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Information Sharing and Case Conference Among the Multidisciplinary Team Improve Patients' Perceptions of Care

Hiroko Komatsu^{*1}, Kazuhiro Nakayama², Taisuke Togari³, Kumi Suzuki⁴, Naoko Hayashi², Yoshie Murakami⁵, Yukiko Iioka², Wakako Osaka², Kaori Yagasaki¹, Seigo Nakamura⁶, Joyce Neumann⁷ and Naoto T. Ueno⁸

¹Faculty of Nursing and Medical Care, Keio University, Tokyo, Japan

²St. Luke's College of Nursing, Tokyo, Japan

³The Open University of Japan, Chiba, Japan

⁴School of Nursing, Hyogo University of Health Sciences, Hyogo, Japan

⁵Graduate School of Human Health Sciences, Tokyo Metropolitan University, Tokyo, Japan

⁶School of Medicine, Showa University, Tokyo, Japan

⁷Department of Stem Cell Transplantation and Cellular Therapy, The University of Texas MD Anderson Cancer Center, Houston, TX, USA

⁸Department of Breast Medical Oncology, The University of Texas MD Anderson, Cancer Center, Houston, TX, USA

Abstract: *Background:* As the advent of genomic technology accelerates personalized medicine and complex care, multidisciplinary care is essential for management of breast cancer.

Objectives: To assess whether healthcare delivery systems are related to patients' perceptions of care in breast cancer treatment institutions.

Methods: We conducted a cross-sectional nationwide study of breast cancer treatment institutions approved by the Japanese Breast Cancer Society in Japan. From 128 of the 457 institutions, 1,206 patients were included in the analysis. Each patient completed a questionnaire regarding perceptions of care that consisted of a multidisciplinary care subscale and a patient-centered care subscale.

Results: Multiple regression analysis revealed that the multidisciplinary care subscale was significantly related to implementation of patient-based medical record system that was paper-based ($p < 0.05$). The results of the secondary analysis showed a significant relationship between the interdepartmental medical record system and the patient's perception of multidisciplinary care ($p < 0.05$) and patient-centered care ($p < 0.05$). When a multidisciplinary case conference took place regularly or multidisciplinary viewpoints were incorporated into the conference records, the conference had a significantly higher correlation with both subscales ($p < 0.001$).

Conclusions: Integrated patient-based information and regular multidisciplinary case conferences that include records of viewpoints from different professionals improve patients' perceptions of comprehensive breast cancer care.

Keywords: Breast cancer, multidisciplinary care, electronic medical record, patient perception, patient satisfaction, multidisciplinary case conference.

INTRODUCTION

Breast cancer is the most common cancer among women worldwide [1]. Over the past two decades, the management of breast cancer has shifted towards early detection and less surgical treatment [2]. As the advent of genomic technology accelerates personalized medicine, breast cancer care has become increasingly complex in terms of diagnosis and

treatment [3]. In recent years, a multidisciplinary approach to the management of breast cancer has become the standard of care [4]. Multidisciplinary care refers to a team-based approach to care in which relevant professionals work collaboratively throughout the process of the patient's cancer treatment [5]. Since 2007, the long-awaited Japan Cancer Control Act has encouraged multidisciplinary care as a core element of the national cancer control plans [6].

An essential feature of multidisciplinary care is the multidisciplinary case conference or multidisciplinary cancer conference, which is defined as "a forum for multidisciplinary discussion regarding diagnostic and treatment aspects of a cancer patient's care" [7]. Since a wide range of

*Address correspondence to this author at the Faculty of Nursing and Medical Care, Keio University, 35 Shinano-machi, Shinjuku-ku, Tokyo 160-8582, Japan; Tel: +81-3-5363-3733; Fax: +81-3-5363-2039, E-mail: hkomatsu@sfc.keio.ac.jp

professionals are involved in care, poor coordination and miscommunication are major concerns [8]. The case conference is an important opportunity for the entire team to share and exchange patient information.

Healthcare delivery is dependent on information. In Japan, healthcare institutions have been broadly shifting from paper-based to electronic medical record systems. The electronic medical record, electronically collected and stored data about the patient, is at the core of health information technology, and is expected to improve care coordination and patient outcomes. This electronic system should allow for the accumulation of data at the point of care, as well as improve access to and integrate of data from other sources [9].

Although the participation of the cancer patient in care is another important aspect of the recent management of breast cancer [10], patients' perceptions of breast cancer care have not been clearly evaluated. We thus conducted a cross-sectional nationwide study to assess whether Japanese healthcare delivery systems, including patient information management and multidisciplinary case conferences, are related to patients' perceptions of care in breast cancer treatment institutions.

MATERIALS AND METHODOLOGY

Study Design

This cross-sectional nationwide study assessed healthcare delivery systems in relation to patients' perceptions of care in Japanese breast cancer treatment institutions between August 1, 2005 and March 31, 2006. We developed a novel survey which asked patients with breast cancer about their perceptions of care, and nurse administrators about the healthcare delivery systems. The objective of the primary analysis was to assess the relationship between healthcare delivery systems and patients' perceptions of care. For the secondary analyses, we focused on the institutions where electronic computerized information systems were used and those where multidisciplinary case conferences were implemented. The Institutional Review Board of each participating institution approved this study.

Study Sample

Of all 457 institutions approved as breast cancer treatment institutions by the Japanese Breast Cancer Society, 248 (response rate, 54%) participated in this study. We surveyed consecutive female patients of the participating institutions undergoing treatment for primary breast cancer who had breast surgery followed by chemotherapy and/or active hormonal treatment and/or radiotherapy. Inclusion criteria were >20 years of age; ability to read and write; and permission from the attending physician. Eligible patients were given an explanation of the multidisciplinary care approach for individual "personalized" treatment by the attending physician and then asked to complete a "perceptions of care questionnaire" during a regular outpatient visit. Of the 2,842 eligible patients, 1,950 replied to the questionnaire (68.6%). After excluding 744 of them due to lack of matching data between patients and nurse administrators, we included data of 1,206 patients from 128 institutions that also had data from nurse administrators for the analysis. The questionnaires for both patients and nurse

administrators were collected by mail. There were no significant differences in patient characteristics between those who were included and those who were excluded in the study. Due to missing values, 1,167 patients were included for the final primary analysis, and 569 and 371 patients for the secondary analyses of electronic computerized information systems and multidisciplinary case conferences, respectively.

Development of Questionnaire

Patients' Perceptions of Care

Due to the lack of an existing tool to evaluate patients' perceptions of the multidisciplinary care approach, we developed a "perceptions of care questionnaire" for this study based on the literature on patient satisfaction [11-13]. We developed 19 items to assess 1) patient's perception of multidisciplinary care and 2) patient satisfaction with their care, using a 5-point rating scale with item scores ranging from 0 (not at all) to 4 (very much). This self-reported questionnaire includes questions, such as "Do healthcare professionals other than physicians explain to you and consult with you about your disease?" and "Do you feel comfortable receiving treatment?"

We performed exploratory factor analysis of the 19 measures to develop subscales with internal consistency. Excluding six items because of low factor loading, a final explanatory factor analysis extracted two factors. The first factor included eight measures that reflected the "patient's perception of multidisciplinary care;" the highest loading was found for communication among nurses, followed by communication between physicians and nurses, i.e., "Do you think that nurses often communicate with each other regarding your condition?" The second factor included five measures indicating that patients were satisfied with their care, and was defined as the "patient's perception of patient-centered care." Components of this latter factor included items, such as "I feel comfortable receiving treatment" (which scored the highest), followed by "treatment is performed in accordance with my wishes" and "healthcare professionals fully explain my disease and treatment to me." Since Cronbach alpha of the perceptions of multidisciplinary care and perceptions of patient-centered care subscales were 0.88 and 0.85, respectively, we used the total scores of the eight items and five items as subscale scores. The items of the two subscales are presented in Table 1.

The questionnaire also included patient sociodemographics, i.e., age, sex, employment status, history of breast cancer, years since the initial visit to the current institution, and number of outpatient visits at the current institution.

Healthcare Delivery System Questionnaire

Nurse administrators were asked to complete a questionnaire on the healthcare delivery systems including the patient information system and multidisciplinary care in their institutions, as they coordinate and manage patient care with other healthcare professionals. The questionnaire includes questions on the medical record system: 1) patient-based (each patient's clinical information is recorded and categorized by department in a single chart) or department-based (each department uses and stores a different chart for the same patient); 2) paper-based or electronic records; and

Table 1. Factor Analysis of Perceptions of Multidisciplinary Care and Patient-Centered Care (Factor Loading) (n=1,167)

Item	Factor 1	Factor 2
Perceptions of multidisciplinary care (Cronbach α =0.88)		
Do you think that nurses often communicate with each other regarding your condition?	0.862	-0.105
Do you think that the physician and nurse often communicate regarding your condition?	0.734	0.102
Do you think that what you have said is conveyed to other healthcare professionals?	0.657	0.059
Do healthcare professionals other than your physician explain to you and consult with you about your disease?	0.607	-0.004
Do you think that various healthcare professionals are involved in your care?	0.597	0.030
When a new treatment starts, do healthcare professionals other than the physicians explain treatment and side effects to you?	0.579	0.010
Do individual healthcare professionals take responsibility for supporting you?	0.535	0.271
Do you think that physicians often communicate with each other regarding your condition?	0.534	0.251
Perceptions of patient-centered care (Cronbach α =0.85)		
Do you feel comfortable receiving treatment?	-0.119	0.903
Do you think that treatment is under way in accordance with your wishes?	-0.006	0.789
Do healthcare professionals fully explain your disease and treatment to you?	0.032	0.710
When your condition or treatment changes, do you receive appropriate care?	0.158	0.599
Do healthcare professionals quickly respond to your wishes or concerns?	0.225	0.540
Sum of squared factor loadings	5.67	5.37
Note: Factor analysis: Maximum likelihood, Promax rotation		

3) full or partial electronic records (e.g., computerized physician order entry only or radiology data system only). The questionnaire also surveys whether electronic medical records can be accessed and integrated from other internal departments, and whether clinical information such as physician and nursing notes could be mutually accessed.

Nurse administrators were also asked about multidisciplinary case conferences for patients. The implementation of multidisciplinary case conferences ("implemented" and "not implemented") and whether the conference records incorporated viewpoints from different professionals ("included" and "not included") were measured.

Data Analysis

We used means and standard deviations (SDs) for continuous variables, and frequencies and percentages for categorical variables. Univariate analyses, including analysis of variance (ANOVA), *t*-test, and multiple regression analyses, were used to examine the relationship between subscales and items of healthcare delivery systems. Only items of healthcare delivery systems that showed a significant relationship with either or both subscales were used for the multiple regression analyses. Descriptive statistics and regression analyses were performed using SPSS for Windows version 14.

RESULTS

Sample Characteristics

The types of institutions and their healthcare delivery systems are listed in Table 2. Of the participating

institutions, 58.6% used patient-based medical records and 27.3% implemented multidisciplinary case conferences.

Table 2. Characteristics of Institutions

	Number of Institutions (n=128)	
	n	(%)
Type of institution		
Cancer hospital	9	(7.0)
General hospital	91	(71.1)
Clinic/Other	13	(10.2)
Special-functioning hospital ^a	15	(11.7)
Patient-based medical record system		
Paper-based medical records	64	(50.0)
Electronic medical records	11	(8.6)
Not implemented	53	(41.4)
Implemented	35	(27.3)
Not implemented	93	(72.7)

^aHospitals designated by the Ministry of Health, Labour and Welfare for patients who need advanced treatment referred from general hospitals.

Sociodemographic and disease-related characteristics of the patients are listed in Table 3. The mean age of patients was 55.2 years (SD 11.2 years). The mean period of treatment for breast cancer was 2.7 years (SD 3.1 years). Most patients underwent breast surgery (92.4%), and

ultimately received hormone treatment (58.3%) and/or adjuvant chemotherapy (55.3%).

Table 3. Sociodemographic and Clinical Characteristics of Patients

	Mean	(SD)
Age, years old	55.2	(11.2)
Period of treatment, years	2.7	(3.1)
Occupation	n	(%)
Full-time	198	(16.4)
Self-employed/Family-employed	103	(8.5)
Full-time housewife	533	(44.2)
Part-time/Temporary	163	(13.5)
Unemployed	173	(14.3)
Other	16	(1.3)
No response	20	(1.7)
Treatment modality		
Breast surgery	114	(92.4)
Hormone treatment	703	(58.3)
Chemotherapy	667	(55.3)
Adjuvant radiotherapy	495	(41.0)
Other	20	(1.7)
Frequency of hospital visit		
Once a week	200	(16.6)
Once every two weeks	156	(12.9)
Once a month	417	(34.6)
Once every two to three months	386	(32.0)
Other	26	(2.2)
Once every three weeks	21	(1.7)
Total	1206	(100.0)

The multidisciplinary care subscale was significantly related to implementation of patient-based medical record system that was paper-based ($p < 0.05$). There was no significant relationship between the patient-centered care subscale and the patient-based medical record system (Table 4).

Although the use of the computerized physician order entry was not significantly related to the perception of multidisciplinary care, implementation of interdepartmental electronic medical records, i.e., the mutual access to clinical information between departments through electronic medical records, was significantly related to the perception of multidisciplinary care ($p < 0.05$). Patient-centered care was

significantly related to the computerized physician order entry and interdepartmental electronic medical records ($p < 0.05$; Table 5).

Moreover, when a multidisciplinary case conference took place regularly or multidisciplinary viewpoints were incorporated into the conference records, the conference had a significantly higher correlation with both subscales ($p < 0.001$; Table 6).

DISCUSSION

This study shows the importance of patient-based information management in which care generated by different departments can be combined and link together by a patient identifier. In contrast to general expectations regarding electronic medical records, paper-based records were related to patients' perceptions of multidisciplinary care in this study. There are several possible reasons.

First of all, adoption of electronic medical record systems has been slow, and paper-based patient information was still being used in many institutions during the study period, although electronic medical record systems had been partially introduced. Implementation of electronic medical record systems requires changes in practice, which is not easy [9].

Electronic medical records are not always positively accepted. Nurses perceive less interdisciplinary communication and hindered team functioning as their free-text documentation in the electronic medical records had not been referred [14]. Easy access to information provided by electronic medical records has not been shown to encourage the usual trading of information that stimulates multidisciplinary interaction. In fact, electronic medical records have failed to support the non-verbal interactive system which facilitates multidisciplinary communication achieved through paper-based records [15]. Collaborative decision making among different professionals thus remains difficult even with the use of electronic records [16].

Despite its apparent limitations [17], paper-based information management still has superiority over computerized systems in some areas. In other words, the electronic medical record systems applied to Japanese clinical practices may need to be refined, especially with regards to ease of use and standardization of medical information. Our secondary analysis suggests a correlation between interdepartmental electronic medical records systems and patients' perceptions of multidisciplinary care and patient-centered care. The interdepartmental record system is essential for multidisciplinary teams to collaborate effectively. All relevant information should be accessible and mutually linked between departments. While passive use of the computerized system as a storage of data may have little impact on multidisciplinary care, more active use of the system should generate more interaction and communication among multidisciplinary team members.

Computerized physician order entries were also related to patients' perceptions of patient-centered care but not to their perceptions of multidisciplinary care. This finding suggests that the computerized physician order entry, which should

Table 4. Patients' Perceptions of Healthcare Delivery Systems (n=1,167 from 128 Institutions)

	Multidisciplinary Care		Patient-Centered Care	
	Regression Coefficient	Probability	Regression Coefficient	Probability
Type of institution				
Cancer hospital	0.54	0.54	-0.77	0.13
General hospital	0.03	0.96	-0.18	0.62
Clinic/Other	1.99	0.01	0.33	0.48
Special-functioning hospital	ref.		ref.	
Duration from the initial visit (log)	-0.69	0.00	-0.23	0.02
Frequency of outpatient visits (log)	0.39	0.07	-0.32	0.01
Patient-based information management				
Paper-based medical records	0.94	0.02	0.19	0.42
Electronic medical records	0.56	0.38	-0.24	0.52
Not implemented	ref.		ref.	
Multidisciplinary case conference				
Implemented	0.21	0.59	0.08	0.74
Not Implemented	ref.		ref.	
Intercept	28.45	0.00	22.01	0.00

Table 5. Patients' Perceptions of Healthcare Delivery Systems in Institutions Using Electronic Medical Record Systems (n=569 from 62 Institutions)

	n (%)	Multidisciplinary Care		Patient-Centered Care	
		Regression Coefficient	Probability	Regression Coefficient	Probability
Type of institution					
Cancer hospital	26 (4.2)	1.55	0.34	0.51	0.58
General hospital	449 (76.5)	-0.17	0.82	0.13	0.76
Clinic/Other	39 (5.8)	4.37	0.00	2.09	0.01
Special-functioning hospital	84 (13.5)	ref.		ref.	
Duration from the initial visit (log)		-0.78	0.00	-0.15	0.31
Frequency of outpatient visits (log)		0.67	0.04	-0.28	0.13
Computerized physician order entry					
Implemented	56 (9.4)	0.30	0.76	1.17	0.03
Not implemented	542 (90.6)	ref.		ref.	
Interdepartmental electronic medical records					
Interdepartmental	441 (75.4)	1.54	0.04	1.39	0.00
Not interdepartmental	144 (24.6)	ref.		ref.	
Intercept		27.12	0.00	20.58	0.00

Table 6. Patients' Perceptions of Healthcare Delivery Systems in Institutions Implementing Multidisciplinary Case Conferences (n=371 from 35 Institutions)

	Multidisciplinary Care				Patient-Centered care	
		Regression Coefficient	Probability	Regression Coefficient	Probability	
Type of institution						
Cancer hospital	6 (1.6)	-3.26	0.25	-3.18	0.05	
General hospital	295 (77.2)	-2.63	0.05	-1.67	0.03	
Clinic/Other	55 (14.4)	1.75	0.25	-0.14	0.87	
Special-functioning hospital	26 (6.8)	ref.		ref.		
Duration from the initial visit (log)						
		-0.70	0.02	-0.17	0.32	
Frequency of outpatient visits (log)						
		1.13	0.01	-0.16	0.49	
Multidisciplinary case conference						
Regularly implemented	209 (54.7)	2.58	0.00	1.29	0.00	
Irregularly implemented	173 (45.3)	ref.		ref.		
Multidisciplinary viewpoints in conference records						
Included	213 (55.8)	2.13	0.00	1.56	0.00	
Not included	169 (44.2)	ref.		ref.		
Intercept						
		26.73	0.00	21.32	0.00	

reduce medication errors by electronically ordering prescription drugs, may facilitate billing procedures and thus shorter waiting time for the patient. On the other hand, the system does not seem to affect multidisciplinary care.

Another aspect of care is the multidisciplinary case conference. In the present study, patients did not perceive any improved communication when multidisciplinary case conferences were irregular or when multidisciplinary viewpoints were not incorporated into the conference records. The multidisciplinary case conference is more than a participation of different professionals in a conference and sharing of patient data. All professionals need to be present for the discussion to be successful, and increased interaction among participants would yield significant gains [18]. Moreover, multidisciplinary case conferences have been found most effective only when all those involved in care are actively engaged and their views are incorporated in the decisions of patient care [19]. A recent study reports that multidisciplinary care results in high patient satisfaction with the coordination of care for other types of cancer [20]. Regular multidisciplinary case conferences that exchange relevant and accurate information ensure that the treatment preferences and needs of the patient are met, thus resulting in the patients' perception of a high-quality multidisciplinary care approach.

There are several limitations to this study. First, the questionnaire to assess patients' perceptions of care is not a standardized tool. The results regarding the correlation of patients' perceptions of care with electronic medical records

and multidisciplinary case conference should be interpreted with caution, based on the results of the secondary analyses.

Second, as this study evaluated only breast cancer treatment institutions where quality of medical treatment for breast cancer has been approved by the Japanese Breast Cancer Society, the patients' perceptions for the multidisciplinary care approach may have been slightly biased. There may also be bias in nurse administrator responses generated by social desirability.

The accumulating evidence shows that breast cancer patients report the greatest improvements in care experiences when multidisciplinary teams are more established [21]. This study has implications for policy makers and healthcare providers. Electronic medical record systems have yet to be utilized successfully in clinical practice to positively impact patients' views on multidisciplinary care and satisfaction. Both integrated patient-based information and regular multidisciplinary case conferences with records from different professionals prove to have major effects on patients' perceptions of comprehensive breast cancer care. Oncology nurse is the primary contact for cancer patients and the multidisciplinary team and is expected to bridge communication across the continuum of care [22]. Therefore, the oncology nurse should play an important role in promoting information sharing and case conference among the multidisciplinary care team to response to patient needs.

Future research needs to assess healthcare professionals' perceptions of comprehensive breast cancer care focusing on multidisciplinary care and patient information management.

AUTHORSHIP

Hiroko Komatsu was responsible for the study design and takes responsibility for the paper as a whole.

Kazuhiro Nakayama and Taisuke Togari performed the data analysis.

Kumi Suzuki, Naoko Hayashi, Yoshie Murakami, Yukiko Iioka, Wakako Osaka, Kaori Yagasaki performed the data collection.

Seigo Nakamura, Joyce Neumann and Naoto Ueno designed the study and provided substantial contributions to the article revision.

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CONFLICT OF INTEREST

None declared.

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