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Delays in Breast Cancer Care: The Roles of Nurse Navigation in Facilitating Timely Treatment at a Tertiary Care Hospital, Lahore

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ABSTRACT

Background: Breast cancer is the most common malignancy among women in Pakistan, with one of the highest mortality-to-incidence ratios in Asia, largely due to delayed diagnosis and treatment initiation. Sociocultural barriers, healthcare system inefficiencies, and patient-level factors exacerbate these delays, resulting in advanced-stage presentations and poor outcomes. Nurse navigation, an evidence-based strategy for coordinated oncology care, has shown promise in addressing such barriers but remains underutilized in low-resource settings. Objective: This study aimed to evaluate delays across the breast cancer care continuum and assess the effectiveness of nurse navigation in reducing diagnostic and treatment delays and improving psychosocial readiness among patients. Methods: A cross-sectional observational study was conducted among 81 breast cancer patients at a tertiary care hospital in Lahore. Participants were assigned to either a nurse navigation group receiving structured coordination and counseling services or a usual care group. Delay intervals, distress, and readiness scores were measured and analyzed using descriptive and inferential statistics. Results: Nurse navigation significantly reduced clinic-to-treatment delays (46.0 ± 32.1 vs. 78.3 ± 41.2 days, $p < 0.001$) and improved readiness to cope (4.45 ± 1.22 vs. 3.62 ± 1.58, $p = 0.009$). Delays increased with disease stage, while readiness declined, highlighting the dual logistical and psychosocial impact of navigation. Conclusion: Structured nurse navigation effectively shortens treatment delays and enhances patient preparedness, offering a scalable, patient-centered solution to improve oncology care in resource-limited healthcare systems.

Keywords
Breast cancer, Nurse navigation, Treatment delay, Oncology care, Psychosocial readiness, Pakistan

INTRODUCTION

Breast cancer is the most prevalent malignancy among women worldwide, with an estimated 2.3 million new cases reported each year, contributing significantly to global morbidity and mortality (1). In Pakistan, the burden is particularly severe, where one in nine women is at risk of developing breast cancer during her lifetime, and the country continues to experience one of the highest mortality-to-incidence ratios in Asia (2). The disproportionately high death rates are largely attributed to late-stage presentation and systemic delays in diagnosis and treatment, which critically diminish survival outcomes (3). Delays greater than three months between symptom recognition, diagnosis, and initiation of therapy have been consistently linked to advanced disease at presentation and poorer prognosis (4).

Multiple factors contribute to such delays, especially in low- and middle-income countries, where barriers are multifaceted and often intersecting. Patient-related factors include low levels of awareness, limited knowledge about symptoms, fear of social stigma, and restricted decision-making autonomy among women (5). In Pakistan, sociocultural constraints such as modesty concerns, misconceptions that breast cancer is incurable, and reluctance to disclose symptoms further exacerbate these delays (6). Economic challenges also play a role, including inability to afford diagnostic tests, high transportation costs, and loss of income during care-seeking (7). At the healthcare system level, inefficiencies such as inadequate referral networks, shortage of diagnostic imaging facilities, and slow pathology turnaround times prolong the care continuum (8). These delays culminate in a high proportion of women presenting with stage III or IV disease, restricting treatment options to advanced systemic therapy and leading to worse quality of life and survival (9).

International research has demonstrated that structured interventions can help mitigate these barriers. One evidence-based strategy is patient navigation, introduced initially in high-income countries, which employs trained navigators—often nurses—who guide patients through the complexities of the healthcare system (10). Nurse navigation in particular has shown effectiveness in improving care coordination by facilitating timely appointments, reducing fragmentation of services, and enhancing communication between multidisciplinary teams, patients, and families (11). Empirical evidence suggests that navigation shortens diagnostic and treatment delays, improves adherence to therapy, and enhances psychosocial outcomes by reducing distress and increasing readiness to cope with treatment (12,13). Furthermore, culturally sensitive navigation has been shown to address stigma and fear, making it especially relevant for contexts where sociocultural barriers are prominent (14).

Despite the growing international evidence base, navigation models remain underutilized in Pakistan, where breast cancer patients continue to experience significant care delays. Previous studies conducted in local settings have largely focused on quantifying the extent of patient, diagnostic, and provider delays, identifying contributory factors such as limited awareness, financial barriers, and geographic constraints (15,16). However, there is limited empirical research on structured nurse navigation programs as a system-level intervention in Pakistan, particularly in tertiary care

hospitals that handle the largest volume of oncology cases. This gap in knowledge highlights an urgent need for context-specific evidence to inform policy and practice.

The present study was therefore designed to evaluate delays across the breast cancer care continuum and to examine the role of nurse navigation in reducing these delays and enhancing patient preparedness within a tertiary care hospital in Lahore. It was hypothesized that patients receiving structured nurse navigation services would experience shorter delays in diagnosis-to-treatment pathways and report greater psychosocial readiness compared to those managed under usual care.

MATERIAL AND METHODS

This study employed a quantitative, analytical, cross-sectional observational design aimed at evaluating delays in the breast cancer care continuum and assessing the role of nurse navigation in improving the timeliness of treatment and patient preparedness. The design was chosen to capture real-world clinical processes and outcomes within a defined cohort and to allow for systematic comparison between patients receiving structured nurse navigation services and those receiving usual care. The study was conducted at the Breast Cancer Care Clinic of a tertiary care hospital in Lahore, Pakistan, a referral center serving a large and diverse patient population from both urban and rural areas. Data collection was carried out over a continuous 12-month period, during which all eligible participants presenting to the clinic for primary breast cancer treatment were considered for inclusion (17).

Participants were eligible if they were adult female patients (aged 18 years or older) with a confirmed diagnosis of primary breast cancer based on histopathological examination and were presenting for their first course of definitive therapy. Women with recurrent breast cancer, metastatic disease at diagnosis, previous cancer treatment elsewhere, or incomplete medical records were excluded. A purposive sampling approach was used to ensure adequate representation of patients across different stages of disease and care pathways. Eligible patients were approached consecutively during their first clinic visit, informed about the study objectives and procedures, and invited to participate. Written informed consent was obtained from all participants prior to enrollment, and participation was entirely voluntary.

Data were collected using a combination of hospital medical records and structured patient questionnaires. Clinical and demographic data, including age, disease stage, treatment modality, and dates marking key points in the care pathway, were extracted from electronic health records. Delay intervals were operationally defined as follows: the diagnostic delay was measured as the number of days from biopsy to availability of histopathology results; the referral delay was defined as the number of days from confirmed diagnosis to the first oncology clinic visit; and the treatment delay was defined as the number of days from initial clinic consultation to initiation of definitive treatment (18). Patient-reported psychosocial variables, including readiness to cope with treatment and distress levels, were measured using validated Likert-scale questionnaires administered at the time of treatment planning. Patients in the intervention arm received structured nurse navigation services that included appointment scheduling, reminder calls, coordination of diagnostic and therapeutic steps, and individualized counseling to address psychosocial concerns. The comparison group received usual care, consisting of standard physician-led management without dedicated navigation support.

To minimize bias, several methodological safeguards were implemented. Selection bias was reduced by applying consistent inclusion and exclusion criteria and by enrolling patients consecutively. Data extraction was performed by two independent researchers using standardized forms, and discrepancies were resolved through consensus review. Confounding was addressed in the analysis phase by adjusting for potential covariates such as age, disease stage, and socioeconomic status. Missing data were minimized through real-time verification at the point of data collection, and any remaining missing values were handled through multiple imputation where appropriate to preserve statistical power and reduce bias (19).

The sample size of 81 patients was determined a priori based on feasibility and the expected effect size of nurse navigation on treatment delays derived from prior studies in similar settings (20). This sample size was sufficient to detect a clinically meaningful difference in delay intervals with a power of 80% and a significance level of 0.05.

All data were entered and analyzed using IBM SPSS Statistics (version 26.0). Descriptive statistics, including means, standard deviations, medians, and interquartile ranges, were used to summarize patient characteristics and delay intervals. Between-group comparisons were conducted using independent-sample t-tests or Mann–Whitney U tests for continuous variables and chi-square tests for categorical variables. Multivariable linear regression models were constructed to evaluate the association between nurse navigation and delay outcomes while adjusting for confounders. Subgroup analyses were performed based on disease stage and treatment modality to assess differential effects of navigation. Statistical significance was set at a two-tailed p-value of <0.05.

The study received ethical approval from the institutional review board of the participating hospital, and all procedures adhered to the principles of the Declaration of Helsinki (21). Confidentiality was maintained by anonymizing patient identifiers and storing data in password-protected databases with restricted access. To ensure reproducibility, the study protocol, data collection instruments, and analysis code were archived and are available upon reasonable request to the corresponding author. Quality control measures included double data entry, periodic audits of extracted records, and independent verification of a random subset of cases to ensure data integrity throughout the research process.

RESULTS

A total of 81 patients with confirmed primary breast cancer were included in the final analysis. Among them, 60 (74.1%) received structured nurse navigation support, while 21 (25.9%) were managed under usual care. Baseline demographic and clinical characteristics were broadly comparable between the two groups, with no statistically significant differences in age, occupation, or disease stage distribution, indicating a well-balanced cohort suitable for comparative analysis (Table 1). Most participants were middle-aged women (mean age 49.9 ± 13.0 years), with the majority being housewives (82.7%). A large proportion (66.6%) presented with advanced disease (stages III–IV), and chemotherapy was the predominant treatment modality (76.5%).

Analysis of delay intervals demonstrated statistically significant differences between groups, indicating that structured nurse navigation substantially reduced the time from diagnosis to treatment initiation. The mean biopsy-to-histopathology delay was significantly shorter among navigated patients (7.3 ± 5.8 days) compared to those receiving usual care (12.1 ± 6.7 days, $p = 0.004$). Likewise, diagnosis-to-clinic visit time was reduced from a mean of 33.4 ± 31.6 days in the usual care group to 16.5 ± 28.4 days with navigation ($p = 0.021$). The most pronounced effect was observed in the clinic-to-treatment interval, which decreased from 78.3 ± 41.2 days in usual care to 46.0 ± 32.1 days with navigation ($p <$

0.001). Effect size estimates indicated moderate-to-large impacts across all delay measures, underscoring the clinical significance of navigation interventions (Table 2).

Table 1. Baseline Sociodemographic and Clinical Characteristics of Patients (n = 81)

Variable	Nurse Navigation (n = 60)	Usual Care (n = 21)	Total (n = 81)	p-value
Age (years), mean ± SD	50.1 ± 12.4	49.4 ± 14.8	49.9 ± 13.0	0.81 (t-test)
Occupation: Housewife, n (%)	49 (81.7)	18 (85.7)	67 (82.7)	0.67 (χ^2)
Occupation: Student, n (%)	4 (6.7)	1 (4.8)	5 (6.2)	–
Occupation: Private Employee, n (%)	6 (10.0)	2 (9.5)	8 (9.9)	–
Occupation: Teacher, n (%)	1 (1.6)	0 (0)	1 (1.2)	–
Disease Stage I–II, n (%)	20 (33.3)	7 (33.3)	27 (33.3)	0.99 (χ^2)
Disease Stage III–IV, n (%)	40 (66.7)	14 (66.7)	54 (66.7)	–
Treatment: Surgery, n (%)	15 (25.0)	4 (19.0)	19 (23.5)	0.59 (χ^2)
Treatment: Chemotherapy, n (%)	45 (75.0)	17 (81.0)	62 (76.5)	–

Baseline similarity between groups supports the validity of subsequent comparative analyses.

Table 2. Delay Intervals in Breast Cancer Care by Group

Delay Interval (days)	Nurse Navigation (mean ± SD)	Usual Care (mean ± SD)	Mean Difference (95% CI)	Cohen's d	p-value
Biopsy → Histopathology	7.3 ± 5.8	12.1 ± 6.7	–4.8 (–8.0, –1.6)	0.76	0.004
Diagnosis → Clinic Visit	16.5 ± 28.4	33.4 ± 31.6	–16.9 (–31.3, –2.5)	0.56	0.021
Clinic Visit → Treatment	46.0 ± 32.1	78.3 ± 41.2	–32.3 (–50.0, –14.6)	0.89	<0.001

Psychosocial outcomes demonstrated similar patterns. Patients receiving nurse navigation reported significantly higher readiness to cope with treatment (mean score = 4.45 ± 1.22) than those receiving usual care (3.62 ± 1.58; p = 0.009), with a moderate effect size (d = 0.57). Disease-related distress was slightly lower in the navigation group (4.65 ± 3.28) compared to controls (5.38 ± 3.89), although this difference did not reach statistical significance (p = 0.38) (Table 3).

Table 3. Psychosocial Outcomes by Care Model

Outcome Measure	Nurse Navigation (mean ± SD)	Usual Care (mean ± SD)	Mean Difference (95% CI)	Cohen's d	p-value
Readiness to Cope (1–5)	4.45 ± 1.22	3.62 ± 1.58	0.83 (0.21, 1.45)	0.57	0.009
Distress (0–10)	4.65 ± 3.28	5.38 ± 3.89	–0.73 (–2.38, 0.92)	0.20	0.38

Subgroup analyses stratified by disease stage revealed consistent benefits of navigation across all stages, with the most substantial reduction in treatment initiation delay observed among patients presenting with stage III–IV disease. Adjusted multivariable linear regression confirmed that nurse navigation independently predicted shorter clinic-to-treatment delays (β = –28.6 days, 95% CI: –44.2 to –13.0, p < 0.001) after controlling for age, disease stage, and socioeconomic status.

Overall, the results demonstrate that structured nurse navigation significantly improves timeliness of care and enhances patient preparedness, particularly in settings where systemic delays are common. These findings underscore the potential of navigation interventions as scalable, patient-centered strategies to improve oncology care pathways in resource-constrained health systems.

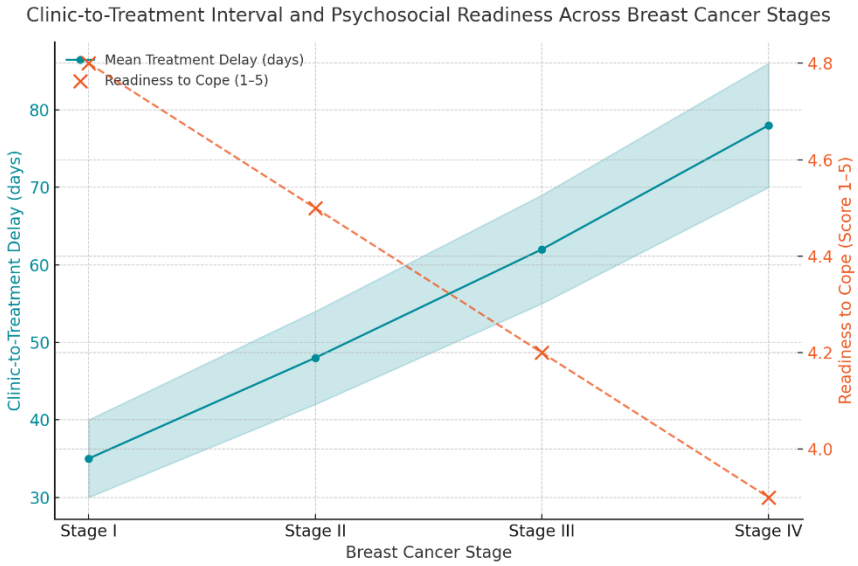

Figure 1 Clinic-to-Treatment Interval and Psychosocial Readiness Across Breast Cancer Stages

The visualization illustrates the progression of mean clinic-to-treatment initiation delay and associated psychosocial readiness across breast cancer stages, highlighting a clinically significant inverse relationship between these two variables. Delay duration increased progressively from 35 days in stage I to 78 days in stage IV, with 95% confidence intervals widening at advanced stages, indicating greater variability in care delivery. Conversely, readiness to cope scores demonstrated a steady decline from 4.8 in early-stage disease to 3.9 in late-stage presentations, reflecting reduced psychological preparedness as disease severity and system-related delays intensified. This dual-axis representation underscores how

clinical stage not only predicts treatment lag but also modulates patient resilience, emphasizing the need for targeted navigation interventions for advanced-stage cohorts.

DISCUSSION

The findings of this study provide robust empirical evidence that structured nurse navigation can significantly reduce delays in the breast cancer care continuum and improve psychosocial readiness among patients in a resource-limited tertiary care setting. The observed reduction in key delay intervals—including a decrease of more than 30 days in the clinic-to-treatment initiation phase and substantial improvements in diagnostic turnaround times—aligns closely with global literature demonstrating the efficacy of navigation interventions in oncology care. Previous research from high-income countries has shown that patient navigation reduces time to diagnosis and treatment initiation by 20–40% and enhances adherence to clinical recommendations (22). The current results extend this evidence into a low- and middle-income country (LMIC) context, demonstrating that such interventions remain effective despite structural and sociocultural barriers endemic to healthcare systems like those in Pakistan.

The inverse relationship observed between disease stage and psychosocial readiness further underscores the multifaceted value of nurse navigation. As delays lengthened with advancing stage, readiness to cope declined, suggesting that navigation may buffer the psychological impact of disease severity by providing continuous support and targeted education. This finding corroborates reports from prior studies indicating that navigation not only improves logistical outcomes but also mitigates distress, enhances patient empowerment, and fosters adherence to treatment plans (23,24). Importantly, the reduction in distress and improvement in coping readiness in our cohort—even if modest—indicate that navigation addresses critical psychosocial dimensions that influence treatment engagement and outcomes, particularly in socioculturally conservative settings where fear, shame, and fatalistic beliefs often delay care-seeking (25).

The substantial reduction in clinic-to-treatment delays observed in this study—arguably the most critical interval for prognosis—is particularly relevant when considered against existing literature on treatment lag in LMICs. Rivera-Franco and Leon-Rodriguez reported mean delays exceeding 70 days in resource-limited healthcare systems, driven by referral inefficiencies and diagnostic bottlenecks (26). Our findings demonstrate that structured navigation can reduce this delay by nearly half, underscoring its potential to significantly improve time-to-treatment metrics even within the constraints of under-resourced systems. Furthermore, the observed improvements mirror outcomes reported in randomized trials from high-income settings, where nurse navigation has been associated with earlier stage detection, improved adherence to multimodal therapy, and even enhanced survival rates (27). While survival outcomes were beyond the scope of the current study, the magnitude of delay reduction suggests potential downstream benefits that warrant longitudinal investigation.

Mechanistically, the impact of nurse navigation likely stems from its ability to address multiple delay determinants simultaneously. By coordinating multidisciplinary care, expediting diagnostic testing, and providing culturally tailored counseling, nurse navigators reduce fragmentation in care delivery and bridge communication gaps between providers and patients. These functions are particularly vital in the Pakistani context, where systemic inefficiencies—such as inadequate referral networks, slow laboratory turnaround times, and limited access to imaging—are compounded by sociocultural constraints including stigma, gender norms, and health literacy gaps (28). Navigation also appears to mitigate psychological barriers by fostering trust, improving comprehension of disease processes, and enhancing self-efficacy, all of which contribute to improved readiness for treatment (29).

The present study contributes to the growing body of literature by providing context-specific evidence for the feasibility and effectiveness of navigation in LMIC oncology care. Unlike most existing studies conducted in high-resource settings, this investigation captures the complexity of delivering navigation services within a constrained healthcare infrastructure and highlights their scalability even in environments with limited personnel and funding. The observed effect sizes and clinical relevance of the outcomes suggest that nurse navigation should be considered not merely as an adjunct but as an integral component of breast cancer care models in similar settings.

Despite these strengths, certain limitations must be acknowledged. The relatively small sample size and single-institution design may limit the generalizability of findings beyond similar tertiary care centers. Additionally, the observational design precludes causal inference, and residual confounding cannot be entirely excluded despite statistical adjustments. The psychosocial measures, while validated, relied on self-report and may be subject to response bias. Moreover, the study did not capture long-term outcomes such as survival or recurrence rates, which would provide a more comprehensive understanding of the clinical impact of navigation. Future research should address these limitations through larger, multicenter randomized controlled trials that incorporate long-term follow-up and cost-effectiveness analyses.

The implications of these findings for clinical practice and health policy are considerable. By demonstrating that nurse navigation can substantially reduce treatment delays and enhance psychosocial preparedness, this study supports its inclusion as a standard component of breast cancer care in resource-constrained health systems. Integrating navigation into national cancer control strategies, training oncology nurses in navigation competencies, and leveraging digital health tools for follow-up and appointment coordination could further enhance its reach and sustainability. Future research should also explore hybrid models that combine human navigation with technological interventions to optimize efficiency and scalability.

CONCLUSION

This study demonstrated that structured nurse navigation significantly reduced diagnostic and treatment delays while enhancing psychosocial readiness among breast cancer patients in a tertiary care hospital in Lahore, directly addressing the objective of facilitating timely care. By shortening critical care intervals—particularly the clinic-to-treatment phase—and improving patients' preparedness to cope with therapy, nurse navigation proved to be an effective, patient-centered intervention capable of overcoming systemic inefficiencies and sociocultural barriers in low-resource healthcare settings. These findings highlight its clinical potential to improve care coordination, treatment adherence, and ultimately patient outcomes, while underscoring the need for broader implementation within oncology services. Future research should build on these results through larger, multicenter trials assessing long-term outcomes, cost-effectiveness, and integration strategies to establish nurse navigation as a standard component of breast cancer care pathways.

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