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Clinical Investigation

Programmatic Comparison and Dissemination of an Audit of Single-fraction Radiation Therapy Prescribing Practices for Bone Metastases is Associated with a Meaningful and Lasting Change in Practice on a Population Level

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Summary

After an audit-based educational intervention in our population-based, provincial radiation therapy program, we demonstrate a lasting and meaningful 10% increase in the prescription of single-fraction radiation therapy for bone metastases. Other jurisdictions should consider using similar programmatic, audit-based, educational

Purpose: There is ample evidence that single-fraction radiation therapy (SFRT) is as efficacious as more costly and morbid multifraction regimens. We previously demonstrated that an audit-based intervention increased the use of SFRT in all regional cancer centers the following year. However, other investigators have demonstrated that interventions were only associated with a transient 1-year change in prescribing practices. We sought to determine whether our intervention resulted in a more lasting impact.

Methods and Materials: In 2012, we performed an audit of the prescribing practices of individual physicians, which was then presented to leaders and oncologists as an intervention to increase SFRT. We compared the use of SFRT between 2007 to 2011 (preintervention) and 2013 to 2016 (postintervention) in all 31,192 patients treated in our provincial program.

Results: The use of SFRT increased from 49.2% to 58.9% postintervention ($P < .001$). Rates from 2007 to 2011 were 51%, 51%, 48%, 49%, and 48%, respectively, whereas the postintervention rates from 2013 to 2016 were 60%, 62%, 59%, and 56%,

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approaches in an effort to increase the use of this cost-effective treatment, which has been historically used well below evidence-based benchmarks internationally. Our data suggest that the benchmark of 60% use of single-fraction radiation therapy for bone metastases is feasible.

respectively. Postintervention, half of the centers prescribed SFRT in a relatively narrow range (55%-58%). However, across all centers, there was still a broad range, with the lowest and highest users at 35% and 81%, respectively, although the lowest-using center still showed a significant increase (26% to 35%; $P < .001$).

Conclusions: Our audit and education-based intervention resulted in a lasting and meaningful 10% change in practice. Our provincial rate is similar to that of a previously recommended benchmark rate of 60%, but we continue to see significant variation by center, suggesting further room for improvement in provincial standardization. With emerging evidence in support of ablative radiation therapy for select populations of patients with bone metastases, future benchmark rates of SFRT should be readdressed. However, our data suggest that programmatic comparison and dissemination of SFRT prescribing practices can achieve a population-based SFRT utilization rate near 60%.

Introduction

There is abundant evidence in support of single-fraction radiation therapy (SFRT) for bone metastases (BoM), but a global reluctance to adopt its use remains (1-4). We previously demonstrated that there was variation in the use of SFRT for BoM in a publicly funded, salary-based provincial program (5). Subsequently, we demonstrated that an audit-based educational intervention was associated with an increase in the use of SFRT the year after the intervention (6).

However, other jurisdictions have demonstrated that their interventions, mainly limited to publication of guideline documents, only resulted in a transient change of practice for a year after the intervention (7). Subsequently, we were challenged by the radiation oncology community to demonstrate that our intervention resulted in a more lasting change in practice. Therefore, the purpose of this study is to evaluate the long-term impact of our intervention aimed at increased SFRT use.

Methods and Materials

BC Cancer is the sole provider of radiation therapy (RT) in our province. The BC Cancer database, which captures all RT delivered in British Columbia, Canada, was used to assess dose, fractionation, center, prescribing radiation oncologist, primary diagnosis, and anatomical location of the BoM RT.

Descriptive statistics were used to present patient characteristics. The change in proportion of patients who received SFRT before and after our 2012 intervention (ie, programmatic audit of prescribing practices) was assessed with χ^2d tests. Multilevel logistic regression was performed to control for physician and British Columbia Cancer Agency center as group effects.

Results

During the study period, 16,898 and 14,294 patients were treated in the 5- and 4-year periods before and after the 2012 intervention, respectively. Table 1 presents the patient characteristics before and after our intervention in 2012. The Abbotsford and Prince George centers were opened in August 2008 and November 2012, respectively, and represent their data after those periods. Table 2 demonstrates the association between SFRT use and patient, tumor, and treatment characteristics, including an increased use of SFRT from 49.2% before intervention to 58.9% postintervention.

Table 1 Patient, treatment, and provider characteristics

Variable	Preintervention proportion 2007-2011 (n = 16,898)	Postintervention proportion 2013-2016 (n = 14,294)
Male	50%	50%
Primary tumor		
Genitourinary	26%	28%
Breast	23%	21%
Lung	22%	24%
Hematologic	11%	10%
Gastrointestinal	8%	9%
Other	10%	8%
Site of metastases		
Spine	42%	45%
Pelvis	29%	25%
Upper extremity	10%	10%
Lower extremity	7%	8%
Ribs	8%	8%
Skull	2%	2%
sternum	2%	2%
Center		
Abbotsford	6%	8%
Centre for the North	-	6%
Kelowna	19%	19%
Surrey	16%	14%
Vancouver	36%	31%
Victoria	23%	23%