

# Utilization and Toxicity of Breast Boost Radiotherapy Following Hypofractionated Whole Breast Irradiation: Comparative Analysis of a Large, Statewide Multicenter Cohort

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## PURPOSE / OBJECTIVE(S)

- Little is known about current patterns of breast boost radiotherapy (boost) use or its acute toxicity, especially after hypofractionated whole breast irradiation (H-WBI)
- Current guidelines recommended H-WBI and personalization of the use of boost for most node-negative patients.
- We evaluated prospectively collected data from a statewide multicenter cohort to understand factors associated with utilization and acute toxicity of boost after H-WBI.

## MATERIAL & METHODS

We analyzed data on 6,133 patients from 23 radiation oncology clinics within our database from 2012 to 2017.

We excluded patients with:

- additional nodal radiation treatment fields (15.3%)
- missing demographic/treatment/toxicity information (8.4%)
- Whole breast radiation treatment delivered with conventional fractionation (38.4%)

2,409 women received H-WBI and constituted the analytic sample.

- Sociodemographic, clinical, and treatment characteristics were analyzed for association with the use of boost.
- Patients and physicians reported toxicity weekly during treatment and at the end of treatment -4/+7 days (EOT). Toxicity from the first three weeks of treatment was compared to toxicity at the EOT for patients receiving boost and not.
- We additionally created a multiple variable model of the association between boost receipt and toxicity, adjusting for age, race, comorbidities, smoking status, nodal disease, chemotherapy, endocrine therapy, separation distance, breast volume, and use of IMRT for the H-WBI.

## RESULTS

Of the 2,409 women

- 19% were treated without boost
  - 81% received boost
- The most common H-WBI regimens utilized were:
- 42.56 Gy/16 fractions (80% of cases)
  - 40 Gy/15 fractions (10% of cases)
- Boost regimens ranged between:
- 10-10.64 Gy/4 fractions (51%),
  - 10 Gy/5 fractions (31%),
  - 12 Gy/6 fractions (8%).

Boost was delivered less often in women with increasing age and comorbidities.

- The percent of women receiving boost was:
    - 79% for age 51-60
    - 66% for age 61-70
    - 48% for age greater than 71.
  - Patients with close margins, positive margins, ER negative or Her2 positive disease, African American, and those having received chemotherapy were more likely to receive boost.
- Maximal pain scores were similar between boost and non-boost cases up to 3 weeks (OR = 0.95, 95% CI: 0.68 – 1.34), p=0.786, yet statistically different at EOT (OR=1.52, 95% CI: 1.10 – 2.12), p=0.012 when adjusted for important confounders.
- At EOT, moderate/severe pain was reported in 11.0% of non-boost cases and 19.5% of boost cases.

Figure 1. Association of clinical and tumor characteristics with administration of Boost

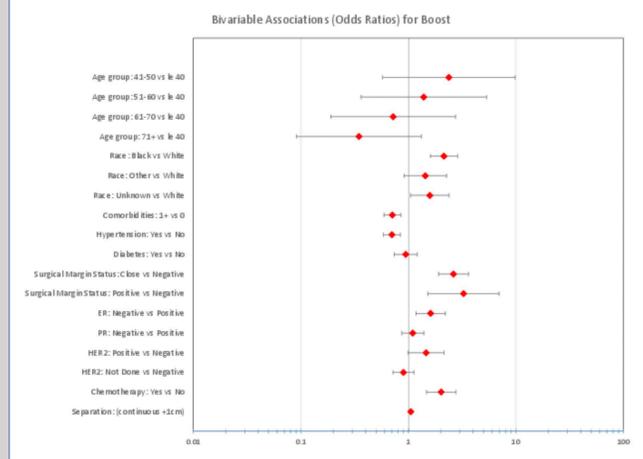


Figure 2. Correlates of boost specific pain. The outcome is an increase in composite breast pain of 2+ at EOT

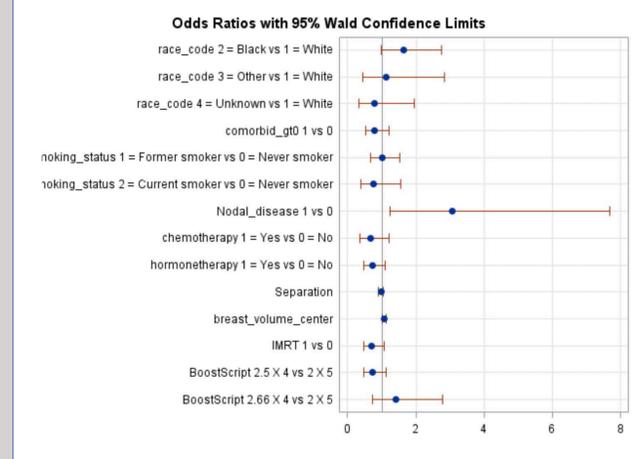


Table 1. Maximal reported breast pain

COMPOSITE BREAST PAIN	MAXIMUM BY 3 WEEKS FROM START		EOT (-4/+7 DAYS FROM END)	
	NO BOOST	BOOST	NO BOOST	BOOST
MISSING	1 (0.2)	8 (0.8)	0	0
0	318 (51.2)	487 (45.5)	303 (48.8)	377 (35.2)
1	248 (39.9)	442 (41.3)	250 (40.3)	485 (45.3)
2	37 (6.0)	105 (9.8)	52 (8.4)	147 (13.7)
3	17 (2.7)	29 (2.7)	16 (2.6)	62 (5.8)
FISHER'S EXACT PVALUE	0.018†, 0.008‡		<0.001†, <0.001‡	

Figure 3. Typical dose distribution for <sup>A</sup> accelerated whole breast treatment <sup>B</sup> addition of an electron boost <sup>C</sup> Addition of a photon boost



## SUMMARY / CONCLUSION

In this large, multi-center cohort, treatment with boost was used frequently in conjunction with H-WBI and personalized based on patient characteristics.

The observed differences in acute toxicity constitute relevant considerations in decision-making about boost use (especially in the large group for whom current consensus guidelines make no clear recommendation), in conjunction with existing evidence regarding efficacy, long term side effects, and cost.

## REFERENCES / ACKNOWLEDGEMENTS

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## PURPOSE / OBJECTIVE(S)

Little is known about current patterns of breast boost radiotherapy (boost) use or its acute toxicity, especially after hypofractionated whole breast irradiation (H-WBI), now the recommended regimen for most node-negative patients. We evaluated prospectively collected data from a statewide multicenter cohort to understand factors associated with utilization and acute toxicity of boost after H-WBI.

## MATERIAL & METHODS

We analyzed patients within our database from 2012 to 2017. 6,133 women were evaluable from 23 radiation oncology clinics. We excluded patients with nodal treatment (15.3%), and missing demographic/treatment/toxicity information (8.4%). Of the remaining 4,761 women, 2,409 women received H-WBI and constituted the analytic sample. Sociodemographic, clinical, and treatment characteristics were analyzed for association with the use of boost. Patients and physicians reported toxicity weekly during treatment and at the end of treatment -4/+7 days (EOT). Toxicity from the first three weeks of treatment was compared to toxicity at the EOT for patients receiving boost and not. We additionally created a multiple variable model of the association between boost receipt and toxicity, adjusting for age, race, comorbidities, smoking status, nodal disease, chemotherapy, endocrine therapy, separation distance, breast volume, and use of IMRT for the H-WBI.

## RESULTS

Of the 2,409 women, 19% were treated without boost and 81% received boost. The most common H-WBI regimens utilized were 42.56 Gy/16 fractions (80% of cases) and 40 Gy/15 fractions (10% of cases). For women receiving a boost, regimens ranged between 10-10.64 Gy/4 fractions (51%), 10 Gy/5 fractions (31%), or 12 Gy/6 fractions (8%). Boost was delivered less often in women with increasing age and comorbidities. The percent of women receiving boost was 79% for age 51-60, 66% for age 61-70, and 48% for age greater than 71. Patients with close margins, positive margins, ER negative, or Her2 positive disease, African American, and those having received chemotherapy were more likely to receive boost. Maximal pain scores were similar between boost and non-boost cases up to 3 weeks (OR = 0.95, 95% CI: 0.68 – 1.34), p=0.786, yet statistically different at EOT (OR=1.52, 95% CI: 1.10 – 2.12), p=0.012 when adjusted for important confounders. At EOT, moderate/severe pain was reported in 11.0% of non-boost cases and 19.5% of boost cases.

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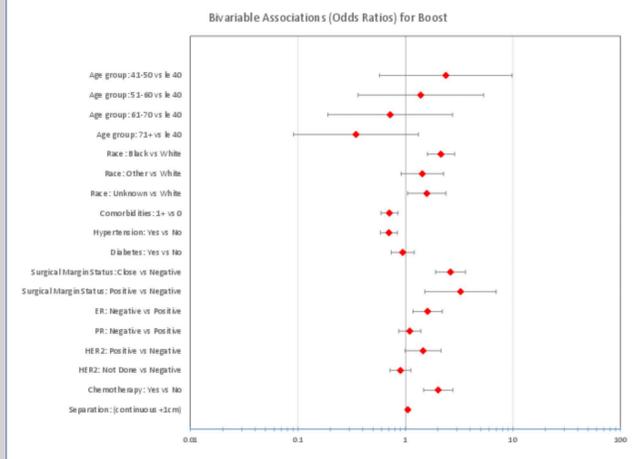


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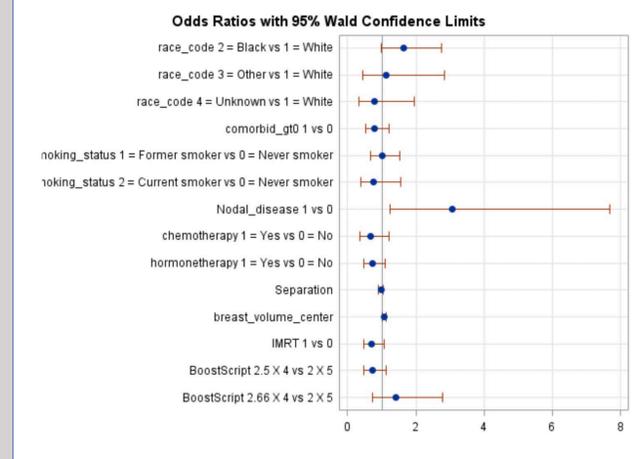


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