The Breast 41 (2018) 25–33

Contents lists available at ScienceDirect

The Breast

journal homepage: www.elsevier.com/brst

Original article

The impact of organized breast assessment on survival by stage for screened women diagnosed with invasive breast cancer

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ARTICLE INFO

Article history:
Received 19 March 2018
Received in revised form
13 June 2018
Accepted 15 June 2018
Available online 18 June 2018

Keywords:
Breast cancer
Organized assessment
Survival
Time to diagnosis

ABSTRACT

Purpose: Since 1998, the Ontario Breast Screening Program (OBSP) has offered organized assessment through Breast Assessment Centres (BAC). This study compares survival between screened women diagnosed with breast cancer who have undergone assessment through a BAC and usual care (UC).
Methods: A retrospective design identified two concurrent cohorts of women aged 50 to 69 within the OBSP diagnosed with screen-detected invasive breast cancer at a BAC (n = 2010) and UC (n = 1844) between 2002 and 2010 and followed until 2016. Demographic and assessment characteristics were obtained from the OBSP. Abstraction of medical charts provided prognostic and treatment data. Death data were assessed from the Registered Person's Database and the Ontario Registrar General All-Cause Mortality File. Multivariable Cox proportional hazards models compared overall survival by assessment type (BAC/UC), stratified by stage.
Results: There were 505 deaths during the study (BAC = 239; UC = 266). Among women with stage I screen-detected breast cancer, those diagnosed through a BAC had 31% reduced risk of all-cause mortality (HR = 0.69, 95% CI = 0.53–0.90) compared to UC. Diagnosis within 7 weeks of an abnormal mammogram reduced the hazard of death from all causes by 34% among all women with stage I breast cancers (HR = 0.66, 95% CI = 0.47–0.91), and was more likely in BAC (79.7%) than UC (66.9%).

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https://doi.org/10.1016/j.breast.2018.06.007

Conclusion: The significant improvement in overall survival for women with stage I screen-detected invasive breast cancer assessed through BACs further supports the recommendation that women with abnormal mammograms should be managed through organized assessment.

1. Introduction

To ensure the benefits of early detection, women with abnormal screening mammograms must have access to timely and accurate diagnostic assessment [1]. Delays in assessment of an abnormal mammogram are associated with patient stress and anxiety [2–4] and have a negative impact on the prognosis of screen-detected breast cancers [5,6]. In Ontario, the estimated 3-year relative survival ratio for breast cancer is high for those diagnosed in stage I (99.8%) but falls to 40.9% for stage IV breast cancers [7].

There have only been a few studies that have examined survival among women diagnosed at dedicated breast cancer centres. A Norwegian study found 14% reduced risk of breast cancer death after establishment of multidisciplinary breast centre care units [8], and two German studies found 30% and 15% reduced risk of death, respectively, among women seen in Certified Breast Centres compared to usual care (UC) [9,10]. However, all three studies evaluated centres with both diagnostic and treatment services, and thus it is difficult to identify which part of the assessment-diagnosis-treatment pathway impacted survival. Another German study compared survival for women inside and outside the Quality Assured Mamma Diagnostic "QuaMaDi" program, which offers a standardized, evaluated diagnostic process [11]. This study found a 22% reduced risk of death for women with breast cancer in the program, but only included symptomatic or at-risk patients.

The Ontario Breast Assessment Collaborative Group (OBACG) was established in 1998 to guide development of organized breast assessment in Ontario, resulting in the establishment of Breast Assessment Centres (BACs) [12]. Our recent study found that women assessed through BACs have shorter times to diagnosis (overall median wait times from abnormal screen to diagnosis were 28 days for women assessed through BACs and 39 days for UC), and fewer, timelier, more appropriate assessment procedures compared to UC [13]. However, to our knowledge it remains unknown how organized breast assessment, independent from treatment, may influence survival among asymptomatic women diagnosed with screen-detected breast cancer.

This study examines overall survival between concurrent cohorts of women aged 50–69 screened in the Ontario Breast Screening Program (OBSP) undergoing assessment through BAC and UC and diagnosed with breast cancer. The association of assessment characteristics with survival was also examined.

2. Materials and methods

2.1. Study population

The OBSP has operated since 1990 to deliver a population-based breast screening program to eligible women [14]. Women are not eligible if they have acute breast symptoms, a history of breast cancer, or current breast implants. At all OBSP centres, mammography consists of standard craniocaudal and mediolateral oblique views that are obtained for each woman using high-quality mammography machines and processors that are optimized for mammography by certified Medical Radiation Technologists. Quality assurance on the equipment meets or exceeds that specified by the Canadian Association of Radiologists Mammography Accreditation Program (CAR-MAP). OBSP requires that the centres and the radiologists reading at the site be CAR-MAP accredited.

This study identified women aged 50–69 screened through the OBSP with an abnormal mammogram between January 1, 2002 and December 31, 2009 [13]. Of those with an abnormal mammogram, one cohort underwent diagnostic assessment through a BAC and the other through UC. Ontario facilities that provide organized assessment must meet established criteria to qualify as a BAC. Criteria include: providing all abnormal mammographic work up including special mammographic views and image-guided core biopsy; providing radiological, surgical and pathologic consultation with experts in breast evaluation; and providing a navigator for patient support and coordination of referrals. BACs may either perform all the required services for abnormal mammographic work up, or establish networks with facilities to provide the services [13,15]. For OBSP women seen through UC, further diagnostic imaging after an abnormal mammogram is arranged directly from the screening centre and/or through their primary care physician; results must be communicated to the physician who is then responsible for arranging any further imaging or necessary biopsies. Although all women were screened at an OBSP centre, referral for assessment was dependent on whether the screening centre was affiliated with a BAC. Women were then followed prospectively to a definitive diagnosis. Breast cancer treatment location is unrelated to whether a woman had her breast assessment at a BAC or UC following an abnormal mammogram. During the study, women were screened at 150 OBSP centres and assessed at 35 BACs. The study was approved by the University of Toronto Research Ethics Board and informed consent was not required.

2.2. Selection of breast cancer cases

There were 2,147,257 women aged 50–69 screened at an OBSP centre between January 1, 2002 and December 31, 2009. To allow for learning curves for new BACs, only women with an abnormal mammogram after 6 months of operation were selected [16]. Invasive breast cancers of any histological type classified as screen-detected by the program during follow-up and detected within 12 months of an abnormal screening episode were included. Prevalent breast cancers detected on initial screens were not included. Women were excluded if they were premenopausal, had bilateral or non-primary breast cancer, were non-Ontario residents, had a diagnosis >365 days after an abnormal screen, had stage IV cancer, were missing information required to identify treatment location, or received treatment at a hospital with less than 15 eligible women.

2.3. Data sources

Demographic, risk factor, and assessment characteristics were obtained from the Integrated Client Management System (ICMS) of the OBSP. Additional risk factor data, prognostic, and treatment information were obtained from chart abstraction at regional cancer centres. Regional cancer centres are specialized centres that