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Patients' and doctors' preferences in early-stage triple-negative breast cancer treatment: a discrete choice experiment

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Patients' and doctors' preferences in early-stage triple-negative breast cancer treatment: a discrete choice experiment

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Abstract

OBJECTIVES: This study aimed to assess preferences of patients and doctors regarding treatment attributes for early-stage triple-negative breast cancer (eTNBC) in the Asia-Pacific region.

METHODS: A discrete choice experiment (DCE) was conducted in Australia, Japan, Korea, Philippines and Taiwan, with 115 patients who self-reported a diagnosis of eTNBC and 86 doctors with at least five years' experience managing eTNBC patients. Key attributes relevant to TNBC treatment decision-making were verified through a consultative process with clinical experts. A D-efficient fractional-factorial design was employed to create 15 online choice sets with seven key attributes: pathological complete response (pCR), disease-free/event-free survival (DFS/EFS), chance of undergoing breast conserving surgery after receiving anticancer treatment, febrile neutropenia, peripheral sensory neuropathy (PSN), diarrhoea, and irreversible endocrine-related side effects requiring lifelong medication. A mixed logit model was used to estimate preference weights for attribute levels, which were then used to compute the relative importance score (RIS) for each attribute.

RESULTS: Median age of patients were 44.0 (interquartile range 38.0-56.5) years. 68% of patients were married, 77% had children, 40% employed full-time and 70% had a college degree. 46% of patients were diagnosed below the age of 40. Among the doctors, 58% were medical oncologists and the remaining breast or general surgeons. pCR, DFS/EFS, and PSN were the three most important attributes in both doctors and patient groups. pCR had the highest weighted preference among patients and doctors (RIS, 28.5 and 32.9, respectively). In general, patients assigned more weight to safety attributes compared to doctors, while doctors assigned more weight to efficacy attributes than patients did. Surgeons assigned more weight to irreversible endocrine-related side effects than medical oncologists (RIS, 14.4 vs. 5.4). Differences in preferences within the regions were noted.

CONCLUSIONS: Overall, patients' and doctors' preferences were aligned in ranking for efficacy and safety attributes tested.

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Strengths and limitations

- This is the first study in Asia-Pacific that used a discrete choice experiment (DCE), a well-recognized method, to quantify patients' and doctors' preferences in attributes for early-stage TNBC (eTNBC) treatment in five territories in Asia-Pacific
- Use of the same attributes and levels in the patients' and doctors' DCE enabled comparison of their perspectives
- A multi-step approach was followed to identify attributes and levels, which involved a thorough literature review, advisory boards and cognitive interviews with eTNBC patients and treating doctors
- Participants were recruited by convenience sampling and may not be representative of all eTNBC patients and treating doctors in Asia-Pacific

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INTRODUCTION

Breast cancer continues to be a global health challenge, with an estimated 2.3 million new cases diagnosed in 2020 alone, according to GLOBOCAN 2020 data.¹ In the Asia-Pacific region, breast cancer incidence rates are among the highest worldwide,² particularly for Triple-Negative Breast Cancer (TNBC), characterized by its aggressive clinical behaviour, high histologic tumour grade, and increased risk of relapse and distant recurrence.^{3,4}

Treatment approaches to early- stage TNBC (eTNBC) include surgery, chemotherapy, radiation therapy, with the recent addition of immunotherapy for high-risk disease, and several targeted therapies currently under clinical trials. Chemotherapy is the mainstay of systemic treatment for TNBC, with a shift towards neoadjuvant chemotherapy as decisions for optimal surgical, radiation or chemotherapy are increasingly tailored based on initial response to neoadjuvant chemotherapy, with adjuvant chemotherapy recommended in patients with residual tumour after neoadjuvant treatment.⁴⁻⁶

Treatment regimens for eTNBC are associated with different efficacy-tolerability profiles. Furthermore, besides clinical benefits, patients’ perceptions of treatment value is also influenced by other factors that affect their quality of life, and this is a dimension that is increasingly acknowledged in value assessment frameworks.⁷ Nonetheless, there is limited information on how patients perceive treatment efficacy and tolerability and other factors deemed crucial for making their treatment choices particularly for TNBC. Majority of preference studies to date investigated patients’ preferences in treatment attributes for metastatic breast cancer, additionally these studies were focused on Western countries.⁸⁻¹⁰ Few studies assessed the alignment of patients’ preferences for treatment of eTNBC with that of doctors’ that would help inform shared decision making.

Although cytotoxic regimens have been the primary chemotherapy treatment, with the accumulation of data to support the introduction of immunotherapy as a new treatment class, it is timely to understand attributes of eTNBC treatment that are important to patients and the extent to which these preferences align with doctors’ judgement, especially in Asia Pacific.

This study used a discrete choice experiment (DCE) to characterize and quantify patients’ and doctors’ preferences regarding attributes of eTNBC treatment in terms of treatment efficacy and safety in Australia, Japan, Korea, Philippines, and Taiwan.

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METHODS

Discrete choice experiment (DCE)

In the DCE survey, respondents were presented with a series of choice tasks (questions), each comprising 2 hypothetical treatment profiles that contained various combinations of treatment attributes (i.e. benefits and risks). For each choice task, respondents were asked to select the profile they found most preferable. The execution of this DCE study adhered to the guidelines set forth by the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) in their comprehensive framework for proficient research conduct in conjoint analysis.¹¹

Attributes and levels

A preliminary list of 30 attributes and their levels was identified based on a targeted literature review of eTNBC. A consultative process with key opinion leaders in this field (co-authors) from Australia, Japan, Korea, Philippines, and Taiwan was then used to identify key attributes and levels most relevant to making treatment choices for eTNBC. After deliberating on relevance and significance of these attributes, seven were decided on for use in the DCE, and description of these attributes and levels were refined through cognitive interviews.

Cognitive interviews

Initial cognitive interviews were conducted using a structured discussion guide with a total of 10 patients with eTNBC and 15 doctors from Australia, Japan, Korea, Philippines, and Taiwan. The aim of the interviews was to assess participants' understanding of the language and phrasing of survey questions. Interviews were conducted via online video conference and in participants' native language.

The seven key attributes were identified each with different levels (Table 1) to describe the TNBC treatment alternatives. The key attributes were pathological complete response (pCR), disease-free/event-free survival (DFS/EFS), chance of undergoing breast conserving surgery (BCS) after receiving anticancer treatment, febrile neutropenia, peripheral sensory neuropathy, diarrhoea, and irreversible endocrine-related side effects requiring lifelong medication.

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Table 1. Attributes and levels tested

Attributes	Levels
Disease-free/Event-free survival	12 months 18 months 24 months
Pathological complete response (pCR)	30% probability of achieving pCR 50% probability of achieving pCR 70% probability of achieving pCR
Chance of undergoing breast conserving surgery (BCS) after receiving anticancer treatment	30% chance of undergoing BCS 50% chance of undergoing BCS 70% chance of undergoing BCS
Febrile neutropenia	5% risk of experiencing febrile neutropenia 10% risk of experiencing febrile neutropenia 20% risk of experiencing febrile neutropenia
Peripheral sensory neuropathy	5% risk of experiencing peripheral sensory neuropathy 20% risk of experiencing peripheral sensory neuropathy 40% risk of experiencing peripheral sensory neuropathy
Diarrhoea	10% risk of experiencing diarrhoea 25% risk of experiencing diarrhoea 50% risk of experiencing diarrhoea
Irreversible endocrine-related side effects requiring lifelong medication	0% chance of developing irreversible endocrine-related side effects 8% chance of developing irreversible endocrine-related side effects

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Construction of the DCE questionnaire

The combination of these attributes and levels resulted in a total of 1458 hypothetical scenarios ($3^6 \times 2^1$) that exceeded the practical limits for inclusion within a questionnaire. Therefore, a fractional factorial design approach was used to systematically generate a set of optimal scenarios in SAS software version 9.4. The macro %Mktruns was utilized to compute appropriate design dimensions, followed by using the macro %Mktex to generate requisite combinations.^{12,13} The experimental design ultimately consisted of 15 distinct choice pairs.

The survey instrument included an introduction of choice sets with a description of the attributes and their levels. Each respondent answered 15 trade-off questions, exemplified in **Error! Reference source not found..**

Beyond the DCE questions, we also collected the study-relevant baseline characteristics for each study participant, including information on patients' sociodemographic (e.g. age, race, educational level) and clinical characteristics (e.g. time since diagnosis, cancer stage, past treatment), and doctors' professional experience (e.g. specialty, practice setting). The survey instrument was translated into local languages and implemented via an online survey platform.

Sample size and participant recruitment

Patients were identified through referrals from patient advocacy groups and panel of patients who previously participated in similar surveys; practicing doctors were identified from commercial panel of clinicians who previously participated in similar surveys and were invited to participate in this study. 120 patients and 86 doctors were recruited and the final sample included 115 patients and 86 doctors. The sample size of DCE study was estimated based on a common rule of thumb formula¹⁴ $(n \times t \times a)/c \geq 500$, where n: number of respondents; t: number of choice sets; a: number of alternatives per set; and c: largest number of levels for any one attribute.

To be eligible, patients had to be a woman who is ≥ 18 years old and self-reported a clinician-confirmed diagnosis of eTNBC (Stage I to III). Doctors (medical oncologists, breast or general surgeons depending on the clinical practice in the region) had to have ≥ 5 years' experience managing patients with eTNBC and spent $\geq 50\%$ of their time in direct patient care.

Patient and public involvement statement

Patients or the public were not involved in the design, conduct, or reporting of this study.

Data analysis

Mixed logit model was used to estimate the preference weight for each attribute level in patients and doctors, where a more positive preference weight indicates a stronger preference for that attribute level.¹⁵ Analysis was performed in STATA/IC version 14.2 software.

Relative importance score of attributes was calculated to compare the relative influence of each attribute on patients' and doctors' choices. The relative attribute importance score is the proportion of total variance explained by the individual attribute, expressed as a percentage.

$$\text{Relative importance} = \frac{\text{Difference in preference weights between the most and least preferred level}}{\text{Sum of differences across all attributes}} \times 100\%$$

Due to the smaller sample sizes of each subgroup, conditional logit model was used to estimate preference weights in patients' and doctors' subgroups by territory, doctors' specialty and patients' clinical characteristics and relative importance score calculated to compare relative influence of attributes within subgroups.

RESULTS

Baseline characteristics

Patient characteristics

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183 Patient characteristics (N=115) are shown in Table 2. Overall, median age of patients was 44.0 (IQR
184 38.0-56.5) years. 68% of patients were married, 77% had children, 40% employed full-time and 70%
185 had a college degree. 37% of patients were diagnosed at Stage I, 44% in stage II and 17% in stage III.
186 55% of patients were diagnosed with eTNBC within 2 years prior to the study, and 6% had
187 experienced recurrence of TNBC before. 74% of patients had undergone breast surgery (mastectomy
188 or BCS) and 83% had received chemotherapy before. At the time of survey participation, 72% were
189 receiving treatment. Across the territories, all patients in Australia had received their eTNBC
190 diagnosis more than 2 years prior to study participation, while majority of patients in remaining
191 territories received their diagnosis within 2 years of study participation. 42% of patients in
192 Philippines were diagnosed at Stage III, while majority of patients in remaining territories were
193 diagnosed at stages I and II. Majority of patients in Australia and Philippines had undergone breast
194 surgery and 88% of patients in Australia were not receiving treatment at the time of study
195 participation.

196 *Doctors' characteristics*

197 Among doctors (n=86), 58% were medical oncologists, 15% breast surgeons, 27% general surgeons.
198 41% of doctors had more than 15 years' post-training experience managing eTNBC patients. 43% of
199 doctors practiced in academic-based institutions and 31% in private setting (Table 2).

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200 **Table 2. Sociodemographic characteristics and eTNBC-related medical history of patients and professional characteristics of doctors**

Sociodemographic characteristics of patients		Overall (N=115)	AU (n=16)	KR (n=30)	PH (n=20)	PH (n=19)	TW (n=30)
Median (Q1-Q3) age, years		44.0 (38.0-56.5)	57.0 (51.5-64.0)	47.5 (41.0-57.0)	51.0 (45.0-57.3)	50.0 (39.0-56.5)	38.0 (34.3-42.8)
Race							
	Asian, n (%)	101 (87.8)	2 (12.5)	30 (100.0)	20 (100.0)	19 (100.0)	30 (100.0)
	Caucasian, n (%)	13 (11.3)	13 (81.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Aboriginal, n (%)	1 (0.9)	1 (6.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Marital status							
	Single, n (%)	19 (16.5)	2 (12.5)	4 (13.3)	4 (20.0)	1 (5.3)	9 (30.0)
	Married/ domestic partner, n (%)	78 (67.8)	6 (37.5)	22 (73.4)	15 (75.0)	14 (73.7)	21 (70.0)
	Divorced/ separated/ widowed, n (%)	18 (15.7)	8 (50.0)	4 (13.3)	1 (5.0)	4 (21.1)	0 (0.0)
Have children, n (%)		88 (76.5)	14 (87.5)	24 (80.0)	15 (75.0)	16 (84.2)	19 (63.3)
Median (Q1-Q3) age of youngest child, years		15.0 (8.5-25.5)	25.0 (15.0-33.8)	20.0 (12.5-29.3)	22.5 (15.5-27.5)	17.0 (12.0-25.5)	7.0 (5.0-12.5)
Education level							
	Primary/ high school, n (%)	15 (13.0)	4 (25.0)	9 (30.0)	1 (5.0)	1 (5.3)	0 (0.0)
	Certification program/ vocational school, n (%)	12 (10.4)	3 (18.8)	0 (0.0)	6 (30.0)	3 (15.8)	0 (0.0)
	University degree, n (%)	80 (69.6)	6 (37.4)	19 (63.3)	13 (65.0)	14 (73.7)	28 (93.3)
	Post graduate degree, n (%)	8 (7.0)	3 (18.8)	2 (6.7)	0 (0.0)	1 (5.3)	2 (6.7)
Employment status							
	Full-time, n (%)	46 (40.0)	2 (12.5)	6 (20.0)	5 (25.0)	3 (15.8)	28 (93.3)
	Part-time, n (%)	9 (7.8)	4 (25.0)	2 (6.6)	0 (0.0)	1 (5.3)	2 (6.7)
	Homemaker, n (%)	32 (27.8)	2 (12.5)	14 (46.7)	7 (35.0)	9 (47.3)	0 (0.0)
	Retired/ unemployed/ leave of absence, n (%)	18 (15.7)	4 (25.0)	5 (16.7)	3 (15.0)	6 (31.6)	0 (0.0)
	Others ^a , n (%)	10 (8.7)	4 (25.0)	3 (10.0)	3 (15.0)	0 (0.0)	0 (0.0)
Duration since diagnosis of eTNBC							
	≤2 years, n (%)	63 (54.8)	0 (0.0)	18 (60.0)	11 (55.0)	14 (73.6)	20 (66.7)
	2 to 5 years, n (%)	30 (26.1)	6 (37.5)	7 (23.3)	4 (20.0)	4 (21.1)	9 (30.0)
	5 to 10 years, n (%)	10 (8.7)	4 (25.0)	0 (0.0)	4 (20.0)	1 (5.3)	1 (3.3)

	≥10 years, n (%)	12 (10.4)	6 (37.5)	5 (16.7)	1 (3.0)	0 (0.0)	0 (0.0)
Age at diagnosis							
	≤40 years, n (%)	53 (46.1)	3 (18.8)	11 (36.7)	7 (25.0)	7 (36.8)	25 (83.3)
	40 to 59 years, n (%)	52 (45.2)	11 (68.8)	16 (53.3)	2 (7.0)	8 (42.1)	5 (16.7)
	≥60 years, n (%)	10 (8.7)	2 (12.5)	3 (10.0)	2 (7.0)	4 (21.1)	0 (0.0)
Stage of eTNBC at diagnosis							
	Stage I, n (%)	43 (37.4)	5 (31.3)	9 (30.0)	0 (0.0)	0 (0.0)	21 (70.0)
	Stage II, n (%)	51 (44.3)	7 (43.8)	14 (46.7)	0 (0.0)	11 (57.9)	9 (30.0)
	Stage III, n (%)	19 (16.5)	4 (25.0)	6 (20.0)	0 (0.0)	8 (42.1)	0 (0.0)
	Others ^b / don't know, n (%)	2 (1.7)	0 (0.0)	1 (3.3)	0 (0.0)	0 (0.0)	0 (0.0)
History of breast surgery							
	Mastectomy, n (%)	35 (30.4)	6 (37.5)	5 (16.7)	0 (0.0)	14 (73.7)	2 (6.7)
	BCS, n (%)	50 (43.5)	9 (56.3)	13 (43.3)	0 (0.0)	2 (10.5)	15 (50.0)
	Yes but unaware what type, n (%)	5 (4.4)	1 (6.2)	0 (0.0)	0 (0.0)	1 (5.3)	3 (10.0)
	Did not undergo surgery, n (%)	25 (21.7)	0 (0.0)	12 (40.0)	1 (3.0)	2 (10.5)	10 (33.3)
Receiving breast cancer treatment at time of survey							
	Chemotherapy, n (%)	69 (60.0)	0 (0.0)	15 (50.0)	2 (7.0)	18 (94.7)	24 (80.0)
	Others ^c , n (%)	14 (12.2)	2 (12.5)	5 (16.7)	2 (7.0)	0 (0.0)	5 (16.7)
	None, n (%)	32 (27.8)	14 (87.5)	10 (33.3)	6 (20.0)	1 (5.3)	1 (3.3)
Professional experience of doctors							
		Overall (N=86)	AU (n=15)	KR (n=20)	P (n=16)	PH (n=15)	TW (n=20)
Specialty							
	Medical oncologist, n (%)	50 (58.1)	12 (80.0)	10 (50.0)	0 (0.0)	8 (53.3)	10 (50.0)
	General surgeon, n (%)	13 (15.2)	2 (13.3)	0 (0.0)	0 (0.0)	7 (46.7)	4 (20.0)
	Breast surgeon, n (%)	23 (26.7)	1 (6.7)	10 (50.0)	6 (37.5)	0 (0.0)	6 (30.0)
Practice							
	Public/ government hospital, n (%)	22 (25.6)	6 (40.0)	2 (10.0)	5 (31.3)	2 (13.3)	7 (35.0)
	Private hospital or clinic, n (%)	27 (31.4)	2 (13.3)	0 (0.0)	6 (37.4)	11 (73.4)	8 (40.0)
	University hospital or academic institute, n (%)	37 (43.0)	7 (46.7)	18 (90.0)	5 (31.3)	2 (13.3)	5 (25.0)
Post-training experience managing eTNBC patients							
	5-10 years, n (%)	30 (34.9)	8 (53.3)	9 (45.0)	2 (12.5)	5 (33.3)	6 (30.0)
	11-15 years, n (%)	21 (24.4)	4 (26.7)	4 (20.0)	3 (18.8)	7 (46.7)	3 (15.0)
	>15 years, n (%)	35 (40.7)	3 (20.0)	7 (35.0)	11 (68.7)	3 (20.0)	11 (55.0)

^aFreelancer, self-employed, home-call counsellor; ^bStage II-III; ^cRadiation, surgery, don't know
BCS, breast conserving surgery

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202 **DCE results**

203 *Overall patient and doctor preferences in treatment attributes*

204 Preference weights for attributes estimated using mixed-logit model (Table 3) demonstrated that
205 both patients and doctors preferred longer DFS/EFS, higher chance of achieving pCR and undergoing
206 BCS after receiving anticancer treatment, lower risks of febrile neutropenia, peripheral sensory
207 neuropathy, diarrhoea and irreversible endocrine-related side effects that require lifelong
208 medication.

209 Analysis of relative importance score (**Error! Reference source not found.**) showed that attributes
210 were rank ordered similarly between patients and doctors with pCR, DFS/EFS and risk of peripheral
211 sensory neuropathy as the top 3 attributes, and febrile neutropenia as lowest-rank attribute.
212 Patients assigned more weight on safety attributes (46.8%) than doctors (27.7%), while doctors
213 assigned more weight on efficacy attributes (72.3%) than patients (53.2%).

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214 **Table 3. Preferences among patients and doctors for selected attribute levels**

Attributes	Levels	Patient preferences (n=115)			Doctor preferences (n=86)		
		Coefficient*	SE	P value	Coefficient*	SE	P value
DFS/ EFS	12 months	-1.02	0.16	0.000	-3.8	0.53	0.000
	18 months	-0.30	0.11	0.008	-0.4	0.22	0.054
	24 months	0.53	0.14	0.000	1.6	0.27	0.000
pCR	30% probability	-1.76	0.19	0.000	-4.0	0.56	0.000
	50% probability	-0.74	0.11	0.000	-1.3	0.21	0.000
	70% probability	1.07	0.13	0.000	1.7	0.22	0.000
Chance of undergoing BCS after receiving anticancer treatment	30% chance	-0.48	0.12	0.000	-0.8	0.20	0.000
	50% chance	-0.32	0.10	0.002	-0.9	0.23	0.000
	70% chance	0.43	0.09	0.000	0.4	0.10	0.000
Febrile neutropenia	5% risk	0.27	0.08	0.001	0.0	0.10	0.873
	10% risk	-0.35	0.11	0.001	0.0	0.22	0.984
	20% risk	-0.55	0.12	0.000	-0.2	0.20	0.205
Peripheral sensory neuropathy	5% risk	0.59	0.10	0.000	0.5	0.10	0.000
	20% risk	-0.30	0.10	0.003	-0.8	0.22	0.000
	40% risk	-0.93	0.16	0.000	-1.3	0.28	0.000
Diarrhoea	10% risk	0.38	0.15	0.000	0.3	0.15	0.000
	25% risk	-0.25	0.11	0.026	-0.5	0.21	0.016
	50% risk	-0.47	0.10	0.000	-0.7	0.18	0.000
Irreversible endocrine-related side effects requiring lifelong medication	0% chance	0.68	0.12	0.000	0.6	0.12	0.000
	8% chance	-0.78	0.10	0.000	-0.9	0.19	0.000

215 Note: Coefficients represent the change in utility for a respondent for a specific level of a given attribute. Positive coefficients indicate positive preference.

216 Abbreviations: BCS, breast conserving surgery; DFS/EFS, disease-free survival/ event-free survival; pCR, pathological complete response; SE, standard error.

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219 *Patient preferences in treatment attributes by territory*

220 Subgroup analysis revealed that patients in Australia, Korea, Japan and Philippines placed greater
221 weight on pCR than DFS/EFS and BCS, while patients in Taiwan had a relatively higher preference for
222 BCS than pCR and DFS/EFS (Figure 2a). Among the safety attributes, patients in Australia, Japan,
223 Korea and Philippines placed greater weight on irreversible endocrine-related side effects that
224 require lifelong medication, while patients in Taiwan placed higher importance on peripheral
225 sensory neuropathy. Chance of pCR was the top ranked attribute by patients in Korea, Japan and
226 Philippines; irreversible endocrine-related side effects in Australia and peripheral sensory
227 neuropathy in Taiwan.

228 *Doctors' perspectives of treatment attributes by territory*

229 Subgroup analysis revealed differences in treatment attribute preferences between doctors in
230 various territories (Figure 2b). Doctors in Australia, Korea and Philippines placed greater weight on
231 DFS/EFS than pCR, while those in Japan and Taiwan had a relatively higher preference for pCR than
232 DFS/EFS. There were variations in the relative importance of safety attributes across the territories;
233 the highest-ranking safety attributes were peripheral sensory neuropathy in Australia, Japan and
234 Philippines, while irreversible endocrine-related side effects and diarrhoea was ranked higher in
235 Korea and Taiwan, respectively.

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Subgroup analysis results

Relative importance of treatment attributes in medical oncologists and surgeons

Medical oncologists and breast/ general surgeons prioritized pCR and DFS/EFS as the top 2 attributes (**Error! Reference source not found.**). Surgeons placed a higher importance on irreversible endocrine-related side effects than medical oncologists (rank 3 vs 6).

243

Relative importance of treatment attributes in patients by age group

Patients above the age of 50 placed a higher importance on irreversible endocrine side effects than younger patients did (**Error! Reference source not found.**). pCR was the top ranked attribute in both older and younger patients. Chance of undergoing BCS after treatment was the lowest ranked attribute in older patients while febrile neutropenia was the lowest rank attribute in younger patients.

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Relative importance of treatment attributes in patients diagnosed at different stages

The top 2 attributes in patients diagnosed in Stage 1 were peripheral sensory neuropathy and pCR; for patients diagnosed in stages 2 and 3 were pCR and DFS/EFS (**Error! Reference source not found.**). The lowest ranked attribute for patients diagnosed in Stage 1 and Stages 2 and 3 were diarrhoea and chance of undergoing BCS, respectively. Patients diagnosed in stages 2 and 3 assigned more weight on efficacy than safety (55.9% vs 44.1%) attributes, while patients diagnosed in stage 1 assigned more weight on safety than efficacy (53.9% vs 46.1%) attributes.

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Relative importance of treatment attributes in patients by duration of time since diagnosis

We undertook an exploratory analysis to investigate if patient preferences in treatment varied with length of time since diagnosis. However, relative importance of attributes was similar between patients who were diagnosed with eTNBC within or more than 2 years prior to study participation (**Error! Reference source not found.**). There was a greater difference in relative importance score for irreversible endocrine-related side effects for patients diagnosed more than 2 years prior to study participation than patients within 2 years of their diagnosis (17.4% vs 12.0%, rank 2 vs 4).

Relative importance of treatment attributes in patients who were receiving chemotherapy during study participation

As treatment preferences may be influenced by patients' experience with various types of treatment, we undertook an exploratory analysis in attribute preference based on treatment

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3 270 received during study participation. pCR was the top rank attribute in patients who were receiving
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5 271 chemotherapy and non-chemotherapy options (surgery, radiation therapy, no treatment) during
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7 272 study participation (**Error! Reference source not found.**). The second most important attribute was
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9 273 DFS/EFS in the non-chemotherapy subgroup and peripheral sensory neuropathy in the
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11 274 chemotherapy subgroup.

12 275 **DISCUSSION**

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14 276 Treatment regimens for eTNBC are associated with different efficacy-tolerability profiles, however
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16 277 there is limited information on how patients and doctors perceive various treatment characteristics.
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18 278 This study characterized treatment attributes important to patients and doctors in five territories in
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20 279 Asia-Pacific and assessed the alignment in patient preferences and doctors' judgement.

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22 280 Our study found that overall ranking of attributes was similar between eTNBC patients and doctors.
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24 281 This could have been due to the high literacy rate among the patient population in our study and
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26 282 hence a more consistent understanding of treatment outcomes between patients and doctors.
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28 283 Nevertheless, patients tended to place greater importance on the safety attributes tested compared
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30 284 to doctors, indicating differences in how patients perceive the impact and value of treatment side
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32 285 effects.

33 286 While patients in our study prioritized pCR, a DCE study investigating patients' preferences for
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35 287 metastatic breast cancer treatment found that overall survival was of primary importance.⁸ The
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37 288 importance of pCR to patients in our study may be due to majority of patients being in the early
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39 289 phases of their treatment as indicated by the high proportions diagnosed within 2 years of study
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41 290 participation and receiving chemotherapy. This preference is consistent with a survey of early-stage
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43 291 breast cancer patients that also found that achievement of pCR was most important, ahead of DFS
44
45 292 and option for BCS.¹⁶ This might be reflective of the discussions patients had with their doctors
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47 293 during the decision-making process for neoadjuvant therapy where patients were informed of the
48
49 294 relevance of pCR as an interim surrogate marker which correlates with long-term survival outcomes.

50 295 Among the territories, majority of patients in Japan, Korea and Philippines had a more recent
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52 296 diagnosis of eTNBC and were receiving chemotherapy at the time of the survey, which may account
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54 297 for the importance of pCR to patients in these territories. The prioritization of peripheral sensory
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56 298 neuropathy and irreversible endocrine-related side effects by patients in Taiwan and Australia,
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58 299 respectively, may be attributed to differences in literacy and age. Additionally, the presence of
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60 300 patient support group in Taiwan may also have contributed to the high level of patient education
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and awareness of side effects. Subgroup analysis by age also showed that compared with older

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patients, younger patients placed greater importance on peripheral sensory neuropathy than they did irreversible endocrine-related side effects, suggesting that younger patients might be better informed of management options for irreversible endocrine-related side effects.¹⁷ The relatively higher preference for BCS by patients in Taiwan could be due to younger age compared to patients in other territories.¹⁸ Inherent limited access to health facilities may also account for the low relative importance of BCS to patients in Philippines, where the rates of BCS and adjuvant radiotherapy use have been reported at less than 11% and 51% at tertiary institutes, respectively.^{19–21}

Interestingly, we found that patients diagnosed in stages II and III prioritized pCR while peripheral sensory neuropathy was the top attribute for patients diagnosed in stage I, indicating patients' awareness of the higher probability of survival in stage I and thus prioritized side effects while patients in later stages had a poorer prognosis and prioritized treatment efficacy.

Despite the increasing use of neoadjuvant chemotherapy for eTNBC in the region as recommended by various treatment guidelines,^{6,22,23} there were slight differences in efficacy outcomes prioritized by doctors across the territories. While survival was ultimately prioritized by doctors in Australia, Korea and Philippines, the achievement of pCR was deemed the immediate goal in Japan and Taiwan. The achievement of a pCR after neoadjuvant chemotherapy is regarded as a marker for systemic therapy sensitivity.^{4,6} There has been an accumulation of evidence demonstrating that pCR is associated with improved long-term outcomes in EFS and overall survival for TNBC.^{24,25} Indeed, the overall importance of pCR to doctors in our study reflects its increasing recognition as a clinically relevant outcome. Interestingly, surgeons placed greater emphasis on irreversible endocrine-related side effects compared with medical oncologists suggesting a possible divergence in understanding and management approaches between the specialties, further highlighting the need for multidisciplinary management of patients to continue beyond early stages of treatment.

The findings of our study should be interpreted within the following limitations. Participants were recruited by convenience sampling and may not be representative of all eTNBC patients and treating doctors in Asia-Pacific. Recruitment of patients was also based on self-report of clinician-confirmed diagnosis of eTNBC and was not verified through medical records. There was also variability in patient characteristics across the territories leading to variability in experience and understanding of treatment attributes. Patients who were diagnosed with Stage I disease would not have been eligible for immunotherapy and thus may not fully comprehend the impact of irreversible endocrine-related side effects. These patients also typically proceed to surgery directly and thus achieving pathological complete response deemed a hypothetical attribute. Although there was a relatively small sample size of participants from each territory, the overall sample size was deemed sufficient for analysis.

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3 335 While the overall median age of eTNBC patients in our study is consistent with published data,³
4 336 patients in Taiwan were comparatively younger which could imply a difference in treatment
5 337 experience and perceptions. Nonetheless, our study used a multi-step to identify attributes and
6 338 levels, which involved a thorough literature review, advisory boards and cognitive interviews with
7 339 eTNBC patients and doctors, to ensure the content validity and improvement of the DCE
8 340 questionnaire. The use of the same attributes in patients' and doctors' DCE also enabled comparison
9 341 of their perspectives. To our knowledge, few studies have been published that assessed the
10 342 alignment of patient preferences with doctors' perception for early breast cancer treatment.
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22 344 **CONCLUSION**

23 345 It is well-accepted that shared clinical decision making between patients and treating doctors is
24 346 associated with enhanced patient outcomes.²⁶ While there was alignment in ranking of attributes in
25 347 our study, patients generally assigned more weight on safety attributes than doctors did, with older
26 348 patients placing greater concerns on irreversible endocrine-related side effects requiring lifelong
27 349 medication. Understanding patient perspectives would also help guide doctors in explaining complex
28 350 treatment characteristics in the limited time available during consultation. To our knowledge, this is
29 351 the first study that quantifies patient and doctor preferences for eTNBC treatment in Asia. With the
30 352 shift towards including patient perspectives in assessing the value of treatments, our study provides
31 353 insights on the alignment between patients' and doctors' preferences for eTNBC treatment, which
32 354 may enhance medical decision-making and evaluation of treatment for reimbursement.
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42
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45 359 responsible for collecting data.
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51 361 **Author contributions**

52
53 362 All authors were involved in the conception and design of the study, interpretation of results and
54 363 critical revision of the manuscript. QS and TEM were involved in data analysis and drafting the
55 364 manuscript. All authors read and approved the final manuscript.
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Approval of research protocol and informed consent

This protocol for this study conforms to the provisions of the Declaration of Helsinki and has been approved by the following research ethics committee: Bellberry Human Research Ethics Committee (2021-12-1415), National Center for Global Health and Medicine Institutional Review Board (IRB) (NCGH-S-004437-00), Asan Medical Center IRB (2022-0098), Cardinal Santos Medical Center Research Ethics Review Committee (2021-052) and Taipei Veterans General Hospital IRB (2022-08-023AC). Informed consent was obtained from all the respondents.

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Disclosures

AY received consulting fees from GSK, MSD, Eisai; received honoraria from MSD, Eisai, AstraZeneca and GSK; received support from MSD for attending meetings and/or travel and has a leadership role in Australia New Zealand Gynaecological Oncology Group. JKH received consulting fees from AstraZeneca, Celgene, Everest Medicine, MSD, Pfizer, Takeda Pharmaceuticals, Bixink Therapeutics, Daiichi Sankyo, Gilead, Novartis, Roche. SC received honoraria from Chugai, AstraZeneca, Eisai, Kyowa-Kirin and MSD; received consulting fees from Daiichi-Sankyo and has a leadership role in the Adolescent and Young Adult Cancer Alliance. LJ, TML received honoraria from MSD and TLM declared no other conflicts of interests. ISY, SC and HDC were full-time employees of MSD. QS and TEM were full-time employees of IQVIA that was commissioned to conduct this study. The funding source had no role in the analysis of this study.

Data sharing statement

All data relevant to the study are included in the article or uploaded as supplementary information.

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Figure legend

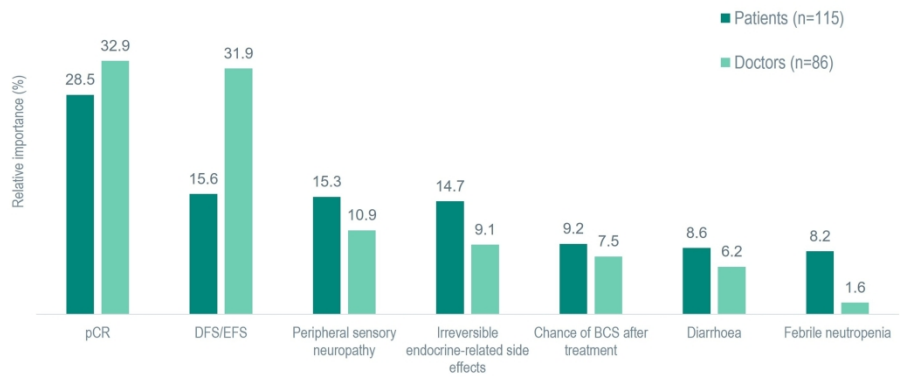
Figure 1. Relative importance of attributes in patients and doctors overall. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.

Figure 2. Relative importance of attributes in (a) patients and (b) doctors in different territories. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.

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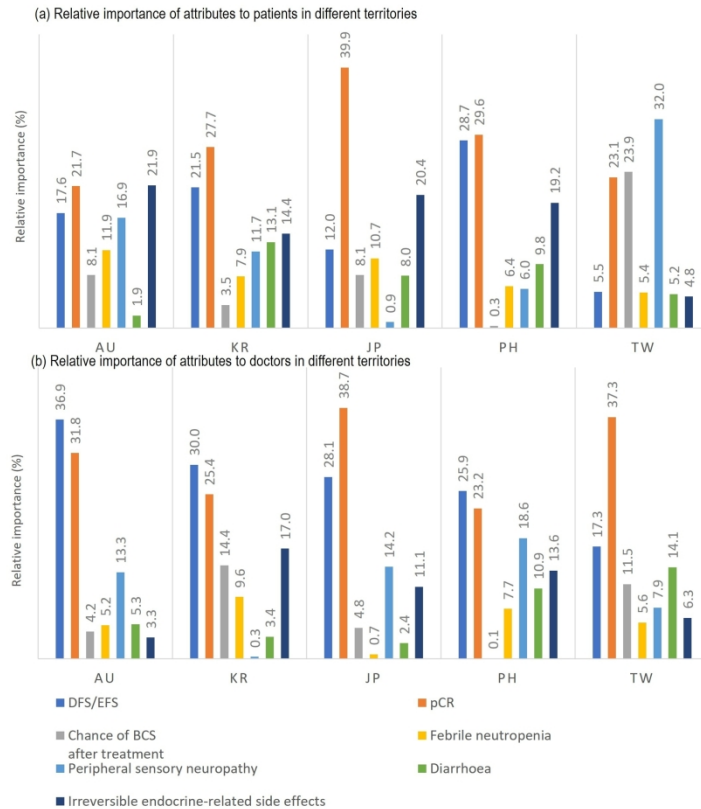
Figure 1.



Relative importance of attributes in patients and doctors overall. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.

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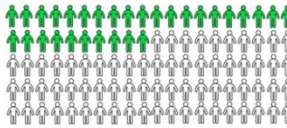
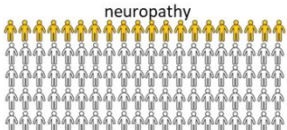
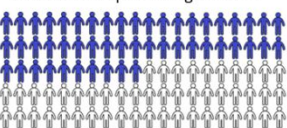
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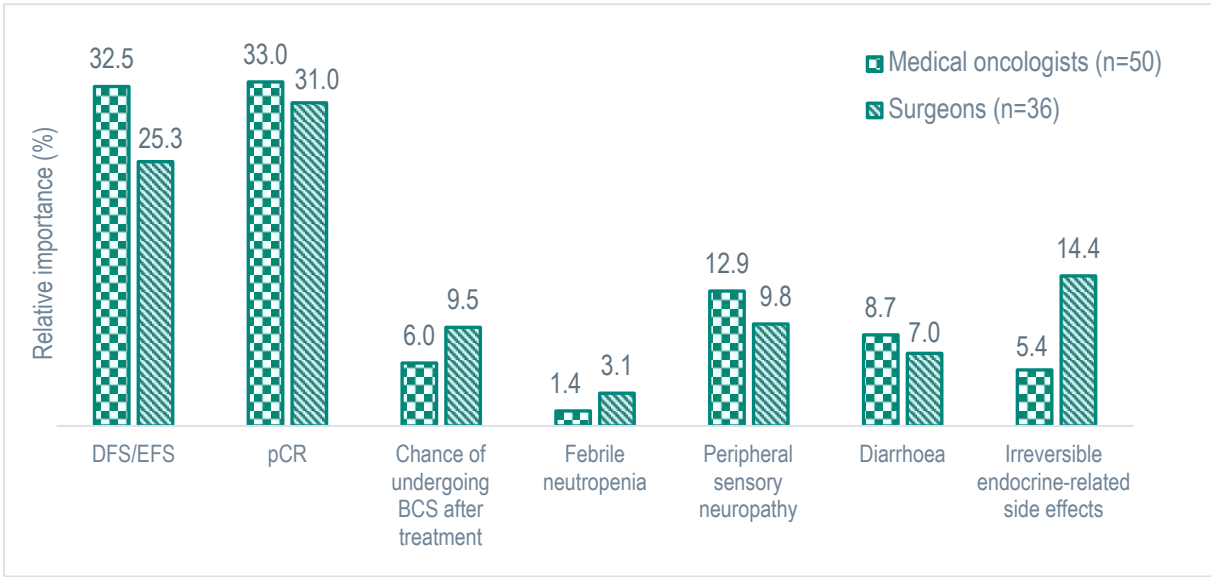
Relative importance of attributes in (a) patients and (b) doctors in different territories. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.

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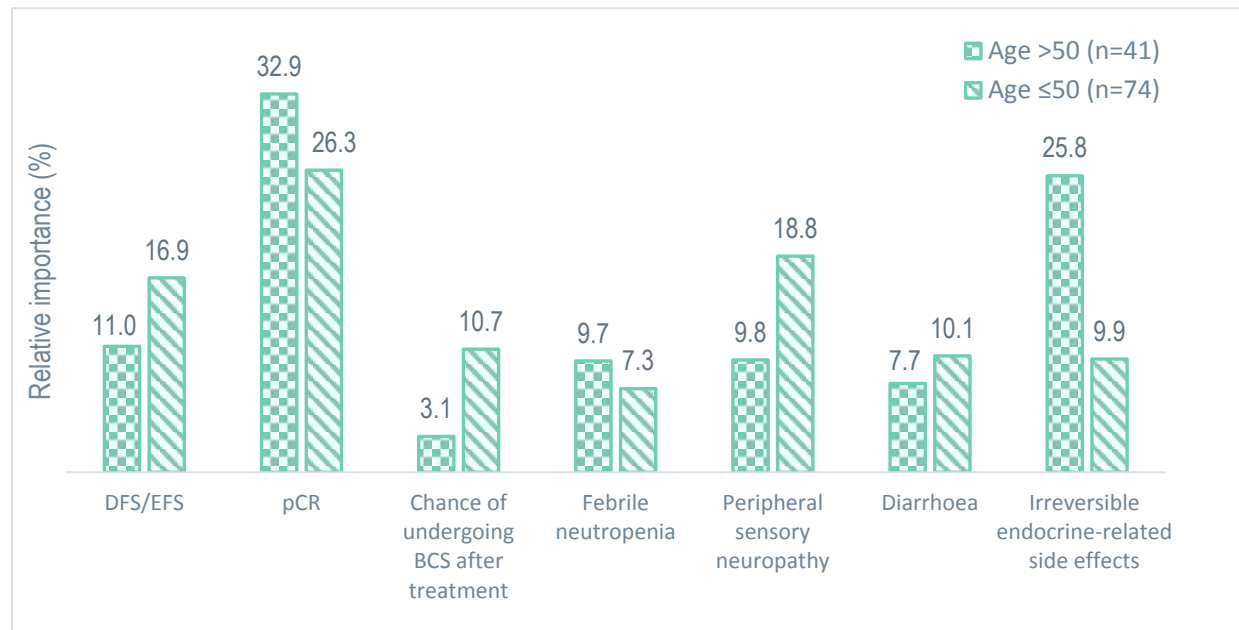
Supplemental Figure 1. Sample of DCE questionnaire

Attribute	Regimen A	Regimen B
Median disease-free/ event-free survival	12 months free of cancer, recurrence, progression, complications or death.	24 months free of cancer, recurrence, progression, complications or death.
Pathological complete response (pCR)	70% probability of achieving pCR 	30% probability of achieving pCR 
Chance of undergoing breast conserving surgery (BCS) after receiving this anticancer treatment	70% chance of undergoing BCS 	30% chance of undergoing BCS 
Febrile Neutropenia	5% risk of experiencing febrile neutropenia 	20% risk of experiencing febrile neutropenia 
Peripheral sensory neuropathy	5% risk of experiencing peripheral sensory neuropathy 	20% risk of experiencing peripheral sensory neuropathy 
Diarrhoea	50% risk of experiencing diarrhea 	10% risk of experiencing diarrhea 
Irreversible endocrine-related side effects requiring lifelong medication	8% chance of developing irreversible endocrine-related side effects 	0% chance of developing irreversible endocrine-related side effects 
If these were your only options, which treatment regimen would you choose? Select the box to indicate your choice. [Single select]	<input type="checkbox"/>	<input type="checkbox"/>

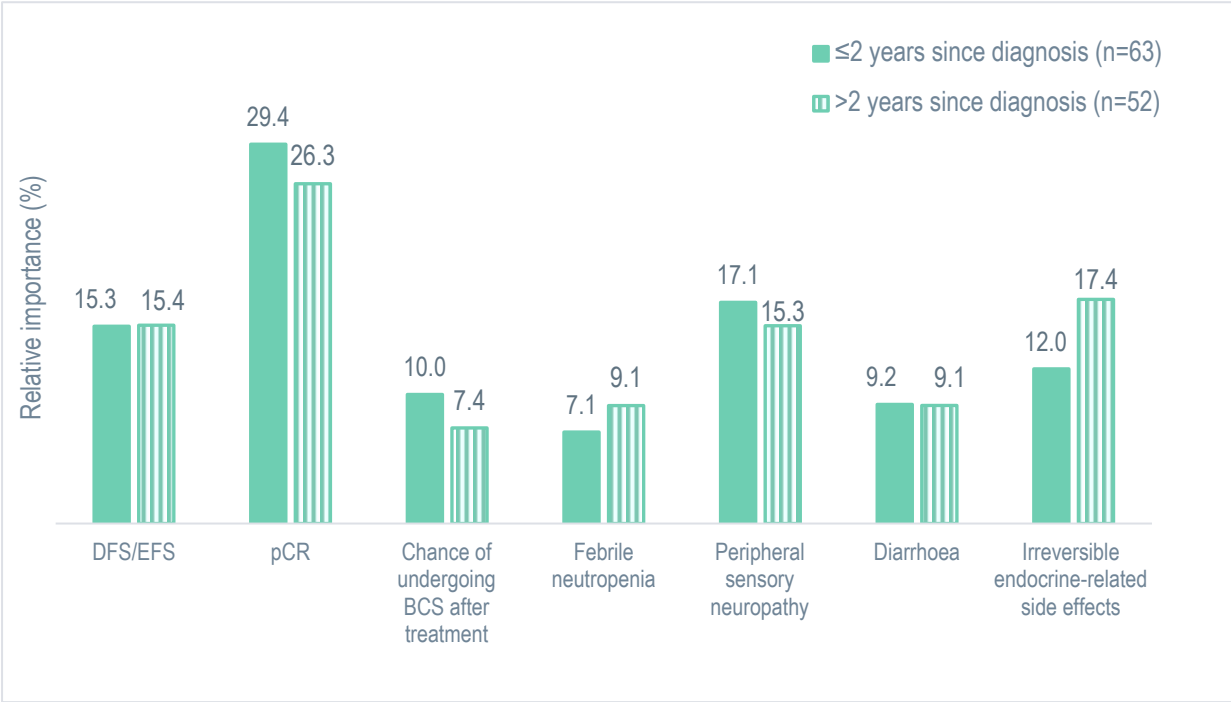
Supplemental Figure 2. Relative importance of attributes in medical oncologists and surgeons.
BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.



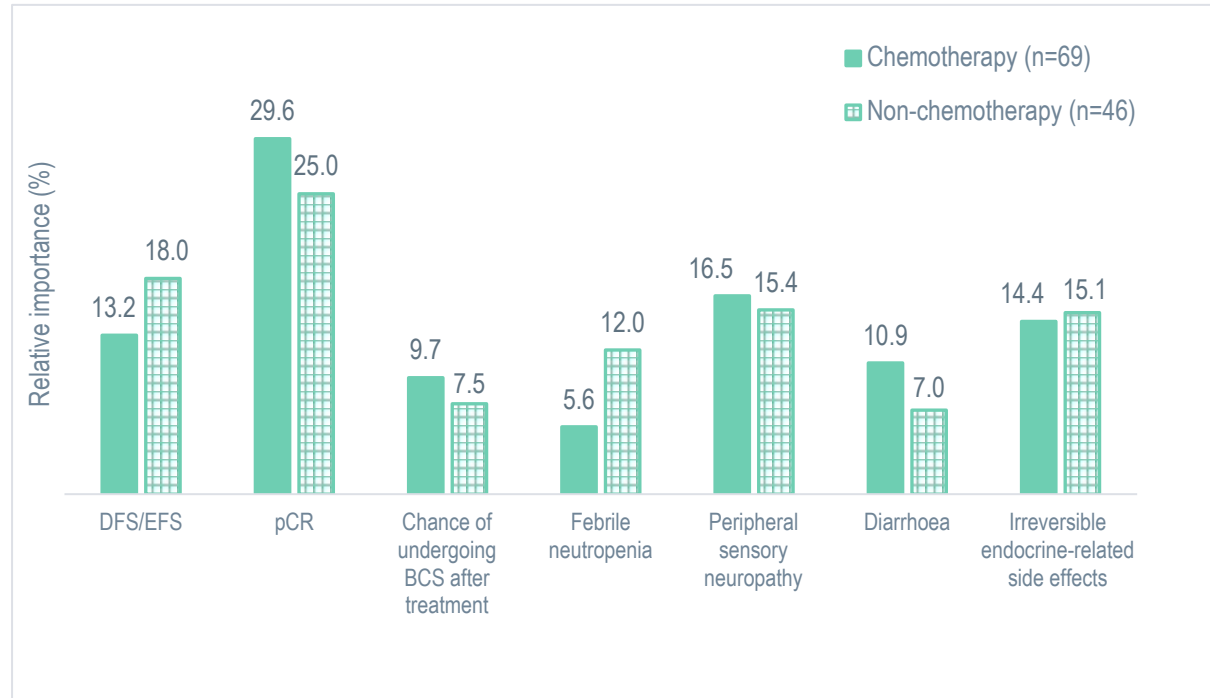
Supplemental Figure 3. Relative importance of attributes in patients younger than and above 50 years of age. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.



Supplemental Figure 5. Relative importance of attributes in eTNBC patients who were diagnosed within and more than 2 years prior to study participation. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.



Supplemental Figure 6. Relative importance of attributes in patients who were receiving chemotherapy and non-chemotherapy options during study participation. Non-chemotherapy includes radiation therapy (n=3), surgery (n=6), don't know and not receiving treatment (n=37). BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.

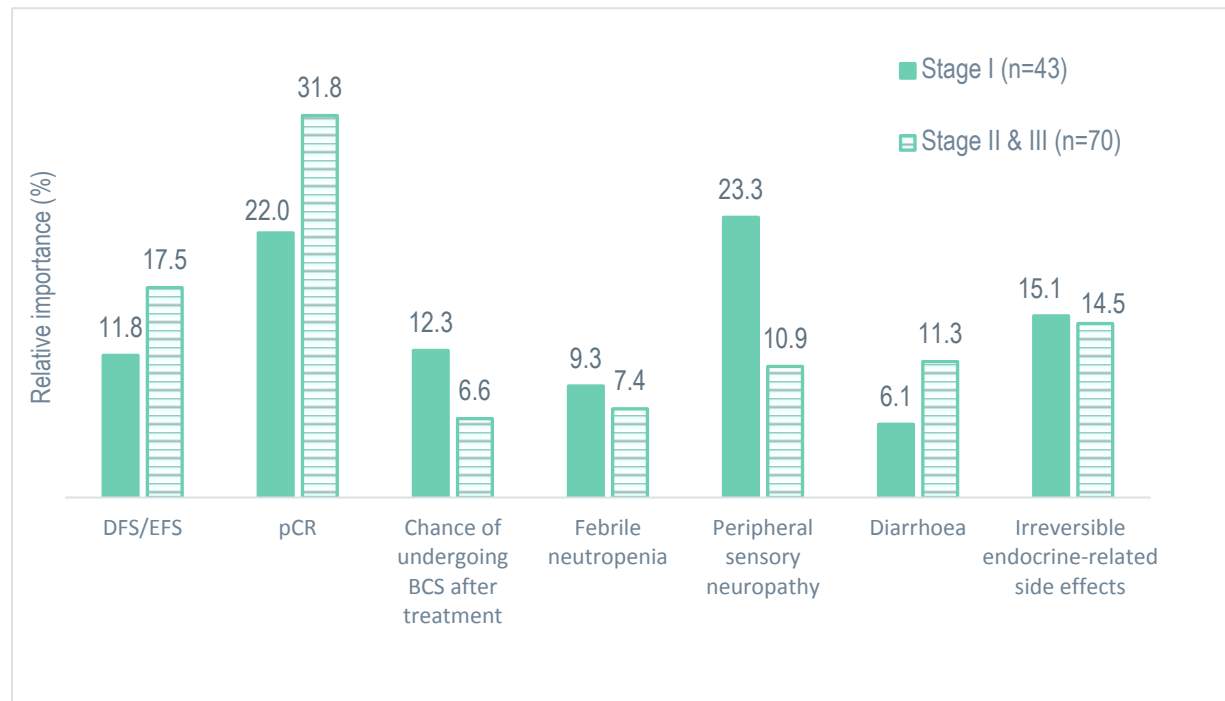


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Supplemental Figure 4. Relative importance of attributes in patients diagnosed at stage I and stages II and III. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.



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Patients' and doctors' preferences in early-stage triple-negative breast cancer treatment in Asia-Pacific: a multi-territory discrete choice experiment using a cross-sectional survey

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Patients' and doctors' preferences in early-stage triple-negative breast cancer treatment in Asia-Pacific: a multi-territory discrete choice experiment using a cross-sectional survey

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Abstract

OBJECTIVES: This study aimed to assess preferences of patients and doctors regarding treatment attributes for early-stage triple-negative breast cancer (eTNBC) in the Asia-Pacific region.

DESIGN: Discrete choice experiment (DCE) by cross-sectional survey was conducted with patients and doctors. Key attributes relevant to eTNBC treatment decision-making were verified through a consultative process with clinical experts, the levels and description of seven attributes were refined through cognitive interviews. A D-efficient fractional-factorial design was employed to create 15 choice sets with seven key attributes.

SETTING: An online web-based DCE with the 15 choice sets was developed and made available to participants in Australia, Japan, Korea, Philippines and Taiwan.

PARTICIPANTS: The final dataset comprised 115 patients who self-reported a diagnosis of eTNBC and 86 medical oncologists, breast and general surgeons with at least five years' experience managing eTNBC patients

PRIMARY OUTCOMES: Patients' and doctors' preferences on seven attributes: pathological complete response (pCR), disease-free/event-free survival (DFS/EFS), chance of undergoing breast conserving surgery after receiving anticancer treatment, febrile neutropenia, peripheral sensory neuropathy (PSN), diarrhoea, and irreversible endocrine-related side effects requiring lifelong medication. Data were analysed using a mixed logit model to determine preference weights for attribute levels, which were then used to compute the relative importance score (RIS) for each attribute.

RESULTS: Median age of patients were 44.0 (interquartile range 38.0-56.5) years. Most patients (68%) were married, and 77% had children. Additionally, 40% were employed full-time, and 70% held a college degree. Nearly half (46%) were diagnosed before the age of 40. Among the doctors, 58% were medical oncologists and the remaining breast or general surgeons. pCR, DFS/EFS, and PSN were the three most important attributes in both doctors and patient groups. pCR had the highest weighted preference among patients and doctors (RIS, 28.5 and 32.9, respectively). In general, patients assigned more weight to safety attributes compared to doctors, while doctors assigned more weight to efficacy attributes than patients did. Surgeons assigned more weight to irreversible endocrine-related side effects than medical oncologists (RIS, 14.4 vs. 5.4). Differences in preferences within the regions were noted.

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66 **CONCLUSIONS:** While our study revealed a concordance between patients' and doctors' ranking of
67 the seven assessed treatment attributes, patients generally assigned greater emphasis on safety-
68 related attributes in comparison to doctors.

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Strengths and limitations

- This is the first study in Asia-Pacific that used a discrete choice experiment (DCE), a well-recognized method, to quantify patients’ and doctors’ preferences in attributes for early-stage TNBC (eTNBC) treatment in five territories in Asia-Pacific
- Use of the same attributes and levels in the patients’ and doctors’ DCE enabled comparison of their perspectives
- A multi-step approach was followed to identify attributes and levels, which involved a thorough literature review, advisory boards and cognitive interviews with eTNBC patients and treating doctors
- Participants were recruited by convenience sampling and may not be representative of all eTNBC patients and treating doctors in Asia-Pacific

INTRODUCTION

Breast cancer continues to be a global health challenge, with an estimated 2.3 million new cases diagnosed in 2020 alone, according to GLOBOCAN 2020 data.¹ In the Asia-Pacific region, breast cancer incidence rates are among the highest worldwide,² particularly for Triple-Negative Breast Cancer (TNBC), characterised by its aggressive clinical behaviour, high histologic tumour grade, and increased risk of relapse and distant recurrence.^{3,4}

Treatment approaches to early-stage TNBC (eTNBC) include surgery, chemotherapy, radiation therapy, with the recent addition of immunotherapy for high-risk disease, and several targeted therapies currently under clinical trials. Chemotherapy is the mainstay of systemic treatment for TNBC.^{4,5} There is a growing trend towards using neoadjuvant chemotherapy as decisions for optimal surgical, radiation or chemotherapy are increasingly tailored based on initial response to neoadjuvant chemotherapy, while adjuvant chemotherapy recommended in patients with residual tumour after neoadjuvant treatment.⁴⁻⁶

Treatment regimens for eTNBC are associated with different efficacy-tolerability profiles. Furthermore, besides clinical benefits, patients' perceptions of treatment value is also influenced by other factors that affect their quality of life, and this is a dimension that is increasingly acknowledged in value assessment frameworks.⁷ The majority of preference studies to date investigated patients' preferences in treatment attributes for metastatic breast cancer, additionally these studies were focused on Western countries.⁸⁻¹⁰ There is thus limited information on how patients perceive treatment efficacy and tolerability and other factors deemed crucial for making their treatment choices particularly for TNBC. Few studies assessed the alignment of patients' preferences for treatment of eTNBC with that of doctors' that would help inform shared decision making. With the accumulation of recent data to support addition of immunotherapy to cytotoxic chemotherapy as a new treatment option, it is timely to understand patients' perception of eTNBC treatment attributes and the extent to which their preferences align with doctors' judgement, especially in Asia Pacific.

Using a discrete choice experiment (DCE) conducted in Australia, Japan, Korea, Philippines and Taiwan, this study aimed to characterize and quantify patients' and doctors' preferences for eTNBC treatment attributes related to efficacy and safety, in order to examine alignment in preferences for eTNBC treatment attributes between patients and doctors in the Asia-Pacific region and across different territories.

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113 **METHODS**

114 **Discrete choice experiment (DCE)**

115 In the DCE survey, respondents were presented with a series of choice tasks (questions), each

116 comprising 2 hypothetical treatment profiles that contained various combinations of treatment

117 attributes (i.e. benefits and risks). For each choice task, respondents were asked to select the profile

118 they found most preferable. The execution of this DCE study adhered to the guidelines set forth by

119 the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) in their

120 comprehensive framework for proficient research conduct in conjoint analysis.¹¹

121 **Attributes and levels**

122 A preliminary list of 30 attributes and their levels was identified based on a targeted literature

123 review of eTNBC. A consultative process with key opinion leaders in this field (co-authors) from

124 Australia, Japan, Korea, Philippines, and Taiwan was then used to identify key attributes and levels

125 most relevant to making treatment choices for eTNBC. After deliberating on relevance and

126 significance of these attributes, seven were decided on for use in the DCE, and description of these

127 attributes and levels were refined through cognitive interviews.

128 **Cognitive interviews**

129 Initial cognitive interviews were conducted using a structured discussion guide with a total of 10

130 patients with eTNBC and 15 doctors from Australia, Japan, Korea, Philippines, and Taiwan. The aim

131 of the interviews was to assess participants’ understanding of the language and phrasing of survey

132 questions. Electronic written consent was obtained from participants prior to the interviews.

133 Interviews were conducted via online video conference and in participants’ native language.

134 The seven key attributes were identified each with different levels (Table 1) to describe the TNBC

135 treatment alternatives. The key attributes were pathological complete response (pCR), disease-

136 free/event-free survival (DFS/EFS), chance of undergoing breast conserving surgery (BCS) after

137 receiving anticancer treatment, febrile neutropenia, peripheral sensory neuropathy, diarrhoea, and

138 irreversible endocrine-related side effects requiring lifelong medication.

139

6

140 **Table 1. Attributes and levels tested**

Attributes	Levels
Disease-free/Event-free survival	12 months 18 months 24 months
Pathological complete response (pCR)	30% probability of achieving pCR 50% probability of achieving pCR 70% probability of achieving pCR
Chance of undergoing breast conserving surgery (BCS) after receiving anticancer treatment	30% chance of undergoing BCS 50% chance of undergoing BCS 70% chance of undergoing BCS
Febrile neutropenia	5% risk of experiencing febrile neutropenia 10% risk of experiencing febrile neutropenia 20% risk of experiencing febrile neutropenia
Peripheral sensory neuropathy	5% risk of experiencing peripheral sensory neuropathy 20% risk of experiencing peripheral sensory neuropathy 40% risk of experiencing peripheral sensory neuropathy
Diarrhoea	10% risk of experiencing diarrhoea 25% risk of experiencing diarrhoea 50% risk of experiencing diarrhoea
Irreversible endocrine-related side effects requiring lifelong medication	0% chance of developing irreversible endocrine-related side effects 8% chance of developing irreversible endocrine-related side effects

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142 **Construction of the DCE questionnaire**

143 The combination of these attributes and levels resulted in a total of 1458 hypothetical scenarios
 144 ($3^6 \times 2^1$) that exceeded the practical limits for inclusion within a questionnaire. Therefore, a fractional
 145 factorial design approach was used to systematically generate a set of optimal scenarios in SAS
 146 software version 9.4. The macro %Mktruns was utilized to compute appropriate design dimensions,
 147 followed by using the macro %Mktex to generate requisite combinations.¹² The experimental design
 148 ultimately consisted of 15 distinct choice pairs (choice sets).

149 The survey instrument included an introduction of choice sets with a description of the attributes
 150 and their levels. Each respondent answered 15 trade-off questions, exemplified in Supplemental
 151 Figure 1.

152 Beyond the DCE questions, we also collected the study-relevant baseline characteristics for each
 153 study participant, including information on patients' sociodemographic (age, race, educational level)
 154 and clinical characteristics (time since diagnosis, cancer stage, past treatment), and doctors'
 155 professional experience (specialty, practice setting). The survey instrument was translated into local
 156 languages and implemented via an online survey platform.

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157 **Sample size and participant recruitment**

158 The sample size of DCE study was estimated based on a common rule of thumb formula $(n \times t \times a)/c$

159 ≥ 500 , with n: number of respondents; t: number of choice sets; a: number of alternatives per set;

160 and c: largest number of levels for any one attribute.¹³ Considering respondent fatigue, we decided

161 on a maximum of 15 choice sets, 2 treatment alternatives and 3 levels, which required a minimum

162 sample size of at least 50 for each group. Based on recommended sample size calculation and for

163 representation of the territories included, our study intended to recruit 120 patients and 86 doctors.

164 Between April 2022 and June 2023, a targeted recruitment approach was used where personalized

165 email invitations were sent to medical oncologists, general and breast surgeons in Australia, Japan,

166 Philippines and Taiwan via commercial panels Medical Opinion Leaders, Plamed Asia and RDCK

167 panel.^{14,15} Clinicians on these commercial panels had previously participated in similar surveys and

168 opted in to being contacted for future research. In Korea, a recruiter contacted relevant doctors in

169 Tier 2 and Tier 3 hospitals based on publicly available information to seek their interest to

170 participate. Personalized email invitations were then sent to them. In Australia and Japan,

171 personalized email invitations were sent to cancer patients via commercial consumer panels with

172 members profiled on health conditions – CRNRSTONE and Asmarq.^{16,17} In Philippines, Taiwan and

173 Korea, patients were identified through referral from doctors who participated in the study and with

174 referrals from a breast cancer patient advocacy group in Korea. Doctors obtained patients’ approval

175 to refer their contact details to a recruiter who then contacted the patients to explain details before

176 personalized email invitations were sent to them.

177 Personalized email invitations sent to potential participants contained a link to an online

178 questionnaire. Participants were first directed to a preliminary screening section where they

179 answered a series of questions to assess their eligibility based on the study’s inclusion and exclusion

180 criteria. Those who met the specified criteria proceeded to the main survey. Participants indicated

181 their consent to proceed with the survey via a checkbox on the online questionnaire.

182 To be eligible, patients had to be: 1) a woman who is ≥ 18 years old; 2) self-reported a clinician-

183 confirmed diagnosis of eTNBC (Stage I to III); and 3) was able to read and understand the

184 questionnaire in her local language. Patients were excluded if they had been exposed to

185 immunotherapy. Doctors had to be: 1) a medical oncologists, breast or general surgeons; 2) had to

186 have ≥ 5 years’ experience managing patients with eTNBC; and 3) spent $\geq 50\%$ of their time in direct

187 patient care. After excluding five patients who indicated that they received hormone therapy which

188 was inconsistent with the treatment for TNBC, the final sample included 115 patients and 86

189 doctors.

190 Patient and public involvement statement

191 Patients or the public were not involved in the design, conduct, or reporting of this study.

192 Data analysis

193 Mixed logit model was used to estimate the preference weight for each attribute level in patients
194 and doctors, where a more positive preference weight indicates a stronger preference for that
195 attribute level.¹⁸ Analysis was performed in STATA/IC version 14.2 software.

196 Relative importance score of attributes was calculated to compare the relative influence of each
197 attribute on patients' and doctors' choices. The relative attribute importance score is the proportion
198 of total variance explained by the individual attribute, expressed as a percentage.

$$199 \text{ Relative importance} = \frac{\text{Difference in preference weights between the most and least preferred level}}{\text{Sum of differences across all attributes}} \times 100\%$$

200 Due to the smaller sample sizes of each subgroup, conditional logit model was used to estimate
201 preference weights in patients' and doctors' subgroups by territory, doctors' specialty and patients'
202 clinical characteristics and relative importance score calculated to compare relative influence of
203 attributes within subgroups.

204

205 RESULTS

206 Baseline characteristics

207 Patient characteristics

208 Patient characteristics (N=115) are shown in Table 2. Overall, median age of patients was 44.0 (IQR
209 38.0-56.5) years. 68% of patients were married, 77% had children, 40% employed full-time and 70%
210 had a college degree. 37% of patients were diagnosed at Stage I, 44% in stage II and 17% in stage III.
211 55% of patients were diagnosed with eTNBC within 2 years prior to the study, and 6% had
212 experienced recurrence of TNBC before. 74% of patients had undergone breast surgery (mastectomy
213 or BCS) and 83% had received chemotherapy before. At the time of survey participation, 72% were
214 receiving treatment. Across the territories, all patients in Australia had received their eTNBC
215 diagnosis more than 2 years prior to study participation, while majority of patients in remaining
216 territories received their diagnosis within 2 years of study participation. 42% of patients in
217 Philippines were diagnosed at Stage III, while majority of patients in remaining territories were
218 diagnosed at stages I and II. Majority of patients in Australia and Philippines had undergone breast
219 surgery and 88% of patients in Australia were not receiving treatment at the time of study
220 participation.

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221 *Doctors’ characteristics*

222 Among doctors (n=86), 58% were medical oncologists, 15% breast surgeons, 27% general surgeons.

223 41% of doctors had more than 15 years’ post-training experience managing eTNBC patients. 43% of

224 doctors practiced in academic-based institutions and 31% in private setting (Table 2).

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225 **Table 2. Sociodemographic characteristics and eTNBC-related medical history of patients and professional characteristics of doctors**

Sociodemographic characteristics of patients		Overall (N=115)	AU (n=16)	KR (n=30)	PH (n=20)	PH (n=19)	TW (n=30)
Median (Q1-Q3) age, years		44.0 (38.0-56.5)	57.0 (51.5-64.0)	47.5 (41.0-57.0)	50.0 (41.0-57.3)	50.0 (39.0-56.5)	38.0 (34.3-42.8)
Race							
	Asian, n (%)	101 (87.8)	2 (12.5)	30 (100.0)	0 (0.0)	19 (100.0)	30 (100.0)
	Caucasian, n (%)	13 (11.3)	13 (81.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
	Aboriginal, n (%)	1 (0.9)	1 (6.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Marital status							
	Single, n (%)	19 (16.5)	2 (12.5)	4 (13.3)	0 (0.0)	1 (5.3)	9 (30.0)
	Married/ domestic partner, n (%)	78 (67.8)	6 (37.5)	22 (73.4)	5 (25.0)	14 (73.7)	21 (70.0)
	Divorced/ separated/ widowed, n (%)	18 (15.7)	8 (50.0)	4 (13.3)	0 (0.0)	4 (21.1)	0 (0.0)
Have children, n (%)		88 (76.5)	14 (87.5)	24 (80.0)	15 (75.0)	16 (84.2)	19 (63.3)
Median (Q1-Q3) age of youngest child, years		15.0 (8.5-25.5)	25.0 (15.0-33.8)	20.0 (12.5-29.3)	22.5 (15.5-27.5)	17.0 (12.0-25.5)	7.0 (5.0-12.5)
Education level							
	Primary/ high school, n (%)	15 (13.0)	4 (25.0)	9 (30.0)	1 (5.0)	1 (5.3)	0 (0.0)
	Certification program/ vocational school, n (%)	12 (10.4)	3 (18.8)	0 (0.0)	6 (30.0)	3 (15.8)	0 (0.0)
	University degree, n (%)	80 (69.6)	6 (37.4)	19 (63.3)	13 (65.0)	14 (73.7)	28 (93.3)
	Post graduate degree, n (%)	8 (7.0)	3 (18.8)	2 (6.7)	0 (0.0)	1 (5.3)	2 (6.7)
Employment status							
	Full-time, n (%)	46 (40.0)	2 (12.5)	6 (20.0)	15 (75.0)	3 (15.8)	28 (93.3)
	Part-time, n (%)	9 (7.8)	4 (25.0)	2 (6.6)	0 (0.0)	1 (5.3)	2 (6.7)
	Homemaker, n (%)	32 (27.8)	2 (12.5)	14 (46.7)	7 (35.0)	9 (47.3)	0 (0.0)
	Retired/ unemployed/ leave of absence, n (%)	18 (15.7)	4 (25.0)	5 (16.7)	3 (15.0)	6 (31.6)	0 (0.0)
	Others ^a , n (%)	10 (8.7)	4 (25.0)	3 (10.0)	3 (15.0)	0 (0.0)	0 (0.0)
Duration since diagnosis of eTNBC							
	≤2 years, n (%)	63 (54.8)	0 (0.0)	18 (60.0)	11 (55.0)	14 (73.6)	20 (66.7)
	2 to 5 years, n (%)	30 (26.1)	6 (37.5)	7 (23.3)	4 (20.0)	4 (21.1)	9 (30.0)
	5 to 10 years, n (%)	10 (8.7)	4 (25.0)	0 (0.0)	4 (20.0)	1 (5.3)	1 (3.3)

	≥10 years, n (%)	12 (10.4)	6 (37.5)	5 (16.7)	1 (3.0)	0 (0.0)	0 (0.0)
Age at diagnosis							
	≤40 years, n (%)	53 (46.1)	3 (18.8)	11 (36.7)	7 (25.0)	7 (36.8)	25 (83.3)
	40 to 59 years, n (%)	52 (45.2)	11 (68.8)	16 (53.3)	2 (20.0)	8 (42.1)	5 (16.7)
	≥60 years, n (%)	10 (8.7)	2 (12.5)	3 (10.0)	2 (2.0)	4 (21.1)	0 (0.0)
Stage of eTNBC at diagnosis							
	Stage I, n (%)	43 (37.4)	5 (31.3)	9 (30.0)	2 (20.0)	0 (0.0)	21 (70.0)
	Stage II, n (%)	51 (44.3)	7 (43.8)	14 (46.7)	2 (20.0)	11 (57.9)	9 (30.0)
	Stage III, n (%)	19 (16.5)	4 (25.0)	6 (20.0)	2 (20.0)	8 (42.1)	0 (0.0)
	Others ^b / don't know, n (%)	2 (1.7)	0 (0.0)	1 (3.3)	1 (10.0)	0 (0.0)	0 (0.0)
History of breast surgery							
	Mastectomy, n (%)	35 (30.4)	6 (37.5)	5 (16.7)	2 (20.0)	14 (73.7)	2 (6.7)
	BCS, n (%)	50 (43.5)	9 (56.3)	13 (43.3)	2 (20.0)	2 (10.5)	15 (50.0)
	Yes but unaware what type, n (%)	5 (4.4)	1 (6.2)	0 (0.0)	1 (10.0)	1 (5.3)	3 (10.0)
	Did not undergo surgery, n (%)	25 (21.7)	0 (0.0)	12 (40.0)	1 (10.0)	2 (10.5)	10 (33.3)
Receiving breast cancer treatment at time of survey							
	Chemotherapy, n (%)	69 (60.0)	0 (0.0)	15 (50.0)	2 (20.0)	18 (94.7)	24 (80.0)
	Others ^c , n (%)	14 (12.2)	2 (12.5)	5 (16.7)	2 (20.0)	0 (0.0)	5 (16.7)
	None, n (%)	32 (27.8)	14 (87.5)	10 (33.3)	6 (60.0)	1 (5.3)	1 (3.3)
Professional experience of doctors		Overall (N=86)	AU (n=15)	KR (n=20)	P (n=16)	PH (n=15)	TW (n=20)
Specialty							
	Medical oncologist, n (%)	50 (58.1)	12 (80.0)	10 (50.0)	0 (2.5)	8 (53.3)	10 (50.0)
	General surgeon, n (%)	13 (15.2)	2 (13.3)	0 (0.0)	0 (0.0)	7 (46.7)	4 (20.0)
	Breast surgeon, n (%)	23 (26.7)	1 (6.7)	10 (50.0)	6 (37.5)	0 (0.0)	6 (30.0)
Practice							
	Public/ government hospital, n (%)	22 (25.6)	6 (40.0)	2 (10.0)	5 (31.3)	2 (13.3)	7 (35.0)
	Private hospital or clinic, n (%)	27 (31.4)	2 (13.3)	0 (0.0)	6 (37.4)	11 (73.4)	8 (40.0)
	University hospital or academic institute, n (%)	37 (43.0)	7 (46.7)	18 (90.0)	5 (31.3)	2 (13.3)	5 (25.0)
Post-training experience managing eTNBC patients							
	5-10 years, n (%)	30 (34.9)	8 (53.3)	9 (45.0)	2 (12.5)	5 (33.3)	6 (30.0)
	11-15 years, n (%)	21 (24.4)	4 (26.7)	4 (20.0)	3 (18.8)	7 (46.7)	3 (15.0)
	>15 years, n (%)	35 (40.7)	3 (20.0)	7 (35.0)	11 (68.7)	3 (20.0)	11 (55.0)

^aFreelancer, self-employed, home-call counsellor; ^bStage II-III; ^cRadiation, surgery, don't know
BCS, breast conserving surgery

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227 **DCE results**

228 *Overall patient and doctor preferences in treatment attributes*

229 Preference weights for attributes estimated using mixed-logit model (Table 3) demonstrated that
230 both patients and doctors preferred longer DFS/EFS, higher chance of achieving pCR and undergoing
231 BCS after receiving anticancer treatment, lower risks of febrile neutropenia, peripheral sensory
232 neuropathy, diarrhoea and irreversible endocrine-related side effects that require lifelong
233 medication.
234 Analysis of relative importance score (Figure 1) showed that attributes were rank ordered similarly
235 between patients and doctors with pCR, DFS/EFS and risk of peripheral sensory neuropathy as the
236 top 3 attributes, and febrile neutropenia as lowest-rank attribute. Patients assigned more weight on
237 safety attributes (46.8%) than doctors (27.7%), while doctors assigned more weight on efficacy
238 attributes (72.3%) than patients (53.2%).

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239 **Table 3. Preferences among patients and doctors for selected attribute levels**

Attributes	Levels	Coefficient*	SE	P value	Coefficient*	SE	P value
Patient preferences (n=115)				Doctor preferences (n=86)			
DFS/ EFS	12 months	-1.02	0.16	0.000	-3.8	0.53	0.000
	18 months	-0.30	0.11	0.008	-0.4	0.22	0.054
	24 months	0.53	0.14	0.000	1.6	0.27	0.000
pCR	30% probability	-1.76	0.19	0.000	-4.0	0.56	0.000
	50% probability	-0.74	0.11	0.000	-1.3	0.21	0.000
	70% probability	1.07	0.13	0.000	1.7	0.22	0.000
Chance of undergoing BCS after receiving anticancer treatment	30% chance	-0.48	0.12	0.000	-0.8	0.20	0.000
	50% chance	-0.32	0.10	0.002	-0.9	0.23	0.000
	70% chance	0.43	0.09	0.000	0.4	0.10	0.000
Febrile neutropenia	5% risk	0.27	0.08	0.001	0.0	0.10	0.873
	10% risk	-0.35	0.11	0.001	0.0	0.22	0.984
	20% risk	-0.55	0.12	0.000	-0.2	0.20	0.205
Peripheral sensory neuropathy	5% risk	0.59	0.10	0.000	0.5	0.10	0.000
	20% risk	-0.30	0.10	0.003	-0.8	0.22	0.000
	40% risk	-0.93	0.16	0.000	-1.3	0.28	0.000
Diarrhoea	10% risk	0.38	0.15	0.000	0.3	0.15	0.000
	25% risk	-0.25	0.11	0.026	-0.5	0.21	0.016
	50% risk	-0.47	0.10	0.000	-0.7	0.18	0.000
Irreversible endocrine-related side effects requiring lifelong medication	0% chance	0.68	0.12	0.000	0.6	0.12	0.000
	8% chance	-0.78	0.10	0.000	-0.9	0.19	0.000

240 Note: Coefficients represent the change in utility for a respondent for a specific level of a given attribute. Positive coefficients indicate positive preference.

241 Abbreviations: BCS, breast conserving surgery; DFS/EFS, disease-free survival/ event-free survival; pCR, pathological complete response; SE, standard error.

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244 *Patient preferences in treatment attributes by territory*

245 Subgroup analysis revealed that patients in Australia, Korea, Japan and Philippines placed greater
246 weight on pCR than DFS/EFS and BCS, while patients in Taiwan had a relatively higher preference for
247 BCS than pCR and DFS/EFS (Figure 2a). Among the safety attributes, patients in Australia, Japan,
248 Korea and Philippines placed greater weight on irreversible endocrine-related side effects that
249 require lifelong medication, while patients in Taiwan placed higher importance on peripheral
250 sensory neuropathy. Chance of pCR was the top ranked attribute by patients in Korea, Japan and
251 Philippines; irreversible endocrine-related side effects in Australia and peripheral sensory
252 neuropathy in Taiwan.

253 *Doctors' perspectives of treatment attributes by territory*

254 Subgroup analysis revealed differences in treatment attribute preferences between doctors in
255 various territories (Figure 2b). Doctors in Australia, Korea and Philippines placed greater weight on
256 DFS/EFS than pCR, while those in Japan and Taiwan had a relatively higher preference for pCR than
257 DFS/EFS. There were variations in the relative importance of safety attributes across the territories;
258 the highest-ranking safety attributes were peripheral sensory neuropathy in Australia, Japan and
259 Philippines, while irreversible endocrine-related side effects and diarrhoea was ranked higher in
260 Korea and Taiwan, respectively.

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Subgroup analysis results

Relative importance of treatment attributes in medical oncologists and surgeons

Medical oncologists and breast/ general surgeons prioritized pCR and DFS/EFS as the top 2 attributes (Supplemental Figure 2). Surgeons placed a higher importance on irreversible endocrine-related side effects than medical oncologists (rank 3 vs 6).

Relative importance of treatment attributes in patients by age group

Patients above the age of 50 placed a higher importance on irreversible endocrine side effects than younger patients did (Supplemental Figure 3). pCR was the top ranked attribute in both older and younger patients. Chance of undergoing BCS after treatment was the lowest ranked attribute in older patients while febrile neutropenia was the lowest rank attribute in younger patients.

Relative importance of treatment attributes in patients diagnosed at different stages

The top 2 attributes in patients diagnosed in Stage 1 were peripheral sensory neuropathy and pCR; for patients diagnosed in stages 2 and 3 were pCR and DFS/EFS (Supplemental Figure 4). The lowest ranked attribute for patients diagnosed in Stage 1 and Stages 2 and 3 were diarrhoea and chance of undergoing BCS, respectively. Patients diagnosed in stages 2 and 3 assigned more weight on efficacy than safety (55.9% vs 44.1%) attributes, while patients diagnosed in stage 1 assigned more weight on safety than efficacy (53.9% vs 46.1%) attributes.

Relative importance of treatment attributes in patients by duration of time since diagnosis

We undertook an exploratory analysis to investigate if patient preferences in treatment varied with length of time since diagnosis. However, relative importance of attributes was similar between patients who were diagnosed with eTNBC within or more than 2 years prior to study participation (Supplemental Figure 5). There was a greater difference in relative importance score for irreversible endocrine-related side effects for patients diagnosed more than 2 years prior to study participation than patients within 2 years of their diagnosis (17.4% vs 12.0%, rank 2 vs 4).

Relative importance of treatment attributes in patients who were receiving chemotherapy during study participation

As treatment preferences may be influenced by patients' experience with various types of treatment, we undertook an exploratory analysis in attribute preference based on treatment received during study participation. pCR was the top rank attribute in patients who were receiving

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295 chemotherapy and non-chemotherapy options (surgery, radiation therapy, no treatment) during
296 study participation (Supplemental Figure 6). The second most important attribute was DFS/EFS in
297 the non-chemotherapy subgroup and peripheral sensory neuropathy in the chemotherapy
298 subgroup.

299 **DISCUSSION**

300 Treatment regimens for eTNBC are associated with different efficacy-tolerability profiles, however
301 there is limited information on how patients and doctors perceive various treatment characteristics.
302 This study characterized treatment attributes important to patients and doctors in five territories in
303 Asia-Pacific and assessed the alignment in patient preferences and doctors' judgement.

304 While there were differences in preferences for treatment attributes between patients diagnosed at
305 stage 1 compared with stages 2 and 3, our study found that overall ranking of treatment attributes
306 was similar between eTNBC patients and doctors, where doctors and patients ranked efficacy
307 attributes pCR and DFS as the top two attribute. While the median age of patients in our study is
308 consistent with the reported peak age of diagnosis of TNBC in Asia,³ the high literacy rate among the
309 patient population in our study could have contributed to a more consistent understanding of
310 treatment outcomes between patients and doctors. Nevertheless, patients tended to place greater
311 importance on the safety attributes tested compared to doctors, indicating differences in how
312 patients perceive the impact and value of treatment side effects. This is consistent with qualitative
313 studies that reported the complex decision-making processes encountered by patients when
314 evaluating treatment options, with choices shaped by factors including quality of life, capacity to
315 maintain daily routines, ability to meet work and home responsibilities.¹⁹ Furthermore, patients
316 expressed keen desire to be actively involved in decision making with their physicians to choose
317 treatments that align with their goals.^{19,20} The findings of our study thus suggest a need for physician
318 and patient education in communicating and helping patients better understand complex treatment
319 characteristics and outcomes, to ensure goal concordance between patients and doctors.

320 While patients in our study prioritized pCR, a DCE study investigating patients' preferences for
321 metastatic breast cancer treatment found that overall survival was of primary importance.⁸ The
322 importance of pCR to patients in our study may be due to majority of patients being in the early
323 phases of their treatment as indicated by the high proportions diagnosed within 2 years of study
324 participation and receiving chemotherapy. This preference is consistent with a survey of early-stage
325 breast cancer patients that also found that achievement of pCR was most important, ahead of DFS
326 and option for BCS.²¹ In addition to the high literacy rate, the importance of pCR might be reflective
327 of the discussions patients had with their doctors during the decision-making process for

neoadjuvant therapy where patients were informed of the relevance of pCR as an interim surrogate marker which correlates with long-term survival outcomes.

Among the territories, majority of patients in Japan, Korea and Philippines had a more recent diagnosis of eTNBC and were receiving chemotherapy at the time of the survey, which may account for the importance of pCR to patients in these territories. The prioritization of peripheral sensory neuropathy and irreversible endocrine-related side effects by patients in Taiwan and Australia, respectively, may be attributed to differences in literacy and age. Additionally, the presence of patient support group in Taiwan may also have contributed to the high level of patient education and awareness of side effects. Subgroup analysis by age also showed that compared with older patients, younger patients placed greater importance on peripheral sensory neuropathy than they did irreversible endocrine-related side effects, suggesting that younger patients might be better informed of management options for irreversible endocrine-related side effects.²² The relatively higher preference for BCS by patients in Taiwan could be due to younger age compared to patients in other territories.²³ Inherent limited access to health facilities may also account for the low relative importance of BCS to patients in Philippines, where the rates of BCS and adjuvant radiotherapy use have been reported at less than 11% and 51% at tertiary institutes, respectively.²⁴⁻²⁶

Interestingly, we found that patients diagnosed in stages II and III prioritized pCR while peripheral sensory neuropathy was the top attribute for patients diagnosed in stage I, indicating patients' awareness of the higher probability of survival in stage I and thus prioritized side effects while patients in later stages had a poorer prognosis and prioritized treatment efficacy.

Despite the increasing use of neoadjuvant chemotherapy for eTNBC in the region as recommended by various treatment guidelines,^{6,27,28} there were slight differences in efficacy outcomes prioritized by doctors across the territories. While survival was ultimately prioritized by doctors in Australia, Korea and Philippines, the achievement of pCR was deemed the immediate goal in Japan and Taiwan. The achievement of a pCR after neoadjuvant chemotherapy is regarded as a marker for systemic therapy sensitivity.^{4,6} There has been an accumulation of evidence demonstrating that pCR is associated with improved long-term outcomes in EFS and overall survival for TNBC.^{29,30} Indeed, the overall importance of pCR to doctors in our study reflects its increasing recognition as a clinically relevant outcome. Interestingly, surgeons placed greater emphasis on irreversible endocrine-related side effects than medical oncologists did. This suggests a possible divergence in understanding and management approaches between the two specialties, further highlighting the need for multidisciplinary management of patients to continue beyond early stages of treatment.

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3 360 The findings of our study should be interpreted within the following limitations. Since patients were
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5 361 referred by treating doctors, patient advocacy groups and were members of consumer panels, they
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7 362 are likely to be more engaged and informed, which could contribute to the alignment in ranking of
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9 363 attributes between patients and doctors in our study. Furthermore, patients included in our study
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11 364 had a high literacy rate, thus results may not be representative of patients with lower health literacy.
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13 365 Recruitment of patients was also based on self-report of clinician-confirmed diagnosis of eTNBC and
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15 366 was not verified through medical records. There was also variability in patient characteristics across
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17 367 the territories leading to variability in experience and understanding of treatment attributes.
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19 368 Patients who were diagnosed with Stage I disease would not have been eligible for immunotherapy
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21 369 and thus may not fully comprehend the impact of irreversible endocrine-related side effects. These
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23 370 patients also typically proceed to surgery directly and thus deemed achieving pathological complete
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25 371 response as a hypothetical attribute. Our study included participants from five different territories,
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27 372 thus encompassing diverse cultural, social and economic contexts present in the Asia-Pacific region
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29 373 and enabled evaluation of differences in preferences for eTNBC treatment attributes among these
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31 374 territories. Although there was a relatively small sample size of participants from each territory and
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33 375 the overall sample size was deemed sufficient for analysis of each participant group. The findings of
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35 376 our study provide a foundation for validation in a larger cohort, which would allow for exploration of
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37 377 differences in treatment attribute preferences among patients diagnosed with different stages of
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39 378 eTNBC or with different sociodemographic characteristics. While the overall median age of eTNBC
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41 379 patients in our study is consistent with published data,³ patients in Taiwan were comparatively
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43 380 younger which could imply a difference in treatment experience and perceptions. Nonetheless, our
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45 381 study used a multi-step to identify attributes and levels, which involved a thorough literature review,
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47 382 discussions with expert doctors (co-authors) involved in management of patients with eTNBC and
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49 383 cognitive interviews with eTNBC patients and doctors, to ensure the content validity and
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51 384 improvement of the DCE questionnaire. The use of the same attributes in patients' and doctors' DCE
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53 385 also enabled comparison of their perspectives.
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57 387 **CONCLUSION**

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59 388 It is well-accepted that shared clinical decision making between patients and treating doctors is
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389 associated with enhanced patient outcomes.²⁰ While there was concordance between patients and
doctors in the ranking of the seven assessed treatment attributes, patients generally assigned more
emphasis on safety-related attributes than doctors did. To our knowledge, this is the first study that
quantifies patient and doctor preferences for eTNBC treatment in Asia. Understanding patient

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perspectives would also help guide doctors in explaining complex treatment characteristics in the limited time available during consultation. With the shift towards including patient perspectives in assessing the value of treatments, our study provides insights on the alignment between patients' and doctors' preferences for eTNBC treatment, which may enhance medical decision-making and evaluation of treatment for reimbursement.

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Author contributions

All authors were involved in the conception and design of the study, interpretation of results and critical revision of the manuscript. QS and TEM were involved in data analysis and drafting the manuscript. All authors read and approved the final manuscript. AY is responsible for the overall content as guarantor.

Approval of research protocol and informed consent

This protocol for this study conforms to the provisions of the Declaration of Helsinki and has been approved by the following research ethics committee: Bellberry Human Research Ethics Committee (2021-12-1415), National Center for Global Health and Medicine Institutional Review Board (IRB) (NCGH-S-004437-00), Asan Medical Center IRB (2022-0098), Cardinal Santos Medical Center Research Ethics Review Committee (2021-052) and Taipei Veterans General Hospital IRB (2022-08-023AC). Informed consent was obtained from all the respondents.

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Disclosures

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18 433 **Data sharing statement**
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20 434 All data relevant to the study are included in the article or uploaded as supplementary information.
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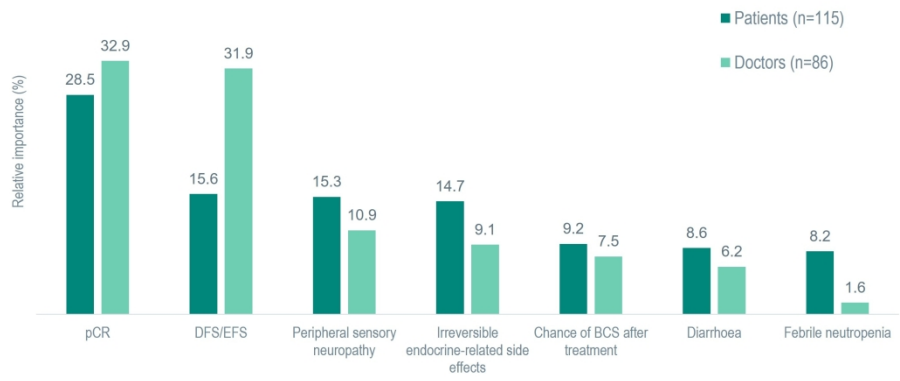
Figure legend

Figure 1. Relative importance of attributes in patients and doctors overall. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.

Figure 2. Relative importance of attributes in (a) patients and (b) doctors in different territories. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.

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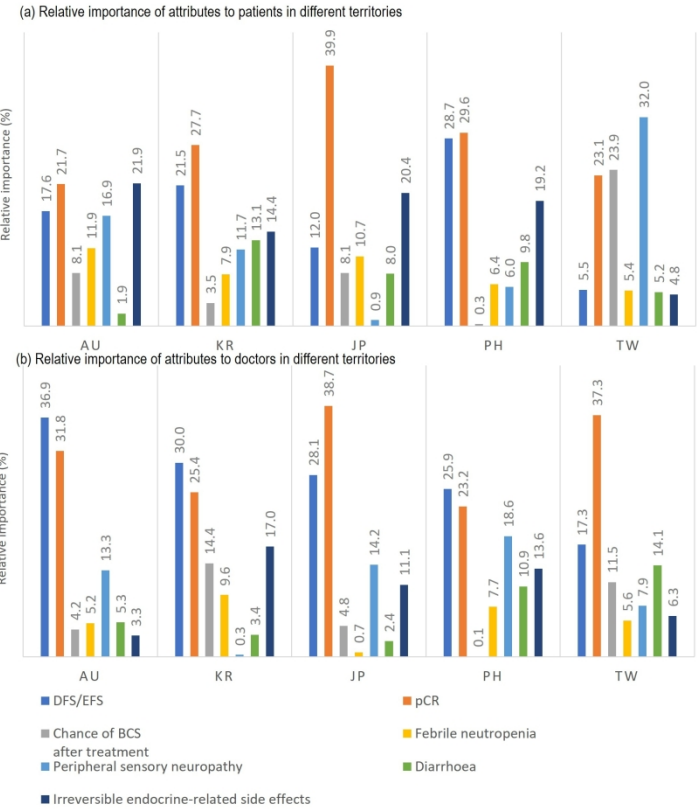
Figure 1.



Relative importance of attributes in patients and doctors overall. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.

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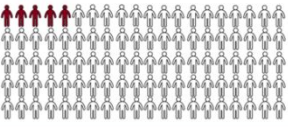
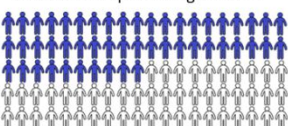
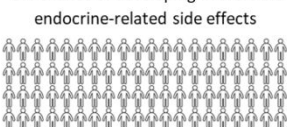
Figure 2.



Relative importance of attributes in (a) patients and (b) doctors in different territories. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.

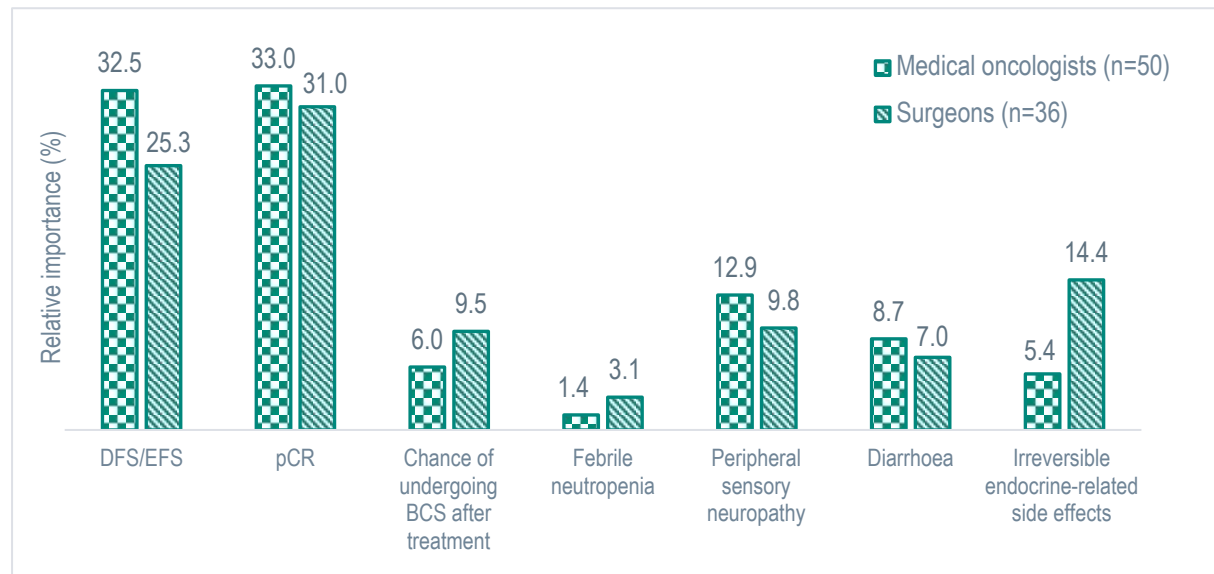
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Supplemental Figure 1. Sample of DCE questionnaire

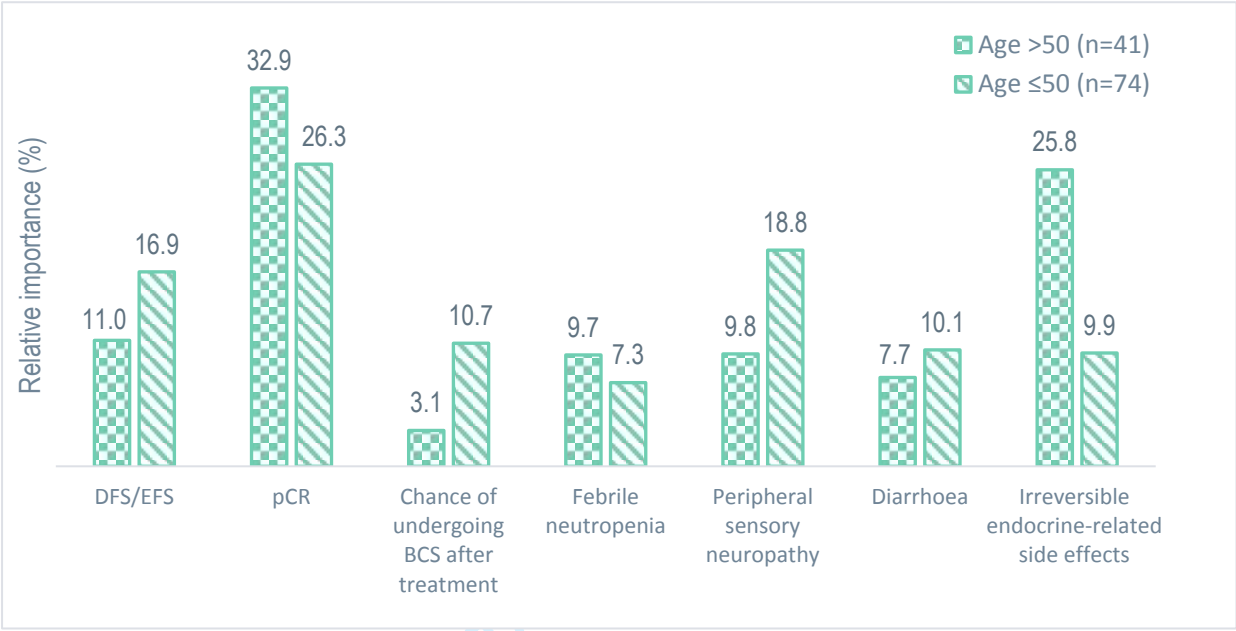
Attribute	Regimen A	Regimen B
Median disease-free/ event-free survival	12 months free of cancer, recurrence, progression, complications or death.	24 months free of cancer, recurrence, progression, complications or death.
Pathological complete response (pCR)	70% probability of achieving pCR 	30% probability of achieving pCR 
Chance of undergoing breast conserving surgery (BCS) after receiving this anticancer treatment	70% chance of undergoing BCS 	30% chance of undergoing BCS 
Febrile Neutropenia	5% risk of experiencing febrile neutropenia 	20% risk of experiencing febrile neutropenia 
Peripheral sensory neuropathy	5% risk of experiencing peripheral sensory neuropathy 	20% risk of experiencing peripheral sensory neuropathy 
Diarrhoea	50% risk of experiencing diarrhea 	10% risk of experiencing diarrhea 
Irreversible endocrine-related side effects requiring lifelong medication	8% chance of developing irreversible endocrine-related side effects 	0% chance of developing irreversible endocrine-related side effects 
If these were your only options, which treatment regimen would you choose? Select the box to indicate your choice. [Single select]	<input type="checkbox"/>	<input type="checkbox"/>

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Supplemental Figure 2. Relative importance of attributes in medical oncologists and surgeons.
BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.

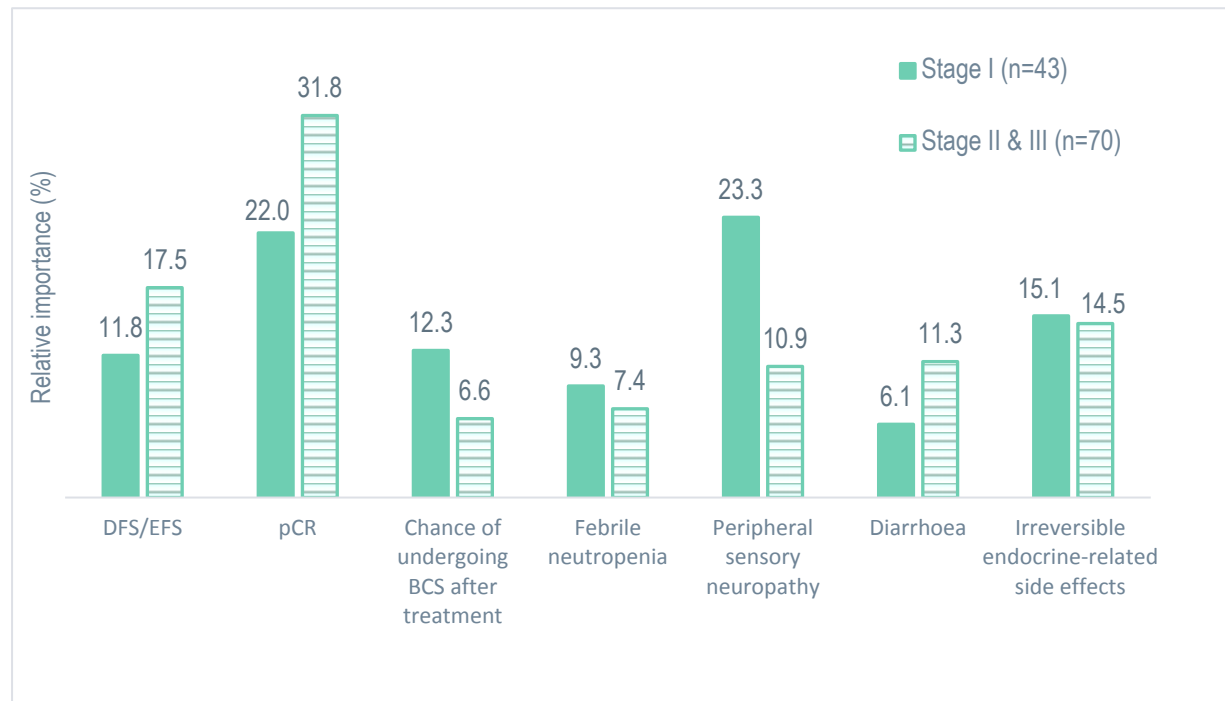


Supplemental Figure 3. Relative importance of attributes in patients younger than and above 50 years of age. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.

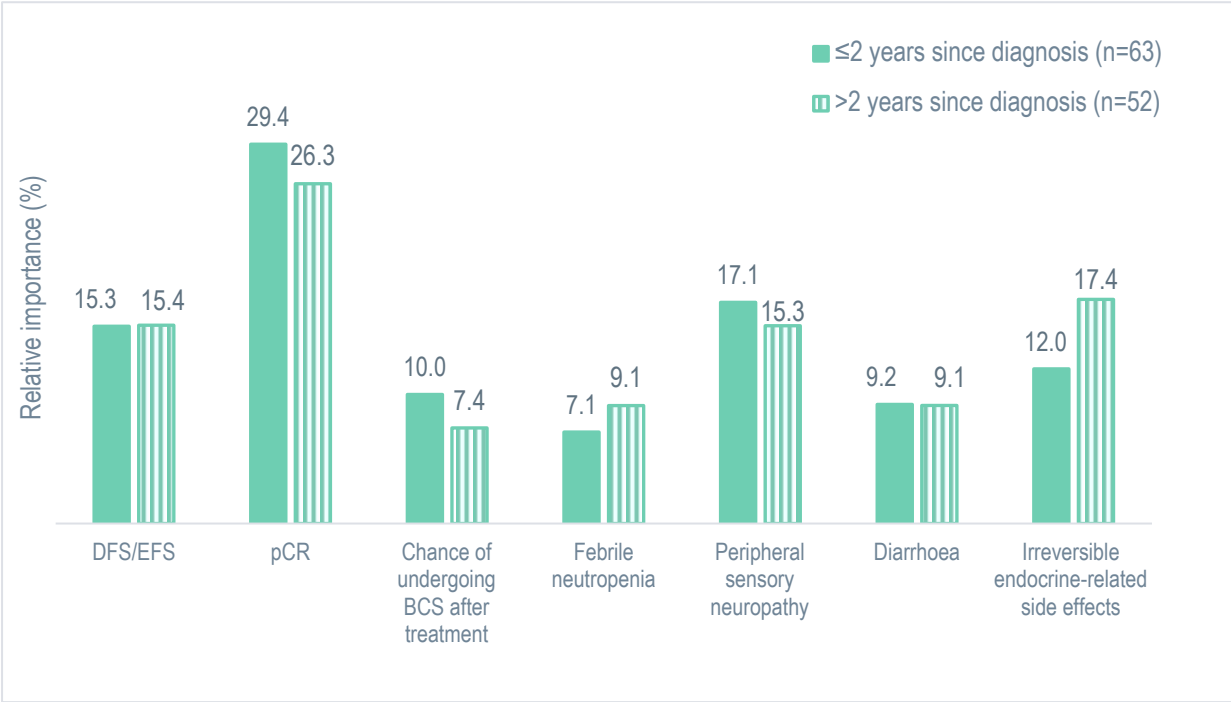


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Supplemental Figure 4. Relative importance of attributes in patients diagnosed at stage I and stages II and III. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.



Supplemental Figure 5. Relative importance of attributes in eTNBC patients who were diagnosed within and more than 2 years prior to study participation. BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.



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Supplemental Figure 6. Relative importance of attributes in patients who were receiving chemotherapy and non-chemotherapy options during study participation. Non-chemotherapy includes radiation therapy (n=3), surgery (n=6), don't know and not receiving treatment (n=37). BCS, breast-conserving surgery; DFS/ EFS, disease free survival/ event-free survival; pCR, pathological complete response.

