The Use of Hypofractionated Whole Breast Irradiation in Treatment of Patients With Early-Stage Breast Cancer in the United States

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Results from multiple randomized clinical trials (RCTs) have established adjuvant whole breast irradiation as the standard of care for patients undergoing breast conservation surgery. Conventionally fractionated whole breast irradiation (CF-WBI) consists of approximately 6 weeks of daily treatment in 1.8 or 2 Gy per fraction to the entire breast to 45 to 50 Gy, often followed by several fractions to the lumpectomy cavity (“boost”). Though effective, this regimen can be inconvenient and costly for patients and the health care system. As techniques evolved, physicians started testing shorter courses delivering higher dose per fraction and completing the course in 3 to 4 weeks. Four large RCTs have compared hypofractionated whole breast irradiation (HF-WBI) vs CF-WBI and showed equivalent rates of local control, overall survival and cosmesis, while another recent RCT showed that acute toxicity is actually lower with HF-WBI, and there may even be a trend toward better physical well-being at 6 months after HF-WBI. In 2011, American Society for Radiation Oncology (ASTRO) practice guidelines endorsed HF-WBI as “equally effective for in-breast tumor control and comparable in long-term side effects” for patients with pT1/2N0 tumors, 50 years or older, no prior chemo-
therapy, and achievable homogenous radiation dose distribution. For patients who do not meet these criteria, the task force did not recommend for or against the use of HF-WBI.

In 2013, ASTRO launched the Choosing Wisely initiative, aimed at reducing health care costs, which encouraged physicians and patients to discuss HF-WBI. In a recent issue of JAMA, Bekelman et al.² showed a trend of increased utilization of HF-WBI in the United States in recent years and the associated reduction in care expenditures. Using the administrative claims data from 14 commercial health plans that cover 7% of the US adult women, the authors showed that the proportion of patients receiving HF-WBI roughly tripled between 2008 and 2013. The percentage of women fitting the HF-endorsed category (patients who did not fit the HF-endorsed criteria) rose more conservatively, from 8% up to 21%. Of mean total health care expenditures in the year after the diagnosis, adoption of HF-WBI was associated with roughly a 10% savings. The findings are in line with care expenditures in the year after the diagnosis, adoption of HF-WBI permitted category (patients who did not fit the HF-endorsed criteria) rose more conservatively, from 8% up to 21%. Of mean total health care expenditures in the year after the diagnosis, adoption of HF-WBI was associated with roughly a 10% savings. The findings are in line with.

The use of a more expensive intensity-modulated radiation therapy (IMRT) technique may be slowly increasing, preventing a more profound reduction in health care costs. From Table 1 of the JAMA article one can calculate that IMRT was used in 8% of conventionally treated patients and in 12% of patients treated with HF-WBI. Could this percentage be slowly rising, despite the 2013 Choosing Wisely campaign recommending against the routine use of IMRT in whole breast radiation therapy, to offset the decline in reimbursements owing to the fewer treatment fractions patients receive with HF-WBI?

The use of IMRT for the left breast cancer is frequently justified by the need to decrease the dose to the heart. There is an inherent concern about a higher fractional dose to the heart and a potential increase in late cardiac toxicity. Despite no difference in morbidity leading to hospitalization from cardiac causes among women with left-sided early-stage breast cancer treated with HF-WBI or CF-WBI after 15 years of followup,³ some physicians argue that hypofractionation needs a longer follow-up, as the cardiac toxicity increases with each decade after radiation. Instead of IMRT, many advocate for the use of breath-hold technique—a simple respiratory maneuver that increases the distance between the left chest wall and the heart—introduced in 1997 by the Harvard group of physicians.⁴ One might argue that this technique is even more important for patients receiving HF-WBI to the left breast. Prone treatment is another low-cost technique that can reduce the in-field heart volumes for large-breasted women,⁵ and could be considered for such patients undergoing HF-WBI. Not only could it reduce the risk of cardiac and pulmonary toxicity, but it could also lead to improved homogeneity of dose distribution by simply reducing the width of treated breast tissue, potentially translating into better long-term outcomes.

All 3 studies⁶-⁷ also highlighted significant differences in international practice patterns. For example, 70% of patients in Ontario, Canada, received HF-WBI in 2008, whereas in the United Kingdom, since 2009 most patients received HF-WBI since the release of the National Institute for Health and Clinical Excellence guidance.

How can we achieve a wider adoption of HF-WBI in the United States? In addition to utilizing techniques, such as breath-hold and prone radiation, to protect the heart and improve dose homogeneity, a greater concern is the strong financial incentives in the United States to deliver a higher number of fractions or more expensive treatments such as IMRT. Perhaps a reimbursement structure that is based on “course” rather than “number” of treatment warrants consideration.

In summary, HF-WBI offers greater convenience, lower costs, and the same outcome for women with early-stage breast cancer. The publication by Bekelman et al.² showed improved adoption over time, but the actual rate remains low compared with other countries. This is an opportunity for US radiation oncologists to reflect on their practices and implement HF-WBI responsibly. More data are needed to determine whether HF-WBI can be used in women who receive chemotherapy and/or targeted therapy and those who require regional nodal irradiation.

**REFERENCES**


