴ was the framework for the study, and sources of self-efficacy were specifically targeted: mastery experiences, vicarious observation, verbal persuasion, and physiological status. Using role play, the intervention nurses were able to “try out” the scripts for each of the three phone call consultations using the website during these sessions, and ultimately conducted a complete “one on one”

intervention contact with the PI over the phone. In addition, the intervention nurses were observed during their initial telephone consultations (face to face) by the PI or PC. Follow up feedback took place directly afterward to assure fidelity in the way the intervention was conducted.

Methods (Stage 2-Pre-testing Intervention)

Design and Sample

The pre-testing stage involved a descriptive study with a small convenience sample (N=4) of people with spinal cord injury using IC on a regular basis. A combination of quantitative and qualitative data were sought to: describe the sample, assess whether the online surveys would be effective for data collection, and determine what changes were needed in the intervention and/or websites prior to the full feasibility study with 30 persons.

Two study participants were recruited through a nurse at the urological clinic of our medical center, the third through contact with a person who had expressed interest during the planning stage of the study in years prior, and the fourth through a urological physician at a spinal cord clinic. Eligibility criteria included: English speaking adults over 18 with an SCI, use IC for regular bladder drainage and expect to use it indefinitely or for at least four months, and have access to and ability to use a computer, Internet and telephone. Study participants did not need to perform IC entirely themselves, as people with limited hand dexterity may have caregivers who do the procedure. In addition, the pretesting group needed to have used IC for at least one year as they were to be considered for peer advisors for the next stage of research (the full pilot with 30 persons).

Procedures

Enrollment—During the enrollment phone call, the researcher (PI or PC) used a brief script to determine eligibility, describe activities of the study, ascertain interest, and obtain contact information for those interested in participation. If the person was interested, a Study Website link was sent by email to the person so they could review the Explanation of Research (consent form) and other details of the study, and a time was set to complete the verbal consent by phone. The researcher explained how to complete the online consent process through clicking a check mark (agree or disagree). After consenting, the participant was sent a link to complete the REDCap online survey. The researcher conducting enrollment also asked which measurement equipment they preferred, either a 1000 mL beaker or a “hat” with measurement marks for over the toilet; requested information about what the “best times” were for the Intervention nurse to contact them; and informed them of how to contact the Project Coordinator (email or phone call). Information was also provided on how to access the intervention site using their choice of username, screen name for forums, and a password for protection of their personal health information in their personal database. No other study participant could view the personal database of others enrolled in the study.

Data Collection—Two research phone call interviews took place with each of the four pre-testers to evaluate the web-based program. The first phone interview for data collection

took place a week or so after enrollment was completed and evaluated our process of online enrollment. The second phone call for data collection took place after study participation ended about three months after enrollment and it focused on feasibility/usability¹⁵ and to ask for comments and suggestions.

The Project Coordinator conducted the first short telephone call interviews with the pre-testers for feedback on how the enrollment and consent processes worked. Notes were taken by the PC for each person based on answers to each of the three questions, and summarized in a table format. When all the interviews were completed, these data were reviewed by the team for decisions about changes in our enrollment and consent procedures, which would be used in the next stage of the study.

The final tape recorded interviews with the four pre-testers were conducted by the PI. The quantitative items were scored on paper, and brief notes were taken to remind of key issues in the conversations as the final interviews were conversational in nature and took about one hour to conduct. Then the PI listened to the tapes and wrote summaries of each interview, using the written notes as well as the details in the tape recordings. The PC listened to the tapes to verify that the summaries were accurate.

Instruments

First Online Survey—An online survey developed by the researchers was used to collect data on demographic and catheter-related practices for describing the pretesting sample, using many of the questions previously used in the team's research with indwelling catheter users,¹⁶ but modified for IC. Items included 1) demographics; 2) SCI level and completeness; 3) activities of daily living; 4) catheter care details (e.g., frequency of catheterization and catheter type); 4) catheter adverse events (e.g., UTIs, leakage) and a general rating of health status (from www.Patienteducation.Stanford.edu/research).

First Phone Interview Questions—For the first interview about the enrollment processes we asked: 1) How did it go for you to start the online study? Did you have any problems getting started? 2) Do you think others would find this process easy to use? 3) What suggestions do you have for us to make this process smoother? Specific probes were utilized e.g. related to their computer, our server, and helpfulness of our team.

Second Phone Interview Questions—For the second interview at the end of the two months' participation, for feasibility we asked whether the parts of the catheter self-management program contained *information that was useful* related to the intake and output part, journal, educational materials, phone calls with the intervention nurses, and discussion forums. Similarly, we asked *whether they were satisfied* with these parts of the program, meaning it gave them desired information.¹⁵ These answer options were on a 5 point Likert scale of Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree, or Did not Use.

For usability, we asked whether the program was easy to use, to move around the site, to get back on later, pleasant or visually attractive. These answer options were: none of the time, a little of the time, some of the time, a good bit of the time, most of the time, or all of the time. We also asked whether the person believed he/she was more in control of the bladder

problem because of this program, using the same answer options as for the usability questions.

Open-ended questions were asked to solicit comments and suggestions for revising the program for the next phase of research in the pilot study:

1. What they thought of the program, with probes about what they liked best, anything they thought should be removed, information missing etc.
2. Whether the length of time for the program was too long, too short, or about right
3. Whether they were satisfied with the technical support, with probes about whether they needed to contact anyone to get access, anything confusing
4. What they liked or did not like about the intervention nurse contacts
5. Whether they had suggestions for improving this program for managing an intermittent urinary catheter
6. Whether they would recommend this program to others, with probes of why or why not.

Data Management and Analysis

Quantitative data were collected and managed using REDCap electronic data capture tools hosted by our University. REDCap is a secure, web-based technology designed to support data capture for research studies, providing: 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.¹⁷ Data were catalogued when they were received and later exported to an SPSS (IBM SPSS Statistics V. 20) file for verification and cleaning by our data analyst. Quantitative data from the hard copy forms completed by the PI during the final interview (feasibility questionnaire) were entered by the PC to SPSS and verified by the data analyst for accuracy.

For qualitative data, key issues from comments and suggestions from the process interview and from the final interviews were identified and compiled into a table for review by the team. First, the PC conferred with the PI and they came to agreement about the issues raised, condensed them in a table to be shared with the full team, and then the team reviewed them and made decisions for an action plan. In the written action plan, we detailed whether to address each of the issues raised, what would be done, and who would be responsible to do it.

Results

Quantitative Data

Sample Demographics—The sample was made up of two males and two females, median and mean age of 54 (SE 8.3), and mostly white (n=3; one person not reporting) and non-Hispanic (n=4). Three were married and one had never been married. Living arrangements included three who lived with 3 people and one who lived alone. The

educational level included two people with a bachelor's degree, one person with a masters' degree, and one with a high school diploma. Two had a complete SCI and two had incomplete. Level of injury ranged from T3–4 (2 people), one with T5, and one T11–L1. Insurance coverage varied with two people having both Medicare and private insurance, one each with just private insurance or Medicare. One person was employed full time and the other three were not employed. While all were able to get around by wheelchair independently, other activities of daily living—for bathing dressing, toileting, transfers, and feeding self--were performed independently by three people but required assistance by one. Health status was viewed as “very good” by three people, and one chose not to answer this. The frequency of catheterizing was 4 times a day by two people, between 4–5 times a day by one, and 5 times a day by one. One person reported mild pain related to catheterizing, occurring about every two months. Two people had UTIs in the previous 6 months, one had 2 and one had 4; however, none had been hospitalized for it. Most people (3 of 4) had leakage; three had this daily and one had it at least monthly, with amounts listed as moderate by two persons and large by one. Three participants answered the question of whether they were more in control of their bladder because of this program. One person each answered some, most, or all of the time.

Feasibility and Usability—The scores for feasibility and usability were viewed as highly favorable. For instance, the feasibility questions were rated highly either as agree (18 times), strongly agree (17 times) or neutral (1 time) for 35 of 38 answers related to usefulness or satisfaction with the intervention components (intake and output diary, journal, educational materials, intervention nurse phone calls, and peer forum). There was one missing answer and two not applicable. Similarly, the usability questions about how well the web application worked were also highly scored with 14 out of 16 answers being either most (n=2) or all of the time (n=12), the highest two response items. There were no answers of none or a little of the time.

Qualitative Data

Enrollment Feedback—We received many positive comments related to the process of enrollment such as: appreciating having guidance during this task from our research and/or IT staff; there were no problems in getting started or using the site; basic computer skills would allow for easy navigation; and the Overview feature gave a “quick snapshot” of what is going on. One participant liked the convenience of completing I & O when resting in bed using a cell phone. Another said that it was very convenient to not have to travel for this research.

Participant Suggestions for the Intervention—Numerous suggestions were made about possible changes to the online urinary diary. Some ideas were incorporated into the web application and others were not adopted, but we discussed each suggestion and considered them as a team. Key issues we addressed and acted upon were related to: adding a choice in selecting dates to view I and O records, more information on clothing adaptations on how fluids are affected by position and for women by monthly cycles, using IC instead of the CIC term, adding a description of a typical week on the goals page, and making the sites user friendly for mobile phones.

Specifically, one concern was about not being able to select just a specific date for viewing the Intake and Output record. No matter whether one entry was made, or 20, the entire list of entries would be shown. This “all or nothing” option made it difficult to track progress. We agreed, and therefore we added a way of selecting a date or several dates for viewing as this would be useful for any long term tracking of I and O. Leakage of urine, with a drop down menu of small, medium, or large amount was considered essential and we added that to the program. Some suggestions however were not practical, such as placing pictures of mucous or bloody urine on the urinary diary and an additional urine color chart to be kept in the bathroom so we decided to not make those changes.

Two major changes were made in the educational booklet based on our feedback from the study participants. One related to clothing issues which could discourage from catheterization. So we added additional links in the educational booklet with illustrations of clothing adaptations which could be made easily without purchasing specific items. We received feedback about how fluid changes affect persons with SCI who perform IC, specifically related to women’s menses or the position in a wheelchair and therefore added this information to the educational booklet.

Finally, there was an additional text box added to the goals page related to a typical pattern of weekly activity. This was to help the person identify when fluid and activity patterns might vary—particularly weekday as compared with weekend patterns-- and allow for adjustments in fluid intake and catheterization times.

Final Interview Comments about the Program—For a question about the length of the program, the participants were divided when answering the question about whether they considered the length of time for the program (3 months) to be too long, too short or just about right. Two responded that it was too short, one thought the length was good as it was, and one thought it was too long. Related to question 6, when asked whether they would recommend the program to others, three of the pre-testers responded affirmatively, with two of them also adding “absolutely.” The fourth pre-tester answered conditionally and somewhat inconclusively saying that a recommendation would depend on “how recent the injury as to how much the program might help.”

Discussion

Our web-based self-management intervention for people with intermittent catheter is the only known program of its kind. Using the criteria identified by Chee and associates, we evaluated the study in relation to *meaningfulness, target population, focus, components, technological aspects, user logistics, and theoretical basis*.¹⁰ Individuals with SCI have severe limits in mobility but most use a computer.¹⁸ Online forums for this population with SCI were evaluated prior to the study and found to be infrequently monitored, often with no activity for years on a site. Therefore, our goal was to develop a program that would be *meaningful* to this *target population* and the positive responses of the pretesting group indicate this. In addition, we had recruited through the internet previously and found enthusiastic interest in research that would help them manage their catheter.¹³ No one dropped out during the pretesting time and the participants’ response was very positive

overall. While participants received at least 6–7 phone calls during the study for enrollment, consent, orientation to the study, nurse contacts, and evaluation, no one complained about the interactions as burdensome. The educational booklet was based on our prior qualitative interviews with IC users¹³ and literature, and the *focus* was on assisting participants to find the best interval for catheterization and in using a new web-based urinary diary. Other key *components* of the intervention included a discussion forum and a large amount of information on catheter products. We knew from our prior research¹³ that many people did not know about new developments in catheter products, and sometimes they used what had been recommended 20 or more years earlier when in rehabilitation. *Technological aspects* and *user logistics* were developed and refined based on feedback from our pretesting participants. Moreover, use of our self-management *theoretical model* (which is not discussed in this paper) is appropriate because this population with SCI must manage not only their self-care but also direct caregiver assistants. Self-management has been used as the theoretical framework in numerous online intervention studies for chronic conditions,¹⁹ and in one study²⁰ the intervention specifically targeting sources of self-efficacy as in our study.

The Experience of Developing the Intervention

Developing this intervention helped us understand how our intended audience viewed the websites and components of the intervention, and they helped us make important changes. For instance, without working closely with the four pre-testers we would not have known to plan for IT assistance or know how much of it would be required in a larger study. Our “tracking request” system was instituted based on an IT problem that required the study participant’s contacting the PC and then further communication with the IT staff person who could address the issue. However, we realized that the key IT member for our study might not always be available, necessitating that someone else on the School’s IT team step in to possibly address access issues or computer problems. Therefore we decided that a permanent record was needed of who addressed the issue and how it was resolved.

Also, we would not have known that our terminology for CIC (for clean intermittent catheterization) would not be familiar with every participant. When one pre-tester alerted us to a lack of familiarity with the term, we wondered whether we had made a mistake in using this abbreviation. We know that not everyone uses clean catheters; some use sterile. So we decided to replace all the CIC terms with IC for intermittent catheterization.

Conducting a study “live” with study nurses talking by phone with participants was more complicated than we anticipated, and it was harder to know how to teach this interactive process. Initially we found it challenging to understand how to review the basic self-management content, navigate the webpages with the study participant on the phone line (including interactive urinary diary features), and individualize to their needs. Nevertheless, the training manual was found to be a helpful guide overall to plan for the intervention content even though the sequence and flow of the conversation varied. After several mock intervention phone calls, our intervention nurses were comfortable with the approach. Thus, our training manual was used somewhat differently than we had anticipated due to the complexity of our telephone call consultations between nurses and participants with the

simultaneous use of their computers/websites. Occasionally a computer not working well or internet slowness would stall the discussion, but it went smoothly for the most part.

At the end of our pretesting phase, we also included two meetings with a local urology nurse practitioner who provided additional suggestions about the intervention components related to the educational booklet. Also at this time, we were in the process of training our two peer leaders (who had been selected from the four pre-testers) for the next stage of the study (Stage 3), and they verified that the changes we were planning were valuable.

Both quantitative and qualitative data were required to determine whether each of the components of the intervention were of value and to obtain comments and suggestions for modifications. Each component of the intervention (the study nurse contacts, web-based information, and peer forums) seemed to be of value to the pre-testers, giving us support for combining these elements in a synergistic way. Positive comments from the second phone interviews corroborated the high ratings from the second (quantitative) survey and helped us identify what was needed for improvements to the intervention.

Strengths and Limitations

This is the first known web-based self-management study for intermittent catheter users. The population focus in persons with spinal cord injury has made it more tailored to their needs, such as in clothing adaptations suggested. Our experienced team was a strength of the study, which included researchers, study nurses, information technology staff, consultants, and our pre-testers who use intermittent catheters. The team worked well together, and we benefitted from having consultants to call on at various times. The sample demographics are intended solely to describe the pre-testers in relation to the population with spinal cord injury, and this group is too small to be generalizable. Also our small pretesting sample of four did not permit full evaluation of some components of the intervention, such as the forum, and other participants might have had different suggestions. While our measures were designed by the research team, we have conducted several studies in populations with permanent urinary catheters, and thus for the demographic and catheter related questions, we used or modified items found satisfactory.^{12, 13, 21–23}

Conclusion

In summary, our four pretesting study participants were instrumental in helping us develop our web-based intervention by providing thoughtful comments and suggestions during the two phone calls and web-survey at the end. Specifically, we: 1) added a tracking system related to our help menu; 2) changed terminology related to catheterization from CIC to IC; and 3) made changes in the diary, including an addition of a text box about their usual weekly patterns, a choice to display a range of dates for I & O, and a drop-down for leakage amounts; and 4) added links to clothing adaptations and content related to how fluids can affect catheterization.

We were able to complete the development of the web-based intervention and to pre-test it with intermittent catheter users in seven months, and we were pleased that all parts of the web-based intervention worked smoothly. Development and pre-testing this new

intervention provided the preliminary data to revise the intervention for the next stage, i.e., the pilot study with 30 people. Critical improvements were incorporated into the design of the intervention by receiving feedback from our pre-testing participants.

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Figure 1.
Screenshot of intervention home page (reprinted with permission)

Table 1

Glossary of technical terms for web-applications

Term	Definition	Description
HTML5	Hyper-Text markup Language” version 5.	HTML5 is the language used to describe how a page is to be displayed in a Web browser.
CSS	“Cascading Style Sheet”	CSS is a way to define commonly used styles to provide a uniform format for Web pages. It allows for more exact control of how elements of a Web page are displayed.
Javascript	Scripting language	This language is supported by most Web browsers and allows for the addition of interactive elements on a Web page.
Python	A general purpose programming language	A language created in December 1989, Python can be used to create complex tasks and provide connectivity to other services (such as databases). It is often used to extend the capabilities of Web pages
Django	A web application framework	Django is a tool, written in Python, used to create database-driven websites. It also assists in implementing security on interactive Web pages.
PostgreSQL	A relational database system	Often used to store and retrieve data for dynamic Web applications
SSL/HTTPS	“Secure Sockets Layer”	This is a way to secure information being sent across the internet. It encrypts the Web protocol (known as HTTP) making it unreadable to a third party.
XSS (Cross site scripting)	“Cross-site scripting”	This web application vulnerability exploits the browser’s trust of content it receives from the Webserver that can result in the ability to bypass existing security measures. This is the reverse of CSRF.
CSRF (Cross site request forgery)	“Cross site request forgery”	In contrast, this web application vulnerability exploits the Webserver’s trust of content it receives from the user’s browser, in essence, impersonating the user. This is the reverse of XSS.
SQL	“Structured Query Language”	Structured Query Language is the standard language for relational databases.
SQL injection	“SQL injection”	SQL injection is when a command to the database is unknowingly inserted into a Web application, usually through a vulnerability in an entry form. This can result in the disclosure, alteration, or deletion of secured data.
GIT	A version control system	This software program is for organizing and tracking changes made in the code of a software project involving multiple people.