Rural-Urban Disparity in Triple-Negative Breast Cancer

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BACKGROUND

Several studies have assessed the disparity in breast cancer survival between rural patients and urban patients, showing worse outcome for rural breast cancer patients relative to those from urban backgrounds (1, 2); however, the findings are inconsistent (3). An important predictor of survival is a pathological complete response to neoadjuvant chemotherapy, which is achieved when all invasive cancer has been eradicated in the breast (4). Rural patients may often be at a socioeconomic disadvantage with less access to healthcare resources, which may result in delays in the diagnosis and treatment of cancer (5). Few studies have focused on the relevance of urban versus rural dwelling in triple-negative breast cancer (TNBC).

AIMS

We aim to evaluate the effect of rural versus urban dwelling on pathological features and outcome in patients diagnosed with TNBC in Galway University Hospital (GUH). Additionally, we seek to determine if any differences exist between rural and urban TNBC patients in relation to rates of association with other risk factors and demographic factors, such as; obesity, nulliparity, alcohol use, and smoking.

METHODS

Data from 401 patients diagnosed with TNBC between 2000 and 2017 at GUH were collated in an Excel database which included tumour stage, grade, and type; chemotherapy regimen; pathological response to neoadjuvant chemotherapy; lifestyle and demographic factors including location of residence; and 5-year follow-up. Statistical analysis was carried out using SPSS version 25, including descriptive and regression analyses. Logistic regression analysis was performed to calculate likelihood of a pathological complete response (pCR). Kaplan-Meier estimator survival curves and Cox regression analysis was performed to calculate 5-year disease-free, metastasis-free and breast cancer-specific survival. A 95% confidence interval was used and a p-value <0.05 was considered statistically significant.

RESULTS

Location of residence was available for 342 patients; 57 rural and 285 urban.

Of 57 rural patients:

- 14 (25%) received neoadjuvant chemotherapy
- Tumour stage at diagnosis: pT1 = 32%, pT2 = 59%, pT3 = 5%, pT4 = 5%. 22 (61%)
- Nodal stage at diagnosis: pN0 = 61%, pN1 = 22%, pN2 = 6%, pN3 = 11%

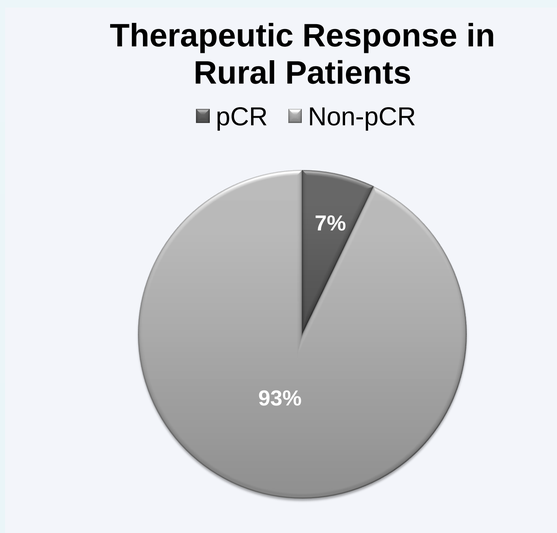
Of 285 urban patients:

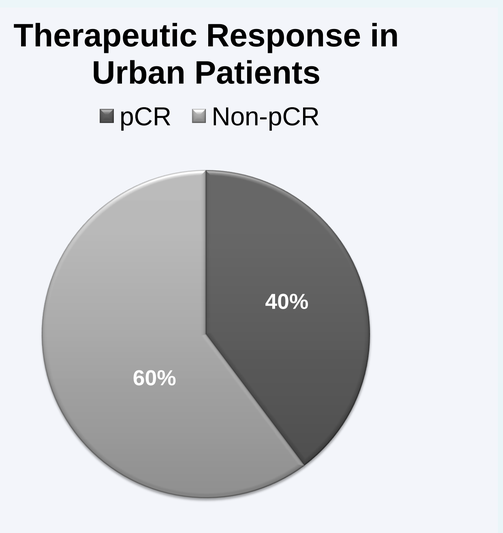
- 85 (30%) received neoadjuvant chemotherapy
- Tumour stage at diagnosis: pT1 = 36%, pT2 = 55%, pT3 = 6%, pT4 = 3%
- Nodal stage at diagnosis: pN0 = 66%, pN1 = 20%, pN2 = 8%, pN3 = 5%

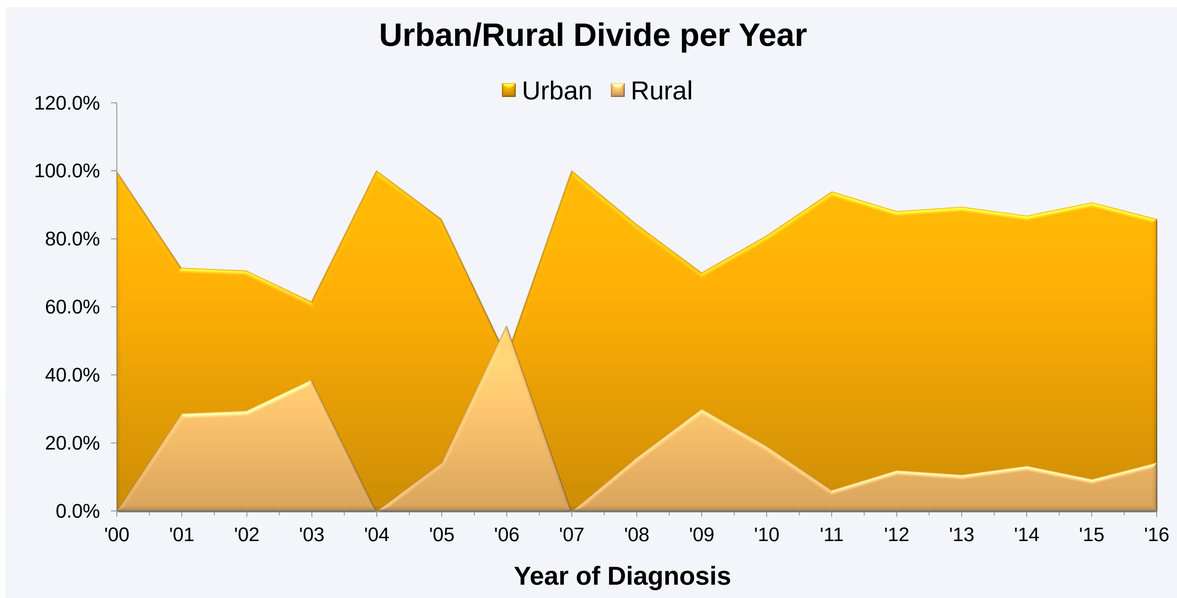
Rural patients were significantly more likely to not achieve a complete therapeutic response (non-pCR) to neoadjuvant chemotherapy (n=102, OR=8.62, p=0.043) – 40% (35/88) of urban patients had a pCR, while just 7% (1/14) of rural patients had a pCR.

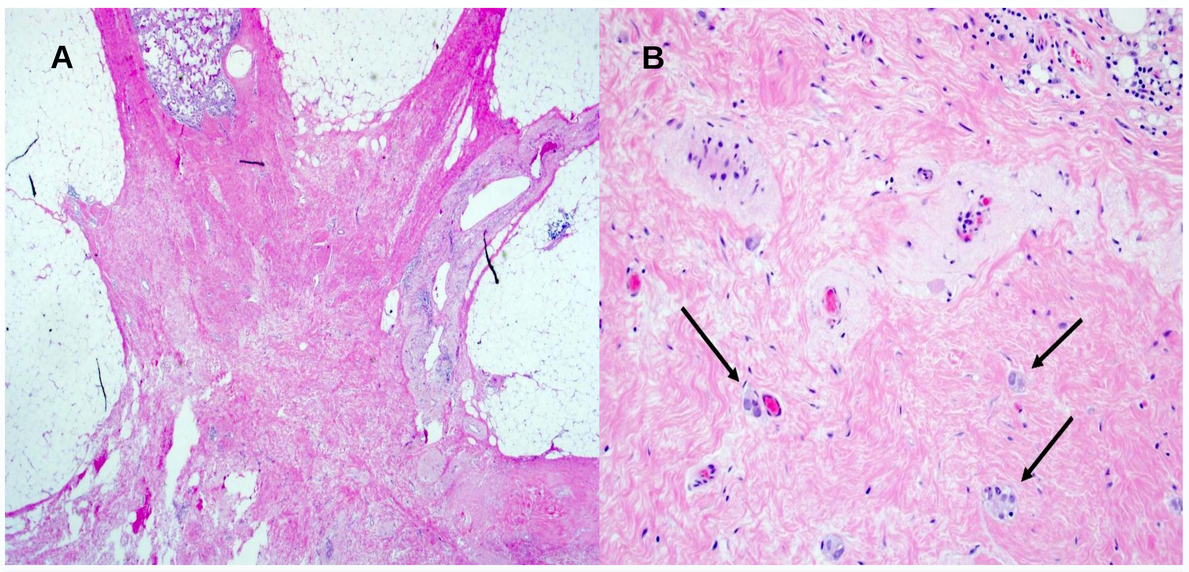
Rural patients were also significantly more likely to be heavy smokers (n=72, OR=11.36, p=0.023) – 93% (n=13/14) of rural patients had a pack-year history >20, 53% (n=31/58) of urban patients had a pack-year history >20.

Mean nodal status at diagnosis, 5-year local recurrence (29.8% rural vs. 24.9% urban, p=0.379), 5-year metastasis (3.5% rural vs. 2.5% urban, p=0.310) and 5-year mortality from breast cancer (29.8% rural vs. 24.2% urban, p=0.318) were higher in rural than urban patients; albeit not statistically significant. There was no difference in tumour size, grade, number of pregnancies, body mass index or alcohol consumption between the two groups.



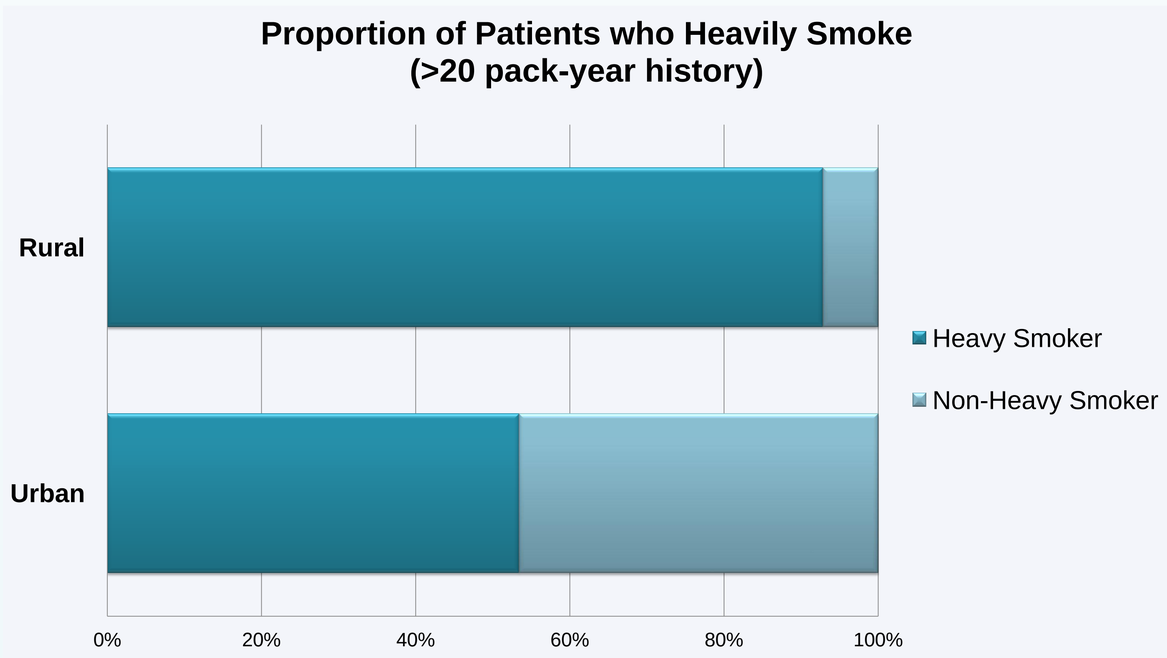






A. Histological image of breast tissue showing tumour bed comprised of fibrous tissue and an absence of invasive carcinoma, denoting a pathological complete response.

B. Breast tissue showing fibrous tumour bed with foci of residual invasive carcinoma (arrows), indicating an incomplete response (non-pCR).



CONCLUSIONS

Significantly higher rates of of non-pCR and smoking in rural patients – which are associated with poorer long-term outcome – warrant further investigation. Although not reaching statistical significance, poor prognostic indicators such as higher rates of local recurrence and metastasis in rural patients also portend additional investigations and surgeries for the patient – adding to psychological stress and negatively impacting quality of life. We propose that urban/rural dwelling status be obtained and assessed as a factor in future TNBC datasets. Our study is limited by a relatively small number of rural patients, and incomplete data. Larger studies are recommended to investigate the impact of urban versus rural dwelling on breast cancer outcomes in Ireland and to evaluate the association between attainment of pCR and location of residence.

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