Delays in breast cancer presentation, diagnosis and treatment in young women

Bessie X. Zhang, MD, MBA[1,2], Tal Sella, MD[2,3,4], Yue Zheng, MS[3], Gregory J. Kirkner, MPH[3], Kathryn J. Ruddy, MD, MPH[5], Shoshana M. Rosenberg, ScD, MPH[6], Virginia F. Borges, MD, MMSc[7], Lidia Schapira, MD[8,9], Steven E. Come, MD[2,10], Jeffrey Peppercorn, MD, MPH[2,11], Ann H. Partridge, MD, MPH[1,2,3], Kristen D. Brantley, PhD, MPH[2,3]

1 Brigham and Women's Hospital 2 Harvard Medical School 3 Dana-Farber Cancer Institute 4 Sheba Medical Center 5 Mayo Clinic 6 Weill Cornell Medicine 7 University of Colorado Cancer Center
8 Division of Medical Oncology, Department of Medicine, Stanford University 9 Stanford Cancer Institute 10 Beth Israel Deaconess Medical Center 11 Massachusetts General Hospital

Presentation ID: PS3-02-16

Introduction

Breast cancer in young women 40 years and under carries poorer clinical outcomes.[1] It is important to understand factors influencing delays in presentation, diagnosis and treatment, and the impact on long-term disease-free survival and mortality.

Methods and Materials

Study Population: The Young Women's Breast Cancer Study (YWS) is a prospective cohort of women diagnosed with stage 0-IV breast cancer at ≤ 40 years, across 13 academic and community sites in US and Canada.

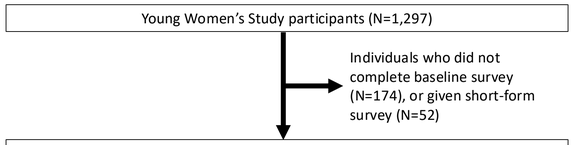


Figure 1. Analytic Cohort Inclusion Criteria

Exposure Definitions:

- *Self-delay*: ≥ 90 days[2,3,4] from first symptom to presentation
- *Diagnosis delay*: ≥ 90 days[2,5] from presentation to diagnosis
- *Treatment delay*: ≥ 60 days[6,7] from diagnosis to first treatment (surgical, chemotherapy, radiation, or endocrine)

Statistical Analyses: Univariable and multivariable logistic regression to estimate associations between patient and tumor variables and three delay types, with backwards selection (p≤0.05 retained) to choose factors for multivariable models. Multivariable Cox proportional hazard models to test the association between delays and disease-free survival (DFS) and mortality.

Our study updates and expands upon Ruddy et al. 2014.[2]

Results

Table 1. Overall Cohort Patient Characteristics (n=1,071)

Characteristic	N (%) or median (IQR)	Characteristic	N (%)
Age at diagnosis (y)	36 (33-39)	Pregnant (<1 y from dx)	19 (1.8%)
Race		Income	
White	939 (87.7%)	<50K	170 (15.9%)
Black/Haitian/African American	38 (3.5%)	50K-100K	331 (30.9%)
Asian	62 (5.8%)	≥100K	505 (47.2%)
American Indian/Alaskan Native	6 (0.6%)	Financial comfort	62 (5.8%)
Multi-Racial	13 (1.2%)	Uncomfortable	215 (20%)
Other/Unknown	13 (1.2%)	Comfortable	838 (78%)
Hispanic	50 (4.7%)	First-degree family hx BC	143 (13.4%)

Percentages may not add to 100% due to missing data.

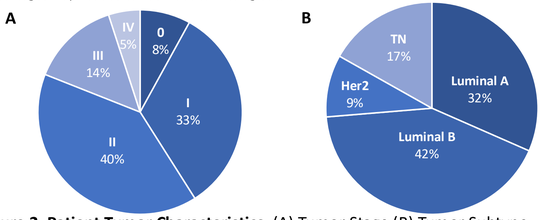


Figure 2. Patient Tumor Characteristics. (A) Tumor Stage (B) Tumor Subtype
TN: Triple negative. Percentages may not add to 100% due to missing data.

Delays and median times for BC presentation, diagnosis and treatment

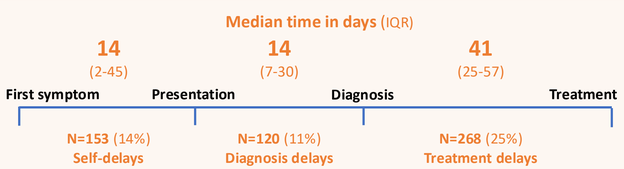


Figure 3. Delays and median days for BC presentation, diagnosis and treatment among women with Stage 0-IV young-onset BC (N=1,071). Note: *Treatment time not available for Stage 4 patients (5%)*

Univariable regression results

- **In univariable models,** **self- and diagnosis delays** were associated with **2.7x** higher odds of **Stage 4 BC**.
- **Self-delay** was less likely in **TNBC** and more likely in **HER2+** tumors.
- **Diagnosis** and **treatment delays** were less likely in **TNBC** or **luminal B** tumor subtypes.

Table 2. Multivariable regression results

Patient or Tumor Characteristic	OR (95% CI)	p-value
Self-delay[1] (N total=824, N=128 delays)		
Pregnancy within one year	0.15 (0.01-0.74)	0.07
Income under 50K (v. >50K)	1.97 (1.22-3.13)	0.004
First-degree family history of BC	0.40 (0.17-0.80)	0.02
Luminal B subtype (v. Luminal A)	0.83 (0.53-1.29)	0.41
HER2+ subtype (v. Luminal A)	1.25 (0.64-2.35)	0.50
TNBC (v. Luminal A)	0.30 (0.13-0.60)	0.002
Diagnosis delay[2] (N total=964, Delays=111)		
Age at diagnosis	0.94 (0.89-0.99)	0.01
Hispanic	2.05 (0.90-4.27)	0.07
Luminal B subtype (v. Luminal A)	0.60 (0.38-0.95)	0.03
HER2+ subtype (v. Luminal A)	1.18 (0.62-2.18)	0.6
TNBC (v. Luminal A)	0.35 (0.16-0.70)	0.005
Treatment delay[3] (N=922, Delays=190)		
Luminal B subtype (v. Luminal A)	0.59 (0.41-0.86)	0.006
HER2+ subtype (v. Luminal A)	0.60 (0.32-1.11)	0.12
TNBC (v. Luminal A)	0.25 (0.13-0.43)	<0.001
Stage 2 (v. Stage 1)	0.78 (0.55-1.11)	0.16
Stage 3 (v. Stage1)	0.37 (0.20-0.65)	0.001

Selected variables remained at p<=0.05 after backwards selection; estimates calculated among patients with non-missing variables. Subtype results used Luminal A subtype as a reference group. Stage used Stage 1 as a reference group. 1 Tested in N=809, 124 self-delays. 2 Tested in N=908, 104 self-delays. 3 Tested in N=776, 158 treatment delays (excludes Stage 0 or Stage 4).

- **Self-delay** was more likely in those with income <$50K & less likely given a first-degree family history of BC, or recent pregnancy
- **Diagnosis delay:** Greater in younger women & Hispanic women
- **Self, diagnosis, and treatment delays** were less likely if more aggressive subtype (Luminal B or TNBC vs. HR+/HER2-)

Disease Outcomes

Table 3. Association of delays with DFS for Stage 1-3 cancers (N=928, Events=214)

	Events/N total			HR (95% CI)	p-value
	Overall	With delay	No delay		
Self-delay (y/n)[1]	202/867	31/127	96/740	1.09 (0.74-1.61)	0.67
Diagnosis delay (y/n)[1]	205/887	17/92	188/795	0.79 (0.48-1.30)	0.34
Treatment delay (y/n)[2]	205/928	23/192	182/736	0.50 (0.32-0.78)	0.002

Adjusted for: age at diagnosis, stage, subtype, surgical type (none, breast conserving, unilateral mastectomy, bilateral mastectomy), chemotherapy (y/n) and radiation (y/n). 1 DFS calculated from diagnosis date to first event (CBC, local recurrence, distant recurrence, death) or last follow-up date. 2 For evaluation of treatment delay a left truncated model was used with DFS measured from time that first treatment was given.

- **Self- and diagnosis delays** were not associated with DFS
- **Treatment delays** were associated with improved DFS

Discussion

Social disparities: Disparities by income and ethnicity are prevalent.[3,8-11] Financial status may uniquely impact young patients with less employment stability.[10]

Pregnancy-associated BC (PABC): While BC during pregnancy often faces more detection delays and worse outcomes.[12,13] prenatal care may enable quicker detection of BC symptoms and decrease self-delay.

Family history: Family history of BC could potentially prompt greater vigilance,[14] though the impact of family history is varied.[15,16]

Younger age: Multiple factors likely contribute to greater diagnosis delay in younger patients, e.g., physician bias, decreased adolescent awareness, and patient fears.[17-19]

Aggressive subtypes: TNBC tumors' larger size and Luminal B tumors' propensity for axillary spread compared to other subtyptes[20,21] possibly allow for more timely detection and treatment.

Delays and disease stage: Despite mixed literature,[2,22-24] our finding suggests delays may lead to worse stage in young patients.

Delays and survival outcomes: Our results are best understood via the survival paradox,[22,25] whereby more aggressive tumors, which carry poorer prognosis, may also be found and treated more quickly.

Conclusions

- Lower income and Hispanic ethnicity are associated with greater delays, highlighting ongoing disparities.
- Self- and diagnosis delays are associated with ~3x higher odds of Stage 4 disease. Decreasing such delays is critical.

Contact

Bessie X. Zhang, MD, MBA
Brigham and Women's Hospital
Email: bxzhang@mgh.harvard.edu

Research Funding: This study was supported with funding from the Breast Cancer Research Foundation (BCRF-21-124,to AHP), Susan G. Komen (SAC100008, to AHP), an American Cancer Society Research Professorship (CRP-24-1187963-01-PROF, to AHP), and Susan G. Komen (CTA241187107, to KDB).

1. Johnson RH, Anders CK, Litton JK, Ruddy KJ, Bleyer A. Breast cancer in adolescents and young adults. Pediatric Blood & Cancer. 2018;65(12):e27397. doi:10.1002/pbc.27397
2. Ruddy KJ, Gelber S, Tamimi RM, et al. Breast cancer presentation and diagnostic delays in young women. Cancer. 2014;120(1):20-25. doi:10.1002/cncr.28287
3. Rascher GH, Ferrans CE, Kaiser K, Campbell RT, Calhoun EE, Warnecke RB. Misconceptions about breast lumps and delayed medical presentation in urban breast cancer patients. Cancer Epidemiol Biomarkers Prev. 2010;19(3):640-647. doi:10.1158/1055-9965.EPI-09-0997
4. Koo MM, van Wagner C, Abel GA, McPhail S, Rubin GP, Lyratzopoulos G. Typical and atypical presenting symptoms of breast cancer and their associations with diagnostic intervals: Evidence from a national audit of cancer diagnosis. Cancer Epidemiol. 2017;48:140-146. doi:10.1016/j.canep.2017.04.010
5. Sluver SD, Zhu J, Simchowitz B, Hassett MJ, Shulman LN, Weingart SN. Identifying women at risk of delayed breast cancer diagnosis. Int Comm J Qual Patient Saf. 2011;37(12):568-575. doi:10.1016/s1553-7250(11)37072-0
6. McLaughlin EM, Anderson RT, Ferketich AK, Seiber EE, Balkrishnan R, Paskett ED. Effect on Survival of Longer Intervals Between Confirmed Diagnosis and Treatment Initiation Among Low-Income Women With Breast Cancer. J Clin Oncol. 2012;30(36):4493-4500. doi:10.1200/JCO.2012.39.7695
7. Bleicher RJ, Ruth K, Sigurdson ER, et al. Time to Surgery and Breast Cancer Survival in the United States. JAMA Oncol. 2016;2(3):330-339. doi:10.1001/jamaoncol.2015.4508
8. Reiscchmmn M, Wooster M, DeStephanis D, et al. Multilevel factors associated with delays to neoadjuvant chemotherapy among young adults with operable breast cancer. JCO. 2024;42(16_suppl):11091-11091. doi:10.1200/JCO.2024.42.16_suppl.11091
9. Smith BC, Zogas A, Anton-Culver H. Delay in Surgical Treatment and Survival After Breast Cancer Diagnosis in Young Women by Race/Ethnicity. JAMA Surg. 2013;148(6):516-523. doi:10.1001/jamasurg.2013.1680
10. Subramanian S, Tangka FKL, Edwards P, et al. Treatment cost and access to care: experiences of young women diagnosed with breast cancer. Cancer Causes Control. 2020;31(11):1001-1009. doi:10.1007/s10552-020-01334-9
11. Berrian JL, Liu Y, Lin M, Schmaltz CL, Colditz GA. The relationship between Insurance Status and Outcomes for Breast Cancer Patients in Missouri. Cancer. 2021;127(6):931-937. doi:10.1002/cncr.33330
12. Shao C, Yu Z, Xiao J, et al. Prognosis of pregnancy-associated breast cancer: a meta-analysis. BMC Cancer. 2020;20(1):746. doi:10.1186/s12885-020-07248-8
13. Ulery M, Carter L, McKerlin BL, Giurgescu C. Pregnancy-Associated Breast Cancer: Significance of Early Detection. Journal of Midwifery & Women's Health. 2009;54(5):357-363. doi:10.1016/j.jmwh.2008.12.007
14. Petrinek A, Campbell S, Laliberte L. Family History of Breast Cancer. Cancer Practice. 2000;8(3):135-142. doi:10.1046/j.1523-5394.2000.83007.x
15. Yip CH, Bt Mohd Taib NA, Lau PC. Does a positive family history influence the presentation of breast cancer? Asian Pac J Cancer Prev. 2008;9(1):63-65.
16. Koch KM, Holland JC, Halper MS, Miller DG. Psychological distress and surveillance behaviors of women with a family history of breast cancer. J Natl Cancer Inst. 1992;84(1):24-30. doi:10.1093/jnci/84.1.24
17. Miedema BB, Easley J, Hamilton R. Young adults' experiences with cancer: comments from patients and survivors. Can Fam Physician. 2006;52(11):1446-1447.
18. Gibson F, Pearce S, Eden T, et al. Young people describe their predignosis cancer experience. Psycho-oncology. 2013;22(11):2585-2592. doi:10.1002/pon.3325
19. Lawrence S, PitzGerald S, Hegarty J, Saab MM. Cancer awareness among adolescents in second-level education: a mixed methods systematic review. Health Educ Res. 2025;40(3):ryaf014. doi:10.1093/her/ryaf014
20. Billar JAY, Dueck AC, Stucky CCH, et al. Triple-Negative Breast Cancers: Unique Clinical Presentations and Outcomes. Ann Surg Oncol. 2020;27(3):384-390. doi:10.1245/s10434-010-1260-4
21. Johnson KS, Conant EF, Soo MS. Molecular Subtypes of Breast Cancer: A Review for Breast Radiologists. J Breast Imaging. 2021;3(1):12-24. doi:10.1093/jbi/wbaa110
22. Caplan L. Delay in Breast Cancer: Implications for Stage at Diagnosis and Survival. Front Public Health. 2014;2:87. doi:10.3389/fpubh.2014.00087
23. Yoon JC, Perez-Rojas S, Aroha B, et al. Association of Neighborhood Deprivation with Stage at Diagnosis and Treatment Delay For Breast Cancer in Philadelphia. Ann Surg Oncol. 2025;32(8):5500-5509. doi:10.1245/s10434-025-17367-w
24. Partridge AH, Hughes ME, Ottesen RA, et al. The Effect of Age on Delay in Diagnosis and Stage of Breast Cancer. Oncologist. 2012;17(6):775-782. doi:10.1634/theoncologist.2011-0469
25. Symonds RP. Cancer biology may be more important than diagnosis delay. BMJ. 2000;320(7247):774.

This presentation is the intellectual property of the author/presenter. Contact them at bxzhang@mgh.harvard.edu for permission to reprint and/or distribute. Copies of this poster obtained through Quick Response (QR) Code are for personal use only and may not be reproduced without permission from SABCS® and the author.
© POSTER TEMPLATE BY GENIGRAPHICS® 1.800.790.4001 WWW.GENIGRAPHICS.COM