The Economics of Breast Cancer in Younger Women in the U.S.

The Present and Future

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In the past four decades, substantial progress has been made in breast cancer survival in part because of advances in early detection and treatment following diagnosis.[1,2] Further, recent studies[3,4] have reported that the observed improvement in breast cancer mortality and survival between the 1970s and 2000s is also the result of changes in the distribution of tumor characteristics, which include the identification of the human epidermal growth factor receptor 2 and the development of the targeted agent such as trastuzumab that extends survival in both the adjuvant and metastatic settings for a range of 15%–25% of patients with human epidermal growth factor receptor 2–positive tumors. For example, in 2012, the annual age-adjusted breast cancer mortality was approximately 21 per 100,000 and 5-year relative survival exceeded 90%.[5] Despite this progress, not all age, racial/ethnic, or socioeconomic groups have benefited equally, and disparities in incidence and mortality still exist.[6] During the past four decades, incidence of breast cancer was much higher in older women (aged >50 years) and the survival rate was lower in younger women (aged <50 years).[7] This is in part because breast cancer in women aged 15–44 years (henceforth referred to as younger women) is often characterized by aggressive tumor subtypes that are less likely to be amenable to treatment at the time of diagnosis and have poorer survival outcomes.[8–11] As a result, these breast cancers could result in more devastating health outcomes and economic burden to younger women, their families, and society.

In recent years, there has been increased interest in breast cancer among younger women. In 2009, the Education and Awareness Requires Learning Young Act, which is presented in detail in Section 10413 of the Patient Protection and Affordable Care Act,[12] authorized CDC to conduct research and develop initiatives that increase knowledge in evidence-based approaches to advance understanding and awareness of breast health and breast cancer among younger women. To provide information to support resource allocation decisions that effectively increase awareness and support among younger women diagnosed with breast cancer, the authors set out to quantify the economic burden in this population. To date, there have been no national studies specifically quantifying the economic burden of breast cancer in younger women in the U.S. The available estimates are at the aggregate level regardless of specific age group. For instance, a study[13] reported economic burden on breast cancer care for all women to be $16.5 billion in 2010 dollars. Although these are useful data for decision making, they mask information on the burden of breast cancer outcomes and economic costs in younger women. Therefore, gaps exist in knowledge about the health outcomes and economic burden of breast cancer in this population. Historically, economic burden studies have proven to be useful for providing a basis for decision making in program planning and evaluating interventions such as cancer screening programs.

The five articles in this theme issue attempt to address the economic burden of breast cancer among younger women. In this issue, economic burden was defined as changes in health-related quality of life (HRQoL), a measure of resources used for medical care and loss of economic resources associated with the diagnosis and treatment of breast cancer in this population. Given this definition, the articles presented in this theme issue consist of two categories:

1. assessment of health outcomes; and
2. assessment of economic impacts.

Figure 1 illustrates the conceptual framework of how the articles fit together to provide up-to-date data that could be used to inform budget, clinical, and health promotion decisions in this population.

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The first two articles address issues on health outcomes that reflect women's self-assessment of the impact of breast cancer treatment(s) on their HRQoL and well-being. The article by Brown et al.[14] provides new and important data on the burden of breast cancer in younger women for use in the economic evaluation of intervention programs and public health surveillance. The authors used a measure known as the health state utility (HSU), a cardinal scale that represents a 0 (worst health) to 1 (best health) summary of preference-weighted outcomes over HRQoL outcomes. They found that the burden of breast cancer in terms of HSU was significantly larger for younger women compared with women aged $\geq$45 years. Additionally, the HSU impact on breast cancer was significantly larger than that found for other types of cancer. These differences underscore the importance of conducting age-specific analysis when measuring HRQoL and HSU values in economic evaluation of public health programs and when making medical decisions for cancer treatment among younger women. The results also suggest that clinicians and public health officials should consider placing greater emphasis on identification of preventive measures for younger women who may be at greater risk for breast cancer, as the HRQoL burden for a woman aged $<$45 years is significantly larger than that caused by other cancers.

The second article by Trogdon and colleagues[15] complements Brown et al.[14] by further examining the HRQoL impacts of breast cancer, measured by HSU, age of diagnosis, and race/ethnicity. Prior to this paper, little was known about the effect of breast cancer diagnosis on HRQoL among younger women. The existing literature suggests that younger women with breast cancer may face substantial HRQoL challenges, including chemotherapy-induced menopause, decreased sexual function, infertility, diminished body image, and other side effects.[16–19] There is also evidence that the HRQoL effects of breast cancer vary by race/ethnicity.[20–24] Trogdon and colleagues[15] reported three key findings. First, the HRQoL effects of breast cancer are larger among women diagnosed at younger ages. Second, the HRQoL effects of breast cancer are concentrated in the first year after diagnosis, with larger effects among women diagnosed at younger ages. Third, there are significant differences in the HRQoL effects of breast cancer by race/ethnicity. The results highlight the need for separate quality of life adjustments for women by age at diagnosis and race/ethnicity when conducting cost-effectiveness analysis of breast cancer prevention, detection, and treatment.

The last three articles assessed economic impacts and described the direct medical care costs consumed in treating breast cancer and indirect morbidity costs associated with the diagnosis of breast cancer in this population. Two of the articles focused on direct medical care costs: Allaire et al.[25] examined medical care costs of breast cancer in privately insured younger women, and Ekwueme and colleagues[26] presented estimates of treatment costs of breast cancer among younger women enrolled in Medicaid. The last article in the series by Ekwueme et al.[27] focused on indirect morbidity costs and presented estimates of productivity costs associated with younger breast cancer survivors. The cost estimates reported in these three articles are prevalence-based, which represent economic cost burden for all young women breast cancer survivors alive in a specific year. Prevalence cost estimates can be useful for informing the design of insurance benefits, eligibility criteria for public programs, and budgeting for future program costs.[28]

The study by Allaire and colleagues[25] utilized the MarketScan database, which contains one of the nation's largest administrative claims data on people who have employment-based health insurance. The database

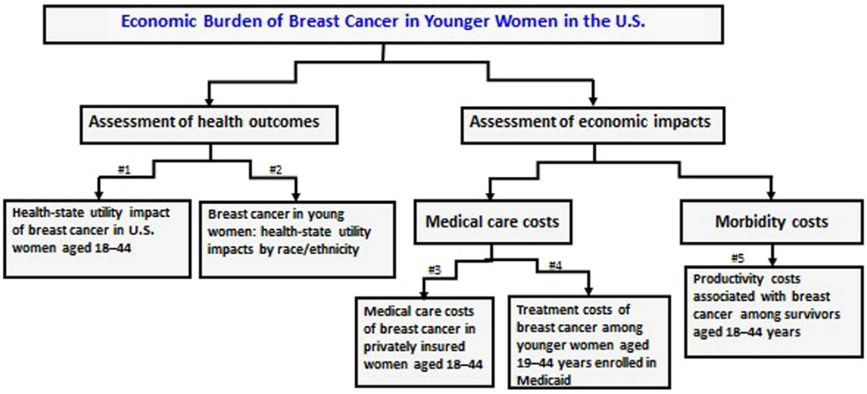

Figure 1. Illustration of the conceptual framework of the articles in this theme issue.
Note: # means the number of articles in the theme issue. Health state utility (HSU) values are scaled to a single 0 (dead) to 1 (best health) cardinal index. HSU is a special health-related quality of life measure that represents global health-related well-being, is based on preference-based tradeoffs, and is used in economic evaluations to value improvements in morbidity and mortality from interventions (e.g., quality-adjusted life-years).