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ORIGINAL ARTICLE

# Pharmacotherapy decision-making among patients with breast cancer in Japan: results of an online survey

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## Abstract

**Background** Although communication between patients with breast cancer and physicians is central to treatment decision-making for patients and the concept of shared decision-making has been increasingly advocated worldwide, little is known about decision-making and perceptions among the population in Japan. Therefore, this cross-sectional study aimed to clarify the status of pharmacotherapy decision-making among patients with breast cancer in Japan and assess factors associated with patient satisfaction with patient–physician communication.

**Methods** Data for women previously treated with pharmacotherapy agents for breast cancer in Japan were collected in July 2017 using an online survey. Respondents were categorized by their decision-making role (active, shared, passive). Characteristics, decisional conflict level, and satisfaction with communication with their physician at the time of pharmacotherapy selection were stratified by decision-making roles. Stepwise multivariate logistic regression was performed to assess factors associated with satisfaction.

**Results** Of 486 women that responded, nearly half played an active decision-making role (48.4%) and 26.0% played a shared role. The lowest decisional conflict and higher satisfaction were observed among those who played a shared role. The highest decisional conflict and lower satisfaction were observed in passive decision-makers. Shared decision-making, a longer consultation time with the physician, and multiple treatment options provided by the physician were significantly associated with satisfaction with communication with the physician.

**Conclusions** Our findings suggest that among patients with breast cancer, a shared role in treatment decision-making, longer consultation time at treatment selection, and having multiple treatment options are important for higher patient satisfaction with communication with their physician.

**Keywords** Breast neoplasms · Decision-making · Communication · Patient preference · Japan

## Introduction

Communication between patients with cancer and physicians is central to treatment decision-making for patients. Although patients now have better access to treatment information through the Internet, understanding such information remains challenging [1]. Experiencing conflict in treatment decision-making is also common under potentially life-threatening conditions [2, 3]. The guideline on communication between patients with cancer and clinicians strongly recommends clinicians provide patients with information about all available treatment options and the advantages and disadvantages of each, after clarifying the patient's treatment goal to promote their hope, understanding, and autonomy about treatment [4].

Shared decision-making (SDM) is an increasingly advocated concept reflected by patient-centered clinical decision-making. This interactional process involves patients and physicians sharing information and jointly selecting preferred and agreed treatment from among treatment options, after consideration of benefits and harms. Four important characteristics of SDM are: (1) at least two participants (physician and patient) are involved; (2) both parties share information;

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(3) both parties take steps to build a consensus about the preferred treatment; and (4) an agreement is reached on the treatment to implement [5]. Patients who experienced SDM showed good treatment adherence and higher satisfaction with their treatment and decision-making process [6, 7], which resulted in better psychological and health outcomes [8]. However, some studies reported that congruity between patients' preferred and actual decision-making processes affects their satisfaction with the treatment decision-making process [9, 10].

Preference for SDM among patients with breast cancer has been reported globally. In the United States (US), Europe, and Oceania, 45%–65% of patients with breast cancer preferred SDM, whereas around 25% preferred active decision-making [9, 11]. Similarly in Japan, SDM was the most preferred decision-making among patients with breast cancer. One study found participants showed the highest preference for SDM (69.2%) and the lowest preference for a passive decision-making (12.5%) [1]. An online survey also found a predominant preference for SDM (49.8%) followed by active decision-making (37.2%), whereas actual decision-making was mainly controlled by patients (active, 47.8%; shared, 29.8%; and passive, 22.3%) [10].

Although SDM is the preferred decision-making process among patients with breast cancer worldwide, little is known about decision-making and perceptions among this population in Japan. Patients with breast cancer tend to experience conflicts in treatment selection among various and complex treatment options. More information is also available, partly because of the increasing use of gadgets (e.g., smartphones and tablets). In addition, a "paternalistic" relationship has conventionally existed between patients and physicians to varying degrees in Japan.

Therefore, we aimed to clarify the status of decision-making on pharmacotherapy selection among patients with breast cancer in Japan, and assess factors associated with patient satisfaction with patient–physician communication, using an online survey. We also assessed factors associated with the level of conflict in decision-making (decisional conflict), as decisional conflict occurs as a consequence of the difficulty of the decision being made.

## Materials and methods

### Study design and target population

This cross-sectional study targeted women who had been treated with pharmacotherapy agents for breast cancer in Japan. Respondents were recruited online from individuals registered as monitors with a healthcare marketing research company (Anterio Inc., Tokyo, Japan). Over 240,000 monitors were voluntarily registered between September and October 2016. In July 2017, an online invitation was sent to 1422 potential female respondents aged ≥ 15 years with a history of breast cancer. The informed consent was obtained from all respondents who agreed to complete the online survey. Online shopping points were given to the respondents.

The study was conducted according to the Declaration of Helsinki. Because the study used fully anonymized data of voluntarily pre-registered respondents, ethical approval was not an obligation for this observational study. The Japanese Ethical Guidelines for Medical and Health Research Involving Human Subjects do not apply to studies exclusively using anonymized data [12].

### Questionnaire

The questionnaire covered respondents' demographic and clinical characteristics, decision-making on pharmacotherapy treatment, consultation time with their physician at the time of treatment selection, number of treatment options provided by their physician at the time of treatment selection, decisional conflict, and satisfaction with communication with their physician. Respondents answered all questions; the survey did not allow missing responses.

To determine decision-making roles (attitudes) that respondents played in their actual pharmacotherapy treatment, we used a Japanese translation of questions used by Schaede et al. [13], which were originally designed to measure patients' preference for treatment decision-making [14]. Respondents were asked to select one of seven descriptions: (1) I made the treatment decision on my own; (2) I made the treatment decision after hearing the physician's opinion; (3) I made the treatment decision together with the physician; (4) the physician made the treatment decision after talking to me; (5) the physician made the decision on his/her own; (6) I don't know; and (7) I prefer not to answer. Responses were classified into four categories: active role (option 1 or 2), shared role (option 3), passive role (option 4 or 5) [14], and others (option 6 or 7). In addition, the role participants' would prefer to take in hypothetical future pharmacotherapy treatment for breast cancer was evaluated in the same manner, with the addition of "I prefer" to the beginning of each description. These responses were classified in the same manner as the past decision-making role.

To assess participants' level of decisional conflict in making treatment decisions in their most recent pharmacotherapy for breast cancer, we used the Japanese version of Decisional Conflict Scale (DCS) [15–19]. The DCS includes 16 items measuring personal perceptions of uncertainty in choosing treatment options, modifiable factors contributing to uncertainty, and effective decision-making. Responses are on a 5-point scale (strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree). Total scores were calculated according to the user manual [20]: summed

score divided by the number of items and multiplied by 25. The total score ranges from 0 (no decisional conflict) to 100 (extremely high decisional conflict). Scores ≥ 37.5 indicate high decisional conflict, scores < 25.0 low decisional conflict, and scores 25.0 to < 37.5 moderate decisional conflict [20]. High decisional conflict is considered to be associated with decision delay or feeling unsure about implementation, and low conflict indicates an association with implementing decisions.

Satisfaction with communication with the physician at the time of pharmacotherapy selection was also assessed. Respondents rated their satisfaction as: very satisfied, somewhat satisfied, neither satisfied nor dissatisfied, not very satisfied, or dissatisfied.

### Statistical analysis

Respondents' demographic and clinical characteristics were descriptively analyzed. The proportions of respondents' actual decision-making roles at the time of their past pharmacotherapy treatment selection were calculated. Demographic and clinical characteristics, DCS scores, and satisfaction with communication with the physician were further stratified by decision-making role.

To assess factors associated with satisfaction ("very satisfied") communication with the physician, all potential factors (number of treatment options provided at the time of treatment, age, education, marital status, employment status, medical institution, treatment status, cancer stage, consultation time, and decision-making role) were entered into a multivariate logistic regression model. The stepwise method was used to select factors at significance levels of $p < 0.25$ for entry and removal. Odds ratios (OR) and 95% confidence intervals (CI) were calculated. The tests were 2-tailed, with statistical significance set at $p < 0.05$. Using the same methods, factors associated with decisional conflict (DCS scores < 25.0) in the most recent pharmacotherapy for breast cancer were assessed.

All analyses were performed using SAS software release 9.4 (SAS Institute, Inc., Cary, NC, USA).

## Results

Respondents were 486 women who had previously been treated for breast cancer with pharmacotherapy agents, including infusion and oral and injection agents for chemotherapy, hormonal therapy, or targeted therapy.

### Demographic and clinical characteristics

Table 1 summarizes respondents' demographic and clinical characteristics; 77.6% were aged 40–60 years, and 87.4% had no recurrent or metastatic breast cancer after their previous treatment. In addition, 67.5% of respondents were under treatment at the time of the survey, and 31.9% were receiving regular follow-up without treatment. The most common current or latest breast cancer stages were I (44.9%) and II (39.7%), followed by stage III (9.1%), and stage IV or recurrent (6.4%). Most (> 80%) of the respondents were receiving or had previously received oral hormonal therapy. Over half of the respondents (51.2%) were only provided with one treatment option by their physician. Most respondents had less than 30 min for the consultation with their physician regarding pharmacotherapy (81.6%).

### Decision-making roles and characteristics

Nearly half of the respondents played an active role (48.4%), 26.0% a shared role, and 25.6% a passive role (excluding five respondents who selected "I don't know" or "I prefer not to answer") (Table 1). A passive role was more predominant among respondents aged 50–59 years (50.4%) compared with respondents aged 40–49 years (27.6%). More respondents who worked full-time played an active role (40.4%) than shared (33.9%) and passive roles (30.3%). In contrast, more respondents who were unemployed played passive roles (43.4%) compared with active (32.2%) and shared roles (32.3%). In total, 61.5% of respondents who played a passive role were given one treatment option, and 60.2% of those who played a shared role were given two or more options. Respondents who played a shared role had longer consultations with their physician than those who took active or passive roles (consultation time ≥ 15 min: active 58.1%, shared 74.5%, and passive 55.4%).

### Satisfaction with communication with the physician and factors associated with satisfaction

When asked about satisfaction with communication with their physician at the time of pharmacotherapy selection, 45.1% of respondents were "somewhat satisfied" and 27.2% were "very satisfied" (Table 1). Approximately half of the respondents who played a shared decision-making role were "very satisfied" with communication with their physician (48.8%), whereas fewer of those who played a passive role were "very satisfied" (16.3%). Respondents who played active or passive roles were most commonly "somewhat satisfied" (48.9% and 46.3%, respectively).

Multivariate logistic regression identified four factors (Table 2). The likelihood of being very satisfied communication with the physician was: more than five times higher for respondents who played a shared decision-making role (OR 5.125, 95% CI 2.585–10.159); 2–3 times higher when the consultation time for treatment selection was longer (15 to < 30 min, OR 1.944; 95% CI 1.091−3.463; ≥ 30 min,

**Table 1** Demographic and clinical characteristics of all respondents and by decision-making role

| Characteristics | Total *n* (%) | Decision-making roles played in the past | | |
|---|---|---|---|---|
| | | Active *n* (%) | Shared *n* (%) | Passive *n* (%) |
| Overall | 486 (100.0) | 233 (48.4) | 125 (26.0) | 123 (25.6) |
| Age (years), mean ± SD | 51.9 ± 8.03 | 51.8 ± 8.30 | 51.7 ± 7.51 | 52.3 ± 8.02 |
| 30 to < 40 | 26 (5.3) | 14 (6.0) | 5 (4.0) | 7 (5.7) |
| 40 to < 50 | 158 (32.5) | 76 (32.6) | 45 (36.0) | 34 (27.6) |
| 50 to < 60 | 219 (45.1) | 102 (43.8) | 54 (43.2) | 62 (50.4) |
| 60 to < 70 | 75 (15.4) | 36 (15.5) | 20 (16.0) | 18 (14.6) |
| ≥ 70 | 8 (1.6) | 5 (2.1) | 1 (0.8) | 2 (1.6) |
| Marital status | | | | |
| Married | 337 (69.3) | 149 (63.9) | 97 (77.6) | 89 (72.4) |
| Not married | 149 (30.7) | 84 (36.1) | 28 (22.4) | 34 (27.6) |
| Presence of family in the same household | | | | |
| Yes | 407 (83.7) | 188 (80.7) | 108 (86.4) | 110 (89.4) |
| No | 79 (16.3) | 45 (19.3) | 17 (13.6) | 13 (10.6) |
| Education[a] | | | | |
| High school or lower | 171 (35.8) | 84 (36.1) | 39 (31.2) | 46 (37.4) |
| Above high school | 307 (64.2) | 149 (63.9) | 86 (68.8) | 77 (62.6) |
| Employment status[b] | | | | |
| Full-time | 173 (36.0) | 93 (40.4) | 42 (33.9) | 37 (30.3) |
| Part-time | 139 (29.0) | 63 (27.4) | 42 (33.9) | 32 (26.2) |
| Unemployed | 168 (35.0) | 74 (32.2) | 40 (32.3) | 53 (43.4) |
| Current medical institution[c] | | | | |
| Clinic | 108 (23.2) | 51 (22.8) | 30 (25.0) | 26 (22.2) |
| University hospital | 110 (23.6) | 51 (22.8) | 31 (25.8) | 26 (22.2) |
| General hospital | 207 (44.4) | 101 (45.1) | 47 (39.2) | 57 (48.7) |
| Cancer center | 41 (8.8) | 21 (9.4) | 12 (10.0) | 8 (6.8) |
| Current breast cancer status | | | | |
| Recurrent or metastatic | 61 (12.6) | 29 (12.4) | 15 (12.0) | 16 (13.0) |
| No recurrent or metastatic | 425 (87.4) | 204 (87.6) | 110 (88.0) | 107 (87.0) |
| Current treatment status | | | | |
| Under treatment | 328 (67.5) | 160 (68.7) | 78 (62.4) | 88 (71.5) |
| Regular follow-up without treatment | 155 (31.9) | 70 (30.0) | 47 (37.6) | 35 (28.5) |
| No treatment or follow-up | 3 (0.6) | 3 (1.3) | 0 (0.0) | 0 (0.0) |
| Current or latest breast cancer stage[d] | | | | |
| I | 183 (44.9) | 96 (49.2) | 47 (42.3) | 38 (39.2) |
| II | 162 (39.7) | 67 (34.4) | 45 (40.5) | 47 (48.5) |
| III | 37 (9.1) | 17 (8.7) | 14 (12.6) | 6 (6.2) |
| IV or recurrent | 26 (6.4) | 15 (7.7) | 5 (4.5) | 6 (6.2) |
| Current or latest pharmacotherapy for breast cancer[e] | | | | |
| Chemotherapy by injection/infusion | 96 (19.8) | 54 (23.2) | 20 (16.0) | 22 (17.9) |
| Hormonal therapy by injection/infusion | 64 (13.2) | 31 (13.3) | 17 (13.6) | 16 (13.0) |
| Molecular targeted therapy by injection/infusion | 57 (11.7) | 29 (12.4) | 14 (11.2) | 14 (11.4) |
| Chemotherapy by oral agent | 12 (2.5) | 8 (3.4) | 1 (0.8) | 3 (2.4) |
| Hormonal therapy by oral agent | 397 (81.7) | 188 (80.7) | 99 (79.2) | 108 (87.8) |
| Molecular targeted therapy by oral agent | 1 (0.2) | 0 (0.0) | 1 (0.8) | 0 (0.0) |
| Unknown | 3 (0.6) | 10 (4.3) | 11 (8.8) | 5 (4.1) |
| Number of treatment options provided at the time of treatment[f] | | | | |
| 1 | 231 (51.2) | 111 (52.1) | 47 (39.8) | 72 (61.5) |
| ≥ 2 | 220 (48.8) | 102 (47.9) | 71 (60.2) | 45 (38.5) |

**Table 1** (continued)

| Characteristics | Total *n* (%) | Decision-making roles played in the past | | |
|---|---|---|---|---|
| | | Active *n* (%) | Shared *n* (%) | Passive *n* (%) |
| Consultation time at the time of treatment[g] | | | | |
| < 15 min | 167 (38.4) | 86 (42.0) | 29 (25.4) | 50 (44.6) |
| 15 to < 30 min | 188 (43.2) | 84 (41.0) | 55 (48.2) | 48 (42.9) |
| 30 to < 60 min | 67 (15.4) | 31 (15.1) | 23 (20.2) | 12 (10.7) |
| ≥ 60 min | 13 (3.0) | 4 (2.0) | 7 (6.1) | 2 (1.8) |
| Decisional conflict, mean ± SD | 35.72 ± 16.56 | 34.31 ± 16.07 | 32.31 ± 14.66 | 41.54 ± 17.84 |
| Low (< 25) | 79 (16.3) | 41 (17.6) | 27 (21.6) | 11 (8.9) |
| Moderate (25–37.4) | 180 (37.0) | 91 (39.1) | 49 (39.2) | 38 (30.9) |
| High (≥ 37.5) | 227 (46.7) | 101 (43.3) | 49 (39.2) | 74 (60.2) |
| Satisfaction on the communication with the physician | | | | |
| Very satisfied | 132 (27.2) | 50 (21.5) | 61 (48.8) | 20 (16.3) |
| Somewhat satisfied | 219 (45.1) | 114 (48.9) | 47 (37.6) | 57 (46.3) |
| Neither satisfied nor dissatisfied | 96 (19.8) | 51 (21.9) | 14 (11.2) | 29 (23.6) |
| Not very satisfied | 31 (6.4) | 14 (6.0) | 2 (1.6) | 14 (11.4) |
| Dissatisfied | 8 (1.6) | 4 (1.7) | 1 (0.8) | 3 (2.4) |

Data presented as frequencies and percentages unless otherwise indicated. Percentages may not add up to 100% because of rounding

Five respondents who selected "I don't know" or "I prefer not to answer" for decision-making role were not included in the active, shared, and passive categories

*SD* standard deviation

[a–d, f, g] Respondents who selected "other", "I don't know", "I don't remember", or "I prefer not to answer" for each question are not included in this table

[e]Multiple answers were allowed

OR 2.873, 95% CI 1.436−5.748); and two times higher for respondents whose physician provided two or more treatment options (OR 2.082; 95% CI 1.264−3.428) ($p < 0.05$ for all).

## Decisional conflict in most recent pharmacotherapy and factors associated with low decisional conflict

The mean DCS score ± standard deviation for respondents overall was 35.72 ± 16.56, with high decisional conflict (≥ 37.5) experienced by 46.7% of respondents and moderate decisional conflict (25.0 to < 37.5) by 37.0%. In all decision-making roles, the mean DCS score was highest among respondents who played a passive role (41.54 ± 17.84), followed by active (34.31 ± 16.07) and shared roles (32.31 ± 14.66) (Table 1).

Table 2 shows the four factors remaining in the multivariate logistic regression model. The likelihood of low decisional conflict in the most recent pharmacotherapy for breast cancer was: more than twofold higher for respondents who played shared (OR 2.568, 95% CI 1.098−6.007) and active (OR 2.319, 95% CI 1.052−5.110) decision-making roles, and nearly twofold higher when the physician provided respondents with two or more treatment options (OR 1.892, 95% CI 1.086−3.293) ($p < 0.05$ for all). The likelihood of low decisional conflict was approximately 60% lower in respondents with middle or high school education than those with a university or graduate degree (OR 0.390, 95% CI 0.186−0.817, $p = 0.013$).

## Actual (past) and future (preferred) decision-making roles in pharmacotherapy selection

Figure 1 shows the transition of decision-making roles. Most respondents ($n = 465$) selected decision-making roles (active, shared, or passive) for both actual (past) and future (preferred) decision-making roles. Of respondents who played an active role in past treatment decision-making, 66.4% preferred to play the same role in future decisions; similarly 80.0% of those who played a shared role preferred this role in future. Fewer respondents who played a passive role preferred the same role in future (38.5%), with 44.4% indicating they would switch to a shared role. In addition, 31.4% of those who previously played an active role would switch to a shared role.

# Discussion

This study used an online survey to capture the current status of treatment decision-making roles in pharmacotherapy selection among patients previously treated for

**Table 2** Assessment of factors associated with satisfaction with patient–physician communication and decisional conflict among patients with breast cancer ($n=486$)

| Factors | OR | (95% CI) | $p$ value |
|---|---|---|---|
| Satisfaction on the communication with the physician (very satisfied) | | | |
| Number of treatment options provided at the time of treatment | | | |
| 1 | 1 | | |
| ≥ 2 | 2.082 | (1.264, 3.428) | 0.004 |
| Marital status | | | |
| Not married | 1 | | |
| Married | 0.680 | (0.406, 1.138) | 0.142 |
| Consultation time at the time of treatment | | | |
| < 15 min | 1 | | |
| 15 to < 30 min | 1.944 | (1.091, 3.463) | 0.024 |
| ≥ 30 min | 2.873 | (1.436, 5.748) | 0.003 |
| Actual decision-making role | | | |
| Passive | 1 | | |
| Active | 1.526 | (0.794, 2.932) | 0.205 |
| Shared | 5.125 | (2.585, 10.159) | <0.001 |
| Low decisional conflict (DCS score < 25.0) | | | |
| Number of treatment options provided at the time of treatment | | | |
| 1 | 1 | | |
| ≥ 2 | 1.892 | (1.086, 3.293) | 0.024 |
| Education | | | |
| University or graduate school | 1 | | |
| Middle or high school | 0.390 | (0.186, 0.817) | 0.013 |
| Vocational school, junior college, or technical college | 0.703 | (0.377, 1.310) | 0.267 |
| Employment status | | | |
| Unemployed | 1 | | |
| Full-time | 1.504 | (0.796, 2.840) | 0.209 |
| Part-time | 0.880 | (0.425, 1.823) | 0.730 |
| Actual decision-making role | | | |
| Passive | 1 | | |
| Active | 2.319 | (1.052, 5.110) | 0.037 |
| Shared | 2.568 | (1.098, 6.007) | 0.030 |

*OR* odds ratio, *CI* confidence interval, *DCS* decisional conflict scale

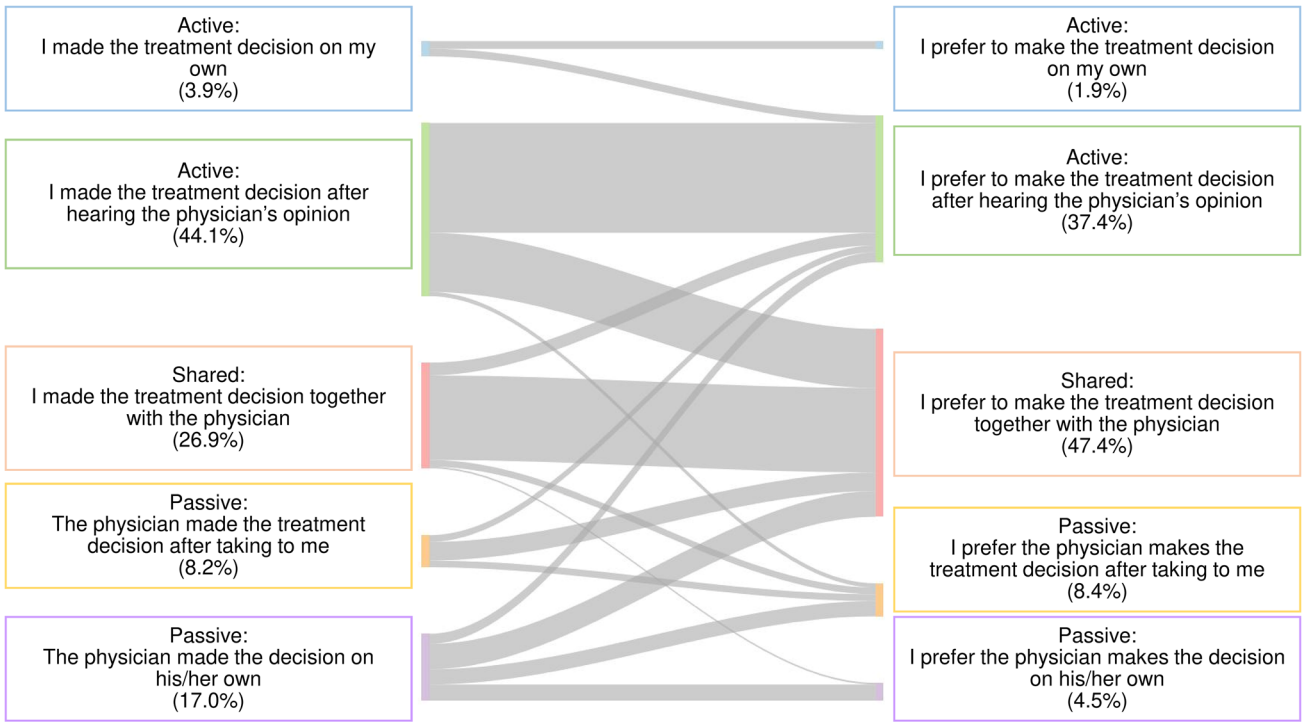
breast cancer in Japan. Nearly half of the respondents played an active decision-making role, and the remaining patients almost equally played shared and passive roles. Those with shared decision-making had the lowest decisional conflict and higher satisfaction with patient–physician communication. Passive decision-makers had the highest decisional conflict and lower satisfaction. Shared decision-making, a longer consultation time with the physician, and multiple treatment options provided by the physician were significantly associated with satisfaction with patient–physician communication. For lower decisional conflict in making treatment decisions, shared and active decision-making roles, multiple treatment options provided by the physician, and a higher educational level were statistically significant factors.

The distribution of actual decision-making roles in our study was consistent with a recent Japanese study that collected data online for patients previously treated for breast cancer (active: 47.8%, shared: 29.8%, passive: 22.3%) [10]. Similar to that study, a shared role was less common than an active role (actual situation) in our study, indicating more Japanese patients with breast cancer actively decided their treatment. The concordance with the previous study may be attributable to similarity in patient demographic and clinical characteristics (e.g., age, cancer stage, and education level) and study design (i.e., online survey using a research company).

Our results differed from another study conducted among Japanese patients with breast cancer that indicated a shared decision-making role was most frequent (43%) and an active role was least frequent (27%) [1]. This may have resulted from the setting in that study (patients were enrolled at two cancer centers) or from changes in decision-making over time among patients with breast cancer. Our results also differed from a US study using register data for patients with 10 different cancer types, including the largest proportion of breast cancer (22.6%) [21]. That study reported a shared decision-making role was most frequent (50%), followed by an active role (33%). Differences between that study and our study may be partially explained by the cultural differences between countries.

Overall, respondents in the present study reported a moderate decisional conflict level ($35.72 \pm 16.56$). This was similar, after applying the same calculation, to the previous DCS-based study conducted among patients with breast cancer in Japan [22] ($2.43 \pm 0.44$ in our study, and $2.36 \pm 0.65$ in the previous study indicating moderate conflict). This may be because patient characteristics (e.g., age, marital status, cancer stage) in the two studies were partly similar. However, when considering decisional conflict according to decision-making roles in the present study, conflict was highest among those who played a passive role and fewer respondents in this group were very satisfied with communication with their physician. Among those who played a shared role, conflict was lowest and more were very satisfied with communication. Over 60% of those who had played a passive role preferred to switch to other roles (mainly to a shared role) in future decision-making, suggesting their experience of decisional conflict (which may be a consequence of communication with their physician) may have affected their future preference.

In addition to decision-making role, consultation time and the number of treatment options provided by the physician were important for patients' satisfaction with communication with their physician. Previous studies indicated that perceiving an insufficient time for consultations was a common




| | Actual decision-making role | | | | | |
|---|---|---|---|---|---|---|
| | Active (n=223) | | Shared (n=125) | | Passive (n=117) | |
| Future role preference | n | (%) | n | (%) | n | (%) |
| Active | 148 | (66.4) | 15 | (12.0) | 20 | (17.1) |
| Shared | 70 | (31.4) | 100 | (80.0) | 52 | (44.4) |
| Passive | 5 | (2.2) | 10 | (8.0) | 45 | (38.5) |

**Fig. 1** Transition of decision-making roles from actual (past) decision-making roles to future preference ($n=465$). Gray shaded cells indicate respondents who selected the same future preference for decision-making role as the actual role they played in past pharmacotherapy decision-making. Respondents included in the figure selected decision-making roles from active, shared, or passive roles for both actual and future preferred decision-making

communication problem for patients with cancer [23], and both the number of treatment options described by the physician and physician-initiated communication toward patients with breast cancer were associated with patients' perception of treatment choice [24]. Regarding the range of available treatment options, physicians can first provide to patients the choice of whether to receive therapy or not (chemotherapy or hormonal therapy). If therapy is chosen, they could provide choice of regimen (e.g., monotherapy with anthracycline or taxane, or both drugs combined for chemotherapy) or medication types (e.g., selective estrogen receptor modulator or aromatase inhibitor for hormonal therapy) despite standard adjuvant therapies established based on the growing number of evidences. It is crucial to provide treatment options to the patients and reach a common understanding as recommended by the clinical practice guidelines for systemic treatment of breast cancer [25]. In order to do so, a physician must take into consideration the balance between benefits and risks, i.e., effectiveness and adverse reactions of medications considering the sense of value of the patient. It may be beneficial for patients if physicians provide sufficient time for discussion and all available treatment options, as well as seeking their patient's preferred role in treatment decision-making. This would help facilitate patients' treatment decision-making and improve their satisfaction with communication with their physician. In addition to making treatment decisions jointly with the physician, our results indicated that having multiple treatment options provided by the physician reduced patients' decisional conflict. These findings suggest that the physician facilitates communication with their patient through providing treatment information and joint decision-making, resulting in enhanced patient satisfaction with communication with their physician as well as alleviating patients' decisional conflict.

There are several limitations to this study. First, our results may not be generalizable to all patients with breast

cancer in Japan due to selection and participation bias. As we recruited patients online using a healthcare marketing research company, some voluntary respondents might have had a particular motive to participate in the survey. Although the monetary incentive given to the respondents might have been a motive for some of them, we think that the incentive being less than one USD may not introduce a participation bias. Second, decision-making roles that patients played were retrospectively investigated. As recall time (e.g., initiation and completion of treatment) varied by each individual, it is inevitable that their responses might have been misclassified. Third, other potential factors might have affected patient's decision-making roles. This study assessed treatment decision-making roles played by patients with breast cancer, but these decision-making roles might not have been played based solely on their perspectives. Both patients' perspectives and the policy of the relevant medical institutions on treatment and patient–physician communication might have been reflected in the physicians' behavior. In addition, there was a potential limitation of the survey in that it could not evaluate respondents' risk adversity. Patients with low risk adversity might have taken passive roles as opposed to risk-adverse patients actively asking for information. Moreover, differences in infrastructure should be mentioned. Some respondents might have had limitations in accessing information, and others might have had difficulty accessing certain medical institutions. Another potential factor affecting patient's decision-making role is our measurement scale choice, which could lead to a bias due to patients' subjective view. Finally, we cannot exclude the possibility of other unknown potential factors affecting patient satisfaction with communication with the physician that were not collected from the respondents with this survey. Further studies will be necessary to assess these aspects. Therefore, the results need to be interpreted carefully with these limitations in mind. However, despite these limitations, this online survey is meaningful in that it collected data from a large number of patients throughout the country in a cost- and time-efficient manner compared to a traditional paper-based questionnaire survey conducted in healthcare institutions. This survey showed the decision-making roles that patients with breast cancer played and their perspective in the pharmacotherapy for breast cancer in general.

In conclusion, patients with breast cancer in Japan tend to actively make pharmacotherapy decisions, with shared decision-making being less common. Our findings suggest that playing a shared role in treatment decision-making, having a longer consultation time at treatment, and having multiple treatment options explained by the physician are important for patient satisfaction with communication with their physician among patients with breast cancer. In addition, our findings suggest that playing a shared role in treatment decision-making and having multiple treatment options explained by the physician enhance satisfaction with communication with their physician and reduce patients' decisional conflict in decision-making.

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## Compliance with ethical standards

**Conflict of interest** Chikako Shimizu has been paid for consulting or advisory role by Eisai Co., Ltd. during the study; and outside the submitted study, been paid honoraria by AstraZeneca K.K., Kyowa Hakko Kirin Co., Ltd., Chugai Pharmaceutical Co., Ltd., ASKA Pharmaceutical Co., Ltd., and Taiho Pharmaceutical Co. Ltd.; been paid for consulting or advisory role by Eli Lilly Japan K.K., Pfizer Japan Inc., and AstraZeneca K.K.; and conducted research projects funded by Eli Lilly Japan K.K., MSD K.K., Chugai Pharmaceutical Co., Ltd., and Pfizer Japan Inc. Yukinori Sakata, Ruiko Sakai, Hiroki Ikezawa, and Toshiyuki Matsuoka are employees of Eisai Co., Ltd. Yoshiki Uetaki is an employee of Anterio Inc.

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