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Original Article

Using a wireless touch screen tablet personal computer is feasible to assess the quality of Breast Cancer Survivorship

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ABSTRACT

Background: Evidence supporting a tablet personal computer (PC)-based mode for a systemic approach to managing the breast cancer survival is limited.
Objective: The objective of this study was to evaluate whether a tablet personal computer (PC) survey is feasible for screening the risks of the recurrence of breast cancer and the survivor issues associated with breast cancer treatment.
Materials and methods: A descriptive study design was used. A pilot test of the tablet PC survey for its feasibility was undertaken using 40 breast cancer survivors at a university affiliated cancer management-survivorship clinic. The tablet PC survey was evaluated by structured questionnaires designed to assess patient experiences responding to the tablet PC-based surveys and user friendliness of the device itself.
Results: Older patients and those with a lower education were more likely to have difficulty with the tablet PC administration and required assistance. Both physicians and nurses reported that the tablet PC survey was a useful tool that assisted healthcare professionals with providing quality of care.
Conclusion: This pilot test supported the feasibility of a tablet PC survey as a vehicle for breast cancer survivorship management.

1. Introduction

Breast cancer is the second leading cancer among Korean women, with an incidence of 18,304 per 100,000 persons.[1] Improvements in its early diagnosis and treatment have led to prolonged survival. According to the National Cancer Center survey, the 5-year survival rate of breast cancer patients from 2010 to 2014 was 92.0%.[2] However, unlike the United States,[3] the peak age at a diagnosis of breast cancer in Korea is approximately 45–49 years.[4] As a result of prolonged survival and a relatively young age, survivorship issues have become more burdensome for healthcare professionals. Survivorship management requires a systematic approach, such as screening for relapses, interventions for long-term effects, enhancing the quality of life and psychosocial functioning, sexuality, and promoting a healthy lifestyle.[5–7] In real clinical practice, it is difficult to approach multiple aspects of survivorship.

Advanced information technology in healthcare has evolved recently, such as the use of tablet personal computers (PCs), which are often used as a tool for such a systematic approach for screening or to assess outcomes of interventions. Thus, computer-based surveys are an applicable and reliable mode of administration and are as feasible as conventional paper-based surveys.[8–11] A tablet PC survey is familiar for a large proportion of adult cancer patients and is useful to guide and manage survivorship issues through the active engagement of cancer survivors and healthcare professionals, with interactions and discussions that enhance the continuity and quality of care, resulting in better patient outcomes.[9,12] However, evidence for the use of such a method for a systematic approach for breast cancer survivorship management is limited.

Therefore, we conducted this pilot study, taking a systematic approach towards patients by using a tablet PC survey at an

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outpatient clinic as the patients were waiting. The purpose of this study was to evaluate the feasibility of using a tablet PC-based survey to screen risks for the recurrence of breast cancer or primary cancer and survivorship issues associated with breast cancer treatment at a university-affiliated lifetime cancer management-survivorship clinic. Using structured questionnaires, feasibility was assessed by: (1) describing breast cancer survivors' experiences using the tablet PC survey as an assessment vehicle for cancer survivorship care, (2) exploring the extent of the user friendliness of the tablet PC itself, regarding ease, simplicity, necessity, comfort, satisfaction, and recommendation, and (3) exploring healthcare professionals' experiences of how both physicians and nurses perceive this mode of care in assisting with cancer survivorship care in a busy clinical environment.

2. Materials and methods

2.1. Design and procedure

A tablet-PC survey was completed by 40 breast cancer survivors after the completion of planned adjuvant chemotherapy following surgery at the outpatient clinic of Ulsan University Hospital from May to September 2016. The participants who agreed to participate in the study were asked to respond to the questionnaire on the tablet PC. The expected time to complete the tablet PC survey was 15–20 min. When the cancer survivors first visited the clinic, the nurses briefly explained how to use the tablet PC and, if needed, further assistance was provided. The patients were asked to complete the tablet PC survey during their visit to the outpatient clinic for a routine check-up. The Institutional Review Board of the hospital approved this study. All of the patients signed written informed consent statements prior to participating in this study.

2.2. Patients

Breast cancer patients were eligible if they were: (1) 18 years or older, (2) had a diagnosis of resectable breast cancer without distant metastasis, (3) completed surgery with a curative intent and received adjuvant chemotherapy, and (4) those who voluntarily agreed to participate in the study. The patients were excluded if they (1) had documented or current disorders that could induce cognitive impairment, including but not limited to, psychiatric disorders, stroke, dementia or Alzheimer's disease, or (2) had conditions that precluded seeing or hearing, or understanding the study materials.

2.3. Development of the tablet PC-based survey

We developed a structured tablet PC questionnaire to assess the survivorship management of breast cancer survivors. The categories of the questions were classified according to the American Cancer Society/American Society of Clinical Oncology (ASCO) Breast Cancer Survivorship care guidelines,[13] and the assessment of each questionnaire followed the survivorship guidelines of the National Comprehensive Cancer Network (NCCN) 2016 version 2. The tablet PC survey was constructed based on a body of empirical research studies, involving areas of concern of surveillance for the recurrence of breast cancer, screening for the occurrence of secondary primary cancer, and a treatment-related symptom assessment.[10,14,15] After the patients had completed the questionnaire, patient information regarding cancer recurrence screening and survivorship issues was presented to the physician and/or nurse, with red-flags for reevaluation if any concerns were raised.

For anxiety and depression, the Korean version of the Hospital Anxiety and Depression Scale (HADS) was used,[16] for distress, the Distress Thermometer was used, and for the overall quality of life, the Korean version of the Functional Assessment of Cancer Therapy-Breast (FACT-B) was used to construct the questionnaire.[17] In addition, reflecting the NCCN survivorship guidelines, the questionnaire included cardiac toxicity, cognitive function, fatigue, menopausal symptoms, pain (Numeric pain Rating Scale [NRS]), sexual function, and healthy lifestyle, and screening questions for secondary malignancies. Among these, in the case of anxiety, depression, and pain, items were added to allow for a more detailed assessment if they exceeded a certain score. Specifically, the health assessment questions included adherence to the national health-screening program, and questions about cancer screening for the recurrence of breast cancer or incidental secondary cancer. The assessment and management of the treatment-related symptoms used dichotomized questions (yes/no), Likert response options, visual analogue scales, or established questionnaires.

2.4. Structured questionnaires for the feasibility tests

To evaluate the patients' experiences in responding to the tablet PC survey, questionnaires were constructed by investigators requesting the patients to evaluate the extent to which they experienced difficulty in understanding and responding to the tablet PC-embedded surveys on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The extent of the user friendliness using the tablet PC itself was also evaluated using a 0- to 100-point scale regarding ease, simplicity, necessity, comfort, satisfaction, and recommendation. The healthcare professionals' opinions on the tablet PC survey were also solicited.

2.5. Statistical analysis

Descriptive statistics were computed to describe the sample and the patients' responses to the use of the tablet PC survey. The patient experiences based on the responses to the PC embedded survey questionnaires were evaluated using descriptive statistics, Pearson's correlation coefficients, t-tests or one-way analysis of variance analysis (ANOVA). The levels of ease, simplicity, necessity, comfort, satisfaction, and the recommendation to use the tablet PC were also evaluated using descriptive statistics, Pearson's correlation coefficients, t-tests, or ANOVA. Narrative statements provided by the healthcare professionals were also analyzed using descriptive statistics. SAS software version 9.1.3 was used for data analyses,[18] with a level of significance set at 0.05.

3. Results

3.1. Subject characteristics

A total of 40 breast cancer survivors participated in the tablet PC survey. Their median age was 50.5 years (range 31–67 years), and 87.5% of the participants were less than 60 years of age. Most of the patients were married (82.5%). Approximately one fourth had less than a high school education (22.5%). The means of duration of the illness and to a diagnosis of a cure were 57.5 months and 43.2 months, respectively. Nearly half of the patients had a breast cancer stage IA (42.5%), followed by IIA (37.5%) and stage IIB (12.5%). Their treatments involved surgery that was either a breast conserving operation (67.5%), a modified radical mastectomy (32.5%), chemotherapy (100.0%) and/or hormonal therapy (37.5%) (Table 1).

Eight of the 40 patients (20.0%) completed the tablet PC survey with assistance from nurses or family caregivers. Several cases had multiple reasons for needing assistance with the tablet PC survey, including difficulty in using the tablet PC due to decreased vision (n = 3), illiteracy (n = 2) or computer illiteracy (n = 1), mental

Table 1
Patients' characteristics ($N = 40$).

Demographic and clinical characteristics			N	%	Median (range)
Age			40	–	50.5 (31.0–67.0)
Marriage		Married	33	82.5	–
		Single	1	2.5	
		Bereaved	1	2.5	
		Divorced	5	12.5	
Education		Elementary school	3	7.5	–
		Middle school	6	15.0	
		High school	19	47.5	
		College or more	12	30.0	
Job		No	23	57.5	–
		Yes	17	42.5	
Perceived financial status		High	1	2.5	–
		Middle	29	72.5	
		Low	10	25.0	
Comorbid conditions		None	14	35.0	–
		Hypertension	3	7.5	
		Diabetes mellitus	3	7.5	
		Heart diseases	0	0.0	
		Depression	1	2.5	
		Chronic renal failure	0	0.0	
		Others	19	47.2	
Duration of cancer diagnosis (mo)			–		36.0 (12.0–192.0)
Length of time after cure (mo)			–		6.0 (0.5–38.0)
Stages of breast cancer		Stage IA	17	42.5	–
		Stage IB	0	0.0	
		Stage IIA	15	37.5	
		Stage IIB	5	12.5	
		Stage IIIA	3	7.5	
Treatments	Operation	BCO	27	67.5	–
		MRM or SM	13	32.5	
	Lymphaden-ectomy	None	16	40.0	–
		SNB	18	45.0	
		ALND	6	15.0	
	Chemo-therapy	No	0	0.0	–
		Yes	40	100.0	
	Hormonal therapy	No	25	62.5	–
		Yes	15	37.5	

Note. Abbreviations: BCO, breast conserving operation; MRM, modified radical mastectomy; SM, simple mastectomy; SNB, sentinel lymph node biopsy; ALND, axillary lymph node dissection.

illness (n = 1), limited understanding of the embedded message (n = 2), digital eye strain (n = 1) or no interest in taking the tablet PC survey (n = 1). The median time required to complete the questionnaire was 15 min and ranged from 8 to 39 min.

3.2. Feasibility of the tablet PC survey

The breast cancer patients' experiences in responding to the tablet PC survey were investigated on a 5-point Likert scale (Table 2). The patients demonstrated favorable attitudes toward the tablet PC survey, with their responses being around four or less to most of the items regarding the ease of reading the tablet PC questionnaires (4.3 ± 0.6). The purpose of the tablet PC survey for cancer survivorship (4.1 ± 0.8) was to understand the contents (4.0 ± 1.1), and web-based expression of personal life (4.0 ± 1.0). The patients also reported that the tablet PC survey was likely to facilitate communication about cancer survivorship (3.9 ± 0.8) and that they would recommended it to others (3.5 ± 0.9). The patients showed neutral responses regarding the length (3.3 ± 1.2), the amount of items that needed response burdens (3.0 ± 1.2), and the extent of assistance (3.6 ± 1.1), indicating that using the tablet PC could be incorporated into outpatient routine care with the assistance of nurses. Regarding its efficacy, the patients believed it decreased burdens of cancer survivorship on both themselves and their families (3.5 ± 1.1). In addition, they found it to be effective for decision-making for cancer survivorship (3.9 ± 0.8) and recommended its wide use (3.9 ± 0.8).

Patients who were older (60 years or higher) and those with a lower education level (less than high school education) were likely to have more difficult experiences in using the tablet PC survey as an assessment tool. These patients reported more difficulties understanding the questionnaires and needed more assistance to respond to the questionnaires. In addition, the length of the survey was more appropriate compared with those of a younger age. Significant differences in the breast cancer survivors' experiences with the tablet PC were found based on age and educational level, while none of the clinical characteristics such as duration of cancer diagnosis or the length of time after a cure significantly affected the breast cancer survivors' experiences with using the tablet PC (Table 3).

Regarding the user friendliness, we also investigated the feasibility of the tablet PC survey, and the patients reported its use was easy (84.8 ± 21.8), simple (75.4 ± 33.3), essential (75.5 ± 30.0), comfortable (72.1 ± 33.2), and satisfactory (83.9 ± 21.5). They reported that they would also recommend it to others (77.8 ± 25.6) on a 100-point scale (Table 4). Most of the demographic and clinical characteristics did not significantly impact the feasibility criteria of the tablet PC usability. The only significant difference was, interestingly, that the older patients (≥60 years) perceived that the tablet PC was easier to respond to than the younger patients (83.1 vs. 96.0, $p = 0.037$).

Regarding the healthcare professionals' perspectives on the tablet PC survey, a semi-structured questionnaire was used, and both physicians (n = 4) and nurses (n = 10) provided their

Table 2
The patient experiences responding to the tablet PC surveys for cancer survivorship management.

Patient experiences responding to the tablet PC surveys	[b]Mean ± SD	Range
1. Understanding of purpose of tablet PC survey questionnaires	4.13 ± 0.82	2–5
2. [a]Difficulty in understanding of the contents	3.98 ± 1.12	1–5
3. Overall easy reading of the tablet PC survey questionnaires	4.28 ± 0.60	3–5
4. [a]Discomfort associated with showing personal life through responding on the tablet PC	3.98 ± 1.03	2–5
5. Easy way of communicating with healthcare professionals about cancer survivorship management through the tablet PC survey as a vehicle	3.90 ± 0.81	1–5
6. Recommendation of the tablet PC survey to others	3.50 ± 0.91	1–5
7. Appropriateness of the length of the tablet PC survey questionnaires	3.25 ± 1.17	1–5
8. [a]Numerous response items of the tablet PC survey questionnaires	3.03 ± 1.17	1–5
9. [a]The levels of assistance for completion of the tablet PC survey	3.60 ± 1.06	2–5
10. Effect of the tablet PC survey on reducing patient and family burdens regarding cancer survivorship management	3.45 ± 1.06	1–5
11. Assistance with medical decision-making for cancer survivorship management	3.85 ± 0.80	1–5
12. Desire for a wide use of the tablet PC survey for cancer survivorship management	3.93 ± 0.83	1–5

[a] Reverse coded.
[b] 1 = Strongly disagree; 5 = Strongly agree (higher scores indicate favorable opinions on responding to the tablet PC surveys).

Table 3
Differences of patients' response for the tablet PC surveys by age and educational levels.

Patient experiences responding to the tablet PC surveys	Age				Education				
	Age	N	[a]Mean ± SD	*p*	Education	N	Mean ± SD	*p*	Scheffe
1. Understanding of purpose of tablet PC survey	<60 yrs	35	4.20 ± 0.83	0.129	= Middle school[a]	9	3.67 ± 0.87	0.031	a < c
	≥60 yrs	5	3.60 ± 0.55		= High school[b]	19	4.05 ± 0.85		
					≥College[c]	12	4.58 ± 0.52		
2. *Difficulty in understanding of the contents	<60 yrs	35	4.11 ± 1.05	0.036	= Middle school[a]	9	2.78 ± 1.30	0.000	a < b, c
	≥60 yrs	5	3.00 ± 1.22		= High school[b]	19	4.11 ± 0.88		
					≥College[c]	12	4.67 ± 0.49		
3. Overall easy reading of the tablet PC survey	<60 yrs	35	4.34 ± 0.54	0.057	= Middle school[a]	9	4.00 ± 0.71	0.067	–
	≥60 yrs	5	3.80 ± 0.84		= High school[b]	19	4.21 ± 0.54		
					≥College[c]	12	4.58 ± 0.52		
5. Easy way of communicating about cancer survivorship	<60 yrs	35	3.94 ± 0.84	0.383	= Middle school[a]	9	4.00 ± 0.50	0.033	–
	≥60 yrs	5	3.60 ± 0.55		= High school[b]	19	3.58 ± 0.84		
					≥College[c]	12	4.33 ± 0.78		
6. Recommendation of the tablet PC survey to others	<60 yrs	35	3.46 ± 0.95	0.436	= Middle school[a]	9	3.78 ± 0.83	0.007	b < c
	≥60 yrs	5	3.80 ± 0.45		= High school[b]	19	3.05 ± 0.85		
					≥College[c]	12	4.00 ± 0.74		
7. Appropriateness of the length of the tablet PC surveys	<60 yrs	35	3.40 ± 1.17	0.001	= Middle school[a]	–	–	–	–
	≥60 yrs	5	2.20 ± 0.45		= High school[b]				
					≥College[c]				

Note. * Reverse coded.
[a] 1 = Strongly disagree; 5 = Strongly agree (higher scores indicate positive opinions on responding to the tablet PC surveys).

Table 4
Differences in the user friendliness of the tablet PC survey by age.

Feasibility criteria	Total [b]Mean ± SD	Age	[b]Mean ± SD	*p*
Easiness	84.75 ± 21.84	<60 yrs	83.14 ± 22.72	0.037
		≥60 yrs	96.00 ± 8.94	
[a]Complexity	75.38 ± 33.31	<60 yrs	77.00 ± 30.97	0.597
		≥60 yrs	64.00 ± 49.80	
Necessity	75.50 ± 30.02	<60 yrs	75.43 ± 30.01	0.969
		≥60 yrs	76.00 ± 33.62	
Comfort	72.13 ± 33.15	<60 yrs	70.71 ± 34.56	0.330
		≥60 yrs	82.00 ± 20.49	
Satisfactory	83.88 ± 21.50	<60 yrs	83.00 ± 21.56	0.503
		≥60 yrs	90.00 ± 22.36	
Recommendation	77.75 ± 25.64	<60 yrs	76.57 ± 26.20	0.449
		≥60 yrs	86.00 ± 21.91	

[a] Reverse coded.
[b] 0 = not likely; 100 = most likely (higher scores indicate stronger agreement with the tablet PC use).

experiences of the benefits and/or limitations and areas of improvement for using the tablet PC survey in routine clinical practice. The physicians primarily reported its benefits as follows: (1) effective time management, (2) comprehensive patient assessment and management, including physical and psychological symptoms, social issues, and lifestyle behaviors or management, (3) easy access to personal matters or problems, (4) effective patient-physician communication, (5) aid with problem identification, (6) uncovering health issues that were covered/or masked, (7) focused care for the identified health problems, and (8) continuity of care through monitoring and/or surveillance.

Nurses also reported numerous positive and practical responses that might further improve its application in practice, including (1) specific problem identification in a timely manner, (2) an effective mode for identifying common comorbidities in cancer survivors, such as anxiety or depressive symptoms, and (3) continuity of care through monitoring and/or surveillance. However, for better administration, patient education was warranted and should involve the purpose of the survivorship management program, the need for the tablet PC as a critical vehicle of such a program, and a periodic assessment every 3 months for cancer survivorship management. They also suggested supplying aids, such as magnifying glasses for elderly persons or personnel to assist the patients with illiteracy or computer illiteracy, as well as for those responsible for the program management.

4. Discussion

Breast cancer is among the most common cancers in the Korean population. An early diagnosis through screening and advances in therapeutic options have increased the survival time of breast

cancer patients; although the survival time varies depending on the type and/or stage of the diagnosis.[19–21] Such prolonged survival is often accompanied by burdensome survivorship issues.

In a busy outpatient clinical setting, a systematic approach to cancer survival is practically difficult. Through our tablet PC survey, we were able to understand the patient's detailed physical and mental symptoms, social problems, and lifestyle habits in a short period of time. We were also able to identify problems such as sexual dysfunction, which patients usually hesitate to mention. For the patients, this tablet PC survey took approximately 15 min, which enabled the medial staff to take a systematic approach. Minimal assistance from the staff or family was required, thereby minimizing staff time and allowing for the identification of survivorship issues prior to the physician consultation, which in turn allowed for a focus on care through the comfortable interaction with technology.

This study supports the feasibility of using a tablet PC-based survey that might be a useful tool for breast cancer survivorship care. Regarding the user experience with this mode of information technology, there were no demographic or clinical differences, indicating that the utility of this technology was fairly well accepted for most people. The older patients and those with a lower education level experienced difficulties using the tablet PC survey as an assessment vehicle. In this study, all of the patients completed this process, with 20% requiring assistance from staff or family. Among the reasons for the assistance, 87.5% were common issues, regardless of the mode of data collection, and the specific reasons for the limited use of such web-based technology included computer illiteracy, a limited understanding of the embedded message, digital eye strain, and no interest in using the tablet PC survey, which were reported in 12.5% of the cancer patients.

Taken together, the tablet PC survey was a useful tool that assisted healthcare professionals with problem identification, focused care, and, eventually, the improvement of cancer survivorship care, which might not be gained despite effective patient-physician communication due to the limited time in busy clinical practice. There were practical concerns, including the need for magnifying glasses for elderly persons and personnel to assist the patients with illiteracy or computer illiteracy. Important suggestions for its successful administration also emerged. For example, there was a need for patient education about what survivorship management means or what constitutes the goals of care.

This study had a couple of limitations. Compared to previous reports that used a tablet-based method to screen or assess outcome measures,[8–11] more cancer patients in this study (20%) needed assistance with the tablet PC survey. Although such minimal assistance is likely to be acceptable as it required minimal staff time, and considering it took a longer time to complete compared to similar information methods of screening or outcome measures, verification of the feasibility of this method as a part of survivorship care is warranted in a larger sample. Another limitation is that this study lacked comparison groups with other methods such as a paper-based surveys or other alternative methods to compare with this mode for reliability and validity.

To the best of our knowledge, this is the first study to investigate the feasibility of a tablet PC as an assessment tool or a part of program intervention for Korean breast cancer survivors. Given the time constraint in a busy clinical environment, this systemic approach to breast cancer survivorship management may also provide healthcare professionals with tailored care to guide and manage patients' survivorship, with timely individual counseling. In addition, through the use of this tablet PC, we expect to be able to identify the prevalence of various problems for breast cancer survivors and to use it as a tool to measure the therapeutic effect of various interventions.

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Conflicts of interest

There are no conflicts of interest to declare.

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