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## **An Inpatient Metastatic Spine Neoplasm Score for assessing the appropriate modality of radiation therapy intervention**

**Author:** Shearwood McClelland III

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# **An Inpatient Metastatic Spine Neoplasm Score for assessing the appropriate modality of radiation therapy intervention**

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Shearwood McClelland III MD(0000-0001-7951-9726)<sup>1,2</sup>

<sup>1</sup>*Department of Radiation Oncology, University Hospitals Seidman Cancer Center Case Western Reserve University School of Medicine, Cleveland, OH, United States*

<sup>2</sup>*Department of Neurological Surgery, University Hospitals Seidman Cancer Center Case Western Reserve University School of Medicine, Cleveland, OH, United States*

**Key words:** metastatic spine disease; inpatient; prognosis; stereotactic body radiation therapy; external beam radiation therapy

**Corresponding author:** Shearwood McClelland III, MD, Department of Radiation Oncology, University Hospitals Seidman Cancer Center, 11100 Euclid Avenue, Lerner Tower Office Suite B161, Cleveland, OH 44106, United States, tel: 216-286-4149; e-mail:

[drwood@post.harvard.edu](mailto:drwood@post.harvard.edu)

## **Research Letter**

For patients with metastatic spine disease, the optimal radiation therapy modality [stereotactic body radiation therapy (SBRT) versus conventional external beam radiation therapy (EBRT)] has yet to be clearly declared, with conflicting results in the two completed Level 1 evidence-producing randomized controlled trials [1, 2]. However, these trials were conducted

predominantly on outpatients. This study sought to evaluate inpatients with metastatic spine disease to assess factors contributing to prognosis with potential implications on radiation therapy recommendations.

From July 2022 to June 2023, a total of 13 inpatients with spine metastases referred for inpatient Radiation Oncology consultation at a single National Cancer Institute-designated Comprehensive Cancer Center institution were retrospectively assessed on an institutional review board (IRB)-approved protocol; no patient underwent operative intervention for their metastatic spine disease. The following clinical demographics were assessed for all patients: age at admission (60+ versus younger), duration of metastatic disease diagnosis (6+ months versus sooner), on active systemic therapy/refractory to systemic therapy (yes or no), additional non-spine metastatic focus (yes or no), severe malnutrition of chronic disease (yes or no), brain metastases (yes or no), and admission for symptomatology besides spine/back pain (yes or no). Each category was scored as a 0 (no) or 1 (yes), and a cumulative score was derived for each patient. The timeframe from inpatient consultation to death or hospice referral was recorded for each patient and then correlated with the cumulative score. Statistical analysis was performed using two-tailed t-testing (GraphPad Software, San Diego, California), using  $p < 0.05$  to define statistical significance.

Patient characteristics are listed in Table 1. Median age was 69 years (mean: 67.6 years; range: 39–94 years), with the most common primary tumor histology being lung and prostate ( $n = 4$  each), followed by breast ( $n = 2$ ). The median cumulative score was 4 (mean: 3.6; range: 1–6). Patients with a score of 0–3 ( $n = 5$ ) had median survival of 188 days (mean = 221 days; range: 62–454); 80% were alive at the time of analysis. Patients with scores of 4–7 ( $n = 8$ ) had median survival of 42 days (mean = 53.8 days; range: 6–124) with no patient alive at the time of analysis; this difference was statistically significant ( $p = 0.0143$ ).

## **Discussion**

The increasing lifespan of patients with metastatic cancer has resulted in increased incidence of metastatic spine disease. This has consequently resulted in a need for more durable treatment results than those traditionally provided by conventional EBRT, resulting in an exponential increase in SBRT popularity over the past two decades [3, 4].

The findings from this study indicate that for patients with metastatic spine disease requiring hospital admission and inpatient Radiation Oncology consultation, those with an Inpatient Metastatic Spine Score of 4 or greater had median survival of 6 weeks, significantly worse than patients with a score of 3 or less. These findings indicate that this scoring system may be able to distinguish which inpatients may exhibit a prognosis long enough to benefit from the durability advantages of palliative spine SBRT over palliative conventional EBRT (i.e. 8 Gy x 1) [1, 2, 5]. Prospective validation of this scoring system is warranted, and is currently underway as part of the ongoing Spine Patient Optimal Radiosurgery Treatment for Symptomatic Metastatic Neoplasms (SPORTSMEN) Phase II randomized clinical trial (registered as NCT05617716 at [clinicaltrials.gov](https://clinicaltrials.gov)) [6].

### ***Conflict of interest***

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### ***Author contributions***

Conception and design, data collection, statistical analysis, data analysis and interpretation, manuscript writing, study coordination, and final approval of manuscript: S.McC.

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**Table 1:** Characteristics of inpatients retrospectively assessed for creation of the Inpatient Metastatic Spine Score

Patient	Age at admission	Primary tumor histology	Inpatient Metastatic Spine Score
1	79	Thyroid	2
2	81	Breast	5
3	65	Prostate	5

4	79	Prostate	6
5	71	Prostate	3
6	70	Non small-cell lung cancer (NSCLC)	4
7	39	Cervix	4
8	66	NSCLC	4
9	63	Prostate	4
10	60	Breast	1
11	69	NSCLC	3
12	94	Gallbladder	5
13	43	NSCLC	1