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Health behavior change following a diagnosis of ductal carcinoma in situ: An opportunity to improve health outcomes

Amy M. Berkman [a], Amy Trentham-Dietz [b,c], Kim Dittus [c,d,e], Vicki Hart [a], Christine M. Vatovec [e,f], John G. King [g], Ted A. James [e,h], Susan G. Lakoski [c,d,e], Brian L. Sprague [a,c,e,h,*]

[a] Office of Health Promotion Research, University of Vermont, Burlington, VT, USA
[b] Department of Population Health Sciences and Carbone Cancer Center, University of Wisconsin, Madison, WI, USA
[c] Vermont Center on Behavior and Health, University of Vermont, Burlington, VT, USA
[d] Department of Medicine, University of Vermont, Burlington, VT, USA
[e] University of Vermont Cancer Center, Burlington, VT, USA
[f] Rubenstein School of Natural Resources, University of Vermont, Burlington, VT, USA
[g] Department of Family Medicine, University of Vermont, Burlington, VT, USA
[h] Department of Surgery, University of Vermont, Burlington, VT, USA

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ABSTRACT

Ductal carcinoma in situ (DCIS) is a non-invasive breast cancer that comprises approximately 20% of new breast cancer diagnoses. DCIS is predominantly detected by screening mammography prior to the development of any clinical symptoms. Prognosis following a DCIS diagnosis is excellent, due to both the availability of effective treatments and the frequently benign nature of the disease. However, a DCIS diagnosis and its treatment have psychological and physical impacts that often lead to adverse changes in health-related behaviors, including changes in physical activity, body weight, alcohol intake, and smoking, which may represent a greater threat to the woman's overall health than the DCIS itself. Depending on age at diagnosis, women diagnosed with DCIS are 3–13 times more likely to die from non-breast cancer related causes, such as cardiovascular disease, than from breast cancer. Thus, the maintenance and improvement of healthy behaviors that influence a variety of outcomes after diagnosis may warrant increased attention during DCIS management. This may also represent an important opportunity to promote the adoption of healthy behaviors, given that DCIS carries the psychological impact of a cancer diagnosis but also a favorable prognosis. Particular focus is needed to address these issues in vulnerable patient subgroups with pre-existing higher rates of unhealthy behaviors and demonstrated health disparities.

Introduction

Breast cancer mortality has declined steadily in the US over the past 20 years due to advances in population screening and the development of new treatments (Berry et al., 2005). However, overdiagnosis has emerged as an unintended consequence and an important harm associated with mammography screening for breast cancer (Marmot et al., 2012. Various lines of evidence suggest that anywhere between 5–40% of early stage screen-detected breast cancers would never have emerged clinically if they had not been detected through screening (Etzioni et al., 2013). Concerns about overdiagnosis are heightened for ductal carcinoma in situ (DCIS), the earliest stage of breast cancer. Two decades of increased screening, diagnosis, and treatment of DCIS have not led to a substantial reduction in invasive cancer incidence, suggesting that a large proportion of DCIS cases would not progress if left undetected (Esserman et al., 2009). DCIS is a non-obligate precursor of invasive breast cancer and is detected predominantly by screening mammography among women who have no clinical symptoms (Lee et al., 2012). It is a heterogeneous diagnosis, with variations in histopathological features, radiological characteristics, natural history, and molecular marker expression (Mokbel and Cutuli, 2006). Large increases in the incidence of DCIS began in the early 1980s (Fig. 1), concurrent with the widespread adoption of screening mammography (Ernster et al., 1996). Every year over 60,000 new DCIS cases are diagnosed (American Cancer Society, 2009), representing 18% of new breast cancer diagnoses overall (Surveillance Epidemiology and End Results (SEER) Program, 2009), with projections that by 2016 there will be over 1 million women living with a DCIS diagnosis in the US (Sprague and Trentham-Dietz, 2009). While the prevalence of DCIS continues to increase, the prognosis is excellent. A recent analysis demonstrated that only 3.2% of women diagnosed with DCIS die from breast cancer over 20 years of follow-up (Berkman et al., 2014). As such, DCIS patients

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* Corresponding author at: Office of Health Promotion Research, 1 S Prospect St, Burlington, VT 05401, USA.
E-mail address: bsprague@uvm.edu (B.L. Sprague).

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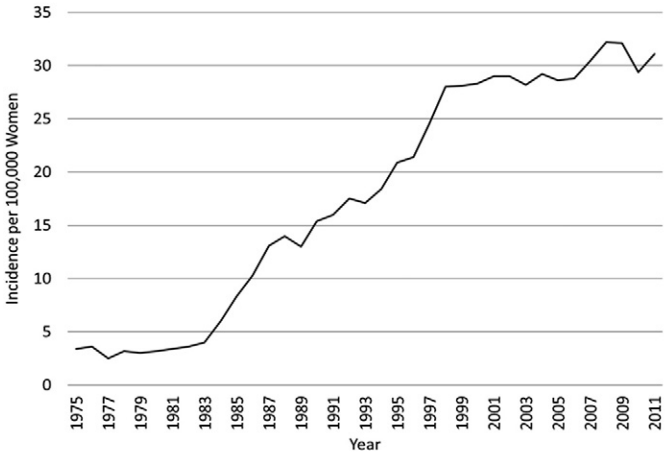

Fig. 1. Annual age-adjusted incidence of ductal carcinoma in situ.
Data from the Surveillance, Epidemiology, and End Results (SEER) Program (Surveillance Epidemiology and End Results (SEER) Program., 2013).

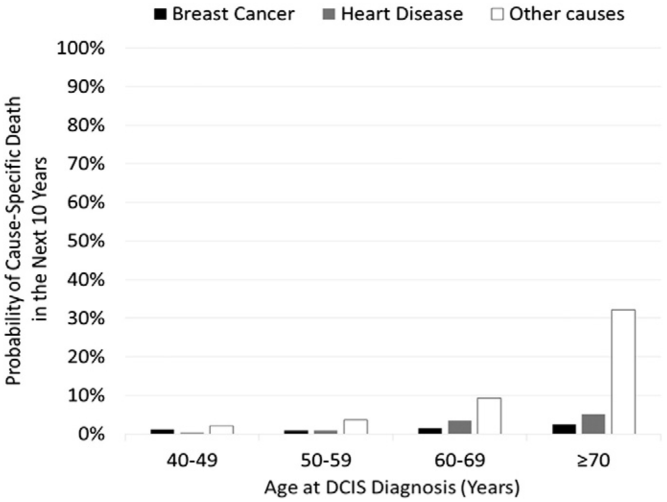

Fig. 2. Ten-year cumulative incidence of death due to breast cancer, heart disease, and other causes following a DCIS diagnosis.
Data from the Surveillance, Epidemiology, and End Results (SEER) Program (Berkman et al., 2014).

are a growing cancer survivor population at risk for competing causes of death. Modification of health-related behaviors may promote breast-cancer specific survivorship as well as protect against competing causes of death. Many health-related behaviors are associated with reduced risk of breast cancer recurrence in addition to decreased risk of a wide array of other common health outcomes (e.g., cardiovascular disease). Importantly, a DCIS diagnosis appears to have a comparable psychological impact to that of a localized invasive breast cancer diagnosis, which may include increased patient motivation to adopt health-improving strategies (Rakovitch et al., 2003). Thus, DCIS management may offer a unique opportunity for health care providers to assist a large number of patients in adopting healthy behaviors that improve both breast cancer and non-breast-cancer outcomes.

Health outcomes after a DCIS diagnosis

Analyses of data from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program have demonstrated that women diagnosed with DCIS are more likely to die from other causes compared to their risk of dying from breast cancer. As with the general population, cardiovascular disease is the leading cause of mortality among women with DCIS. Ernster et al. found that among women diagnosed with DCIS from 1978–1989, 11% of deaths were due to breast cancer while 32% were due to cardiovascular disease (CVD) (Ernster et al., 2000). In a more recent analysis of cases diagnosed between 1978 and 2010, the cumulative risk of cause-specific death at 20 years of follow-up was 3.2% for death due to breast cancer compared to 13.2% for death due to cardiovascular disease and 23.2% for death due to other causes (Berkman et al., 2014). Notably, the relative frequency of other cause death compared to breast cancer death increased with age at DCIS diagnosis (Fig. 2). Women diagnosed with DCIS between the ages of 40–49 were approximately 3 times more likely to die from other causes than from breast cancer; women diagnosed at ages 60–69 were nearly 13 times more likely to die from other causes than breast cancer. This phenomenon occurs because the risk of CVD and other cause mortality increases more rapidly with age compared to the risk of breast cancer mortality after a DCIS diagnosis.

Health-related quality of life and the psychological impact of a DCIS diagnosis

Despite having an excellent prognosis, women with DCIS experience substantial reductions in health-related quality of life, comparable to women with localized invasive breast cancer (Ganz, 2010). These generally are more prominent among the mental, rather than physical, domains of health-related quality of life. In the Nurses' Health Study, the impact of a DCIS diagnosis was examined using the SF-36 health-related quality of life survey (Nekhlyudov et al., 2006). Clinically significant declines in social functioning and mental health were observed within the six months following diagnosis. Small declines in the domains of role limitations due to physical problems and vitality were also observed in the first four years after a diagnosis. In a separate cohort of women with DCIS, notable declines were observed in general health, vitality, and mental health at 9 and 18 months after diagnosis, compared to pre-diagnosis scores (Partridge et al., 2008). In comparison to population controls, patients with DCIS had lower emotional functioning, general health, vitality, sexual interest, poorer mental health, and higher rates of depression (Claus et al., 2006).

These decrements in mental health-related quality of life likely stem from fear of breast cancer recurrence and mortality. Importantly, levels of fear appear similar in women with DCIS and women with more advanced diagnoses. In a study assessing factors related to fear of recurrence, 29% of DCIS patients reported moderate to high fear, which was not significantly different from patients diagnosed with stage IIA breast cancer (Liu et al., 2011). Fear of recurrence is known to affect psychological state and quality of life, through its association with increased anxiety, depression, and functional impairments (Simard et al., 2010). In a separate study, it was found that risk perceptions among women with DCIS were overestimated and did not change over an 18 month follow-up period from diagnosis, and about 10% of women experienced substantial anxiety related to these misperceptions (Partridge et al., 2008). Furthermore, using the Hospital Anxiety and Depression Scale, Kennedy et al. found that about 50% of women with DCIS experienced problematic anxiety at diagnosis, which persisted through 9 months of follow-up, with 33.3% of women continuing to experience high levels of anxiety (Kennedy et al., 2010). Finally, Rakovitch et al. found that 56% of DCIS patients exhibited any level of anxiety, which was similar to anxiety rates among women with early invasive breast cancer (Rakovitch et al., 2003).

Women in the Wisconsin In Situ Cohort (WISC) study were 57% more likely to use antidepressants after their DCIS diagnosis than they were one year prior to diagnosis (Sprague et al., 2010). This is consistent with data from invasive breast cancer populations, which have found depression rates as high as 46% among survivors (Massie, 2004). Depression among women with breast cancer is correlated with a lower quality of life in the physical, emotional, and social dimensions (Reich et al., 2008). Additionally, preliminary data, not yet published, from WISC suggest that DCIS cases experience declines in mental health