ORIGINAL RESEARCH

Integrated Electronic Health Record of Multidisciplinary Professionals Throughout the Cancer Care Pathway: A Pilot Study Exploring Patient-Centered Information in Breast Cancer Patients

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Purpose: The aim of this pilot study was to first aggregate and then integrate the medical records of various healthcare professionals involved with breast cancer patients to reveal if and how patient-centered information is documented in multidisciplinary cancer care.

Patients and Methods: We aggregated 20 types of medical records from various healthcare professionals such as physicians, nurses and allied healthcare professionals (AHPs) throughout three breast cancer patients' care pathways in a department of breast surgery at a university hospital. Purposeful sampling was used, and three cases were examined. The number of integrated type of records was 14, 14, 17 in case 1, 2 and 3, respectively. We manually annotated and analyzed them exploratively using a thematic analysis. The tags were produced using both a deductive template approach and a data-driven inductive approach. All records were then given tags. We defined patient-centered information related tags and biomedical information related tags and then analyzed for if and how patient-centered information was documented.

Results: The number of patient-centered information related tags accounted for 30%, 30% and 20% of the total in case 1, 2 and 3, respectively. In all cases, patient-centered information was distributed across various medical records. The *Progress Note* written by doctors provided much of the patient-centered information, while other records contained information not described elsewhere in the *Progress Notes*. The records of nurses and AHPs included more patient-centered information than the doctors' notes. Each piece of patient-centered information was documented in fragments providing from each of the healthcare professionals' viewpoints.

Conclusion: The documented information throughout the breast cancer care pathway in the cases examined was dominated by biomedical information. However, our findings suggest that integrating fragmented patient-centered information from various healthcare professionals' medical records produces holistic patient-centered information from multiple perspectives and thus may facilitate an enhanced multidisciplinary patient-centered care.

Plain Language Summary: An important paradigm shift within healthcare is the shift toward patient-centered care and away from disease-centered treatment. Patient-centered care is based on shared decision-making, respecting an individual patient's preferences, needs and values, and considering social context and best available research evidence to improve the quality of care. A multidisciplinary team (MDT) approach plays an important role in patient-centered care and MDTs are already adopted into daily oncology practices in many countries, especially in breast cancer care. Previous studies have shown that an effective MDT needs more patient-centered information but often that patient-centered information is notably absent from medical records.

We investigated if and how patient-centered information such as psychosocial entries exists in patient records. For this purpose, we performed an exploratory pilot study in which the patient records of three patients with breast cancer, including two patients with advanced stage disease, were studied throughout their care pathway. We observed that the documentation of patient-centered information was fragmented and scattered across various medical records written by multidisciplinary professionals. Moreover, these pieces of scattered information were recorded from different perspectives and viewpoints. Our findings point to a significant role that healthcare informatics could play, as integrating the various healthcare professionals' electronic health record could likely produce multifaceted and more holistic patient-centered information which could be shared and used in shared decision-making and MDTs with a view to considering both patient and clinical perspectives, potentially improving the quality of care.

Introduction

An important paradigm shift within healthcare is the shift toward patient-centered care and away from disease-centered treatment. Breast cancer treatment and care has many options, and for an individual patient, multiple options like both breast conserving treatment and mastectomy in early-stage breast cancer surgery may be reasonable choices from clinical evidence.[1–3] Breast-conserving treatment refers to breast-conserving surgery (lumpectomy), usually followed by radiotherapy. Patients need to visit the hospital more than 20 times for their radiotherapy. Mastectomy, however, does not usually require radiotherapy. Both healthcare professionals and patients therefore consider not only clinical evidence but also the patient's preferences and daily life requirements to make a better decision for individuals. Moreover, some options could be considered based on patients' preferences and their psychosocial context such as breast reconstruction, the adoption of multigene panel test in advanced stage and so on.[4,5] In these circumstances, to facilitate patient-centered care, shared decision-making (SDM) is an important process. Not only information exchanges but also the interaction of the medical professionals' and patients' entails important considerations from each perspective in considering what kinds of options are available and to decide their best treatment and care pathway.[6–9]

Multidisciplinary team meetings (MDTMs) and care standards are embedded into the breast cancer care pathway to collect and synthesize information and various views from medical professionals from different specialties. They aim to deliver evidence-based recommendations and to examine best available options considering patients' perspectives and circumstances.[10–14] Effective multidisciplinary involvement with breast cancer patients is crucial for patient-centered care to achieve better decision-making that considers the patients' preferences, views and concerns with the clinical opinions of various specialists.[10,15–19]

Patient-centered information, such as psychosocial information, is known to enhance the effectiveness and quality of decision-making in MDTMs.[19] Lack of patient-centered information can lead to inappropriate recommendations and has been reported as the main reason for multidisciplinary team (MDT) decisions not being implemented.[19–21] A cross-sectional study showed that one of the most important reasons for the deviances from MTDM's decision was patient wish.[22] Also, the presence of psychosocial information has been shown to improve the MDT's ability to reach a decision.[23] Similarly, an interview study suggested MDT members needed medical and patient-centered information from various professionals to improve not only MDTMs effectiveness but also patient-centeredness.[24] However, the exchange of such information in a MDT remains limited at present.[25–28]

Capturing a patient's views and preferences can be challenging. Some breast cancer centers in Australia and Germany invited patients to participate in the discussion of their own case to represent preferences in MDTM.[29,30] From a healthcare provider's perspectives, some workflow concerns were raised, such as increased time, inhibited discussion and potential patient burden.[30,31] There are no clear findings regarding the advantages and disadvantages of patients participating in MDTM.[32] Moreover, patients usually share their views and preferences with different medical professionals according to the topic under discussion and the situation they are currently in, and so they are non-uniform.[33] Patient preferences, views and concerns might also change throughout their trajectory.[24] In addition, patient-centered information is usually in a narrative form and documented in free-text format.[34,35] It is therefore frequently more abstract

and fragmented than quantitative clinical information.[34] Various medical professionals record important patient-centered information routinely as non-structured data.

To use patient-centered information in SDM, MDTMs and daily practices, patient-centered information needs to be mapped and potential facilitators to use patient-centered information should be determined.

Few studies have examined the integration of electronic health records (EHR) from various medical professionals involved with breast cancer patient throughout patients' care pathway to explore the data from patient-centered care point of view.

The aim of this exploratory pilot study is to aggregate and integrate the EHR where various medical professionals have documented their records and to reveal if and how patient-centered information is documented in multidisciplinary cancer care.

Methods
Design
We followed the STROBE checklist to ensure reporting rigor.[36] This study adopted an exploratory case study approach to collect EHR data throughout the breast cancer care pathway to understand if and how patient-centered information is documented and to consider the application of their use in multidisciplinary cancer care. Tag-sets were analyzed using a hybrid approach of qualitative methods of thematic analysis.[37] It incorporated both a deductive a priori template of codes (tags) approach and a data-driven inductive approach.[37,38] A descriptive analysis of the tagged text was then carried out, both qualitatively and quantitatively.

Setting
Patients who visited a department of breast surgery at a university hospital in Japan between January 2018 and June 2022 and who fulfilled one of the following eligible criteria were enrolled.

1. Patients with breast cancer who underwent surgery and received pharmacotherapy.
2. Patients with advanced and metastatic breast cancer who received pharmacotherapy.

The reasons for this pilot study and patient selection criteria are as follows. Little or no multidisciplinary information is documented at the beginning of patients' trajectory because few medical professionals are involved with the patient at this stage.[39] However, during their surgery and pharmacotherapy, various medical professionals from different disciplines become involved with the patients at various timepoints.

We also considered the SDM point of view. SDM is a central component of patient-centered care.[6,40] Patient-centered and holistic clinical decisions support high-quality patient care, especially for patients with advanced and metastatic breast cancer.

Data Collection Process
A breast surgeon (HB) selected three eligible patients (Table 1) and type of medical record. A purposeful sampling method was used. A breast surgeon (26 years' experience) identified information-rich cases which fulfilled the inclusion criteria. Case 1 was a typical early-stage breast cancer patient. Case 2 was a recurrent case with a long treatment history. She attended not only the breast oncology department but also other departments. She and her family also had advanced care planning discussions with healthcare professionals. Case 3 was a case with stage IV bone metastasis at initial diagnosis and a long treatment period (9 years). She had a variety of symptoms and problems that required many significant considerations by the healthcare professionals. Eligibility criteria of medical records data was set to include free text. Reports of images, pathology, and other test results and their reports were excluded, even if they contained free text.

Data were extracted in the formats ".csv" and retrieved from hospital information system (HIS) to a secure database by a data management manager (RK). Retrieved data were pseudonymized by data scientists (MS, KK, TY). Data were stored for analysis in an onsite computer under information security controls.

Table 1 Overview of the Patient (N = 3)

Category	Case 1	Case 2	Case 3
Sex	Female	Female	Female
Age of Cancer Diagnosed	40s	40s	40s
Stage	Stage II	Stage III	Stage IV
Duration of Records	1 year	10 years	9 years
Treatment Summary	Neoadjuvant therapy, surgery, adjuvant therapy, hormone therapy and radiotherapy as primary treatment. Treatment is ongoing.	Neoadjuvant therapy, surgery, adjuvant therapy, and radiotherapy as both primary and metastasis treatment. Deceased.	Chemotherapy, hormone therapy and radiotherapy as metastasis treatment. Deceased.

Data Analysis

Annotation Process

Annotation is to assign a tag or tags to text (Figure 1). First, Case 1 was annotated using provisional tag-sets (using a deductive a priori template approach) by three annotators (AS, HO, KF or YS) independently. A data-driven inductive thematic analysis was also applied to Case 1. Next, three annotators discussed and made a draft of revised the title and definition of each tag with reference to the inductively generated codes. A breast surgeon then reviewed the draft of the revised tag-sets and thus a first revised tag-sets were made. Each of the three annotators then annotated Case 2 using the first revision tag-sets. The inductive thematic analysis was then applied to Case 2 further revising the codes from Case 1. Second revised tag-sets were generated using the same strategy applied in Case 1. Case 3 was annotated with the second revised tag-sets by three annotators individually. An inductive thematic analysis was also applied to Case 3 revising the result from Case 2. A final revised tag-sets were produced using the same strategy. All data were then annotated using the final revised tag-sets, and then inter-annotator agreements were obtained using a consensus read. Consensuses results were then reviewed with the breast surgeon and then analyzed if and how information was recorded (Appendix 1).

Annotation Guide

We defined a basic annotation policy to support optimal and consistent annotation decisions. (Appendix 2) All annotations were annotated one per sentence, and one sentence was given multiple tags in consideration of the context. When a sentence was ambiguous, several tags were given.
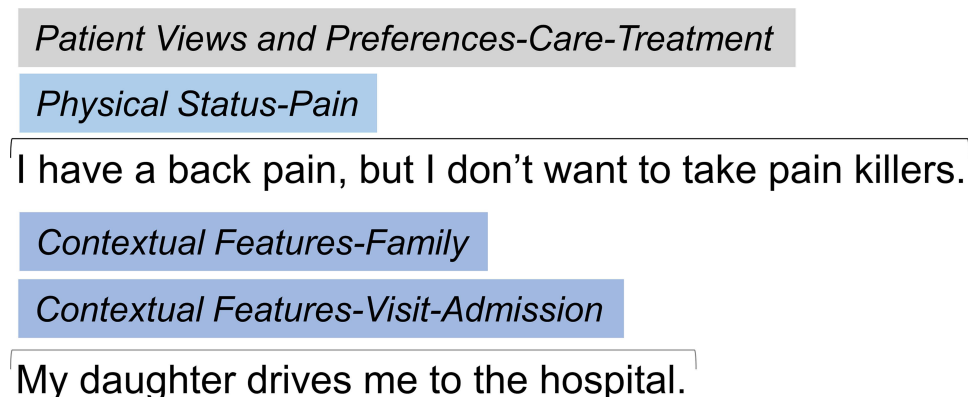

Patient Views and Preferences-Care-Treatment

Physical Status-Pain

I have a back pain, but I don't want to take pain killers.

Contextual Features-Family

Contextual Features-Visit-Admission

My daughter drives me to the hospital.

Figure 1 Example of the text annotation. The words with the colored background were tags. *Patient Views and Preferences-Care-Treatment* and *Physical Status-Pain* tags were given to the first line, and *Contextual Features-Family* and *Contextual Features-Visit-Admission* tags were given to the second line. The author made this figure's text as an example.

Provisional Tag-Sets

Tags consisted of biomedical and psychosocial items. Forty-three provisional tags were then classified into four categories (*Medical Indications, Patient Views and Preferences, Quality of Life (QOL), Contextual Features*).[41] *QOL* was further divided into 3 subcategories (*Physical Condition, Concern of Daily Life-Care-Treatment, State of Mind*). Provisional tag-sets consisted of 6 tags in *Medical Indication*, 7 tags in *Patient Views and Preferences*, 7 tags in *Contextual Features* and 23 tags in *QOL* which were 11 tags for *Physical Condition*, 9 tags for *Concern of Daily Life-Care-Treatment*, and 3 tags for *State of Mind*.

We referred to Jonsen's Four Topics Chart and a palliative care assessment tool of OPTIM-Study to create these tags.[41,42] This assessment tool is well validated and one of the most frequently used to quantify the user-perceived quality of palliative care in Japan.[43] Breast cancer-specific tags were created with reference to the survivor's survey reports.[44]

Annotation Tool

We used a text-annotation environment, INCEpTION (Klie et al 2018),[45] in which several annotators could work on the same annotation document, and it could therefore support several open annotation cases at a time.

Analysis of Annotation Results

To analyze how information was recorded, we prototyped an application to integrate all annotated results (Figure 2a). We prepared a *QOL* dedicated screen to support many types of tags (Figure 2b). This application supported being able to count the number of given tags and to display all paragraphs' descriptions to read for each or multiple given tags with date, type of medical records and which department documented (Figure 2c).

Definition and Measurement of Patient-Centered Information

Definitions of patient-centered care vary, and there is no uniform definition of patient-centered information.[46,47] Therefore, in this study, we defined psychosocial information as patient-centered information, such as the patient's views, preference, concerns, priorities in terms of treatment and care options, psychological status, family support, social resources, financial status, belief, context of their life and so on, that is expected to be used in SDM and MDT's recommendations/decisions.[6-8],[14,15,24] This information was grouped into 4 categories which consisted of *Patient Views and Preferences, Contextual Features, Concern of Daily Life-Care-Treatment* and *State of Mind*. Whereas *Medical Indication* and *Physical Status* designate biomedical information.

Results

Data Overview

We aggregated 20 types of medical records from various healthcare professionals throughout the three breast cancer patients' care pathways. These records consisted of 4061 paragraphs comprising 14,195 lines of text. We integrated these data for each case.

Records were distributed across multiple systems in the hospital with each medical record having a different format which consisted of either only free-text or a combination of unstructured (free-text), structured Boolean (true or false) and numeric values. For example, the *Progress Notes* consisted of seven paragraphs (problem, subjective, objective, assessment, plan, plan-diagnosis, plan-therapy) written in free-text. The *Discharge Screening Sheet* consisted of mixed datatype which consisted of free-text, numeric values, and Boolean values by dropdown menus. In such cases, numeric and Boolean values were each combined into one paragraph and considered as one sentence. Four of the 20 records were written by physicians who were breast surgeons, endocrinologists, emergency physicians and palliative care physicians, with the remaining records written by nurses working in the wards, outpatient, emergency room and palliative care entities and allied healthcare professionals such as physical therapists. The type of medical records varied depending on case. Appendix 3 provides an overview of the analyzed data in each case.

Revised Tag-Sets

Forty-three provisional tags were revised to 54 tags. The revised tag-sets consisted of 10 tags in *Medical Indication*, 7 tags in *Patient Preference*, 9 tags in *Contextual Features* and 28 tags in *QOL* which were 15 tags for *Physical Condition*,
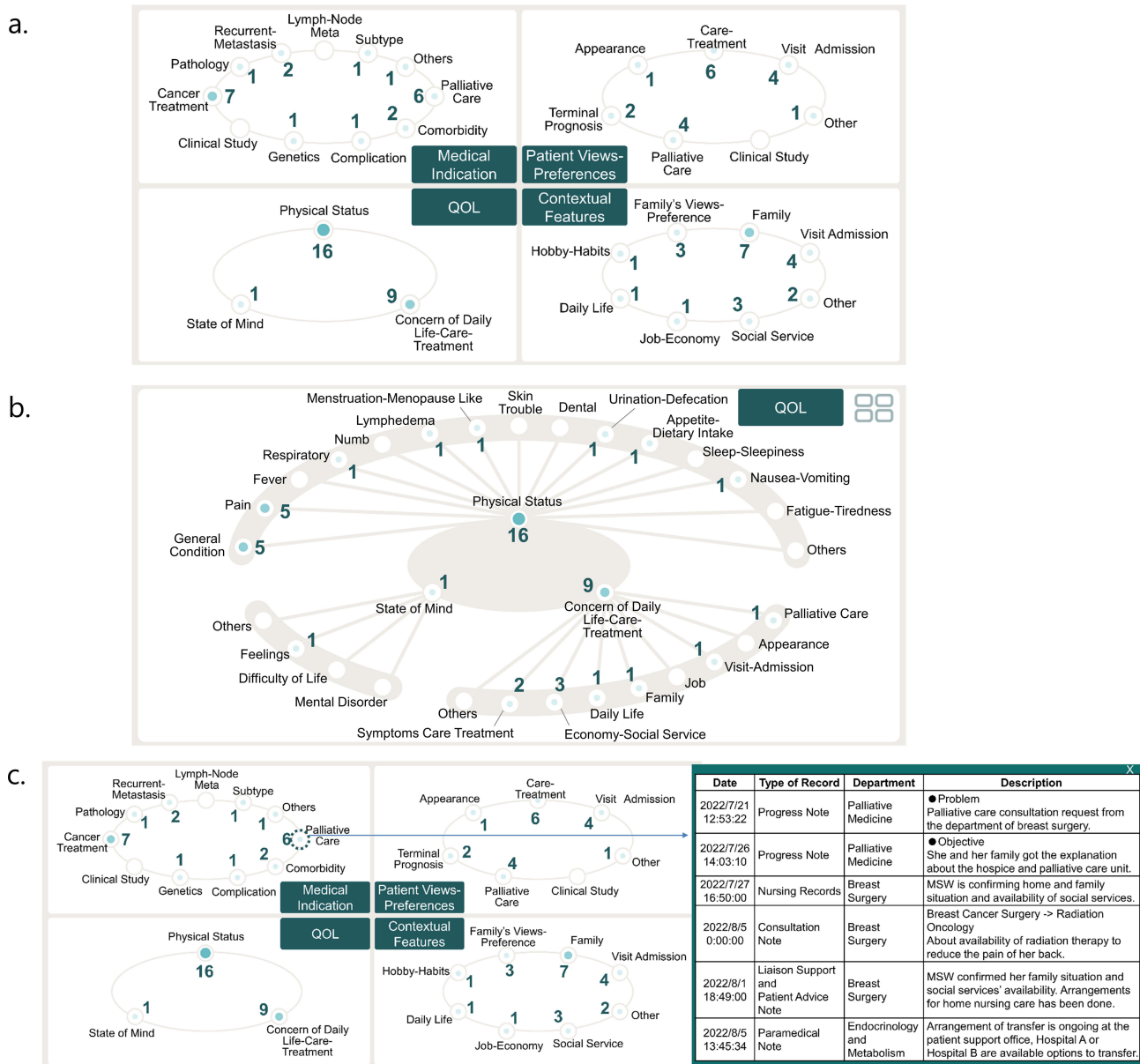
Figure 2 The prototyped application to integrate all annotated results. (**a**) The numbers represent the number of given tags for each tag. (**b**) We created *QOL* dedicated display because *QOL* category has more tags than other categories. (**c**) The list of paragraphs containing tagged sentence are displayed by selecting a tag or tags of interest. Author made this figure's data as an example.

Abbreviations: QOL, Quality of Life, MSW, Medical Social Worker.

9 tags for *Concern of Daily Life-Care-Treatment*, and 4 tags for *State of Mind*. Definitions for each tag are provided in [Appendix 4](#). The main changes from the provisional tags to those eventually used were as follows. Eleven tags were added when the number of tags was extremely large and the tagged text could be further sub-categorized, or when there was a clear lack of appropriate tag. Tags were removed for information that was considered of less importance for clinical decision-making and care. For example, "Insurance" in *Contextual Feature* was removed because Japan has a universal health insurance system including breast reconstruction surgery for patient who underwent the mastectomy. Tag titles and their definitions were also modified to include a broader range of events and issues covered. For example, "Feeling down" in a provisional tag was modified to "Feelings" to include positive, negative, or any mood. "Pathology-grade" was changed to "Pathology" to include not only the disease grading but also all pathological information.

Inter-rater reliability based on Fleiss' kappa was calculated for the results of the template analysis using the final revised tag-sets for a random sample of 10 medical records in each case (Fleiss' kappa = 0.71 on average across the 3 cases).

Annotation Results

The number of patient-centered information related tags accounted for 30%, 30% and 20% of the total in case 1, case 2 and case 3, respectively (Table 2). In all cases, patient-centered information was distributed across various medical records (Table 3). The number of patient-centered information related tags was 19% in the physicians' records and 30% in the nurses' and allied healthcare professionals' records (on average across the 3 cases) (Figure 3).

Patient-centered information existed in all type of medical records in the cases examined. Much of the patient-centered information came from *Progress Notes*, while other records contained information not described in *Progress*

Table 2 Number and Ratio of Given Tags in Each Category

Category	Case 1	Case 2	Case 3
BMI			
Medical Indication	338	1014	2993
QOL-Physical Status	236	737	3852
PCI			
QOL- Concern of DailyLife-Care-Treatment	48	88	220
QOL - State of Mind	10	54	285
Patient Views and Preferences	101	203	456
Contextual Features	92	391	785
Total	825	2487	8591
BMI (%)	574 (70)	1751 (70)	6845 (80)
PCI (%)	251 (30)	736 (30)	1746 (20)

Table 3 Medical Records and Number of Given Tags

Type of Medical Records	Case 1		Case 2		Case 3	
	BMI	PCI	BMI	PCI	BMI	PCI
Progress Note	411	149	1237	458	4221	768
Consultation Note	5	3	16	3	128	28
Discharge Summary	4	3	6	5	38	6
Discharge Summary of Nurse	13	16	17	11	85	51
Discharge Support Screening Sheet	0	0	0	0	14	14
Discharge Conference Note	0	0	0	0	44	20
SOAP and Focus charting	70	22	255	66	1801	586
Nursing Charting	23	22	0	0	72	41
Nursing Note	0	0	14	19	29	23
Paramedical Note	0	1	2	0	54	50
IC Attending Note	8	11	10	16	0	0

(*Continued*)

Table 3 (Continued).

Type of Medical Records	Case 1		Case 2		Case 3	
	BMI	**PCI**	**BMI**	**PCI**	**BMI**	**PCI**
ER Charting	0	0	38	20	93	36
Pain Assessment Template for Nurse	4	1	10	3	49	16
Medication Management Assessment	4	4	6	2	59	10
Illness and Life Questionnaire	0	6	0	0	0	0
Fall Risk Assessment	23	7	32	10	99	38
Nutrition Counseling Note	0	0	101	95	0	0
First Visit and Admission Note	7	6	0	0	42	3
Medical Interview Note	2	0	0	0	2	3
Liaison Support and Patient Advice Note	0	0	7	28	15	53

Abbreviations: IC, Informed Consent; SOAP, Subjective, Objective, Assessment and Plan; ER, Emergency Room.

Notes. Each piece of information was documented in fragments from each of the healthcare professionals' point of view. For example, there was a short sentence, "difficult to lose weight", in the *Progress Note*, while there was a lot of information about the reasons for the difficulty of losing weight such as patient's daily activities, dietary intake, life stressors affecting eating which were found in the *Nutrition Counseling Note*. The *Discharge Summary of the Nurse*

a.

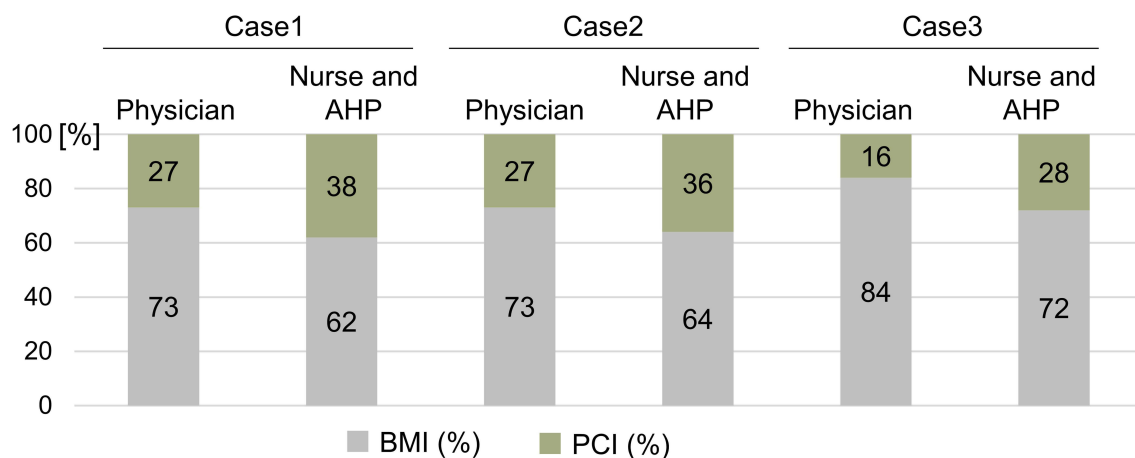|	Case1		Case2		Case3	
Category	Physician	Nurse and AHP	Physician	Nurse and AHP	Physician	Nurse and AHP
BMI	420	154	1297	454	4480	2365
PCI	155	96	486	250	838	908
Total	575	250	1783	704	5318	3273

b.

Figure 3 The number and ratio of given BMI and PCI tags to the text of Physician and Nurse/AHP in each case. (**a**) The table of the number of tags. (**b**) The graphs of the ratio in each case.
Abbreviations: AHP, allied healthcare professionals; BMI, Biomedical Information; PCI, patient-centered information.

provided information about the home and family situation, social support availabilities and utilizations, financial strain and so on. Different descriptions were documented around the same scene in different medical records. For example, when physicians and a nurse were present at the same informed consent discussion, the *Progress Note* (written by physicians) focused on biomedical information and the *IC Attending Note* (written by the nurse) was mostly patient-centered information (Appendix 5). In this case, patient-centered information was 25%, 72% in the *Progress Note*, the *IC Attending Note*, respectively.

Moreover, several descriptions provided information that patients spoke or expressed emotions about the same event differently depending on who they were talking to. For example, when a palliative care physician delivered negative news, liver metastasis exacerbation in this case, to a patient and her family, they did not show their shock to the physician, on the contrary, they expressed their emotion to the nurse. Both data were documented within approximate 2 hours difference on the same day. Descriptions were as follows;

The *Progress Note* (written by a palliative care physician) at 14:03 5th August, 20XX (Date and Year were changed.)

"They didn't show their level of shock in our department".

The *Nursing Chart* at 15:59 5th August, 20XX (Date and Year were changed.)

"She said that she was shocked to hear the bad news. Her daughter also seemed shocked as well and did not make eye contact with me".

Some patient-centered information existed in different locations (paragraphs) in the same type of medical record. For example, we could mostly find the *Patient Views and Preferences-Visit and Admission* tags in the paragraph Problem and Subjective, however, a few tags also existed in the other paragraph in the *Progress Note* (12, 14, 1, 1, 1, tags in the paragraph Problem, Subjective, Plan, Plan-Therapy, Assessment, respectively).

Discussion

This study represents a pilot to investigate if and how patient-centered information is documented in a breast cancer clinical care trajectory. Our analysis resulted in four key findings. First, patient-centered information is already documented to some extent and constituted about 27% of all patient data on average. Second, patient-centered information is documented non-systematically and exists in multiple locations not only in the health information system but also within the medical record. Third, information was fragmented and documented from each of the healthcare professionals' perspective rather than from a centralized agreed to perspective. Finally, we observed that nurses and AHPs documented patient-centered information in their records more often than physicians.

Previous qualitative studies suggested that it was difficult to search for and retrieve patient-centered information due to it essentially being noticeably absent.[34,48] This was especially the case when other members of the care team may have been involved and documented patient-centered information somewhere.[35] However, our findings suggest that patient-centered information exists in EHR and these data are summarized or documented from multiple clinical perspectives and scattered in different locations within the EHR.

A national survey reported one aspect of a nurses' role was to provide psychosocial support and to gather and assimilate patient-centered information into decisions.[19,25] However, it was also known that the contribution of nurses to MDTMs was significantly lower than physicians.[18,20,23] Information on patient psychosocial aspects and views on treatment options (patient-centered information) was also significantly less well represented compared to biomedical information, especially in the case of multidisciplinary oncology consultation to agree on an evidence-based treatment recommendation for each individual patient.[23,27]

However, integrating fragmented patient-centered information from various healthcare professionals which have already been documented in the EHR would likely produce a multifaceted and more holistic patient-centered information which could be shared and used in SDM, MDTs and daily practices without additional workload for healthcare professionals. The digital transformation of healthcare is spreading rapidly, and data standardization and consolidation are an ongoing process.[49,50] These technical innovations could make it easier to integrate patient-centered information from various medical records and increase the use of multifaceted patient-centered information. It also possibly improves these clinical situations and may contribute to the enhanced quality and efficacy of MDTMs because the information to be shared may already be in the EHR.

Strengths and Limitations

This study has several limitations. First, only a small number of cases could be analyzed because the piloted analysis was conducted manually, which is extremely time-consuming. Next, while we analyzed representative cases of breast cancer, the findings of this study were obtained from a partial population of breast cancer patients' pathway at single hospital in Japan. Further work is required to understand which findings are universal for not only breast cancer but also other cancers, diseases, and facilities. Furthermore, regarding the given tags in *Medical Indication* and *Physical Status*, several tags may be incorrect due to lack of formal medical training of the annotators and sparse information of medical context. In addition, regarding given tags in *Patient Views and Preferences, Contextual Features, State of Mind* and *Concerns of Daily Life-Care-Treatment*, several tags may differ from patients' or medical professionals' intention due to the potential of an annotators' bias and lack of text's context. To mitigate these problems, Large Language Models, such as generative AI, may provide solutions.

There are several strengths to this study. Previous studies have suggested that not all relevant information on EHR can be easily shared across specialties.[49,50] However, we aggregated, integrated, and analyzed a wide range of unstructured medical records that documented information from various healthcare professionals across departments. Moreover, although annotation is potentially subjective, the three annotators were able to reach full agreement during consensus, which likely reinforces the validity of our results by reducing subjectivity bias.

Conclusion

Documented information collected throughout the breast cancer care pathway in the cases examined was dominated by biomedical information. However, our findings suggest integrating the EHR entries of various healthcare professionals produces patient-centered information emerging from multiple perspectives and viewpoints. A lack of patient-centered information can result in treatment recommendations that are inappropriate or unacceptable to the patient, which can delay treatment.[51] There is also evidence that decisions that consider patients' comprehensive information are more likely to be clinically appropriate and more acceptable to patients. Hence, it is crucial to capture this information. Diverse input from patients can lead to understanding patients as individuals living with cancer rather than collective "cancer patients" and may support changing treatment goals from disease-centered to patient-centered. Indeed, SDM and MDT approaches play a central role of patient-centered care in cancer. The application of clinical expertise from different areas using patient data that integrates both a patient's clinical status as well as their treatment/care preferences facilitate the determination of a treatment strategy that is highly tailored to the individual patient yet deeply rooted in evidence-based medicine at the same time.

However, challenges exist with implementation, particularly with limited time available for health care encounters, and the availability and accessibility of patient-centered data.[52–55] Supporting technology to integrate various medical records from multidisciplinary professionals may facilitate using patient-centered information in SDM and MDTMs in daily clinical practice.

Data Sharing Statement

The data that support the findings of this study are not publicly available due to privacy/ethical restrictions.

Ethics Approval

This study complies with the Declaration of Helsinki and was performed according to ethics committee approval. The University of Tsukuba Institutional Ethical Review Committee (ERC) approved the study on October 12, 2022 (ERC Management Number; R04-127).

Informed Consent

Informed consent was obtained in the form of opt-out on the website.

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