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Original Research

Patient-reported symptoms after breast cancer diagnosis and treatment: A retrospective cohort study

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Abstract ***Aim:*** Breast cancer and its treatment are associated with varying symptoms. The province of Ontario (13.6 million) has implemented a provincial programme to screen for symptoms among cancer patients using the Edmonton Symptom Assessment System (ESAS). The purpose of this study was to describe symptom burden in the year after diagnosis among women with breast cancer.
Methods: This observational study linked cancer incidence, stage, treatment and demographic data with ESAS scores collected at cancer clinic visits. The cohort consisted of all adult women diagnosed with stage I–III breast cancer between 2007 and 2013 who received surgery as their primary treatment and had at least one symptom screening record. The prevalence and

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trajectory of moderate-to-severe and severe symptom scores in the year after diagnosis were described. Multivariable logistic regression models identified factors associated with moderate-to-severe and severe symptom scores.

Results: The cohort included 23,840 breast cancer patients and with 90,556 unique symptom assessments, within the first year from diagnosis. Tiredness had the highest incidence of moderate-to-severe scores; 60% reported at least one moderate-to-severe score in the 12 months after diagnosis, followed by impaired well-being (53%) and anxiety (44%). Elevated symptom scores were most commonly reported in 6 months after diagnosis. Higher comorbidity score (Aggregated Diagnosis Group $\geq$10), more advanced stage at diagnosis, younger age, urban residence, lower income and treatment course were associated with moderate-to-severe and severe symptom scores.

Conclusion: These findings identify time points and patient subgroups at risk for elevated symptom scores and may benefit from personalised or targeted supportive care interventions.

1. Introduction

Women diagnosed with breast cancer experience multiple cancer-related symptoms throughout diagnosis and treatment. Symptom burden, related to treatment, or the disease itself, can negatively impact patients' overall quality of life (QoL) and may cause abandonment or delays in treatment [1,2]. Symptoms such as nausea, pain and anxiety are particularly concerning during the receipt of adjuvant therapy and may impact outcomes such as emergency department (ED) visits and receipt of further treatment [3,4].

Previous studies focus on a composite of symptoms, such as health-related QoL, or are cross sectional in nature. Interventions to ameliorate symptoms and better support patients throughout their cancer journey may be created by examining patient-reported outcomes (PROs) and specific symptom trajectories over time. More specifically, healthcare providers may better predict the timing of potential symptoms in their patients and identify patients who are at particular risk of elevated symptom burden, by understanding symptom trajectories and patient factors associated with a higher symptom burden. The Edmonton Symptom Assessment System (ESAS) assesses the severity of nine cancer-related symptoms: anxiety, depression, drowsiness, lack of appetite, nausea, pain, dyspnoea, tiredness and impaired well-being. Cancer Care Ontario (CCO), the provincial cancer care agency overseeing care for 13.9 million people, has collected PRO data using ESAS since 2007, with the goals of promoting improved identification, intervention, documentation and communication of patients' symptoms.

The purpose of this study was to describe symptom trajectories and severity over a 1-year period from the time of diagnosis and to identify factors associated with symptom scores in a cohort of patients diagnosed with localised breast cancer.

2. Methods

2.1. Study design and population

This was a retrospective cohort study describing symptom scores for non-metastatic breast cancer patients who received surgery as their primary treatment. Patients were diagnosed in Ontario, Canada, between 01 April 2007 and 31 December 2013 with follow-up until 31 December 2014. The cohort included patients aged $\geq$18 years diagnosed with stage I–III breast cancer. Breast cancer was identified using the World Health Organization International Classification of Diseases for Oncology (ICD-O-3) topography codes: C50.0–50.9. To be included in the study, patients had to possess a valid provincial health insurance number and undergo surgical resection within 1 year of diagnosis as determined through Ontario Health Insurance Plan (OHIP) physician billing records [5]. Patients were excluded if they were male, had an invalid or missing encoded healthcare administrative identification number, a second cancer diagnosis at any time before or during the study period or lacked at least one ESAS record within 1 year of diagnosis. To ensure a cohort of early stage breast cancer patients, we excluded patients receiving chemotherapy or radiotherapy 2 years before surgery as we were unable to reliably ascertain the indication for neoadjuvant therapy and its influence on symptom burden.

The study was approved by the Sunnybrook Health Sciences Centre Research Ethics Board and meets the data confidentiality and privacy guidelines of the Institute of Clinical Evaluative Sciences.

2.2. Data sources

Provincial, administrative healthcare databases were linked to the CCO Symptom Management Database