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CONTINUING EDUCATION

Development and Evaluation of a Web Site to Improve Recovery From Hysterectomy

STEVEN DUKESHIRE, PhD
DONNA GILMOUR, MD
NORMAN MACDONALD, BCSc
KATE MACKENZIE

Following surgery, information received upon discharge for recovery at home varies depending on the hospital, and the information is typically given to the patient all at once rather than timed to the recovery process. To address these information challenges, a Web site to help women recovering at home after hysterectomy was developed and evaluated. The Web site was designed to guide the hysterectomy patient through her postsurgical recovery by providing timely and relevant information tailored to the patient's stage of recovery. The Web site required patients to complete a checkup assessing 18 symptoms related to their recovery, and advice was given on how to deal with any symptom the patient had. The Web site also provided care tips specific to the patient's day of recovery along with general information regarding hysterectomy and recovery. Thirty-one women participated in the evaluation, which consisted of preoperative and postoperative surveys as well as a telephone interview. Results indicated that patients frequently used and were highly satisfied with the Web site. Patients reported that the Web site was easy to use and informative, helped to guide their recovery, reduced worry and anxiety, and helped to inform decisions of when and how to contact health professionals. Based on the findings, the Web site represents a potentially cost-effective means to aid women recovering from hysterectomy.

KEY WORDS

Adverse events • Health information • Hysterectomy • Surgery • Web site

Hysterectomy is the most common surgical procedure performed on women in developed countries,[1] with up to 750 000 hysterectomies performed in North America annually.[2,3] Although a large literature exists pertaining to best practices and improving surgical procedures, there has been relatively little emphasis placed on finding ways to improve patient care posthysterectomy after discharge from hospital. Proper self-care during recovery would likely lead to a more favorable outcome for the patient as well as higher satisfaction with the surgical process. Perhaps even more important, adverse events, both serious and nonserious, are relatively common after hysterectomy.[1,4,5] Timely diagnosis and treatment of evolving adverse events are critical steps in limiting their negative effects. Thus, proper self-care, the ability to recognize symptoms of adverse events, and knowing when and where to access the healthcare system are all important elements of successful recovery from any invasive surgery, including hysterectomy.

Patients discharged from hospital usually receive material concerning their postsurgical self-care, typically in written form on paper. Both the type and quantity of information patients receive vary, depending on the hospital where they have their surgery and on the ratio of healthcare providers to patients. Patients also are provided the information all at once, rather than timed to coincide with the relevant stage of their recovery process. We believe that patients could benefit more from postsurgical information

Author Affiliations: Department of Business and Social Sciences, Nova Scotia Agricultural College, Truro (Dr Dukeshire and Ms MacKenzie); Department of Obstetrics and Gynaecology (Dr Gilmour) and Faculty of Computer Science (Mr MacDonald), Dalhousie University; and IWK Health Centre, Halifax (Dr Gilmour), NS, Canada.

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Corresponding author: Steven Dukeshire, PhD, Department of Business and Social Sciences, Nova Scotia Agricultural College, 56 Rock Garden Rd, PO Box 550, Truro, NS, Canada B2N 5E3 (sdukeshire@nsac.ca).

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if it were comprehensive, delivered in a manner timed to the recovery process, indicated specifically how to recognize adverse events, and helped the patient to decide when and how to contact the healthcare system. This article reports on the development and evaluation of a Web site designed to improve recovery after hysterectomy by providing patients timely, accurate information pertaining to their self-care and self-monitoring for adverse events following surgery.

LITERATURE REVIEW

A recent study examining the factors that influence patients' satisfaction with hospital care concluded that communication between doctor and patient plays an influential role in patients' final perception of their care. Three communication factors related to patient satisfaction were (1) identifying correct health care personnel, (2) receiving enough information about their state of health, and (3) being informed about the place and schedule for medical information.[6] In busy hospitals with high patient-doctor ratios, it is likely that these factors are not always adequately addressed prior to discharge and are likely less well addressed after patients return home following surgery.

Few studies in the published literature have examined the relationship among communication, patient outcomes, and satisfaction with care. A recent study of over 15 000 Spanish hospital inpatients revealed that satisfaction with postsurgical care was largely dependent on the type of information presented to them and the manner in which it was presented, both before and after surgery.[7] An earlier review of the impact of preoperative instruction/information on postsurgery recovery revealed that preoperative instruction generally improved patient outcomes after surgery by increasing knowledge about surgical outcomes, reducing patient anxiety, and increasing compliance with postsurgery care regimens.[8] In a review examining patient satisfaction with hysterectomy or minimally invasive alternative procedures, the authors suggested that regardless of which procedure patients chose, quality-of-life outcomes were dependent on the degree to which patient expectations were met. These authors also highlighted the importance of patients receiving adequate information about surgical options that take into account the specific circumstances of the patient's surgery.[9]

Meeting the goal of getting timely, relevant information to surgical patients is particularly difficult once they leave the hospital. With increasing Internet use, online communication may be one way to help meet the information needs of patients discharged after surgery. In 2009, according to Statistics Canada, over 80% of the Canadian population 16 years or older used the Internet,[10] with 88% of Canadians aged 35 to 54 years and 71% of Canadians aged 55 to 64 years using the Internet.[11] The same survey also showed that 96% of all Canadian Internet users had access to the Internet from home, with more than three quarters of these home users going online at least once a day.[12] The Internet is also becoming a commonly used source for health information. According to Statistics Canada, in 2009 74% of female and 66% of male home users used the Internet to search for medical or health-related information.[12] The increasing penetration of the Internet into Canadian homes as well as the tendency of people to use online sources of health information suggests that the Internet could play an important informational role in helping patients in their recovery after surgery.

To date, no published research has examined the use of the Internet to deliver healthcare after any type of surgical procedure. However, trials have been performed on Web-based self-care modules to help patients manage chronic health conditions. In one study, a 12-week Web-based intervention program was created and used to examine its effects on physical activity levels and glycemic control in patients with type 2 diabetes.[13] Seventy-three adults were randomly assigned to one of three groups: Web-based intervention, printed material intervention, and usual care. The Web-based and printed material interventions were similar in content and consisted of physical activity counseling strategies that were based on the five different stages of the transtheoretical model (precontemplation, contemplation, preparation, action, maintenance). Physical activity levels, fasting blood sugar, and glycosylated hemoglobin were measured before and after completion of the 12-week intervention. Results of the study indicated that the Web-based intervention and the printed material intervention were more effective, compared with usual care, in increasing physical activity levels and decreasing fasting blood sugar and glycosylated hemoglobin. Although no significant differences were found between the two types of interventions, many patients indicated during their poststudy interviews that the Web-based approach felt personal and individually tailored.

A second study also examined the use of an online self-care module in managing blood glucose levels, knowledge about condition, and eating and exercise habits in patients with type 2 diabetes.[14] This module included five Web sites that allowed patients to upload changes in blood glucose readings, browse endorsed educational sites, complete food and exercise diaries, and communicate with healthcare professionals via a clinical e-mail. Both patients and healthcare providers had access to patient data, view it online in trended displays, and discuss areas of concern via e-mail. Three case vignettes demonstrated proof of concept that the module helped patients become better informed about their condition, more involved in treatment, and better able to self-manage

symptoms. Similarly, another study was performed on Internet self-care modules developed to improve quality of life in asthma patients. The Web-based self-management program included weekly monitoring and treatment advice, education, and Web-based communications with a nurse asthma specialist. Quality-of-life indices assessed asthma control, symptom-free days, lung function, and exacerbations. Based on a randomized controlled study, the researchers concluded that improvements in quality-of-life indices for asthma patients were greater with Internet self-care modules versus the usual standard of care.[15]

GOAL OF THE STUDY

Based on the previously mentioned literature review, evidence suggests that patients having all types of surgical procedures could benefit from better communication. This communication should include timely information regarding what to expect during recovery at home, symptoms to be concerned about, self-care, and when and where to contact the healthcare system. The literature review also suggests that an online self-care system to support patients may improve their surgical outcomes and satisfaction with care. To explore the potential of an Internet-based self-care Web site, the *S*tudying *A*dverse Events *F*rom *E*lective Surgery *R*esearch (SAFER) project was developed. The SAFER project was designed to provide access to information on a Web site tailored to women recovering at home after hysterectomy. In this article, we describe (1) the process through which the content for the SAFER Web site was developed, (2) the resulting Internet-based self-care Web site, and (3) the outcome of a study assessing patients' use and perception of the SAFER Web site.

MATERIALS AND METHODS

Institutional Research Ethics Board Review

Prior to beginning recruiting patients for the study, the research was reviewed and approved by the research ethics boards of the IWK Health Centre in Halifax, NS (IWK), and The Ottawa Hospital in Ottawa, ON (TOH), Canada. All patients were informed of the study and provided signed consent forms prior to their participation.

Sample

Patients undergoing total abdominal hysterectomy at IWK or at TOH were invited to participate in the study prior to surgery. Participants for the study were recruited from women scheduled to have an elective abdominal hysterectomy. The preadmission clinical nurse, while seeing patients prior to surgery, asked if they may be interested in participating in the study and determined if they met the inclusion criteria of being able to speak and read English, had home Internet access, and were comfortable using the Internet in an interactive manner (eg, online banking, shopping). Those who met the inclusion criteria and indicated they were willing to learn more about the study were subsequently contacted by study personnel either in person in the clinic or by phone at home. The patient was provided information about the study and what her participation would entail. Those who consented to participate received a brief overview of the Web site as well as instructions about how to log in. Participants were expected to log in to the Web site prior to surgery to complete the preoperative survey as well as to use the Web site resources, particularly the preoperation information provided on the Web site. After having surgery, patients were to use the Web site however they wanted for their recovery, although they were requested to log in at least once a day for the first week after discharge and twice a week for the next 3 weeks thereafter.

The final sample consisted of a preliminary feasibility phase of five patients from the IWK, followed by a pilot study of 26 patients from both the IWK and TOH. Thirty-eight patients initially consented to participate in both studies; one patient was excluded because of cancellation of her surgery, and another was excluded because her surgical approach was changed to subtotal abdominal hysterectomy after her consent to participate was obtained. Of the 36 remaining participants, five from the pilot study did not log in to the Web site at all because of various reasons and were excluded from subsequent analysis. Thus, the study included 31 participants: 11 patients from TOH and 20 from the IWK.

In the feasibility phase, patients (n = 5) were asked to log in to the Web site over 6 weeks postoperatively, complete brief preoperative and postoperative surveys, and participate in a telephone interview. Log-in habits and feedback from participants were reviewed and used to modify the Web site accordingly. Other than adding general information to the Web site pertaining to issues relevant to recovery, the Web site content was the same for patients in both the feasibility and pilot study phases. Because the information available to participants was consistent between the feasibility (n = 5) and pilot study (n = 26) phases, the results were pooled for analysis (n = 31).

Online Intervention

The content of the SAFER Web site was developed by six gynecologic surgeons, a medical writer, a computer programmer, a psychometrician, and a statistician during an interdisciplinary workshop held in Halifax. The six

gynecologic surgeons have many years of experience performing hysterectomies and were members of The Society of Obstetricians and Gynaecologists of Canada, with most holding executive or leadership positions. They ensured the materials developed were accurate and reflected the most up-to-date clinical knowledge and guidelines pertaining to hysterectomy postsurgical care. The surgeons were involved in all aspects of the development of the Web site content and reviewed the final Web site for accuracy. All six surgeons were also available for consultation on an ongoing basis as the materials were being developed and revised.

The SAFER Web site consists of information specific to the type of surgery (total abdominal hysterectomy) and tailored to the day of recovery. The components of the Web site include a 2-minute checkup to screen for symptoms, a daily recovery journal to record access to the healthcare system, daily information on normal and abnormal recovery, and other educational resources specific to total abdominal hysterectomy. The Web site also included a preoperative and postoperative survey. The preoperative survey assessed demographics and patient patterns for searching for health-related information, and the postoperative survey assessed patient perceptions of the Web site.

Our professional medical writer translated the Web site content to a literacy level intended to be understood by the general public. A database-driven Web application was developed and hosted at the IWK with an SQL Server (Microsoft, Redmond, WA) database and the ASP.NET 2.0 Web application. A log-in module fetched daily information and a task list for a specific patient once she was identified by a random nine-digit barcode and password. No patient identifiers were stored with the Web application; all patients were identified by a randomly assigned barcode. The Web application was hosted at the IWK with all communications protected with 128-bit SSL encryption.

Web Site Layout

The Web site consisted of four key components: (1) information specific to day of recovery, (2) a 2-minute checkup with detailed symptom-specific information provided for any positive replies, (3) a free-text recovery journal, and (4) general information pertaining to presurgical and postsurgical care. Each of the components is described below in the order the patient would most likely visit them.

(1) Log-in and Initial Information Specific to Day of Recovery

To begin a session, patients were required to log in, using a nine-digit barcode that was a unique identifier for the patient. The log-in procedure provided the information needed in order to know how many days the patient was along in her recovery. Upon successful log-in, the patient was provided information specific to her day of recovery (Figure 1). In general, the daily information first informed patients of normal symptoms they may be experiencing followed by tips for a healthy recovery. Both types of information were specific to the particular point in time patients were at postsurgery.

(2) Two-Minute Checkup

After logging in and reading tips specific to their day of recovery, patients were asked to complete a screen with 18-symptom questions as part of the "2-minute checkup" (Figure 2). For each symptom question, patients provided a yes or no response regarding whether they were experiencing that symptom. A positive response to a symptom question automatically directed the patient to more detailed information on what the symptom potentially represented and recommendations for actions that the patient should take. The recommendations for action varied depending on the symptom and could be roughly divided into two categories—symptoms that were common and typically not dangerous during normal recovery and symptoms that potentially signaled a serious adverse event. An example of a symptom common during normal recovery was constipation. Patients who indicated they did not have a bowel movement in the past 24 hours were informed that constipation is a common part of the recovery process and were advised to visit a pharmacist for advice on over-the-counter preparations for constipation relief (Figure 3A). An example of a symptom that possibly signaled an adverse event was fainting. Patients who indicated they fainted were prompted to contact their surgeon or present to an emergency department (Figure 3B). Patients were reminded each time they completed a 2-minute checkup that their responses were not being monitored and that it was their responsibility to take appropriate action for their symptoms.

(3) Free-Text Recovery Journal

During each log-in, patients were asked to complete a free-text recovery journal entry to comment on any problems they experienced that day and if they had any unscheduled contacts with the healthcare system. The recovery journal was included solely for research purposes.

(4) General Information

In addition to the daily specific information and symptom information provided, patients could also view information about hysterectomy at any time. This general information covered a wide range of topics including preparing for surgery, the surgical procedure, normal recovery, problems that could arise after surgery, tips on how to have a healthy recovery, and frequently asked questions.

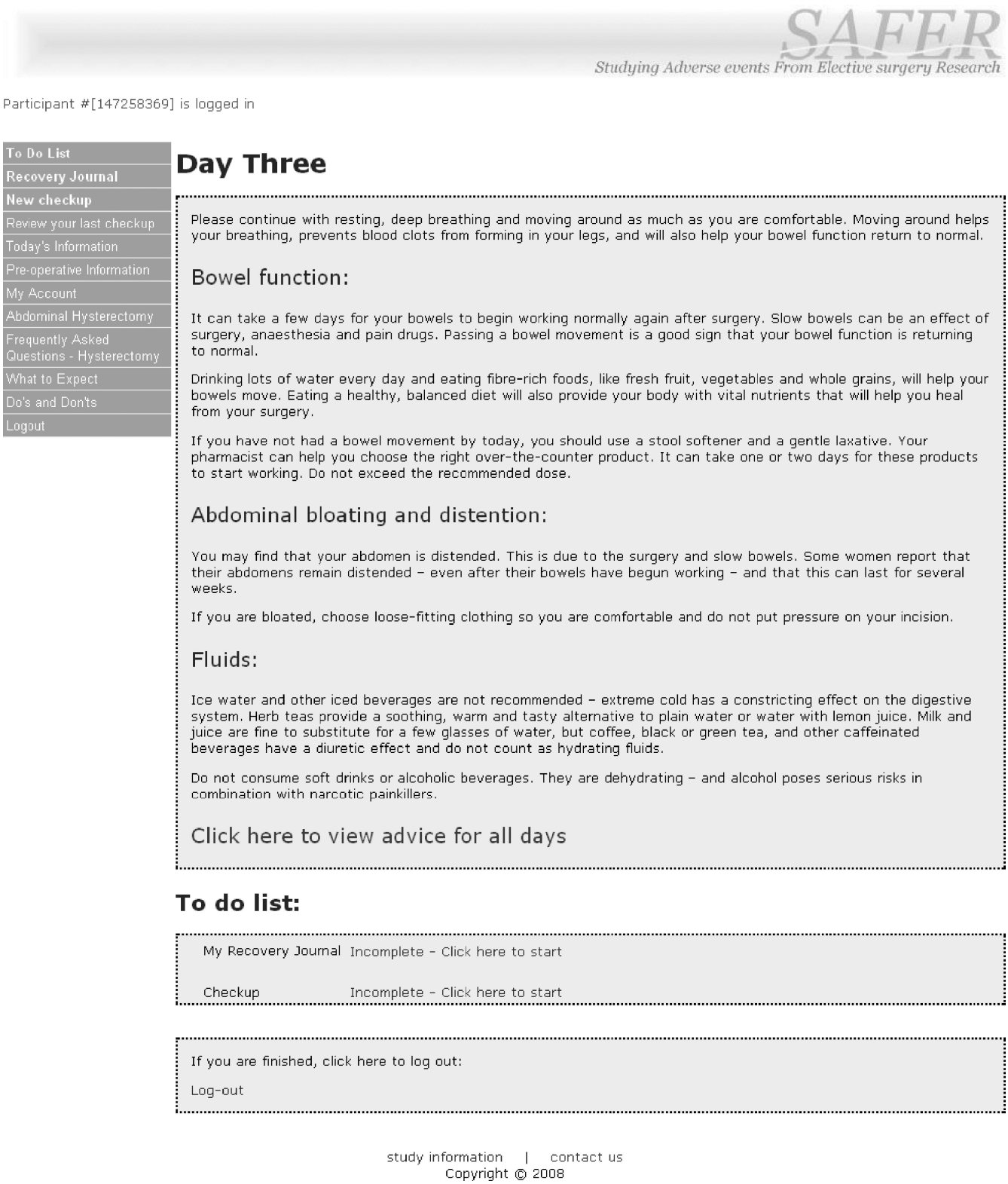

FIGURE 1. Information specific to day 3 postsurgery. Reprinted with permission.

Log-in Schedule

Each patient was asked to log in prior to surgery to complete the online preoperative survey and to explore the preoperative information available on the Web site. For the first week following discharge, patients were asked to log in daily, review the daily tip, submit the 2-minute checkup, and complete the recovery journal.

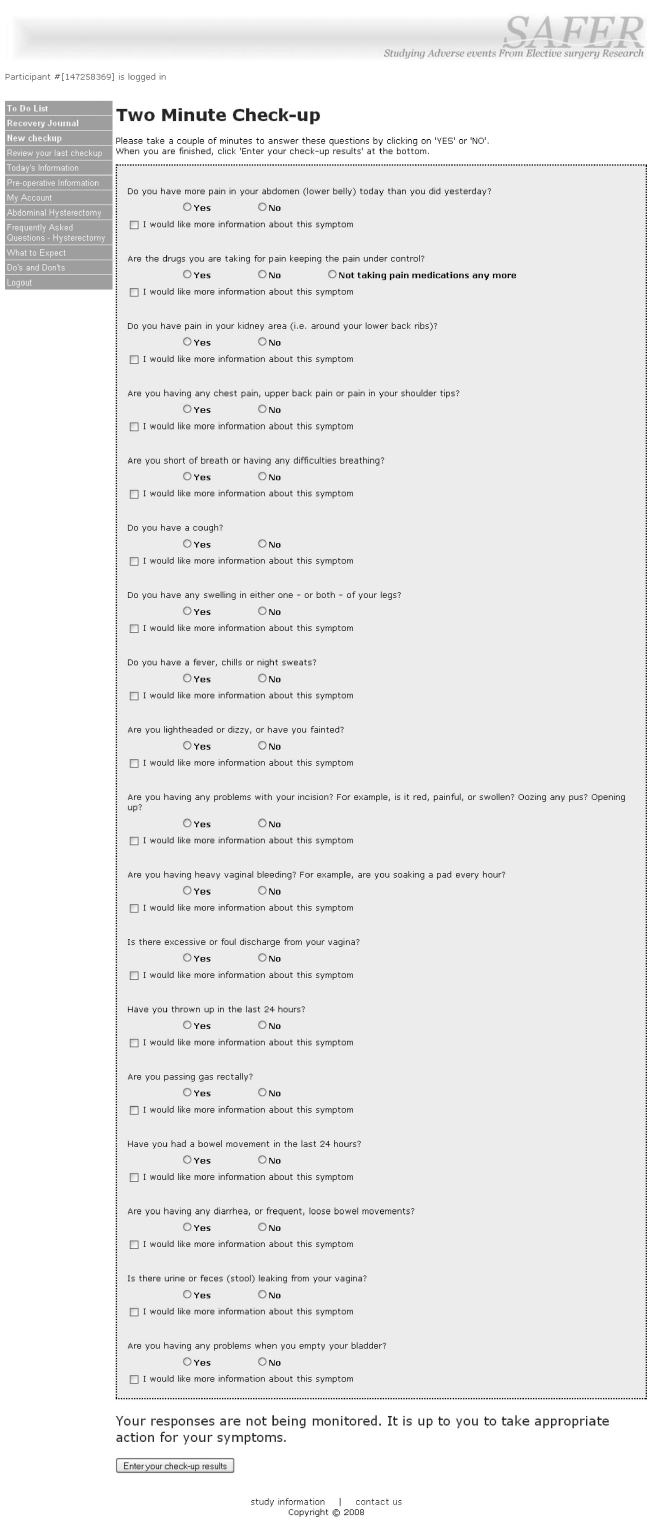

FIGURE 2. Two-minute checkup. Reprinted with permission.

For the following 3 weeks, patients were asked to do these tasks only twice per week. Thus, patients should have logged in and used the Web site for a total of 13 sessions over a 1-month postoperative period. Patients in the feasibility study logged in for a total of 6 weeks, but log-in patterns from the five feasibility patients showed they used the Web site infrequently after 4 weeks. Patients could also log in at any time to review information or to complete another 2-minute checkup, even if they had already completed one or more checkups earlier in the day.

Preoperative and Postoperative Surveys

Participants completed short surveys prior to their surgery and approximately 6 weeks after surgery. Both surveys were completed online from the patient's home. The surveys were designed to assess patients' opinions of the Web site and how it helped them in their recovery. There were also questions pertaining to the actual surgical experience itself, including recovery. For the purposes of this study, only the results from the items directly relevant to the Web site and its impact on recovery are reported.

PREOPERATIVE SURVEY

The preoperative survey asked participants to indicate using five-point scales ranging from 1 ("not at all") to 5 ("quite a lot") how much they used five sources (Internet, books/magazines, television/radio, DVDs/videos, family/friends) to find out information about their surgery. Participants were also asked to select from four statements which one best described them concerning information seeking when making big and small decisions. The statements varied according to the amount of information used for making big decisions (much versus little) and small decisions (much versus little). In addition, participants selected from a list of four statements how much information they looked for pertaining to their surgery ranging from "as much as possible" to "none at all." Participants also provided demographic information including how far away they lived from the hospital where they were having their surgery, how far the nearest hospital and family doctor were from their home, whether they had a previous operation, how often they used the Internet, how difficult it was for them to use the Internet, age, education level, and household income before taxes.

POSTOPERATIVE SURVEY

The postoperative survey contained 13 items directly related to patients' opinions of the SAFER Web site. These 13 items were answered on five-point scales ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The 13 items asked respondents to indicate their opinions about the quality of information on the Web site, the Web site's layout and ease of use, and to what extent the Web site helped in their decision making for self-care and reduced worry about their recovery. Five of the items focused exclusively on the 2-minute checkup.

A

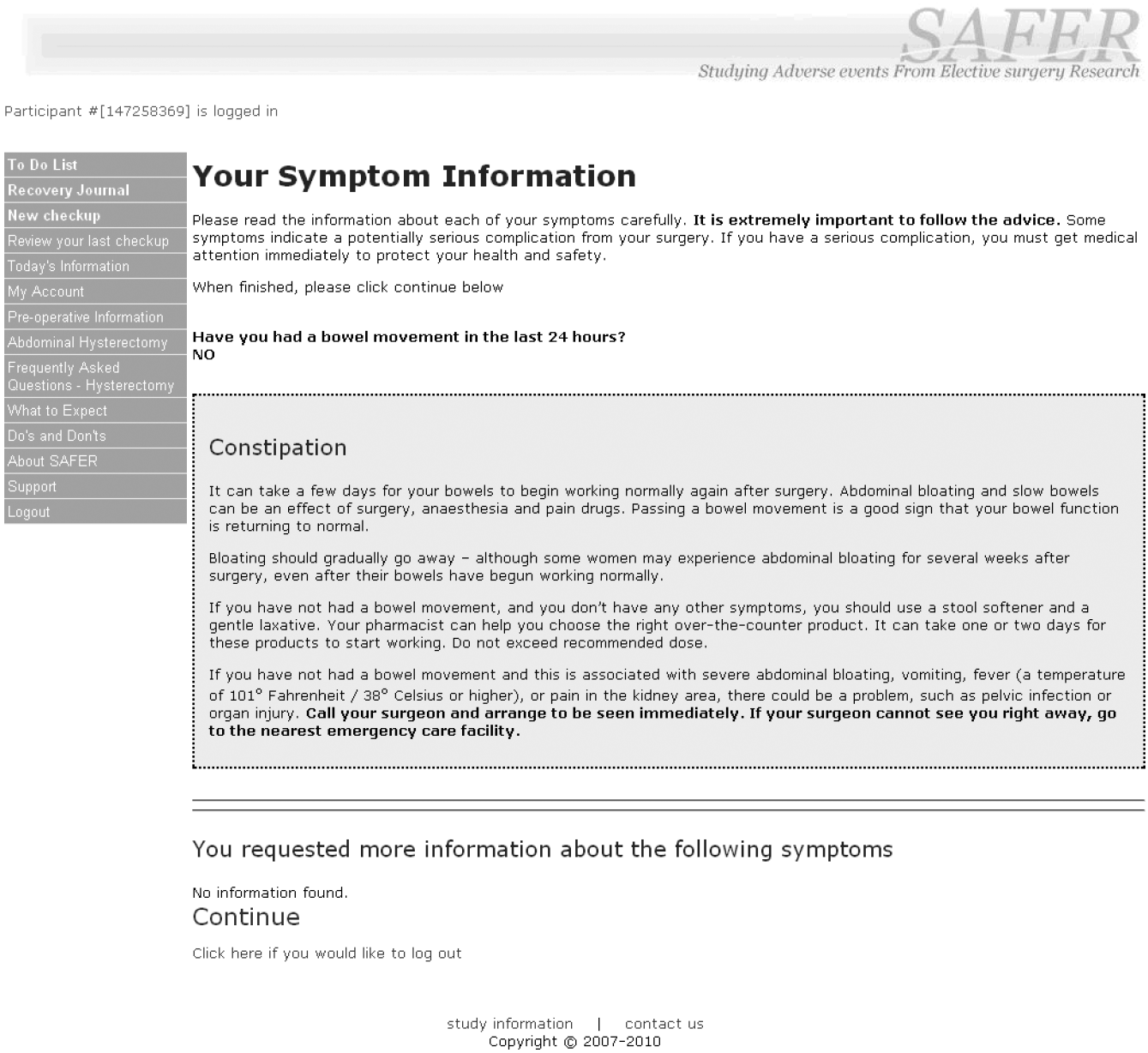

FIGURE 3A. Information provided for 2-minute checkup response that signaled potential constipation. Reprinted with permission.

Postoperative Follow-up and Interviews

At the 6-week postoperative mark, each patient was contacted, and her chart was reviewed. Any contact with the healthcare system and/or adverse events was recorded. In addition, through purposive sampling, patients were selected for a telephone interview including all women (n = 8) who experienced an adverse event and all women (n = 4) who were "noncompliant," completing less than 50% of scheduled log-ins. Two of the women were noncompliant and experienced an adverse event, resulting in a total of 10 women interviewed from these two groups. In addition, it was planned that all women who were compliant and did not experience an adverse event were also to be interviewed. However, because women from this subgroup reported very similar experiences and opinions of the Web site, the interviews quickly reached saturation.[16,17] As a result, only a subgroup of women (n = 8) from the entire set of compliant patients was interviewed. The interviews were conducted by the medical writer on the research team who also had interviewing training and experience. For each interview, the patient was asked to report on her experience using the Web site. The interview focused on ease of use, technical issues

B

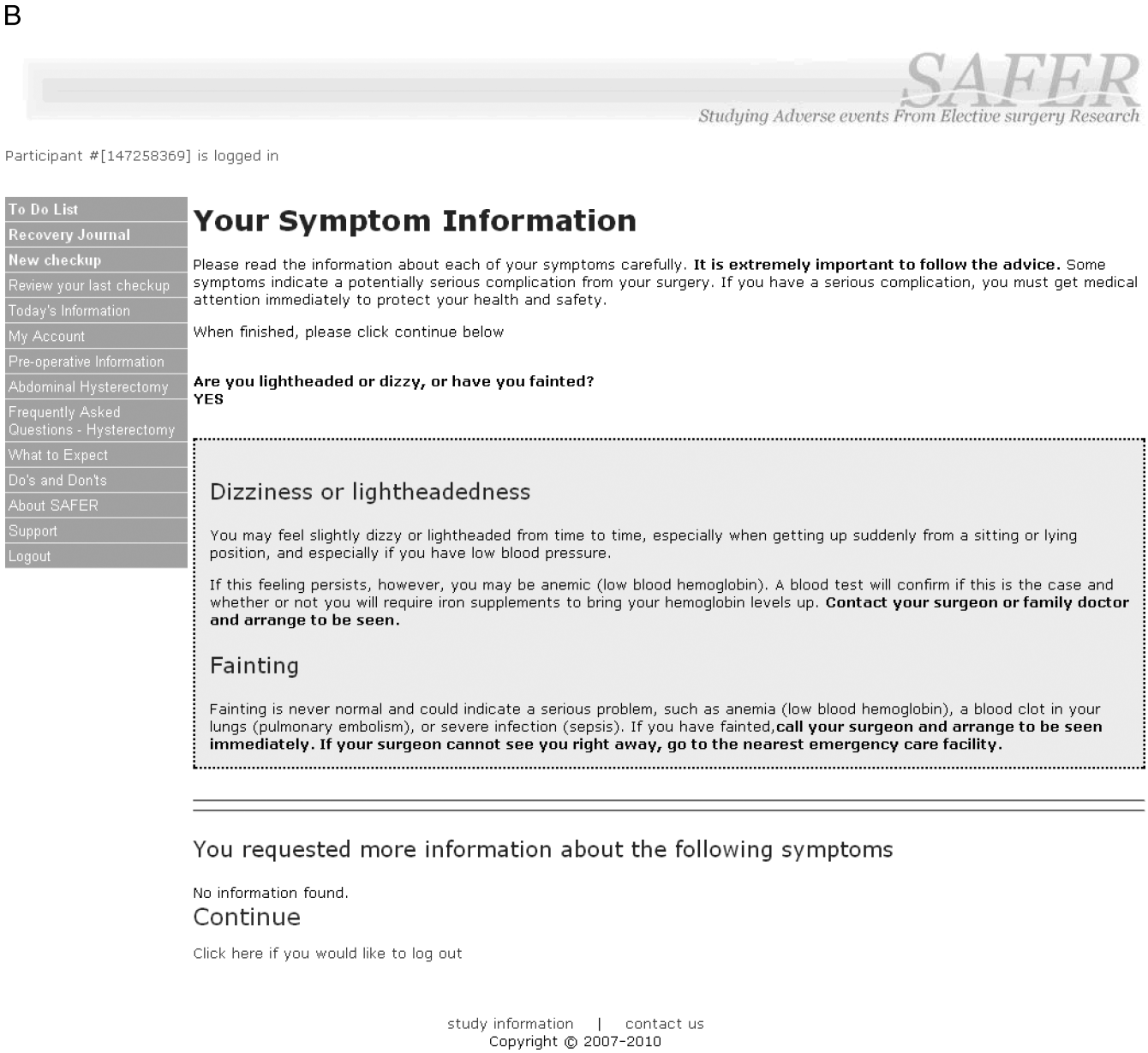

FIGURE 3B. Information provided for 2-minute checkup response that patient had fainted. Reprinted with permission.

encountered, Web site content, the 2-minute checkup, and any recommendations for improvement.

RESULTS

Preoperative Survey

CHARACTERISTICS OF RESPONDENTS

Demographic information was collected via the preoperative survey at the time patients first logged in from home. Three of the 31 patients did not complete the preoperative survey, and one did not complete the demographic section. Study participants tended to be older than 40 years (20/27), well educated (25/27 with at least some post-secondary education), from higher-income households (approximately half reporting an annual household income of over $80 000), and Internet-savvy (26/27 used the Internet at least once per week). Greater than half (14/27) lived more than 20 km from the hospital where they had their surgery. Eight lived more than 20 km from any hospital, and 10 lived more than 20 km from their family doctor. Twenty respondents also reported having had a previous operation (Table 1).

Patients were also asked questions to assess their tendencies to seek information for decision making and the types of information sources used. In general, patients in

Table 1

Characteristics of Participants (n = 27[a])

Characteristic		Frequency
Age, y	<40	7
	40–49	13
	50–59	7
Education level	Less than grade 12	1
	Completed high school	1
	Some college/university	3
	Completed college/university	22
Annual household income	<$20 000	1
	$20 000–$39 999	2
	$40 000–$59 999	5
	$60 000–$79 999	6
	≥$80 000	13
Distance from hospital of surgery, km	≤20	13
	>20	14
Distance from nearest hospital, km	≤20	19
	>20	8
Distance from family doctor's office, km	≤20	17
	>20	10
Previous operation	Yes	20
	No	7

[a]Of the 31 study participants, three patients did not complete the preoperative survey; one patient did not provide demographic information.

the study tended to be information seeking, with 26 of 28 respondents indicating they look for as much information as possible when making big decisions. Similarly, patients indicated when they found out they were going to have a hysterectomy that they looked for as much information as possible (n = 11) or some information (n = 15) about the operation in addition to the information they received from the hospital. When asked to indicate how much they used different sources to find information about their surgery, patients reported using the Internet the most, followed by family/friends, books/magazines, television/radio, and DVDs/videos.

Postoperative Results

COMPLIANCE

Overall, of the 403 possible log-ins from all patients in the study, 288 were completed, resulting in a mean compliance rate of 71.5%. Compliance rates for daily log-in ranged from a high of 80.6% (days 8 and 17 of recovery) to a low of 61.3% (day 10). Reasons provided in the post-study telephone interviews for not logging in included not being able to reach a computer and feeling that the recovery was going well without the information.

PATIENT SATISFACTION

Thirteen questions included in the postoperative survey targeted patients' impressions of the SAFER Web site. Overall, patients indicated a high level of agreement that the Web site was easy to use, helped reduce worry about the recovery process, and helped in decision making concerning evaluating symptoms and deciding whether to contact health professionals. Specific questions concerning the 2-minute checkup revealed patients found it easy and quick, reduced worry, and assisted both with recovery in general and for determining when to call a health professional (Table 2).

The results of the open-ended interview with a subsample of patients reinforced the survey results. Patients reported finding the Web site useful; the information to be clear and easy to read and understand; and the Web site to be reassuring. Some participants in the initial feasibility study indicated that they would have liked more

Table 2

Patient Perception of the SAFER Web Site

Item	Mean	SD
The SAFER Web site tended to be the information source I would most often use to check about symptoms I had	4.29	0.955
The SAFER Web site provided me with information that helped in my recovery	4.25	0.794
The SAFER Web site helped reduce my worry about symptoms I experienced as part of my recovery	4.21	0.884
The SAFER Web site was useful in helping me decide whether to contact a health professional for symptoms I had	4.08	0.974
The SAFER Web site was easy to read	4.71	0.464
It was easy to find the information I needed on the SAFER Web site	4.33	0.817
I used the SAFER Web site more than any other information source (not including health professionals) during my recovery	4.08	0.929
Overall, the SAFER Web site helped me in my recovery	4.38	0.770
The 2-min checkup was easy to do	4.75	0.608
The 2-min checkup was quick to do	4.74	0.619
The 2-min checkup helped me to know how my recovery was progressing	4.33	1.05
The 2-min checkup helped reduce my worry	3.96	1.12
The 2-min checkup was useful in helping me to decide whether I should call a health professional for symptoms I had	4.25	0.847

Responses on five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree).

information to be included in the Web site and this information was added for the later pilot study. No pilot study participant reported she wanted more information, indicating that the changes were effective. A few women questioned why the 2-minute checkup items did not change over the course of recovery, but despite this query, they were satisfied overall with the Web site and its usefulness.

DISCUSSION

Consistent with most surgeries, the hysterectomy patient, once she leaves the hospital, is typically left to take the role of "health provider" in her own care as well as "diagnostician" in terms of deciding whether symptoms experienced are typical of normal recovery or signal a potentially serious adverse event. Often, the patient does these things in the absence of healthcare professionals, trusting her own judgment to properly manage her care. Although many recoveries progress smoothly, the incidence of adverse events after hysterectomies suggests many postsurgery patients find themselves in situations that can lead to uncertainty, anxiety, overuse of scarce healthcare resources, or waiting too long to respond to symptoms that signal trouble in the recovery process. The SAFER project was developed to guide the hysterectomy patient through her postsurgical recovery by providing timely and relevant information via a user-friendly Web site specific to the type of surgery (abdominal hysterectomy) and tailored to the patient's stage of recovery. Delivering this content online represents a new approach for providing information to patients after surgery.

The findings from our study suggest that the SAFER Web site is an appropriate medium and beneficial tool to deliver health information to women recovering from hysterectomy. Women in our study reported that they tended to be information seeking and used the Internet as a source for health information. High log-in compliance rates suggested that patients found the SAFER Web site to be convenient and applicable. Feedback from patients confirmed that they found the SAFER Web site helpful in guiding their recovery, providing information about their care, identifying symptoms that signaled possible adverse events, and facilitating their decision-making process about when to contact healthcare professionals. Furthermore, patients reported that the Web site helped reduce their worry and anxiety during recovery. Overall, patients reported high satisfaction with both the content of the SAFER Web site and its convenience and ease of use.

The success of the SAFER Web site was likely due in part to fulfilling a communication function that is usually absent once surgical patients are discharged from the hospital. Despite research suggesting the importance of both the content and process of communication in surgical outcomes, because of limited health resources minimal attention is given to patients once they leave the hospital setting. The SAFER Web site helps ameliorate this situation by providing timely, relevant, tailored information to patients in an ongoing manner. Although certainly not a complete substitute for face-to-face interaction with healthcare professionals, the Web site nonetheless seemed to meet much of the informational needs for our study participants.

The results of the feasibility and pilot studies suggest that using an online approach may be an effective means to help meet the communication needs for surgical patients after discharge from hospital. In Canada, a high percentage of families have access to the Internet at home and frequently use the Internet as a source for health information. Furthermore, many people still live a relatively long distance from either their place of surgery and/or their nearest healthcare provider. Distance is a geographic barrier for presenting to healthcare professionals when patients experience symptoms. Any tool, such as the SAFER Web site, that facilitates and improves patients' abilities to differentiate between symptoms that are a normal part of recovery and symptoms that signal a possible adverse event will benefit both patients and the healthcare system. However, beyond patients' perception that the SAFER Web site improved their decision-making ability, we do not have any evidence whether the women actually used the healthcare system more effectively and efficiently. A much larger study is needed to test the impact of the SAFER Web site on healthcare utilization.

The SAFER Web site may ultimately be highly cost-effective. Although initial costs of developing the Web site were high, once developed, administration of the Web site was relatively inexpensive and perhaps most importantly did not require the attention of already overburdened health professionals. Thus, the SAFER Web site has the potential to be a highly cost-effective means of increasing patient satisfaction with the surgery experience. However, this cost-effectiveness is largely contingent upon the Web site being unmonitored by health professionals. The pros and cons of monitoring are still being considered. The original intent of the SAFER Web site was to have it as a stand-alone, unmonitored resource to women after surgery. The advantages of having it unmonitored are reduced cost and each woman carrying on with her usual care according to her own surgeon's manner of doing things. On the other hand, the 2-minute checkup considers only symptoms in isolation and makes general recommendations. There are no algorithms to examine combinations of symptoms that could be picked up if responses were monitored. Resolving whether the Web site should be monitored will require further testing in clinical settings.

Despite its many strengths, there are some limitations to the SAFER Web site. First, although Internet use and

availability are increasing steadily, there are still individuals without Internet access in their homes—likely those living in rural/remote areas without access to high-speed Internet, individuals with low income who cannot afford the Internet, and individuals who experience low literacy rates and may not be able to use a Web site based entirely on written information. Alternative methods to providing service to these individuals would have to be found. For example, because there is no monitoring required for the SAFER Web site, it could be provided on a CD for patients with computers but no Internet access.

A second limitation is one pertaining to the uncertainty of the SAFER Web site's impact on the healthcare system. The SAFER Web site was developed with the assumption that the information provided would allow women to take better care of themselves after surgery and make better decisions concerning when to contact health professionals, thereby reducing the burden on the healthcare system. The 2-minute checkup was designed with the dual purpose of ensuring that women who were experiencing symptoms that occur during normal recovery did not (inappropriately) present to the healthcare system while at the same time allowing them to identify symptoms that signal a possible adverse event and to present at the appropriate venue in a timely manner. However, as already mentioned, a much larger study is required to determine the actual impact of the SAFER Web site on healthcare utilization.

A third limitation is the SAFER Web site has been demonstrated only as a research project, and no trial for the SAFER Web site has been performed in a clinical care setting or with different types of surgeries. Because our research is reporting on a study designed primarily to determine if the SAFER Web site was feasible, there still remain issues in both the Web site itself and evaluation. The Web site was written at a literacy level estimated to meet the needs of the general population. However, it still likely presents the material at too high a literacy level for some subgroups, thereby reducing its effectiveness for certain segments of the population. To be utilized in a clinical setting, the literacy level will likely have to be further reduced. Related to this concern, the women who participated in this study tended to be fairly highly educated, and therefore, their ability to effectively use the Web site may exceed those with lower education or lesser computer or literacy skills. In light of these issues, further refinements to the Web site as well as a more comprehensive evaluation are required. Our research team is currently examining the possibility of using the SAFER Web site in an obstetric and gynecologic ward for postoperative cesarean section and hysterectomy patients. To implement the Web site in a clinical setting, we recognize the necessity of making changes to ensure that the Web site is as user-friendly and meets the needs for as large a segment of the population as possible.

CONCLUSION

To the best of our knowledge, this article is the first to report on an online tool designed to improve recovery from surgery after discharge from hospital. Based on our observations and patient responses, there appears to be a strong potential of the SAFER Web site to effectively aid women recovering from hysterectomy. Utilizing the Internet is a cost-effective means that would require few health resources to provide information that can aid in postsurgical recovery. Furthermore, the Internet can reach a wide population including those in more rural areas who tend to have less access to healthcare. Once integrated into a clinical setting, the SAFER Web site has the potential of improving patient care, increasing patient satisfaction with services, and reducing the impact of adverse events. Moreover, the SAFER Web site likely could be easily modified and expanded to include other types of surgeries. Further research is needed to determine the most effective way to provide an online resource for aiding postsurgical patients in their recovery and to demonstrate its utility in improving patient care and satisfaction with surgery.

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