Contrary to the Popular Belief: Differential Impact of HRT and MPH Rules on Female Invasive Breast Cancer Incidence

Appathurai Balamurugan, MD, DPPhM, MPH, FAAFP 1,2,3, Abby Holt, MPH,1 Chris Fisher, BS,1 Melissa Riddle, CTR,1 Robert Delongchamp, PhD, MPH 1,3
1 Arkansas Department of Health, 2 Department of Epidemiology or 3 Department of Family and Preventive Medicine, University of Arkansas for Medical Sciences, Little Rock, Arkansas

Background

While the decrease in incidence trends of female invasive breast cancer has been generally praised by cancer prevention and control partners, the influence of hormone replacement therapy (HRT) cessation, and implementation of the multiple primary and histology (MPH) rules has been understated. This analysis assessed the impact of HRT and MPH rules on female invasive breast cancer incidence trends in Arkansas.

Methods

We followed primary and subsequent invasive breast cancer incidence among Arkansas residents, limited to White females who were diagnosed during the years 1997 – 2013, due to sample size.

Age-adjusted incidence rates with 95% confidence intervals were calculated for each of the following groups:
1. females with any diagnosis of invasive breast cancer
2. females diagnosed with invasive breast cancer as 1st primary, or a subsequent primary breast tumour diagnosed within a year of 1st primary cancer (other than breast).

Trends in age-adjusted incidence rates were adjusted for changes associated with HRT cessation and the application of the MPH Rules on 1st primary breast tumor diagnoses.

Results

A total of 29,335 White females were diagnosed with either 1st primary (23,438 females) or subsequent (5,897 females) breast cancer from 1997 – 2013. Figure 1 shows the distributions of subsequent primaries by 1st primary: breast or other. MPH rules true of false, and years after 1st primary diagnosis. MPH rules mostly decreased the number of subsequent primaries that were diagnosed with the exception of cases diagnosed early in follow-up.

Many subsequent breast cancer diagnoses occur within a year of the 1st primary diagnosis (Figure 1). In these cases, a designation as 1st or subsequent is somewhat arbitrary since both cancers were likely present when one was diagnosed.

Conclusions

Age-standardized invasive female breast cancer incidence trends of invasive breast tumors, by coding rules, AR, 1997-2013

Figure 1: Distribution of subsequent primary breast cancer diagnoses, AR, 1997-2013

Figure 2 plots age-standardized incidence rates of invasive breast cancers with their 95% confidence bounds. These rates are for Arkansas during the years 1997 – 2013.

The blue trend implies that incidence has declined on average by about 1 case per 100,000 per year (p < 0.002). However, this overall decline resulted from 2 interventions in a what was otherwise an increasing trend (1.2 cases per 100,000 annually, p = 0.014); most notable decline occurring in 2002 to 2004, attributed to the cessation of HRT (18.2 cases per 100,000, p = 0.001) but also a decline in 2008 attributed to the 2007 MPH Rules implementation (-9.6 cases per 100,000, p = 0.005).

HRT was associated with a 13.5% decline (Fig 2) and a 14.3% decline (Fig 3). MPH rules were associated with a 7.4% decline (Fig 2) and a 6% decline (Fig 3). Thus, little difference in relative change with these declines. However, the increasing trend largely disappeared (dropping to 0.14 per 100,000 annually, p < 0.05) suggesting that the increasing trend in Figure 2 is due to increasing subsequent breast tumor diagnoses (post diagnosis of a 1st primary breast cancer).

Figure 3: Age-standardized rates of first primary invasive breast tumors, AR, 1997 - 2013

Note: Age-standardized incidence rates calculated include first primary breast tumors only.

Figure 4: Age-standardized rates of subsequent primary invasive breast tumors, AR, 1997 - 2013

Figure 4 plots the crude rates for subsequent primary breast cancer. Rates are roughly 3X higher than those in Figure 3, so increasing the proportion of subsequent primaries is a reasonable explanation of the increasing trend in Figure 2. The trend in Figure 4 is small; suggesting that actual rates of subsequent primaries have changed little over the years.

We have estimated that a 0.5% annual increase in prevalence of cancer survivors would drive the increase.

Removing subsequent primary breast cancers from the incidence calculations essentially eliminated the increasing trend (Figure 3: 0.14 cases per 100,000 per year). Figure 4 shows that breast cancer survivors had a 3-fold greater breast cancer risk than women with no prior cancer diagnosis.

Breast cancer survival rates have increased over time, which has been attributed to increased use of mammography screening and advances in treatment. In Arkansas during 2009 to 2013, 60.9% of breast cancers were diagnosed at the localized stage when prognosis is better. And, overall, 70% of women diagnosed with breast cancer at the localized stage live 10-years or longer after diagnosis. This thus this population at higher risk is increasing. We have estimated that a 0.5% annual increase in prevalence of cancer survivors would drive the increase. New breast cancers account for 0.2% in Arkansas; other sites might be contributing the remainder.


Arkansas Cancer Control Registry is supported by Cooperative Agreement #17-1301 ENU363005323-01-01 from the Centers for Disease Control and Prevention. The contents in the poster are solely the responsibility of the authors and do not necessarily represent the official views of CDC.