

Identifying patients at higher risk of toxicity after breast radiotherapy: analysis of patient-reported outcomes in the Michigan Radiation Oncology Quality Consortium cohort

¹University of Michigan, Ann Arbor; ²MHP Radiation Oncology, Pontiac; ³Karmanos Cancer Center, Detroit; ⁴Beaumont, Royal Oak; ⁵Spectrum Health, Lakeland; ⁶West Michigan Cancer Center, Kalamazoo; ⁷Henry Ford Health System, Detroit

R Jaggi¹, K Griffith¹, F Vicini², J Burmeister³, M Dominello³, I Grills⁴, J Hayman¹, J Moran¹, P Paximadis⁵, J Radawski⁶, E Walker⁷, L Pierce¹



OBJECTIVE

◆ Patient-reported toxicities after breast radiotherapy merit understanding in order to inform decisions and target supportive care interventions.

METHODS

- ◆ As part of a collaborative quality improvement initiative, the Michigan Radiation Oncology Quality Consortium prospectively collects patient-reported outcomes data from women treated for breast cancer at 26 practices across the state.
- ◆ Of all 11,107 patients treated with lumpectomy and whole breast radiation therapy between 1/1/2012 and 12/31/2018, 2817 refused patient surveys.
- ◆ We describe here the maximal toxicity reported by the 7689 patients who provided survey responses within 7 days of end of treatment and for whom we had sufficient data to determine dose-fractionation and treatment fields.
- ◆ Multivariable logistic regression models separately identified the individual and treatment characteristics associated with 1. breast pain, 2. a bother scale (related to itching, stinging/burning, swelling, or hurting of the treated breast), 3. fatigue.
- ◆ Breast pain was considered moderate or severe when score ≥ 4 on modified 10-point Brief Pain Inventory measure.
- ◆ Bother from multiple breast symptoms was considered frequent when score ≥ 3 on a scaled measure (range 0-4) averaging responses on four items derived from the Skindex.
- ◆ Fatigue was considered severe when rated as present “always” or “most of the time” over past four weeks.

RESULTS

- ◆ Moderate or severe breast pain was reported by 2882 (37.5%) overall: 1022 (28.3%) of those receiving hypofractionation (HF) and 1860 (45.7%) of those receiving conventional fractionation (CF).
- ◆ Frequent bother from multiple breast symptoms was reported by 1029 (13.4%) overall: 288 (8.0%) after HF and 741 (18.2%) after CF.
- ◆ Severe fatigue was reported by 1795 (23.4%) overall: 681 (18.8%) after HF and 1114 (27.4%) after CF.
- ◆ In addition to treatment fractionation ($p < 0.001$), younger age, higher BMI, and smoking were highly significant ($p < 0.001$) predictors of all three forms of toxicity, as detailed in the Table.
- ◆ Black race ($p < 0.001$) independently predicted greater breast pain (OR 1.9) and breast symptom bother (OR 1.6).
- ◆ Receipt of boost treatment also predicted greater breast pain ($p = 0.0006$) and bother ($p = 0.04$).

CONCLUSIONS

- ◆ In this large observational dataset of patient-reported toxicities after whole breast radiotherapy, substantial differences existed by radiotherapy dose-fractionation.
- ◆ Race differences in breast pain and bother existed despite controlling for multiple other factors, including age, body habitus, comorbidities, and treatment characteristics; further research is needed to understand what drives these differences in order to target potentially modifiable factors.
- ◆ Intensification of supportive care may be appropriate for subgroups identified as being vulnerable to greater toxicity.

RESULTS

Multivariable models of patient-reported toxicity outcomes

Independent variable	Odds ratio (CI) <i>p</i> -Value, in model with dependent variable=moderate or severe breast pain	Odds ratio (CI) <i>p</i> -Value, in model with dependent variable=frequent bother from breast symptoms	Odds ratio (CI) <i>p</i> -Value, in model with dependent variable=severe fatigue
Age: 70+ vs. 60–69	0.77 (0.67–0.89) $p < 0.001$	0.63 (0.48–0.81) $p < 0.001$	0.99 (0.84–1.16) $p < 0.001$
Age: 50–59 vs. 60–69	1.49 (1.32–1.69)	1.82 (1.52–2.17)	1.34 (1.17–1.54)
Age: <50 vs. 60–69	1.90 (1.63–2.21)	2.66 (2.17–3.25)	1.44 (1.21–1.71)
BMI: Normal 18.5–<25 vs. overweight 25–<30	0.78 (0.68–0.90) $p < 0.0001$	0.89 (0.72–1.09) $p < 0.0001$	0.74 (0.63–0.87) $p < 0.0001$
BMI: Obesity I 30–<35 vs. overweight 25–<30	1.32 (1.15–1.51)	1.15 (0.94–1.40)	1.22 (1.04–1.41)
BMI: Obesity II 35–<40 vs. overweight 25–<30	1.50 (1.28–1.77)	1.61 (1.29–2.01)	1.34 (1.12–1.61)
BMI: Obesity III ≥ 40 vs. overweight 25–<30	2.14 (1.79–2.57)	1.86 (1.47–2.36)	1.59 (1.31–1.94)
BMI: Underweight <18.5 vs. overweight 25–<30	0.98 (0.68–1.42)	0.82 (0.46–1.46)	1.08 (0.72–1.62)
Race: Black vs. white	1.94 (1.70–2.21) $p < 0.0001$	1.58 (1.33–1.87) $p < 0.0001$	0.96 (0.83–1.12) $p = 0.88$
Race: Asian vs. white	1.32 (0.89–1.96)	0.84 (0.46–1.52)	1.15 (0.74–1.80)
Race: Other vs. white	1.74 (1.24–2.45)	1.94 (1.31–2.90)	1.01 (0.68–1.51)
Hypertension: Yes vs. no	0.95 (0.84–1.06) $p = 0.33$	0.92 (0.78–1.08) $p = 0.28$	1.09 (0.96–1.24) $p = 0.17$
Diabetes: Yes vs. no	1.25 (1.08–1.44) $p = 0.003$	1.22 (1.00–1.49) $p = 0.05$	1.29 (1.10–1.51) $p = 0.0015$
Smoking status: Former smoker vs. never smoker	1.25 (1.12–1.39) $p < 0.0001$	1.33 (1.14–1.55) $p < 0.0001$	1.12 (0.99–1.27) $p < 0.0001$
Smoking status: Current smoker vs. never smoker	1.65 (1.41–1.93)	2.02 (1.66–2.46)	1.59 (1.34–1.89)
Fractionation: Conventional vs. hypofractionation	1.67 (1.49–1.86) $p < 0.0001$	1.85 (1.58–2.17) $p < 0.0001$	1.51 (1.34–1.71) $p < 0.0001$
Boost: Boost vs. No boost	1.30 (1.12–1.51) $p = 0.0006$	1.29 (1.01–1.65) $p = 0.04$	1.00 (0.84–1.18) $p = 0.96$
SCV Nodal field treatment: Yes vs. no	1.02 (0.87–1.20) $p = 0.81$	1.11 (0.91–1.36) $p = 0.30$	0.86 (0.71–1.03) $p = 0.10$

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