Time to Treatment for Patients Receiving BCS in a Public and a Private University Hospital in Atlanta

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Abstract: Delays in treatment for breast cancer can lead to poorer patient outcome. We analyzed time to treatment among female patients receiving breast-conserving surgery in two different hospital settings, public versus private. Retrospective chart review revealed 270 patients diagnosed during 2004–2008. Three consecutive time intervals were defined (initial abnormal imaging [I] to core biopsy [II] to surgery/ pathology staging [III] to oncology evaluation for adjuvant treatment). Multivariate analyses investigated hospital type and demographic factors. Overall median treatment time was 83 days, Interval II accounting for the longest (43 days). Only 55% of patients received the entire spectrum of care within 90 days; for each consecutive 30-day interval, percentages varied dramatically: 80.7%, 31.1%, and 68.9%. Public hospital patients experienced longer overall time to treatment than private patients (94 versus 77 days, p < 0.001); these differences persisted throughout the intervals. Longer wait times were experienced by African Americans versus Caucasians (89 versus 64 days, p = 0.003), unmarried versus married patients (93 versus 70 days, p < 0.001), and Medicaid-insured patients, p < 0.001. In multivariate analyses, hospital type, race, marital status, and insurance predicted timely treatment within one or more intervals. For patients undergoing breast-conserving therapy, time to treatment differs between private and public settings. However, barriers to timely treatment arise from both system-based issues and patient socio-demographic factors. Studies are needed to evaluate and intervene on this intricate connection.

Key Words: breast cancer, delay in treatment, private hospital, public hospital, wait time

Widespread socioeconomic and racial disparities exist across a multitude of breast cancer public health aspects, including outcome (1–4). Although the impact of delays on patient outcome is controversial, it has been suggested that a delay of more than 3 months is associated with significantly reduced survival and increased recurrence rates (4,5). However, currently, there are no universal standard guidelines for optimal breast cancer treatment time intervals (6–8).

Studies from the United States addressing the influence of barriers on wait times for breast cancer treatment are limited and inconsistent; with white race/ethnicity, age <50 and private or managed care insurance associated with shorter times in some studies (1–3,6), but not in others (7,8). However, these barriers were measured on patients with widely varying disease stages and treatment options.

We analyzed breast cancer patients with identical cancer care pathways consisting of breast-conserving surgery (BCS) for infiltrating ductal cancer (IDC) or ductal carcinoma in situ (DCIS) followed by adjuvant therapy in two different Atlanta hospital settings, a University-based inner-city public hospital (PUB) and a University-affiliated private practice/community hospital (PR). The study aims were to (a) document specific treatment time intervals; (b) assess how hospital setting and demographic factors affect these intervals; and (c) identify possible risk factors associated with prolonged wait times.
METHODS

From 2004–2008, 514 patients were identified as having received BCS for DCIS or IDC (PUB = 202, PR = 308). We excluded patients who underwent re-excision for positive margins (PUB = 48, PR = 97), or neoadjuvant therapy (PUB = 14, PR = 30), and those with incomplete records (PUB = 6, PR = 45). Thus, a total of 270 patients (PUB = 134, PR = 136) contributed to the study.

Patient demographic factors (age, race, marital status, insurance status/type, histologic tumor type, stage at diagnosis, and the dates associated with the four diagnostic/treatment events) were extracted from review of medical records or pathology reports. Three time intervals (measured in days) were calculated for the four consecutive treatment events (Fig. 1).

Time interval statistical analyses compared medians using the Kruskal–Wallis test. Chi-squared (or fisher exact) tests were used to compare frequencies of descriptive factors and the percentages of women receiving treatment within specified times. Multiple logistic regressions determined factors associated with specified times. Data were analyzed using SAS 9.2 statistical software (SAS Institute; Carey, NC), significance \( p < 0.05 \).

RESULTS

Patient characteristics significantly differed by hospital type. There were proportionally more African American women (AAW), unmarried, Medicaid-insured, and low income patients in the PUB (Table 1).

The median overall treatment time was 83 days, but differed by hospital setting (PUB = 94 versus PR = 77, \( p < 0.001 \)), (Table 2). Similar differences were observed for intervals II and III, but not Interval I, wherein PUB patients received a core biopsy sooner (13 versus 15 days, \( p = 0.037 \)). Analyses between the two hospitals among only the AAW yielded similar results (Data not shown). Significantly longer median times to treatment were also observed for AA, medicaid-insured, and unmarried patients.

Differences in treatment times between the PUB and PR persisted within the intervals (Fig. 2). More patients treated in the PR were likely to receive treatment within shorter time frames, excepting in Interval I, where PUB patients were more likely to receive timely care (Fig. 2a). Moreover, nearly 30% of PUB patients received their biopsies on the day of abnormal imaging versus about 10% of PR patients.

![Figure 1. Time intervals between each of the four consecutive events of breast cancer diagnosis and treatment spectrum: abnormal imaging study, core biopsy, partial mastectomy with pathology diagnosis for staging, and oncology evaluations for adjuvant therapy options.](image)

| Table 1. Patient Characteristics by Hospital Type, Atlanta, GA |
|---------------------------------------------------------------|
|                                                               |
|                  | Private N | Public N | p-value |
| Total            | 136       | 134      | 0.180   |
| Age (years)      |           |          |         |
| <50              | 32        | 25       |         |
| 50–64            | 61        | 52       |         |
| 65+              | 43        | 57       |         |
| Race*            |           |          | <0.001  |
| AA               | 99        | 120      |         |
| White            | 34        | 7        |         |
| Others           | 3         | 7        |         |
| Marital status   |           |          | <0.001  |
| Married          | 61        | 18       |         |
| Unmarried        | 75        | 116      |         |
| Insurance        |           |          | <0.001  |
| Medicaid         | 4         | 65       |         |
| Medicare         | 37        | 27       |         |
| Private          | 95        | 32       |         |
| Others/none      | 0         | 8        |         |
| Annual income($) |           |          | 0.003   |
| <20,000          | 79        | 103      |         |
| 20,000–39,999    | 39        | 20       |         |
| 40,000–89,999    | 9         | 2        |         |
| Unknown          | 9         | 9        |         |
| Stage            |           |          | 0.850   |
| 0                | 50        | 45       |         |
| 1                | 67        | 70       |         |
| 2                | 19        | 19       |         |
Only 55.2% of patients received the entire care spectrum within 90 days (Table 2). For each consecutive 30-day interval, these percentages varied dramatically: 80.7%, 31.1%, and 68.9%. Significant differences were observed for hospital type (PUB = 49.3% versus PR = 61.1%), race (C = 73.2% versus AA = 52.1%),
marital status (married = 72.2% versus unmarried = 48.2%), and insurance status (Medicaid = 30.4%, Medicare = 66.7%, and Private = 62.2%). These differences persisted in intervals II and III, but not in Interval I.

Several factors were independently associated with receiving the entire spectrum of care within 90 days; being married (OR = 2.5) and medicare (OR = 5.3) or private (OR = 3.5) insurance (Table 3). Compared with AAW, Caucasian women (CW) trended toward receiving care within 90 days (OR = 1.7, 95% CI 0.8–3.8) while being treated at the PR trended toward not receiving care within the 90 days (OR = 0.6, 95% CI 0.3–1.2). In analyses restricting to AAW only, results were similar (data not shown).

Each interval identified its own unique independent factors. Married status (OR = 2.2) was the only factor associated with receiving a core biopsy within 30 days (Interval I), (Table 3). Being treated at the PR (OR = 3.7) and medicare (OR = 3.5) or private (OR = 2.8) insurance were associated with Interval II treatment within 30 days. Caucasian race (OR = 3.8) was the strongest predictor of receiving Interval III treatment within 30 days; followed by medicare (OR = 2.9) and private (OR = 2.5) insurance.

**DISCUSSION**

A delay of greater than 90 days from the onset of symptoms to medical oncology adjuvant treatment has been shown to decrease patient survival (4). In our study, longer median times for the overall spectrum of treatment were particularly associated with the PUB hospital, AA ethnicity, nonmarried status, and medic-aid insurance. Bedell et al. reported similar findings; U.S. PR hospitals had the shortest time to treatment, followed by university hospitals, and then PUBs (9). Studies of medically underserved women in 35 U.S. states reported a median time from mammography diagnosis to surgical treatment of 48 days (7,10,11).

We found higher corresponding treatment times for the PUB (57 days), but not the PR (45 days). The 35-state study longest reported interval was from mammogram to biopsy (32 days). Our corresponding time interval was shorter (14 days) and represented our shortest interval. This same interval was shorter in our PUB (13 days) than our PR (15 days). Furthermore, nearly 30% of PUB patients (versus 10% of PR) received their biopsy on the day of abnormal mammographic imaging. In our PUB, a specific concerted effort to perform same day biopsies was instituted. A progressive mammography order allows breast imagers to biopsy patients upon abnormal mammogram or ultrasound findings.

The longest treatment interval in our study was from diagnostic biopsy to excisional surgery; this was even longer for PUB, AA, and medicaid-insured patients. A Nova Scotia study reported this same interval as longest, albeit only 22 days (12). However, only in this interval was PUB an independent predictor, suggesting that system-based interventions could reduce time to treatment.

| Table 3. Multivariate analyses for breast cancer treatment received within prescribed time intervals, Atlanta, GA 2004–2008 |
|---------------------------------------------------------------|
| **Interval I** | **Interval II** | **Interval III** | **Total** |
| **OR** | **95% CI** | **OR** | **95% CI** | **OR** | **95% CI** | **OR** | **95% CI** |
| **Hospital** | | | | | | | |
| Private | 0.5 | 0.2–1.2 | 3.7 | 1.8–7.8 | 1.0 | 0.5–2.1 | 0.6 | 0.3–1.2 |
| Public | ref | ref | ref | ref | ref | ref | ref | ref |
| **Race** | | | | | | | |
| AA | ref | ref | ref | ref | ref | ref | ref | ref |
| White | 1.0 | 0.4–2.5 | 1.0 | 0.5–2.1 | 3.8 | 1.3–11.5 | 1.7 | 0.8–3.8 |
| **Marital status** | | | | | | | |
| Married | 2.2 | 1.0–4.9 | 1.0 | 0.5–2.0 | 1.4 | 0.7–2.9 | 2.5 | 1.3–4.8 |
| Unmarried | ref | ref | ref | ref | ref | ref | ref | ref |
| **Insurance** | | | | | | | |
| Medicaid | ref | ref | ref | ref | ref | ref | ref | ref |
| Medicare | 2.0 | 0.6–6.1 | 3.5 | 1.1–10.9 | 2.9 | 1.2–7.1 | 5.3 | 2.2–12.8 |
| Private | 1.1 | 0.4–2.7 | 2.8 | 1.0–8.2 | 2.5 | 1.1–5.6 | 3.5 | 1.6–7.7 |

* Treatment within 30 days.
† Treatment within 90 days.
AA, African American.
African American women experienced longer delays than CW (89 versus 64 days), driven by intervals II and III. AAW have previously been shown to experience proportionally more 3 month or greater delays between initial consultation and treatment (1,2,7,13). In Atlanta, population-based study from AAW were 4–5 times more likely to experience treatment delays (3). In contrast, a study among economically disadvantaged females found no racial difference in the interval from diagnosis to first line of treatment (14). The longer time to treatments that we report for AAW may be attributable to underlying factors e.g. a greater percentage of unmarried women or lack of transportation.

Unmarried women experienced significantly longer delays. A study by Hershman et al. corroborates our results (5). Others have concluded that marital status is not a predictor of delay, but does affect survival (15). Shorter delays seen among our married patients could be attributable to emotional, social, or transportation support provided by spouses. In weekly PUB breast conferences, psychosocial variables weigh heavily on treatment discussions. Some interventions e.g., a grant-supported social work navigator for complex patients or those who have been noted to delay care compliance have been instituted.

A major strength of our study is in the analysis of a population with a homogeneous disease and equivalent standard of care in a defined timeline, therefore avoiding bias injected by different treatment pathways for different diseases. Limitations should be addressed with future work. Although we showed significant disparities in time to treatment, we did not analyze these effects on survival. Our study is restricted to two Atlanta-based hospitals, and therefore may not be hospital or geographically generalizable.

In summary, among patients undergoing BCS, we described treatment time intervals and identified factors contributing to disparities in timely treatment. Barriers appear to arise both from system-based and patient socio-demographic factors. Prospective studies to evaluate this intricate connection (particularly within each time interval) could identify patient, psychosocial, and system-level factors underlying these disparities. Such studies could provide a foundation for developing new initiatives and interventions to shorten time to treatment and ultimately to reduce morbidity and mortality in vulnerable breast cancer patient populations.

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