Adverse Social Determinants of Health Are Associated With Lower Rates of Cardiotoxicity Surveillance in Trastuzumab-Treated Breast Cancer Patients

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Background

- Trastuzumab is associated with known risk of cardiotoxicity, requiring routine cardiac surveillance.
- Guidelines recommend baseline echocardiography and repeat assessments every 3 months to detect early left ventricular dysfunction.
- Social determinants of health (SDOH) may limit access to recommended surveillance, delaying detection of cardiotoxicity and worsening outcomes.
- This study evaluates how adverse SDOH affect adherence to guideline-directed cardiac surveillance in breast cancer patients receiving trastuzumab.

Methods and Materials

- **Study Design:** Retrospective cohort study using the TriNetX US Collaborative Network (≈70 healthcare organizations).
- **Population:** Adults ≥18 years with breast cancer who received trastuzumab between 2000–2024.
- **Cohort Definition**: Stratified by presence vs absence of documented SDOH risk factors using ICD-10 codes.
- **1:1 propensity score matching** (PSM) for demographics, comorbidities, and relevant medications.
- **Primary outcome:** Proportion of patients completing transthoracic echocardiography (TTE) at guideline-specified intervals.
- **Time windows assessed:** 0–3 months, 3–6 months, and 6–12 months following trastuzumab initiation.
- **Statistical Analysis:** Kaplan–Meier methods, Cox proportional hazards models; $p < 0.05$ considered statistically significant.

Results

Cohort Characteristics

- Before matching, adverse-SDOH patients were younger, more often Black, and had higher comorbidity burden (HTN 56.5% vs 33.5%; HF 15.4% vs 4.2%).
- After 1:1 PSM, both cohorts had 2,554 patients each with balanced demographics, comorbidities, and medication use (including anthracyclines and cardioprotective therapies).

Surveillance Completion (TTE Rates) in Adverse SDOH cohort vs No SDOH cohort

- 0–3 Months: TTE completion: 33.9% vs 45.0%; HR 0.76 (95% CI 0.69–0.83; $p < 0.001$); Median TTEs: 1 vs 1
- 3–6 Months: TTE completion: 27.7% vs 48.9%; HR 0.51 (95% CI 0.46–0.56; $p < 0.001$); Median TTEs: 1 vs 1
- 6–12 Months: TTE completion: 31.1% vs 54.5%; HR 0.49 (95% CI 0.45–0.54; $p < 0.001$); Median TTEs: 1 vs 2

Key Findings

- Adverse SDOH → significantly lower adherence to guideline-directed cardiac surveillance at all timepoints.
- Disparities widened over time, largest beyond 3 months.
- Adverse-SDOH patients had 25–50% lower likelihood of receiving recommended echocardiographic monitoring.

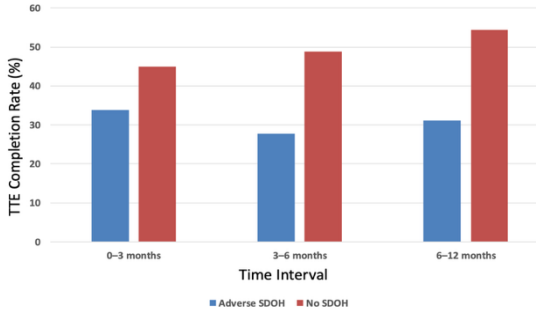


Figure 1: Group Bar Chart Showing Adherence to TTE at 0-3, 3-6 and 6-12 Months after Trastuzumab Initiation

Conclusions

- Adverse SDOH are associated with significantly lower adherence to recommended echocardiographic surveillance across all monitoring intervals.
- Patients with adverse SDOH showed a progressive decline in follow-up surveillance over time.
- These findings underscore the need for equity-focused interventions to ensure consistent cardiac monitoring and reduce long-term cardiotoxicity risk in vulnerable populations.

Variable	Cohort 1 (Adverse SDOH) n=2,554	Cohort 2 (No SDOH) n=2,554	p-value	Std diff
Age, years (mean ± SD)	62.5 ± 13.5	62.0 ± 13.8	0.200	0.036
Age at index, years (mean ± SD)	58.5 ± 13.6	57.9 ± 13.8	0.129	0.043
Female, n (%)	2,388 (93.5%)	2,408 (94.3%)	0.243	0.033
Male, n (%)	16 (0.6%)	23 (0.9%)	0.261	0.031
White, n (%)	1,624 (63.6%)	1,647 (64.5%)	0.502	0.019
Black or African American, n (%)	459 (18.0%)	473 (18.5%)	0.612	0.014
Asian, n (%)	103 (4.0%)	100 (3.9%)	0.830	0.006
Hispanic/Latino ethnicity, n (%)	296 (11.6%)	292 (11.4%)	0.861	0.005
Not Hispanic/Latino, n (%)	1,856 (72.7%)	1,874 (73.4%)	0.570	0.016
Type 2 diabetes, n (%)	668 (26.2%)	700 (27.4%)	0.312	0.028
Hypertension, n (%)	1,437 (56.3%)	1,460 (57.2%)	0.516	0.018
Hyperlipidemia, n (%)	1,082 (42.4%)	1,126 (44.1%)	0.214	0.035
Heart failure, n (%)	384 (15.0%)	391 (15.3%)	0.785	0.008
Acute myocardial infarction, n (%)	121 (4.7%)	121 (4.7%)	1.000	<0.001
Overweight/obesity, n (%)	1,016 (39.8%)	1,034 (40.5%)	0.607	0.014
Cerebral infarction, n (%)	119 (4.7%)	109 (4.3%)	0.498	0.019
Cerebral ischemia, n (%)	80 (3.1%)	82 (3.2%)	0.873	0.004
Cerebral artery stenosis (no infarct), n (%)	15 (0.6%)	13 (0.5%)	0.705	0.011
Nicotine dependence, n (%)	526 (20.6%)	550 (21.5%)	0.410	0.023
Anthracyclines, n (%)	362 (14.2%)	359 (14.1%)	0.904	0.003
Beta blockers, n (%)	1,294 (50.7%)	1,269 (49.7%)	0.484	0.020
ACE inhibitors, n (%)	712 (27.9%)	700 (27.4%)	0.707	0.011
ARBs n (%)	494 (19.3%)	482 (18.9%)	0.669	0.012
Diuretics, n (%)	1,087 (42.6%)	1,088 (42.6%)	0.977	0.001
SGLT2 inhibitors, n (%)	116 (4.5%)	128 (5.0%)	0.431	0.022

Table 1: Baseline Characteristics after Propensity Score Matching

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