Radiation Therapy for Bone Metastases in the Era of Accountable Care: Changing the Treatment Paradigm
A special thanks to

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   Senior Fellow, Leonard Davis Institute for Health Economics

Joanne Levy and the SUMR Program
Outline of Talk

• An Inspiring Case Study
• Epidemiology
• Research Goals
• Model for Accountable Care
• Future Steps
Case Study
Case Study: Patient History

- Pleasant 68 y.o. male, ‘Mr. S’
- Lives an hour from Philadelphia
- Diagnosed with prostate cancer in 2005
- Metastatic cancer since 2008
- Late Fall 2010: extreme pain in lower back, left hip, and legs
Case Study: Timeline

- Several weeks of weakness, trouble standing
- 12/29/11 – Called doctor about back pain, MRI
- 12/30/11 (Friday) – Admitted to ER
  - Patient controlled analgesics (IV morphine)
  - Holiday weekend: no radiation available
- 1/3 (Tues) Radiation planning
- 1/4 (Wed) – 1/7/12 Remained in hospital for 3 days as inpatient
  - 1/5 – 1/18 – Radiation Therapy in multiple doses
Case Study: The Charges

<table>
<thead>
<tr>
<th>Service</th>
<th>Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-Private Room</td>
<td>$11,000</td>
</tr>
<tr>
<td>Multiple Doses of Radiation Therapy</td>
<td>$16,000</td>
</tr>
<tr>
<td>Emergency Room</td>
<td>$4,000</td>
</tr>
<tr>
<td>Other (labs, Pharmacy)</td>
<td>$9,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$40,000</strong></td>
</tr>
</tbody>
</table>

Medicare reimbursement: $10,000
Case Study: Lessons Learned

How could we improve the quality of his care?

- **Improved Patient Experience:** Radiation as an outpatient and quick
- **Reduce Cost:** Single Dose of radiation in one day
Epidemiology
Epidemiology

- 280,000 patients with bone metastases (mets)
- Affects 65%-75% of prostate cancer patients
- Affects 60%–70% of patients with advanced breast cancer
- Total annual costs of $2 billion in the United States

Source: Xie J, Economic evaluation of denosumab compared with zoledronic acid in hormone-refractory prostate cancer patients with bone metastases, 2011
Symptoms

• Pain
• Skeletal Related Events
  • Fractures
  • Spinal cord compression $\rightarrow$ motor weakness, bowel and bladder dysfunction
How do we Treat Bone Mets

Radiation Therapy

- Linear Accelerator
  - Single Fraction
  - Multiple Fraction

8 Gy in 1 fraction - $998
30 Gy in 10 fractions - $2,316

Source: Economic Analysis of Radiation Therapy Oncology Group (RTOG): Multiple versus single fraction radiation treatment of patients with Bone Metastases, Konski 2009
Evidence for Single Fraction Radiation

ASTRO guidelines (2011)
-8GY in a single fraction was found to have equivalent pain relief as a prolonged multifraction course

British Study (1999)
-randomized trial of single fraction and two different multifraction regimens found no difference in time response to therapy

Dutch Multicenter Trial (2004)
-no difference in pain relief or radiation toxicity between single fraction and six fraction regimens

*Downside to single-fraction use: In each study, single fraction radiation therapy required retreatment at a slightly higher rate than with multifraction (20% versus 7%)

Source: Radiation therapy for the management of painful bone metastases, Kachnic
### Fractions actually requested by Radiation Oncologists

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 fraction</td>
<td>43</td>
<td>(3%)</td>
</tr>
<tr>
<td>2-5 fractions</td>
<td>235</td>
<td>(14%)</td>
</tr>
<tr>
<td>6-10</td>
<td>808</td>
<td>(50%)</td>
</tr>
<tr>
<td>11-15</td>
<td>439</td>
<td>(27%)</td>
</tr>
<tr>
<td>More than 15</td>
<td>110</td>
<td>(6%)</td>
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**Source:** Cancer Business Summit 2011, “Achieving Accountable Cancer Care”
Possible reasons for the high usage of multifraction radiation therapy as an inpatient:

- Medical training
- Uncoordinated care
- Physician reimbursement rates
Possible reasons for the high usage of multifraction radiation therapy:

- Medical training
- Uncoordinated care
- Physician reimbursement rates
Research Goals
Research Project

Questions:

1. What are treatment patterns and health care expenditures associated with radiation therapy for bone metastases?

2. How might changes in treatment patterns affect health care expenditures associated with radiation therapy for bone metastases?

Ultimate goal: Payment reform for bone mets that benefits both the healthcare system and patients
My Research Goals

- Understand the current payment system for treating bone mets
- Connect billing information to how Medicare reimburses for services
- **Devise a model for more accountable care**
Medical Billing

Diagnosis → ICD-9 Code

Procedure → CPT Code

Assigns Reimbursement Amounts for Physicians and Hospitals

Medical Billing forms

Interpreted by Medicare
Medical Billing

- Diagnosis
  - Procedure
  - ICD-9 Code
  - CPT Code

Assigns Reimbursement Amounts for Physicians and Hospitals

Medical Billing forms

Interpreted by Medicare
### Room for Cost Improvement

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<td>$4,500</td>
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A Model For Accountable Care
Payment Systems

- **Fee for service** - specific payment for each service provided
- **Episode based** – combine the collective costs of care for a specific condition over a defined period of time into one payment
  - **Clinical pathways approach** – least costly of clinically equivalent treatment regimens is incentivized

Source: Episode-Based Payments: Charting a Course for Health Care Payment Reform, Pham 2010
Applying Episode-based Care to Bone Mets

What qualifies bone mets for episode-based care?

1. Cancer care is supported by a large evidence base and regularly updated guideline
   *Important for cost and quality monitoring
2. Clinically equivalent treatment patterns have been determined
3. There are sizable cost differences between different radiation therapy regimens
   *opportunity for great cost reduction

Source: Episode-based Payments for Cancer Care: A Proposed Pilot for Medicare, Bach 2011
Applying Episode-based Care to Bone Mets

How to define payments

- **Define an episode** - The start of radiation therapy
- **Guideline-based standards** – payments based on accepted clinical guidelines for best practice (ASTRO)
  - Determine the cost if oncologists only followed the recommended best practice (single dose radiation therapy)
  - Set payment for all radiation therapy costs
  - Require that oncologists only pick from the accepted treatment regimens
  - Physicians are incentivized to select a treatment plan that costs less than payment value
Applying Episode-based Care to Bone Mets

An illustration:

Diagnosis code of 198.5

Physician must select from accepted treatment regimens

<table>
<thead>
<tr>
<th>Regimen</th>
<th>Cost</th>
<th>Reimbursement</th>
<th>Physician payment</th>
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<tbody>
<tr>
<td>Radiation in 10 doses</td>
<td>$16,000</td>
<td>$5,000</td>
<td>-$11,000</td>
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<tr>
<td>Radiation in 1 dose</td>
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Less costly treatment is incentivized
Applying Episode-based Payments to Bone Metastases

Benefits:
• Patients
• The healthcare system
Future Steps
Future Steps

- Develop the model for an episode-based payment system for treating bone metastases

- Test this model for improved quality
Thank You!