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Cost-effectiveness of antibody-drug conjugates in previously treated metastatic triple-negative breast cancer in China

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Abstract

Background The ASCENT and OptiTROP-Breast01 trials indicated that sacituzumab govitecan and sacituzumab tirumotecan significantly improved clinical benefits in metastatic triple-negative breast cancer (TNBC). This study evaluated the cost-effectiveness of trophoblast cell-surface antigen 2 (TROP2)-targeted antibody-drug conjugate (ADC) from the Chinese healthcare system perspective.

Methods A partitioned survival model with 21-day cycles was developed to simulate total costs, life-years, quality-adjusted life-years (QALYs), incremental cost-effectiveness ratio (ICER) over 10-year time horizons. Clinical data was extracted from the ASCENT and OptiTROP-Breast01 trial, costs and utilities were estimated from public bid-winning databases, local charges and published literature. The willingness-to-pay (WTP) threshold was three times gross domestic product per capita in 2024 ($40,334.05). In scenario analysis, models were constructed employing network meta-analyses based on chemotherapy as the reference arm. One-way and probabilistic sensitivity analyses were implemented to examine the robustness of the model.

Results In the base-case, the ICERs were $92,593.65/LY and $122,486.54/QALY for sacituzumab tirumotecan, and $348,005.00/LY and $409,219.27/QALY for sacituzumab govitecan compared with chemotherapy. Sacituzumab tirumotecan was dominant versus sacituzumab govitecan by virtue of lower costs and higher QALYs. When the unit costs of sacituzumab tirumotecan and sacituzumab govitecan were lower than $475.12 per 200 mg and $141.54 per 180 mg, they would be cost-effective over chemotherapy. The utility value of progression-free survival state was the most critical role on the base-case result. Probabilistic sensitivity analyses revealed that substantial price reductions for sacituzumab tirumotecan and sacituzumab govitecan could dramatically increase the probabilities of becoming cost-effective.

Conclusion Sacituzumab tirumotecan and sacituzumab govitecan were unlikely to be cost-effective in previously treated metastatic TNBC. Sacituzumab tirumotecan was the preferred TROP2-targeted ADC in China.

Keywords Triple-negative breast cancer, Cost-effectiveness, Sacituzumab tirumotecan, Sacituzumab govitecan, Antibody-drug conjugate

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Background

Breast cancer is the most common malignancy among women worldwide [1], and the second most common and fifth leading cause of cancer-related death among women in China, with 357,200 new cases and 75,000 deaths in 2022 [2]. It also entails enormous economic burdens, accounting for 10.66% of the total expenditure on cancer [3]. Triple-negative breast cancer (TNBC) is an aggressive subtype of breast cancer that is characterized by the absence of expression of estrogen receptors (ERs), progesterone receptors (PRs), and human epidermal growth factors receptor 2 (HER2) [4]. TNBC accounts for approximately 10–15% of all breast cancers, with a median survival of approximately 1 years [5]. In comparison with other subtypes, TNBC is more frequently diagnosed in younger women and has a higher risk of distant recurrence [6].

Trophoblast cell-surface antigen 2 (TROP2) was associated with tumor proliferation enhancement and poor prognosis and notably overexpressed in breast cancer [7, 8]. Sacituzumab govitecan is the only anti-TROP2 antibody-drug conjugate (ADC) approved for metastatic TNBC in multiple countries to date [9]. The phase III ASCENT trial demonstrated that sacituzumab govitecan provided longer median progression-free survival (PFS) [4.8 months vs. 1.7 months; hazard ratio (HR): 0.43; 95% confidence interval (CI) : 0.35–0.54] and median overall survival (OS) [11.8 months vs. 6.9 months; HR: 0.51; 95% CI: 0.41–0.62] compared with chemotherapy for metastatic TNBC patients who had previous use of taxanes [7]. Objective responses were achieved in 35% of patients administered with sacituzumab govitecan and 5% with chemotherapy [7]. Sacituzumab tirumotecan is a novel TROP2-directed ADC independently developed in China [8]. The OptiTROP-Breast01 study indicated that sacituzumab tirumotecan significantly prolonged the PFS [6.7 months vs. 2.5 months; HR: 0.32; 95% CI: 0.24–0.44] and OS [not reached vs. 9.4 months; HR: 0.53; 95% CI: 0.36–0.78] versus chemotherapy in Chinese patients with metastatic TNBC [8]. The percentage of patients with objective responses were 45% with sacituzumab govitecan and 12% with chemotherapy [8]. These treatments have been approved by the National Medical Products Administration in China and recommended by the Chinese Society of Clinical Oncology (CSCO) clinical guidelines [10].

There are no head-to-head clinical trials of sacituzumab govitecan and sacituzumab tirumotecan regarding comparative treatment effectiveness in metastatic TNBC. There are also no validated predictive biomarkers to prioritise one of these. Given the high treatment costs of novel regimens, policy-makers, patients, and clinicians should consider the value of these treatment options in terms of cost-effectiveness. Thus, this study aimed to investigate the cost-effectiveness of TROP2-targeted ADC in the treatment of metastatic TNBC patients from the Chinese healthcare system perspective. Our economic evidence could support clinicians in choosing the optimal treatment regimen and inform policy-makers in allocating limited healthcare resources.

Methods

This study was based on modeling techniques, price databases, and published literatures, so ethics committee approval was exempted. Economic evaluation was conducted according to the consolidated health economic evaluation reporting standards 2022 (CHEERS 2022) [11] (Supplementary Table 1).

Patients and treatments

Eligible patients with unresectable, locally advanced or metastatic TNBC that were relapsed or refractory to two or more previous standard chemotherapy regimens (at least one taxane therapy) [7, 8]. Patients were administered with sacituzumab govitecan (10 mg per kg intravenously on days 1 and 8 of each 21-day cycle), sacituzumab tirumotecan (5 mg per kg intravenously once every 2 weeks of each 28-day cycle) or chemotherapy (eribulin, 1.4 mg per m^2 intravenously on days 1 and 8 of each 21-day cycle; capecitabine, 1,250 mg per m^2 orally twice daily on days 1 through 14 of each 21-day cycle; gemcitabine, 1,000 mg per m^2 intravenously on days 1 and 8 of each 21-day cycle; or vinorelbine, 25 mg per m^2 intravenously on days 1 and 8 of each 21-day cycle) [7, 8]. Patients receiving chemotherapy were randomly assigned to receive eribulin (60.10%), capecitabine (8.00%), gemcitabine (13.50%) and vinorelbine (18.40%) [7, 8]. All treatments were administered to patients until disease progression, unacceptable toxicity, or any other reason for discontinuation [7, 8]. Since subsequent treatment regimens were not explicitly defined in the ASCENT and OptiTROP-Breast01 clinical trials [7, 8], we assumed that all patients were treated with best supportive care once disease progression occurred.

Model structure

Partitioned survival models were routinely used for economic evaluation and reimbursement decisions associated with oncology [12]. We developed a partitioned survival model with 21-day cycles to simulate disease regression and clinical benefits over 10-year time horizons based on the ASCENT and OptiTROP-Breast01 clinical trials from the Chinese healthcare system perspective (Fig. 1). All patients entered the model from the PFS state and could develop into the progressive disease (PD) or death states in each subsequent cycle [13]. Once transitioned into the PD state, patients could only remain in the PD state or progress to death state [13].

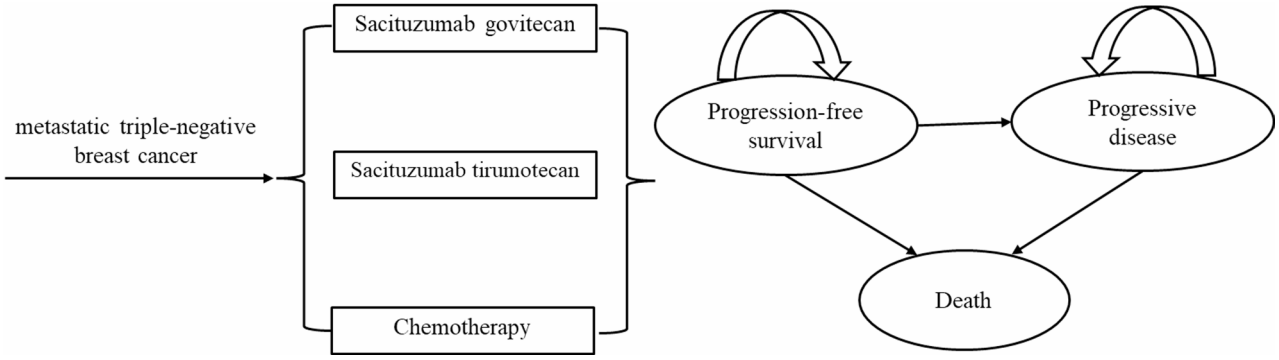


Fig. 1 The structure of the partitioned survival model

We calculated the total costs, life years (LYs) and quality-adjusted life years (QALYs) for each regimen, and the incremental cost-effectiveness ratio (ICER) between any two treatment regimens. All costs and QALYs were discounted at an annual rate of 5% with a range of 0% to 8%, and half-cycle correction was applied. As recommended by China guidelines for pharmacoeconomic evaluation 2020 [14], the willingness-to-pay (WTP) threshold was three times the gross domestic product (GDP) per capita of China in 2024 ($40,334.05). All costs were inflated to 2025 prices using the Consumer Price Index for healthcare and converted into US dollars ($1 = 7.1217 CNY, average value in 2024). This model was programmed in Microsoft Excel 2019 and R 4.3.2.

Clinical data

As the proportional hazards assumptions were not fully satisfied (Supplementary Fig. 1–4), the clinical data was directly extracted from the ASCENT and OptiTROP-Breast01 trials [7, 8]. GetData Graph Digitizer 2.26 was employed to extract data points from the Kaplan-Meier curves of PFS and OS to reconstruct individual patient data using an approach developed by Guyot et al. [15, 16]. Multiple parameter survival distributions were used to fit and extrapolate survival curves of different treatment regiments to predict survival and death beyond the follow-up periods of clinical trials, including Exponential, Weibull, Gamma, Generalised Gamma, Gompertz, Log-normal and Log-logistic distributions [17]. The best fitted distribution was determined based on Akaike information criterion, Bayesian information criterion, visual inspection, and clinical plausibility [18]. Survival data for chemotherapy were estimated from the average of best-fit distributions in the ASCENT and OptiTROP-Breast01 trials, which effectively avoided survival discrepancies from any single source [19]. According to the ISPOR-SMDM Task Force Report on Model Transparency and Validation [20], the face validity of the model was assessed by two clinicians, and internal validity was assessed by extreme parameters and substantial code checking. We selected the parametric survival distribution based on the lowest AIC value, more details were presented in Supplementary Tables 2 and Supplementary Figs. 5–12.

Costs

Only direct medical costs were calculated, including drugs, routine surveillance, management of severe AEs and subsequent treatment. The unit drug costs of sacituzumab govitecan, sacituzumab tirumotecan and chemotherapy were estimated by average winning bid prices from YaoZH database (https://data.yaozh.com/) in 2025 [21]. Since treatment regiments were administered based on patient weight or body surface area, the default patient weight of 57.37 kg and body surface area of 1.72 m^2 was applied [22, 23]. Routine surveillance was performed in accordance with the CSCO Clinical Guideline for Breast Cancer [10], covering laboratory tests, computed tomography of chest and abdomen, and bone scan [23]. As the grade 1–2 adverse events (AEs) could be manageable with standard monitoring, only grade 3–4 AEs with an incidence of 5% or more were calculated in the model, including neutropenia, anemia, leukopenia, febrile neutropenia, thrombocytopenia, diarrhea, fatigue and stomatitis [7, 8]. The AEs for sacituzumab govitecan and sacituzumab tirumotecan were derived from the ASCENT and OptiTROP-Breast01 trials [7, 8], respectively, and chemotherapy-associated AEs were estimated as the average incidence of the two clinical trials. The management costs of AEs were estimated by multiplying costs associated with grade 3–4 AEs with an incidence of 5% or more by the respective incidence rates of each AE. The costs of routine follow-up, management of severe AEs and best supportive care were retrieved from previously published literatures, and were adjusted to 2025 prices with the Consumer Price Index [22–26].

Health state utilities

The QALYs were calculated in the model by multiplying the time spent in health states by a health state utility

value, which represented health-related quality of life anchored at 0 (death) and 1 (perfect health) [27]. As quality of life was not included in the ASCENT and OptiTROP-Breast01 trials [7, 8], published health state utility values were used in this study [28]. The utility value for PFS state without toxicity was 0.715, and a decrease by 0.272 for disease progression, as measured using the standard gamble [28]. In addition, our model accounted for utility decrements caused by grade 3–4 AEs. The disutility values associated with serious AEs were derived from published studies [25, 28–30]. The costs and utilities are presented in Table 1.

Sensitivity analyses

One-way and probabilistic sensitivity analyses were conducted for essential input parameters to assess the robustness of the base-case results. In the one-way sensitivity analysis, the estimated range of model parameters were either based on 95% CI in the published literature or determined by a variance of 20% from the base-case values [31]. The results were presented in tornado diagrams. In the probabilistic sensitivity analysis, 10,000 Monte Carlo simulations was generated by simultaneously sampling the critical model parameters from the pre-specified statistical distributions [32]. Gamma distributions were selected for costs, beta distributions were assigned to utility value and the incidence of AEs [33]. The results were presented in an incremental cost-effectiveness scatter plot. The cost-effectiveness acceptability curve was generated to illustrate the probabilities of each competing treatment regiments being cost-effective at various WTP thresholds [33].

Scenario analyses

First, we performed cost-threshold analyses for sacituzumab govitecan and sacituzumab tirumotecan. Second, the utility values derived from related economics evaluation were used in the model, and we adjusted the PFS state to 0.76 and 0.85, and the PD state to 0.55 and 0.52 [22, 25]. At the same time, based on the mapping functions developed by Liu et al. [34], we mapped the baseline EORTC QLQ-C30 scores in the ASCENT trial to EQ-5D-5L and SF-6D [35]. The utility values for the PFS state in the ADC and chemotherapy groups were adjusted to 0.797 and 0.782 (EQ-5D-5L), and 0.627 and 0.619 (SF-6D), respectively. Third, we constructed partitioned survival model based on network meta-analysis. We utilized the time-independent HRs calculated from the network meta-analysis to the chemotherapy arms, yielding the expected survival data for sacituzumab govitecan and sacituzumab tirumotecan. Fourth, according to the ASCENT and OptiTROP-Breast01 trials, the proportions of patients receiving subsequent treatment in the chemotherapy, sacituzumab govitecan and sacituzumab tirumotecan groups were 71.4%, 73.4% and 50.8% respectively [8, 36].

Results

Base-Case results

Compared with chemotherapy, sacituzumab tirumotecan and sacituzumab govitecan were associated with 0.38-year and 0.23-year increase in life expectancy, and 0.29-QALY and 0.20-QALY increase at an incremental cost of $35,543.11 and $81,140.06. The resulting ICERs were approximately $92,593.65 per LY and $122,486.54 per QALY for sacituzumab tirumotecan, and $348,005.00 per LY and $409,219.27 per QALY for sacituzumab govitecan, respectively(Table 2).

Sensitivity analyses

One-way sensitivity analyses showed that utility value of PFS state, the costs of sacituzumab tirumotecan and sacituzumab govitecan, patient weight, and utility value of PD state had considerable impacts on the base-case results. Compared with chemotherapy, the lowest and highest ICERs were $97,329.95 per QALY and $160,994.35 per QALY for sacituzumab tirumotecan, and $320,779.18 per QALY and $564,988.96 per QALY for sacituzumab govitecan, respectively (Fig. 2). Probabilistic sensitivity analyses showed that the probability of sacituzumab tirumotecan and sacituzumab govitecan versus chemotherapy being cost-effective was approximately 0% at the WTP threshold of 3 times GDP per capita ($40,334.05) in China (Figs. 3 and 4). As the WTP threshold increased, sacituzumab tirumotecan would become the optimal regimen, while sacituzumab govitecan was unlikely to become the preferred option (Fig. 4).

Scenario analyses

Sacituzumab tirumotecan and sacituzumab govitecan were cost-effective compared with chemotherapy when the unit cost of sacituzumab tirumotecan and sacituzumab govitecan were lower than $475.12 per 200 mg and $141.54 per 180 mg, respectively (Fig. 5). When the utility value for PFS and PD states were 0.76 and 0.55, sacituzumab tirumotecan and sacituzumab govitecan yielded relatively lower ICERs of $118,528.79 per QALY and $408,981.94 per QALY versus chemotherapy. When the utility value for PFS and PD states were 0.85 and 0.52, the ICERs of sacituzumab tirumotecan and sacituzumab govitecan further decreased (Supplementary Table 3). Compared with the base-case analysis, the ICERs of sacituzumab tirumotecan and sacituzumab govitecan estimated using the EQ-5D-5L were lower, while those based on the SF-6D were relatively higher. When the models were constructed based on network meta-analysis, the ICERs for sacituzumab tirumotecan ($50,221.13/QALY) and sacituzumab govitecan ($79,707.78/QALY)

Table 1 Model parameter

Parameters	Baseline	Range		Distribution	Source
		Minimum	Maximum		
Costs ($)					
Sacituzumab govitecan (180 mg)	1179.49	943.59	1415.39	Gamma	[21]
Sacituzumab tirumotecan (200 mg)	1319.77	1055.82	1583.72	Gamma	[21]
Eribulin (1 mg)	99.05	79.24	118.86	Gamma	[21]
Capecitabine (500 mg)	0.67	0.53	0.80	Gamma	[21]
Gemcitabine(200 mg)	10.30	8.24	12.37	Gamma	[21]
Vinorelbine (10 mg)	17.80	14.24	21.35	Gamma	[21]
Best supportive care per cycle	359.00	287.20	430.80	Gamma	[23]
Laboratory tests per event	70.96	56.76	85.15	Gamma	[23]
CT of chest and abdomen per event	170.29	136.23	204.35	Gamma	[23]
Bone scan per event	113.53	90.82	136.23	Gamma	[23]
Routine follow-up per event	38.39	30.71	46.07	Gamma	[24]
Cost of Neutropenia	446.05	356.84	535.26	Gamma	[23]
Cost of Anemia	678.60	542.88	814.32	Gamma	[25]
Cost of Leukopenia	446.05	356.84	535.26	Gamma	[23]
Cost of Febrile neutropenia	664.03	531.22	796.84	Gamma	[22]
Cost of Thrombocytopenia	4532.97	3626.38	5439.56	Gamma	[25]
Cost of Diarrhea	56.54	45.23	67.85	Gamma	[25]
Cost of Fatigue	131.78	105.42	158.14	Gamma	[22]
Cost of Stomatitis	3000.00	2400.00	3600.00	Gamma	[26]
Adverse events (%)					
Neutropenia of chemotherapy	40%	32%	48%	Beta	[7, 8]
Anemia of chemotherapy	5%	4%	7%	Beta	[7, 8]
Leukopenia of chemotherapy	21%	17%	25%	Beta	[7, 8]
Fatigue of chemotherapy	5%	4%	6%	Beta	[7]
Neutropenia of SG	51%	41%	61%	Beta	[7]
Anemia of SG	8%	6%	9%	Beta	[7]
Leukopenia of SG	10%	8%	12%	Beta	[7]
Febrile neutropenia of SG	6%	5%	7%	Beta	[7]
Diarrhea of SG	10%	8%	13%	Beta	[7]
Neutropenia of ST	35%	28%	42%	Beta	[8]
Anemia of ST	29%	23%	35%	Beta	[8]
Leukopenia of ST	28%	22%	33%	Beta	[8]
Thrombocytopenia of ST	13%	10%	16%	Beta	[8]
Stomatitis of ST	10%	8%	12%	Beta	[8]
Utility values					
Utility of PFS	0.72	0.57	0.86	Beta	[28]
Utility of PD	0.44	0.35	0.53	Beta	[28]
Disutility of Neutropenia	0.20	0.16	0.24	Beta	[29]
Disutility of Anemia	0.19	0.15	0.23	Beta	[25]
Disutility of Leukopenia	0.20	0.16	0.24	Beta	[29]
Disutility of Febrile neutropenia	0.15	0.12	0.18	Beta	[28]
Disutility of Thrombocytopenia	0.11	0.09	0.13	Beta	[30]
Disutility of Diarrhea	0.10	0.08	0.12	Beta	[28]
Disutility of Fatigue	0.12	0.09	0.14	Beta	[28]
Disutility of Stomatitis	0.15	0.12	0.18	Beta	[28]
Other parameters					
Discount rate (%)	5	0	8	Beta	[14]
Body surface area (m^2)	1.72	1.38	2.06	Normal	[22]
Patient weight (kg)	57.37	45.90	68.84	Normal	[22]

CT computed tomography, *SG* Sacituzumab govitecan, *ST* Sacituzumab tirumotecan, *PFS* progression-free survival, *PD* progressive disease

Table 2 Base-case results

Strategy	Costs, $	LYs	QALYs	ICER ($/LY)		ICER ($/QALY)	
Chemotherapy	7,298.82	1.01	0.49	—		—	
Sacituzumab tirumotecan	42,841.93	1.39	0.78	92,593.65	—	122,486.54	—
Sacituzumab govitecan	88,438.88	1.24	0.69	348,005.00	Dominated	409,219.27	Dominated

LY life-year, *QALY* quality-adjusted life-year, *ICER* incremental cost-effectiveness ratio

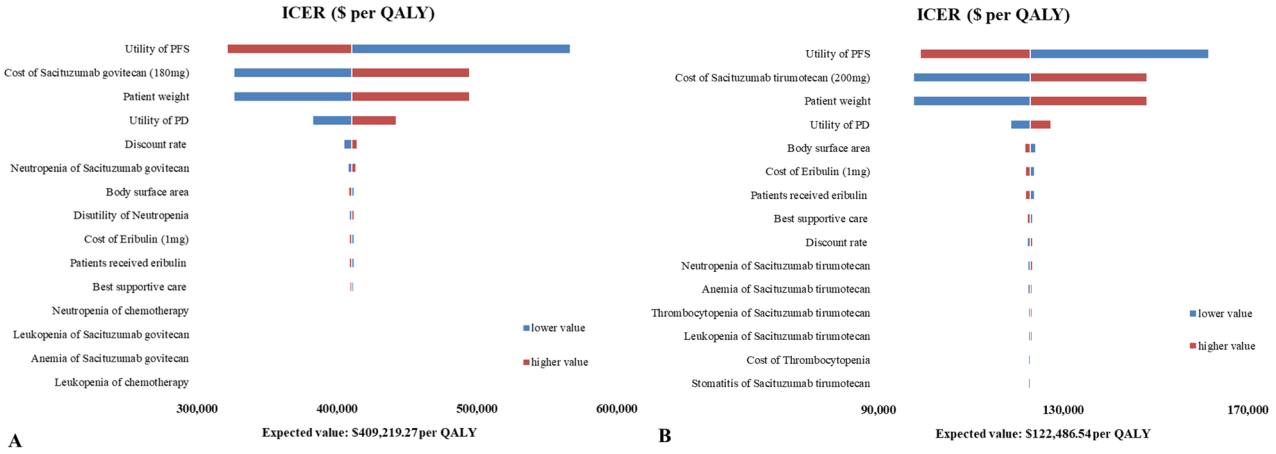


Fig. 2 One-way sensitivity analysis results of sacituzumab tirumotecan (**A**) and sacituzumab govitecan (**B**) compared with chemotherapy. PFS: progression-free survival; PD: progressive disease; ICER: incremental cost-effectiveness ratio.

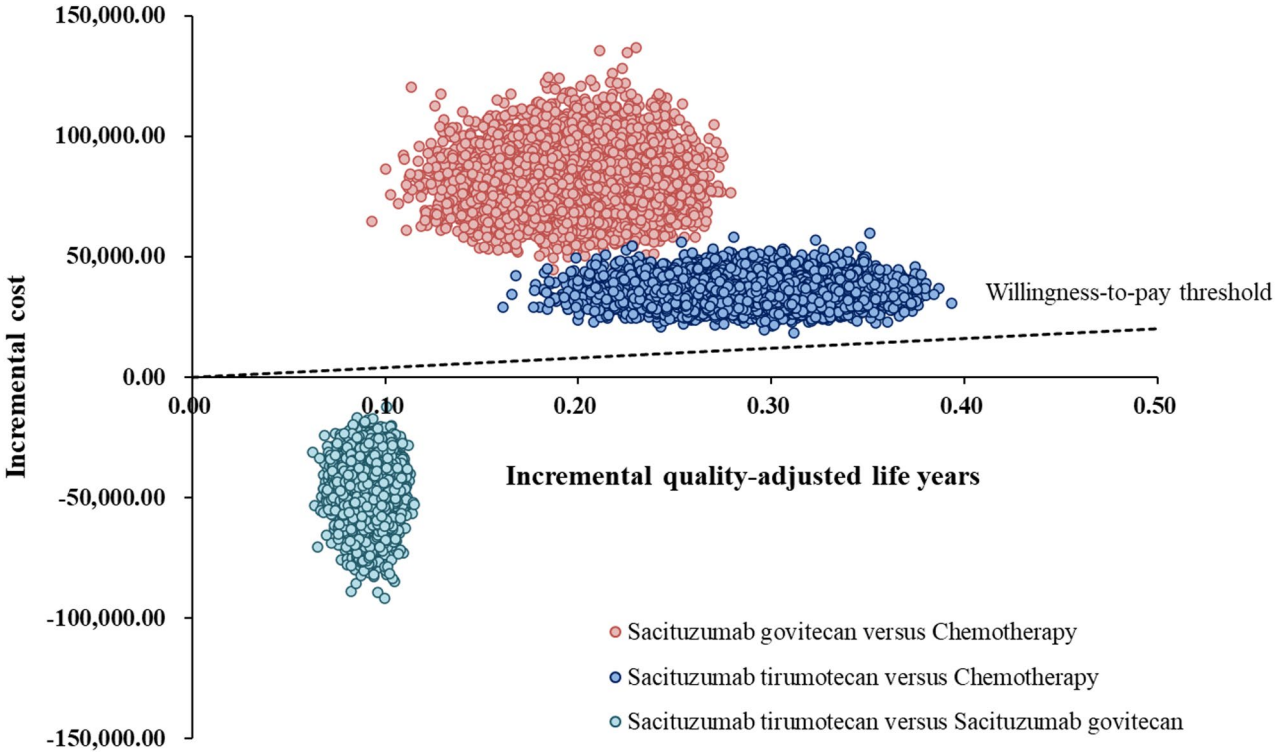


Fig. 3 The incremental cost-effectiveness scatter plot

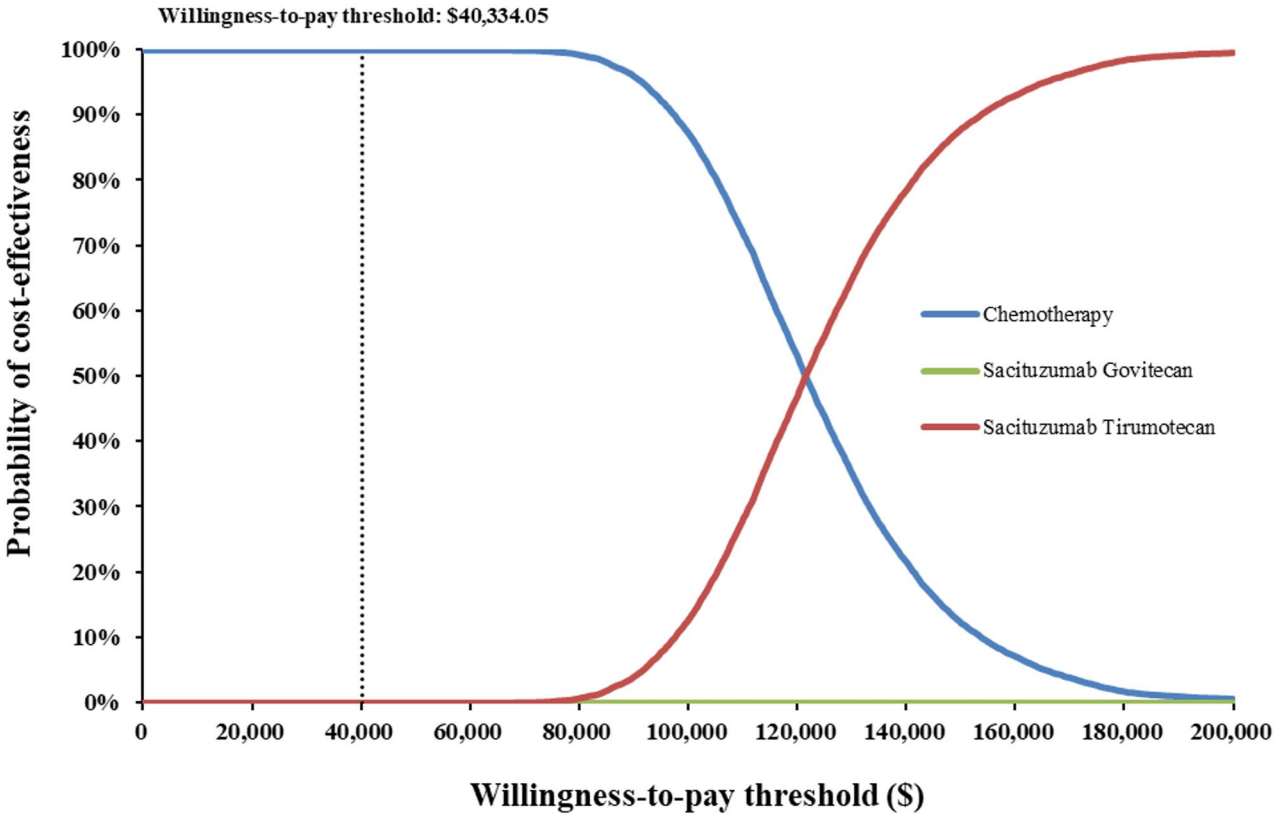


Fig. 4 The cost-effectiveness acceptability curve of the probabilistic sensitivity analysis results

versus chemotherapy decreased significantly. When the proportion of patients receiving subsequent treatment was calculated in the model, the ICERs for sacituzumab tirumotecan ($120,155.27/QALY) and sacituzumab govitecan ($411,391.83/QALY) were similar to those in the base-case analysis. However, these values remained above the WTP threshold (Supplementary Table 3).

Discussion

Since 2021, the therapeutic landscape for metastatic TNBC has made substantial progress, with the extensive application of TROP2-targeted ADC in clinical practice [7, 8]. To our knowledge, this is the first economic evaluation to comprehensively summarize the cost-effectiveness of all available TROP2-targeted ADCs in metastatic TNBC from the Chinese healthcare system perspective. The results indicated that sacituzumab tirumotecan and sacituzumab govitecan yielded ICERs of $122,486.54/QALY and $409,219.27/QALY compared with chemotherapy. Sacituzumab tirumotecan was a high-value treatment strategy compared to sacituzumab govitecan in the treatment of metastatic TNBC in China, which yielded the higher QALYs at the lower cost. These results could support reimbursement decision making and individualized treatment selection in clinical practice.

The utility value of PFS state was the most substantial parameter on the base-case results. The scenario analyses revealed that the source of utility values did not substantially alter the findings [22, 25, 28]. At current prices and WTP thresholds, sacituzumab tirumotecan and sacituzumab govitecan were not cost-effective versus chemotherapy; and sacituzumab tirumotecan was the preferred option compared to sacituzumab govitecan. Since treatment regiments were used based on patient weight [7, 8], the costs of sacituzumab tirumotecan and sacituzumab govitecan, and patient weight became the second most important driving factors. Different body weights might use different dosages, suggesting that sacituzumab tirumotecan and sacituzumab govitecan would be unfavorable in overweight or obese patients because of more dosages and costs required [26, 37]. Therefore, future studies are required to explore the most suitable dosage. In addition, the utility value of PD state was also an important model parameter. Compared to sacituzumab tirumotecan and sacituzumab govitecan, chemotherapy regimens could accumulate more health outcomes in the PD state. Consequently, assigning higher utility values for PD states would consequently lead to elevated ICERs for sacituzumab tirumotecan and sacituzumab govitecan versus chemotherapy, thereby diminishing their cost-effectiveness appeal.

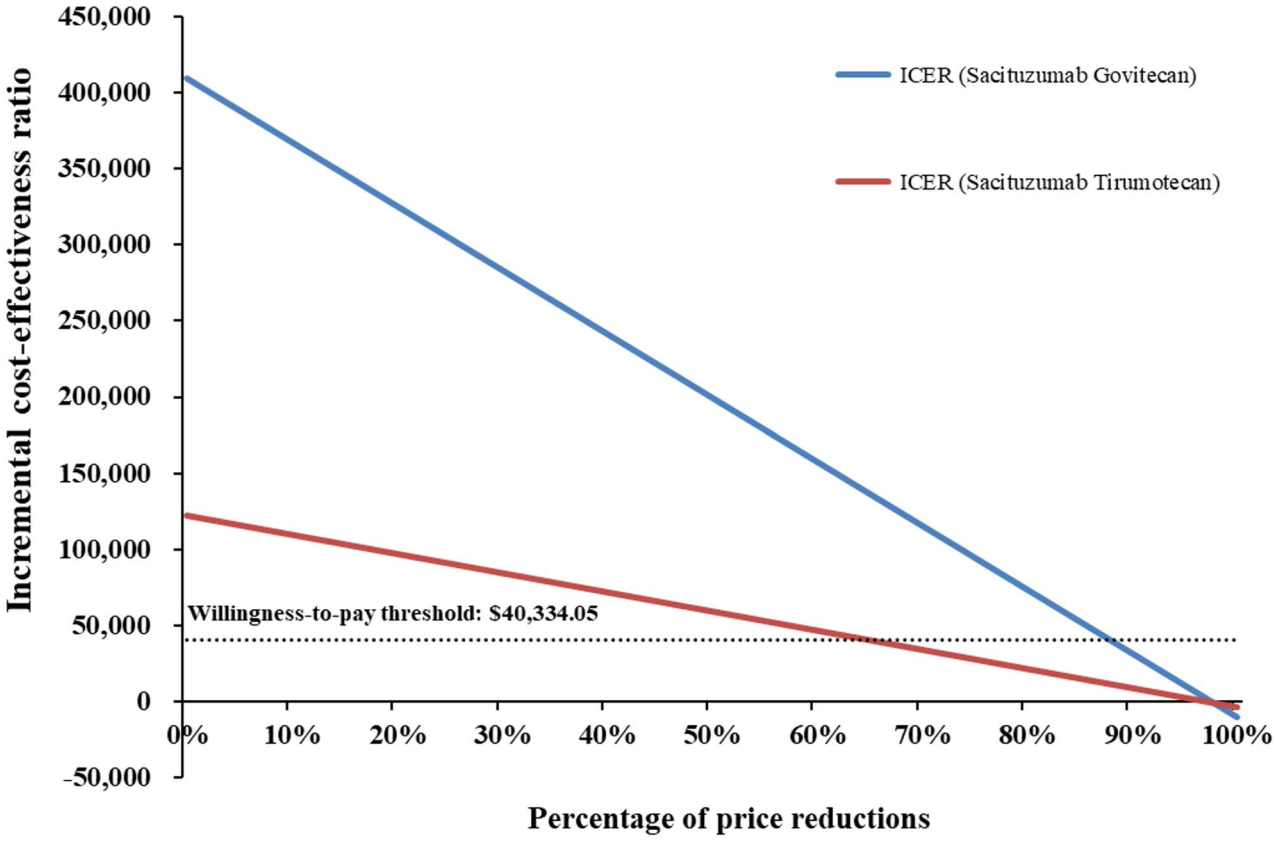


Fig. 5 Scenario analysis results for price reductions of sacituzumab tirumotecan and sacituzumab govitecan. ICER: incremental cost-effectiveness ratio

Sacituzumab govitecan represented the pioneering TROP2-targeted ADC, emerging as a pivotal therapeutic modality for metastatic TNBC and metastatic hormone receptor-positive human epidermal growth factor receptor 2-negative (HR + HER2-) breast cancer [7, 9, 38]. However, sacituzumab govitecan was not cost-effective in numerous countries. In China, three economic evaluations showed that sacituzumab govitecan was not cost-effective compared with chemotherapy in metastatic TNBC, with ICERs ranged from $323,603.84/QALY to $924,037/QALY [22, 39, 40]. This study was consistent with these three studies, and the ICER for sacituzumab govitecan was within the range of the intervals. Liu et al. developed a partitioned survival model to investigate the cost-effectiveness of sacituzumab govitecan for treating HR + HER2- metastatic breast cancer based on the EVER132-002 trial, the ICER was $211,948.62/QALY versus chemotherapy from the Chinese healthcare system perspective [23]. In the United States, the ICERs of sacituzumab govitecan ranged from $494,479/QALY to $1,252,295/QALY in the treatment of metastatic TNBC, exceeding the current WTP threshold of $150,000 [40–42]. Shi et al. evaluated the cost-effectiveness of sacituzumab govitecan for treating HR + HER2- metastatic breast cancer using a partitioned survival model based on the TROPiCS-02 trial, the ICER was $612,772/QALY versus chemotherapy from the third-party payer perspective in the United States [43]. In Singapore, sacituzumab govitecan yielded an ICER of $237,816/QALY above the WTP threshold of $65,254 in the treatment of metastatic TNBC [44]. To conclude, substantial price reductions for sacituzumab govitecan were warranted, which could radically improve affordability for patients with metastatic TNBC.

Sacituzumab tirumotecan was the first independently developed TROP2-targeted ADC in China, and exhibited promising clinical benefits in metastatic TNBC and epidermal growth factor receptor (EGFR) mutant-positive locally advanced or metastatic non-squamous non-small cell lung cancer (NSCLC) [8, 45, 46]. The phase 2 trial demonstrated that the median PFS for EGFR mutant-positive NSCLC was 11.1 months treated with sacituzumab tirumotecan, with a 55% objective response rate [45]. In March 2025, sacituzumab tirumotecan was approved for locally advanced or metastatic EGFR-mutant NSCLC that had been treated with at least one EGFR tyrosine kinase inhibitor (TKI) [45]. Shu et al. developed a partitioned survival model to evaluate the cost-effectiveness of sacituzumab tirumotecan versus chemotherapy for metastatic triple-negative breast cancer from the Chinese

healthcare system perspective [47]. This study found that reducing the cost of sacituzumab tirumotecan by 80% would reduce the ICER to $13,319.46/QALY, with a cost-effectiveness probability of 99.82% [47]. Our findings were largely consistent with this study. The cost threshold analysis indicated that sacituzumab tirumotecan would become a cost-effective option compared to chemotherapy if the unit cost decreased to $475.12 per 200 mg.

In recent years, to control the escalating cost of medicines, the government has initiated national price negotiations to improve the affordability of expensive medicines [48]. The Chinese government possesses strong bargaining power. Many innovative anti-cancer drugs have been substantially reduced in price by approximately 70% to enter the National Reimbursement Drug List [49]. Toripalimab was the sole first-line treatment option available for TNBC that was covered by medical insurance. A cost-effectiveness analysis revealed that the ICER of toripalimab plus chemotherapy versus chemotherapy was $16,133.18/QALY, which suggested that toripalimab plus chemotherapy represented a cost-effective strategy in China [50]. To date, second-line or above treatment options have not been covered by the National Reimbursement Drug List. This study could provide economic evidence for national price negotiations and price adjustments. At the WTP threshold of three times gross domestic product per capita in 2024 ($40,334.05), sacituzumab tirumotecan and sacituzumab govitecan would require 64% and 88% price reductions to be cost-effective in China.

Our model has some limitations. First, clinical data were extracted from the ASCENT and OptiTROP-Breast01 trials and have not been externally validated, as neither head-to-head clinical trials nor real-world data (e.g., national cancer registries or observational cohorts) were available. Differences in baseline characteristics might cause some bias in the model results. Second, there were no health utility values for metastatic breast cancer in China, and we used data from the general public in the UK as a proxy, which might result in insufficiently accurate estimates of health outcomes. Scenario analyses showed that the source of utility values would not substantially alter the research findings. Further validation should be conducted based on utility values of the Chinese population. Third, only costs and disutility values associated with severe AEs (grade 3 or 4) were considered, which might underestimate costs and overestimate health outcomes. Finally, we assumed that all patients were administered with best supportive care after disease progression, as neither clinical trials nor CSCO guidelines recommended subsequent treatment [7, 8, 10]. Notwithstanding these limitations in our model, we believed our conclusions were justified.

Conclusion

Sacituzumab tirumotecan and sacituzumab govitecan might not be cost-effective compared with chemotherapy in previously treated metastatic TNBC at the WTP threshold of three times gross domestic product per capita in China. Compared with sacituzumab govitecan, sacituzumab tirumotecan was the preferred TROP2-targeted ADC with higher QALY at lower cost.

Supplementary Information

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Supplementary Material 1.

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Code availability
Available upon request.

Authors' contributions
Shixian Liu: Conceptualization; Data curation; Methodology; Software; Writing-original draft; Writing-review and editing. Kaixuan Wang: Data curation; Formal analysis; Validation. Ruixue Wang: Data curation; Formal analysis; Validation. Hao Chen: Data curation; Investigation; Software. Ziming Wan: Data curation; Investigation; Software. Lei Dou: Methodology; Supervision; Writing-review and editing. Shunping Li: Methodology; Supervision; Writing-review and editing. All authors read and approved the final manuscript.

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Data availability
All data generated or analysed during this study are included in the manuscript and supplementary files.

Declarations

Ethics approval and consent to participate
Not applicable.

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Competing interests
The authors declare no competing interests.

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