


Challenges in Predicting Future Costs for Metastatic Breast Cancer

Michaela A. Dinan , PhD,^{1,2,*} Rachel A. Greenup, MD, MPH^{2,3}

¹Department of Chronic Disease Epidemiology, Yale School of Public Health, New Haven, CT, USA, ²Cancer Outcomes, Public Policy, and Effectiveness Research Center, Yale School of Medicine, New Haven, CT, USA and ³Department of Surgery (Oncology), Yale School of Medicine, New Haven, CT, USA

*Correspondence to: Michaela A. Dinan, PhD, 60 College Street, Ste 444, New Haven, CT 06510, USA (michaela.dinan@yale.edu).

Breast cancer is the most common female cancer and the second leading cause of cancer death in the United States, affecting more than 250 000 women each year (1). To date, annual breast cancer-specific health system costs are estimated to reach \$20 billion (2). The burden of treatment is multifactorial for patients receiving care; this includes direct payments for health services, such as high out-of-pocket expenditures related to cost sharing (ie, co-payments, high deductibles), and the indirect costs secondary to lost productivity and wages. Individuals with cancer are at a fourfold greater risk of work absenteeism and higher risk of short-term disability when compared with matched non-cancer controls (3). For those with metastatic breast cancer (mBC), reduced incidence, changes in mortality, and the development of novel systemic therapies have further complicated the existing cost landscape. Prior research has demonstrated that mBC is associated with more frequent and high complexity health care, greater medical spending, and an increased risk of cancer-related financial toxicity (4-6).

In this issue of the Journal, the study by Gogate et al. (7) incorporates direct medical costs as well as lost productivity costs to provide a societal perspective of the future financial impact of mBC from 2015 to 2030. The study used real-world data to inform the medical costs and estimates of incidence, survival, and progression, providing data that may be useful in the future to help inform the potential implications of screening programs, targeted drug approval, and policy-relevant insurance programs for mBC patients. For example, a screening program that is able to decrease the number of metastatic cases could use the study's estimated total costs to predict associated savings. There may be one missed opportunity here in that the study estimated the additional cost of metastatic breast cancer as compared with noncancer controls. This comparison may not be as directly relevant to screening programs, because they do not turn metastatic disease into noncancer. Instead, the goal is early detection or a shift in diagnosis from the metastatic stage to earlier, curative stages of disease. Therefore, screening programs that reduce the incidence of metastatic disease will still have to take into account the cost of earlier stage disease, which could also have been estimated using the reported study cohort.

Limitations acknowledged by the authors include that cost data was from a single state and spanned a time period from 2003 to 2014, during which practice patterns may have changed (7). The study did not attempt the largely impossible task of predicting or incorporating specific advances or changes in cancer care into future cost estimates. The costs of cancer care will likely undergo dramatic changes in coming years with the increased use of targeted agents, supportive growth factors, and immune-targeted agents, which have begun to make inroads into the care of triple-negative and HER2-positive disease. Further, more effective and available therapies may translate to longer and more costly total time on treatment. Extending the continued phase of treatment among medically complex individuals with mBC has the potential to impact both the health-care system and patients themselves. Conversely, costs may decrease with a lower risk of distant recurrence among women with early stage disease, the introduction of biosimilars, off-patent anticancer agents, proposed dose reductions, and de-escalation of locoregional treatment in the metastatic setting, now supported by level I evidence. Lastly, there is an increasing awareness and support of shifting end-of-life care from an expensive inpatient setting at the hospital to home. The authors recognize that revolutionary approaches to care and novel models of its delivery, such as telehealth and value-based reform, may impact their estimates. Despite these limitations, the estimated absolute costs of metastatic breast cancer for 2015 have been solidly based on recent empiric cost and demographic data.

Not surprisingly, the greatest challenge lies in predicting costs in the future year 2030. The authors incorporate growing costs in their models with the assumption that cancer costs will increase 5% per year every year (7). Thus, these findings may rest on a somewhat subjectively chosen growth rate. Given the impact of this parameter, it ideally would be more objective and supported by specific data or literature. Holding all other factors constant, roughly three-quarters (108%) of the author's predicted increase in cost (140%) can be attributed to an annual 5% increase in treatment costs over the course of 15 years, assuming a 2% annual increase would have resulted in only a 35% increase in costs and closer to a 77% increase in costs by 2030.

Received: 11 June 2021; Accepted: 22 June 2021

© The Author(s) 2021. Published by Oxford University Press.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact journals.permissions@oup.com

Alternatively, in the absence of any increase in treatment costs, it appears that costs would have increased by about 32% because of shifts in incidence, survival, and age and might serve as a baseline. Additional costs exceeding this baseline will be highly dependent on current and future growth rates, which remain largely unknown.

Historically, efforts targeting the mBC population overwhelmingly focused on interventions that improved survival, limited disease progression, and managed symptoms and quality of life. Findings from Gogate et al (7), contribute to a growing body of essential literature that addresses health services in mBC. In 2017, Mariotto et al. (8) estimated that women aged younger than 50 years with mBC experienced a twofold increase in 5-year relative survival from 18% to 36% over the 20-year study period (1992-1994 to 2005-2012). Using statewide cancer registry data linked to claims (2003-2014), Trogdon et al. (4) demonstrated that monthly costs for younger women with mBC exceeded those of earlier-stage, older patients; notably, these disparate costs were associated with the continued and terminal phases of care.

These data ultimately emphasize the critical need for the cancer community to prepare for the future of individuals with mBC. As breast cancer outcomes improve among a growing population of individuals living with mBC, national survivorship efforts in this population will become increasingly important. Among Medicare beneficiaries, rising costs are best explained by increased life expectancy and higher comorbidities across aging beneficiaries, combined with increasing complexity of their care (9). Health-care costs associated with the care of younger and midlife women with mBC will disproportionately rise in coming years and, presumably, so will their financial costs and care burden. The evolution of mBC will require both fiscal and workforce preparedness to adequately support affected individuals with unique and potentially unfamiliar needs.

Funding

No funding was used for the writing of this editorial.

Notes

Role of the funder: Not applicable.

Disclosures: Dr Dinan and Dr Greenup have no disclosures.

Author contributions: Writing, original draft—MAD, RAG. Writing, review and editing—MAD, RAG.

Data Availability

Not applicable.

References

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2018. *CA Cancer J Clin*. 2018; 68(1):7–30. doi:10.3322/caac.21442 (2018).
2. Mariotto AB, Yabroff KR, Shao Y, Feuer EJ, Brown ML. Projections of the cost of cancer care in the United States: 2010-2020 [published online ahead of print January 12, 2011]. *J Natl Cancer Inst*. 2011;103(2):117–128. doi: 10.1093/jnci/djq495. [Erratum in: *J Natl Cancer Inst*. 2011;103(8):699. PMID: 21228314; PMCID: PMC3107566.
3. Chang S, Long SR, Kutikova L, et al. Estimating the cost of cancer: results on the basis of claims data analyses for cancer patients diagnosed with seven types of cancer during 1999 to 2000. *J Clin Oncol*. 2004;22(17):3524–3530. doi: 10.1200/J Clin Oncol.2004.10.170.
4. Trogdon JG, Baggett CD, Gogate A, et al. Medical costs associated with metastatic breast cancer in younger, midlife, and older women. *Breast Cancer Res Treat*. 2020;181(3):653–665. doi:10.1007/s10549-020-05654-x.
5. Wan C, Williams CP, Nipp RD, et al. Treatment decision making and financial toxicity in women with metastatic breast cancer. *Clin Breast Cancer*. 2021;21(1): 37–46. doi:10.1016/j.clbc.2020.07.002.
6. Samuel CA, Spencer JC, Rosenstein DL, et al. Racial differences in employment and cost-management behaviors in patients with metastatic breast cancer. *Breast Cancer Res Treat*. 2020;179(1):207–215. doi:10.1007/s10549-019-05449-9.
7. Gogate A, Wheeler SB, Reeder-Hayes KE, et al. Projecting the prevalence and costs of metastatic breast cancer from 2015 through 2030. *JNCI Cancer Spectrum*. 2021.
8. Mariotto AB, Etzioni R, Hurlbert M, Penberthy L, Mayer M. Estimation of the number of women living with metastatic breast cancer in the United States. *Cancer Epidemiol Biomarkers Prev*. 2017;26(6):809–815. doi: 10.1158/1055-9965.EPI-16-08899.
9. Yashkin AP, Greenup RA, Gorbunova G, Akushevich I, Oeffinger KC, Hwang ES. Outcomes and costs for women after breast cancer: preparing for improved survivorship of Medicare beneficiaries. *J Clin Oncol Pract*. 2021;17(4):e469–e478. doi:10.1200/OP.20.00155.