A comparative study of subcutaneous and intravenous administration of the trastuzumab-pertuzumab combination in patients with HER2-positive breast cancer: a retrospective and prospective combined analysis of time efficiency, cost-effectiveness, quality of life, and socioeconomic impact

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Background

Intravenous (IV) administration of trastuzumab and pertuzumab (TRA+PER) for HER2-positive breast cancer requires 60 to 150 minutes per infusion session, imposing significant operational constraints in busy chemotherapy departments. This lengthy process limits patients' daily activities, consumes healthcare providers' time, and imposes substantial burdens on both patients and healthcare resources.
In 2023, a fixed-dose combination for subcutaneous (SC) administration was approved in Japan, offering potential advantages in terms of administration efficiency. However, robust real-world clinical data regarding time efficiency, cost-effectiveness, impact on quality of life, and utilization of healthcare resources are limited within the Japanese healthcare setting.

Study Design

IV Group	VS	SC Group
302 administrations		269 administrations

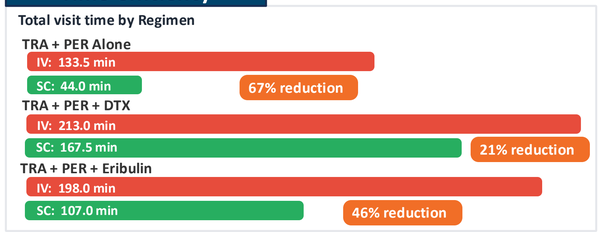
Design: Single-center, combined retrospective and prospective study
Data Sources: Electronic medical records (retrospective)
Patient and Healthcare provider (HCP) questionnaires (prospective)
Period: March 2024 - June 2025
Primary Endpoints: Total visit time (registration to payment), Costs
Secondary Endpoints: Patient QOL, HCP satisfaction and workload
Cost Analysis: Simulated based on a 1-year course of postoperative adjuvant therapy.

Patient Characteristics

Category	Data
Age (years), mean (range)	61.2 (27-81)
Sex (Female : Male)	67 : 1
Performance Status (PS) (0 : 1)	58 : 10
Route: IV only (patients) SC only (patients) Switched (patients)	27 20 21
Timing of Administration (n=571)	AM: 303 / PM: 268
Regimen (sessions)	IV (n) / SC (n)
TRA + PER alone	276 / 172
TRA + PER + DTX	16 / 47
TRA + PER + Eribulin	31 / 29

Results

Time-efficiency



Cost-effectiveness

Supply Cost Breakdown

Category	Item	Unit Price (yen)	Total
IV Group	IV infusion needle	220	
	IV Dressing	112	
	IV Connector	2,093	
	IV Tubing	149.6	
	Alcohol disinfectant	1.9	
	Diluent (Saline)	267	2844
SC Group	SC Injection needle	14.1	
	Alcohol disinfectant	1.9	
	Diluent (Saline)	145	161

Annual Cost	IV Group	SC Group	Difference
Supply Cost	-48,343	-2,733	+45,610
Outpatient Chemotherapy Add-on Fee	+80,000	+12,000	-68,000
Labor Cost	-40,347	0	+40,347
Subtotal	-8,690	+9,266	+17,956

Annual Cost	IV Group	SC Group	Difference
Hospital Net Profit	-8,690	+9,266	+17,956
Patient Productivity Gain	0	+784,983	+784,983
Total Benefits	-8,690	+794,249	+802,939

Quality of life

Satisfaction and burden were evaluated on a 5-point scale. The perception gap was calculated as Patient score minus HCP score. Positive values indicate Patient score > HCP score.

Patient-Healthcare provider Perception Gap in IV Group

Item	Gap	Description
Freedom of Movement	-1.56	Patients feel strongly restricted; HCPs do not fully perceive this constraint.
Information Understanding	+1.25	Patients are satisfied with explanations; HCPs remain cautious about comprehension.
Device Burden	-1.15	Patients perceive higher device burden than HCPs.
Total Satisfaction	+0.86	Patient QOL perception exceeds HCP evaluation.
Communication	+0.84	Patients value communication despite the short interaction.

Patient-Healthcare provider Perception Gap in SC Group

Item	Gap	Description
Information Understanding	+1.17	Consistent with IV: Patients are satisfied with explanations but HCPs are cautious.
Privacy	+1.07	HCPs prioritize privacy considerations regarding thigh injection more than patients.
Relief from Anxiety	+0.96	Patients feel significantly reduced anxiety with SC.
Communication	+0.84	Patients value SC interaction more than with IV; HCPs do not fully appreciate this.
Schedule Flexibility	+0.65	Both groups perceive improvement, but patients rate it higher.

Discussion

Time-efficiency

- SC administration achieved a 67% reduction in total visit time for TRA+PER monotherapy (from 133.5 minutes to 44.0 minutes), with a 21% reduction when combined with DTX and 46% reduction when combined with Eribulin.
- Time savings were achieved regardless of chemotherapy combination, demonstrating minimized constraints on patients' daily lives.
- The difference in time reduction between chemotherapy regimens is considered likely due to the small sample size.

Cost-effectiveness

- The IV group incurred a net loss of 8,690 yen, compared to a net profit of 9,266 yen in the SC group, representing an improvement of 17,956 yen per administration.
- Medical supply costs were significantly reduced from 2,844 yen (IV) to 161 yen (SC), confirming clear savings by eliminating IV-related equipment.
- Socioeconomic benefits including improved patient labor productivity reached 802,939 yen annually. Although patient out-of-pocket costs remained unchanged due to Japan's High-Cost Medical Expense Benefit, SC administration achieved cost savings that exceeded the reduction in the outpatient chemotherapy add-on fee.

Quality of Life

- In the 18-item questionnaire, the SC group demonstrated superiority in most items, with patients experiencing improved freedom of movement, enhanced privacy, and decreased anxiety.
- Since SC administration requires approximately 5 minutes, HCPs can dedicate sufficient time for patient dialogue, enabling high-quality, patient-centered care through comprehensive explanations and psychological support.
- In a survey of 21 patients who experienced both IV and SC routes, both patients and HCPs overwhelmingly preferred SC administration.
- The patient-HCP perception gap was largest for "Freedom of Movement" in the IV group. However, this gap was reduced in the SC group, with patient evaluations exceeding HCP perceptions for "Privacy", "Relief from Anxiety", and "Communication".

Limitations

- This was a single-center study with a short observation period (March 2024 to June 2025), limiting the generalizability of the findings and long-term safety and efficacy data.
- Cost analysis was limited to cases without complications, and the economic impact of adverse events was not evaluated.
- Validation through multi-center collaborative research and accumulation of long-term observational data are needed in the future.

Conclusions

SC administration of trastuzumab and pertuzumab for HER2-positive breast cancer significantly reduced total visit time, improved institutional cost-effectiveness, and enhanced both patient and HCP satisfaction compared with IV administration, supporting SC administration as a preferable option in routine practice.

Contact

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