Treatment Delays and Testing Disparities May Contribute to Racial Differences in Node-Positive ER+/HER2- Breast Cancer Outcomes

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Abstract

- Recent National Cancer Database (NCDB) data show Black patients with N+ ER+/HER2- breast cancer receiving neoadjuvant chemotherapy experience worse overall survival than White patients.
- The objective of this study was to investigate the factors contributing to these racial disparities in outcomes among patients with node-positive ER+/HER2- breast cancer treated with neoadjuvant chemotherapy.
- We performed a retrospective cohort analysis comparing treatment delays and molecular testing rates among 99 patients at a Bronx academic center and 38,134 patients in the NCDB.
- Black and low-income patients were less likely to receive Oncotype DX testing (6.9% vs. 8.9%, $p < 0.001$) and experienced longer times to chemotherapy (43 vs. 38) and surgery (163 vs. 154 days, $p < 0.001$).
- These disparities were more pronounced in the Bronx cohort with Bronx patients experiencing longer times from diagnosis to chemotherapy (48 vs. 39 days, $p = 0.02$) and to surgery (217 vs. 156 days, $p < 0.001$) compared to the NCDB patients.
- These results underscore the clinical impact of structural determinants of health and the importance of keeping these in mind in clinical practice.

Introduction

- NAC response affects survival in node-positive (N+) ER+/HER2– breast cancer.
- Black patients with node-positive (N+) ER+/HER2- breast cancer have worse overall survival compared to White patients (NCDB HR 1.15, $p = 0.001$).
- **Goal:** Compare treatment patterns and outcomes between a Bronx cohort and the NCDB to better understand drivers of racial disparities in N+ ER+/HER2– breast cancer.

Methods and Materials

- **Design:** Retrospective chart review of N+ ER+/HER2– breast cancer patients treated with NAC at a Bronx academic institution (2018–2021) compared with matched NCDB cohort.
- **Population:**
  - Patients with N+ ER+/HER2– breast cancer receiving NAC, including a Bronx cohort and a matched NCDB cohort.
- **Collected data:**
  - **Demographics:** Age, race/ethnicity, insurance, income.
  - **Tumor characteristics:** HR/HER2 status, Oncotype DX recurrence score , Ki-67.
  - **Treatment timelines:** Dates of diagnosis, chemotherapy start, and surgery.
- **Primary End Point:** Nodal pathologic complete response (pCR) after neoadjuvant chemotherapy.

Table 1. NCDB Patient Characteristics

NCDB (Race)	White (n=24,701)	Black (n=6,223)	p-value
Age	57.6 ± 13.8	54.9 ± 13.6	< 0.001
	Number (% of all patients)		
Oncotype DX Testing Ordered (%)	2201 (8.9%)	432 (6.9%)	< 0.001
Ki-67 Ordered (%)	13060 (52.9%)	3272 (52.6%)	0.72
Medicaid (%)	1898 (7.7%)	1197 (19.2%)	< 0.001
Medicare (%)	7886 (31.9%)	1559 (25.1%)	< 0.001
Private Insurance (%)	14053 (56.9%)	3080 (49.5%)	< 0.001
< $46,277 Income (%)	3153 (13.1%)	1843 (34.9%)	< 0.001
> 15.3% No HSD (%)	3061 (12.4%)	1816 (29.2%)	< 0.001
	Median Days (IQR)		
Time to Chemotherapy (Median Days (IQR))	38 (28-55)	43 (31-62)	< 0.001
Time to Surgery (Median Days (IQR))	154 (6-208)	163 (4-218)	< 0.001

Table 2. Comparison of Patients in Bronx vs. NCDB Database

Bronx vs. NCDB	Bronx (n=99)	NCDB (n=38,134)	p-value
Age	58.1 ± 12.5	56.3 ± 13.7	0.16
Race	*Number (% of all patients)*		< 0.001
Asian (%)	2 (2%)	1788 (5%)	
Black (%)	31 (31%)	6223 (16%)	
White (not Hispanic) (%)	16 (16%)	24701 (65%)	
Hispanic (%)	48 (47%)	1421 (4%)	
Other (%)	3 (3%)	1788 (5%)	

Results

- **NCDB by Race:**
  - Black patients were less likely to receive Oncotype DX testing than White patients (6.9% vs. 8.9%).
  - Longer median time to chemotherapy (43 vs. 38 days) and surgery (163 vs. 154 days) for Black patients.
  - Higher likelihood of Medicaid coverage (19.2% vs. 7.7%) and lowest income quartile (<$46,277: 34.9% vs. 13.1%).
- **NCDB by Income:**
  - Patients in the lowest income quartile had longer time to chemotherapy (42 vs. 36 days) and surgery (163 vs. 159 days) compared to highest income quartile.
- **Nodal Response:**
  - Patients in the slowest quartile for time to chemotherapy had lower nodal response compared to fastest quartile (27% vs. 34%).
- **Bronx vs. NCDB:**
  - Bronx cohort had longer times to chemotherapy (48 vs. 39 days) and surgery (217 vs. 156 days) compared to NCDB.

Figure 1. Bronx vs. NCDB Treatment Delays (Time to Chemo and Surgery)

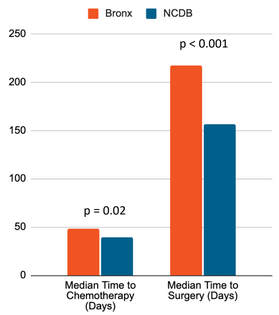
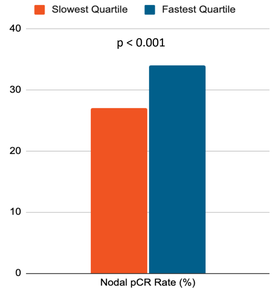


Figure 2. Nodal pCR Rate by Time to Chemotherapy



Discussion

- **Key findings:**
  - Black and low-income patients experienced longer times to chemotherapy and surgery compared to White patients in both the NCDB and Bronx cohorts.
  - Black patients had lower rates of Oncotype DX testing.
  - Longer time to chemotherapy was associated with lower nodal response rates, underscoring the potential clinical consequences of these delays.
- **Clinical Impact:**
  - Bronx cohort delays were more pronounced vs. NCDB delays.
  - Delays in treatment initiation and inequitable molecular testing may partly explain racial disparities in outcomes.
- **Possible contributors:**
  - **Structural determinants:** Insurance, income, care access.
  - **Care Coordination:** Consistent molecular assay ordering, timing of surgery, and chemotherapy scheduling.

Conclusions

- **Summary:** Delays in chemotherapy and surgery, and lower Oncotype DX use among Black patients, may contribute to racial disparities in nodal pCR and outcomes.
- **Clinical implication:** Early molecular assay use and targeted interventions to reduce delays could reduce disparities and improve treatment response.
- **Next steps:**
  - Investigate underlying causes of access barriers causing treatment delays among Black and low-income patients.
  - Identify drivers of delays and potential system-level interventions to reduce delays, including:
    - Automatic prompts for Oncotype DX ordering
    - Key points in patient journey where delays occur
    - Transportation and other logistical barriers
  - Validate findings in multi-institutional cohorts to guide interventions.

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