

The effect of early versus delayed radiation therapy on length of hospital stay in the palliative setting

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Background: Radiation therapy (RT) can offer timely and effective treatment to oncology patients in the palliative setting. To date, there is sparse evidence investigating temporal relationships regarding the initiation of RT and subsequent hospital stay in the inpatient palliative setting. We aimed to assess whether times between admission, consultation, and initiation of treatment effected the length of hospital stay for patients receiving palliative radiation therapy (PRT).

Methods: This was a retrospective chart review of patients who received a consult for PRT from August 2014 to October 2016. All data was collected from a single community cancer center. Data including demographics, radiation treatment details, and temporal data (e.g., length of stay, time from admission to consult, etc.) were recorded.

Results: Of the 135 patients that received PRT, 60 of them were treated in the inpatient setting. The most common indications for PRT were pain (37%) and non-pain related neurologic symptoms (37%). The most common treatment sites were bone (58%), brain (22%), and lung (17%). There was a significant difference in duration of hospital stay between patients who were seen by palliative radiation oncology within 2 days versus greater than 2 days ($P=0.02$); and patients who were treated within 2 days of admission versus greater than 2 days ($P=0.03$).

Conclusions: Further research is needed to establish causal temporal relationships in palliative radiation oncology. However, this data suggests that early involvement of the radiation oncology team is associated with a reduced length of hospital stay.

Keywords: Palliative oncology; palliative radiation; radiation therapy (RT)

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Introduction

Radiation therapy (RT) is frequently utilized to improve local control and survival outcomes in cancer patients. However, it is estimated that half of all RT is delivered in the palliative setting in the United States (1,2). Radiotherapy offers non-invasive, cost-effective, safe and effective symptomatic improvement in patients with locally

advanced or metastatic disease. Research has demonstrated palliative RT's efficacy in multiple cancer sites, including thoracic and gastrointestinal tumors, and is particularly effective in symptomatic control for brain and bone metastases (3-6). Recent technologic advances have led to the ability to deliver higher ablative doses of radiation in fewer fractions with less radiation exposure to the neighboring anatomy, which may further expand radiation

Table 1 Patient demographics

Parameter	N [%] or median [range]
Age (year)	70 [31–94]
Fractionation	5 [1–15]
Dose (Gy)	20 [4–37.5]
Primary disease site	
Lung	19 [32]
Breast	13 [22]
Genitourinary	8 [13]
Skin	4 [7]
Lymphoma	3 [5]
Other/unknown	13 [22]
Treatment site	
Bone	35 [58]
Brain	13 [22]
Lung	10 [17]
Soft tissue	2 [3]
Symptoms	
Airway/dyspnea	11 [18]
Pain	22 [37]
Non-pain neurologic	22 [37]
Other	5 [8]
Time (days)	
Admission-to-consult	2 [0–25]
Admission-to-discharge	9 [1–25]
Admission-to-RT	5 [1–25]
Consult-to-RT	7 [0–46]
Consult-to-discharge	7 [0–46]
RT-to-discharge	4 [0–22]

Gy, Gray; RT, radiation therapy.

oncology's role in palliative therapy.

Despite the well-established role of RT in the palliative setting, there are several obstacles in effective delivery. Providing palliative RT (PRT) often requires efficient coordination across multiple disciplines, particularly in the inpatient setting. Difficulties in this coordination of care may result in delayed referral for PRT, leading to undue discomfort and suffering. Despite the need for timely

intervention, no study to date has investigated temporal relationships between time to consult, time to care, and resultant effect on hospital stay in the inpatient setting. We investigated patterns of care and outcomes in patients who received palliative RT in this setting.

Methods

This retrospective chart review was approved by the Banner Health Research institutional review board (IRB) (No. 017768). This was a retrospective analysis of patients at a single institution. Records were reviewed between August 2014 and October 2016. Inclusion criteria were patients in the inpatient setting that were referred to the radiation oncology department for palliative therapy, received treatment, and were discharged from the hospital. Patient therapy intent was determined to be palliative using the radiation oncologist's discretion. Exclusion criteria were any patients that did not receive RT, had incomplete demographic or treatment records, or were referred to radiation oncology for definitive management. Collected information on patients included basic demographics and time between admission, consult, initiation of RT, and discharge were recorded. All patients were divided into two groups by time periods (greater than or less than 2 days). This time period was selected because patients with malignant spinal cord compressions have significantly worse prognosis if treatment is delayed beyond 48 hours (7,8). Comparison of mean days by group was statistically evaluated using independent two-sample *t*-tests. The threshold for statistical significance was $P < 0.05$.

Results

Overall, 135 patients received PRT. However, patients who received PRT in the outpatient setting were excluded. After all inclusion/exclusion criteria, there were 60 patients with complete evaluable records. As per *Table 1*, the median age was 70 but had a broad range. Fractionation schemes ranged from 1–15 and with a median of 5. The median dose was 20 Gy. The most common primary disease sites were lung (32%) and breast (22%). The most frequently treated sites were bone (58%), brain (22%), and lung (17%). The most common indications for PRT were pain (37%), and neurological compromise (37%), or airway obstruction/dyspnea (18%). Of note, only two patients with neurological compromise were due to malignant spinal cord compression.

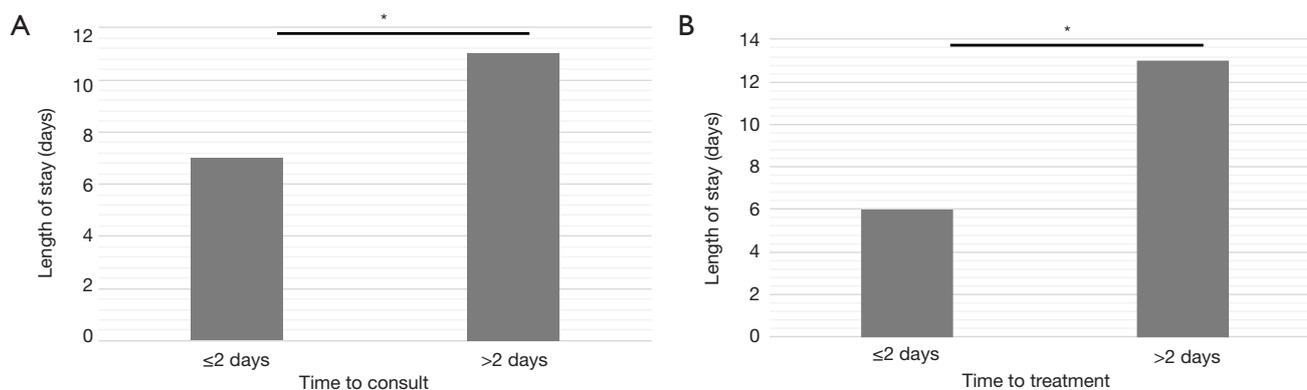


Figure 1 Length of hospital stay by time from admission to radiation oncology consult (“time to consult”) (A), length of hospital stay by time from admission to radiation treatment (B). *, $P < 0.05$.

Analysis of temporal relationships demonstrated that patients who received radiation oncology consultation within 2 days ($n=36$) versus greater than 2 days ($n=24$) of admission had significantly decreased admission to discharge times (median 7 versus 11 days, respectively; $P=0.02$) (Figure 1A). Similarly, patients who received PRT within 2 days of admission ($n=43$) versus greater than 2 days of admission ($n=17$) had significantly shorter admission to discharge times (median 6 versus 13 days, respectively; $P=0.03$) (Figure 1B). Significance persisted across all reported time periods using 1, 3, and 4 days as thresholds for comparison.

Discussion

Evaluating temporal patterns of care in palliative therapy may reveal how delayed consultation and treatment might affect other important system parameters, such as length of stay. This study highlights the typical demographic of patients seen for palliative RT in the United States (1,3,9), with the majority of patients referred for palliation of brain or bone metastases. Our data demonstrate that time from admission to consult and from admission to PRT are significantly associated with total days spent in the hospital. Although not proving causation, our study suggests that further investigation into similar temporal relationships in the inpatient palliative setting are warranted.

These data support the hypothesis that early intervention may lead to reduced length of hospitalization. Interestingly, other significant temporal relationships between length of hospital stay, time from admission to consultation, time

from admission to treatment, and time from consult to treatment were found as well ($P < 0.05$ for all), demonstrating the multifactorial nature of this process. We chose to highlight the possibility that timely care in the palliative inpatient setting has meaningful impacts to the system and the patient and hope to generate further studies considering this important and systemically addressable item.

Although data are limited on this topic, Pintova and colleagues attempted to address a similar issue in a small retrospective study of 7 patients who received inpatient PRT (10). Their small cohort had an appreciably longer average length of stay of 40 versus 9 days in this study. Of note, 5 of the 7 patients opted to remain hospitalized for therapy, despite recommendation by the physical therapist to discharge home and seek outpatient treatment, which at least partially explains the substantially increased average length of stay. In light of this and other significant differences in patient selection criteria, direct comparisons cannot be accurately drawn.

Several interesting trends were identified during the analysis. First, duration of hospital stay was reduced in patients all patients referred to radiation oncology within 2 days, independently of whether or not these patients received PRT. Second, it was common for patients to be seen by radiation oncology and discharged shortly thereafter. One hypothesis for this observation is the fact that the consulting radiation oncologist may be able to propose options for palliative therapy previously not considered by the inpatient team, even if these palliative options did not include radiation. Additionally, the radiation oncology team may have recommended outpatient palliative

care, allowing for more rapid discharge, whether or not the radiation was initiated in the inpatient setting.

Previously studies have highlighted numerous barriers to care in the use of RT in the palliative setting (11,12). Lutz and colleagues surveyed palliative facilities in the United States and found that, despite recognizing the importance of RT as an effective palliative measure, less than 3% of the hospice patients in the surveyed hospices received PRT during the year (11). In a similar study, researchers surveyed physician members of the American Society for Therapeutic Radiation Oncology (ASTRO), the American Academy of Hospice and Palliative Medicine (AAHPM) and the American Society of Clinical Oncology (ASCO) to assess the perceived role of PRT and barriers to effective use (13). The results highlighted that the majority agree that these professional societies should better promote effective multidisciplinary care and involvement of radiation oncology in palliative settings.

There are limitations to this study inherent to all retrospective analyses. First, we are unable to control for selection bias in our cohort, as alluded to above, though we attempted to counter this effect by utilizing a continuous series of patients from a particular time frame as noted above. Consideration of comorbidities has been correlated with outcomes in PRT (14) but was unavailable in our cohort. Second, patients may have been unstable on admission to the hospital and therefore the primary team did not feel a palliative consult was appropriate. However, we contend that this thinking may be flawed and early palliative considerations may be beneficial, even if not appropriate at that immediate time. This is supported by ASCO, which previously published their recommendation that, based on existing evidence, palliative care should be incorporated concurrently with standard oncology care to optimize patient quality of life, caregiver outcomes, improved symptomatic control, limitation of futile care, and much more (15). Lastly, our study was comprised of a small cohort, making subset analysis and more sophisticated statistical analysis difficult.

This retrospective analysis provides valuable, hypothesis-generating data highlighting a need in palliative treatment. It is clear that coordination of care and early involvement of the palliative team, including PRT, has numerous benefits including potentially decreased length of stay with benefits to the system and the patient. Prospective studies are needed to further delineate temporal relationships and outcomes in palliative radiation oncology.

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None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Ethical Statement: This retrospective chart review was approved by the Banner Health Research institutional review board (IRB) (No. 017768).

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