Radiation Therapy at the End of Life: A Population-Based Study Examining Palliative Treatment Intensity

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Abstract: To examine factors associated with the use of radiation therapy (RT) at the end of life in patients with breast, prostate, or colorectal cancer.
Methods: Using data from the Surveillance, Epidemiology, and End Results (SEER) – Medicare database, patients were over age 65 and diagnosed between January 1, 2004 and December 31, 2011 with any stage of cancer when the cause of death, as defined by SEER, was cancer; or with stage 4 cancer, who died of any cause. We employed multiple logistic regression models to identify patient and health systems factors associated with palliative radiation use. **Results:** 50% of patients received RT in the last 6 months of life. RT was used less frequently in older patients and in non-Hispanic white patients. Similar patterns were observed in the last 14 days of life. Chemotherapy use in the last 6 months of life was strongly correlated with receiving RT in the last 6 months (OR 2.72, 95% CI: 2.59-2.88) and last 14 days of life (OR 1.55, 95% CI: 1.40-1.66). Patients receiving RT accrued more emergency department visits, radiographic exams and physician visits (all comparisons $p < 0.0001$). **Conclusions:** Among patients with breast, colorectal, and prostate cancer, palliative RT use was common. End-of-life RT correlated with end-of-life chemotherapy use, including in the last 14 days of life, when treatment may cause increased treatment burden without improved quality of life. Research is needed optimize the role and timing of RT in palliative care.

Strengths:
- Large initial sample size (n=614,214) and final cohort sample (n=39,619).
- A wide multi-centre based study along a prolonged time window.
- Comprehensive analysis of data using multiple variables (clinical, demographics, etc.).
- The reasonable cancer-specific choice of patient population (breast, prostate, and colorectal cancer) with relatively extended survival to allow optimal palliative analysis.

Weaknesses:
- Using administrate claims data to define "palliative" patients with the possibility of curative RT intents.
- No information regarding physician decision-making, patient preference or presenting complaints.
- Inclusion of patients dying from causes other than cancer (all stage 4 deaths).
- The limitation of SEER database selection process that only reflects older patient population and a fee-for-service system.
- Other data variables regarding palliative RT such as radiation dose, treatment times, major side effects and possible RT related deaths were not included.
- Some outcomes were vaguely described such as ER and physician visits, which could be due to other reasons.
- Clinical objectives from end-of-life palliative RT and quality of life were not addressed, such as pain relief and symptomatic control, however included as a recommendation for future research.
- **Relevance to Palliative Care:**
  Addresses the need to accurately identify patient populations who may benefit from palliative RT at end-of-life. The importance of tracking unnecessary use of high cost, high treatment intensity approaches including palliative RT and optimizing treatment plans to improve quality of life and minimize treatment burden. Psychosocial factors and other unmeasured clinical variables influence the decision to treat and should be addressed. Developing specific guidelines for palliative RT at the end-of-life would greatly refine clinical quality objectives and avoid unnecessary interventions that do not provide any value to quality of life.