Cancer Data Analysis
A Must-Have Tool for Service Line Administrators

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Outline

• Numerous challenges faced by cancer centers and their leaders
• How we define, capture, and analyze all cancer-relevant data at VCU
• The “value added” of comprehensive, strategic approaches to cancer data analysis
• Examples

Background

• All cancer centers compete locally / regionally with other cancer providers – private practices, community hospitals, etc.
• Cancer service lines compete with other initiatives / programs in a health system for resources (capital, space, marketing, etc.)
• Cancer service lines need robust, trustworthy data analyses to direct their strategic planning, program development, financial evaluation efforts
• Academic cancer centers compete with each other nationally for prestige, ranking, faculty, research funding, and NCI designation
Imperatives for administrators

- Monitor and improve quality & effectiveness
- Monitor and improve performance
- Minimize costs
- Maximize revenues
- Improve market share, payor mix
- Develop business & strategic plans and get them approved, funded, and implemented
- Foster and support research
- Respond to opportunities and threats

Data analyses can help with all of these

Traditional ways to identify cancer patients in hospital data

- Patients with Oncology-related DRG/MS-DRG codes
  - Captures Inpatient only
- Patients with ICD-9 diagnosis codes for neoplasms (140-239)
  - How many levels—primary only, primary and secondary, top 5, etc.
  - Include V codes? History? Screening?
- Patients seen by Oncology specialists

DRGs only: What would we miss?

<table>
<thead>
<tr>
<th>DRG (Ind Only)</th>
<th>%</th>
</tr>
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<tbody>
<tr>
<td>417 TRACHEA W/ABDOMINAL WALL, MOUTH, LIP, EYE &amp; ANUS</td>
<td>24%</td>
</tr>
<tr>
<td>115 MAJOR SMALL &amp; LARGE BOWEL PROCEDURES W/CC</td>
<td>19%</td>
</tr>
<tr>
<td>59 MAJOR OGDINDOMENAL, TRANSECTION PROCEDURES W/CC</td>
<td>6%</td>
</tr>
<tr>
<td>188 OTHER DISEASES EXCEPT NEOPLASMS PROCEDURES W/CC</td>
<td>6%</td>
</tr>
<tr>
<td>110 MAJOR CARDIOVASCULAR PROCEDURES W/CC</td>
<td>5%</td>
</tr>
<tr>
<td>70 OTHER RESPIRATORY PROCEDURES W/CC</td>
<td>3%</td>
</tr>
<tr>
<td>151 MAJOR SMALL &amp; LARGE BOWEL PROCEDURES W/O CC</td>
<td>2%</td>
</tr>
<tr>
<td>150 PERITONEAL ADHESIOLYSIS W/CC</td>
<td>2%</td>
</tr>
<tr>
<td>418 POSTOPERATIVE &amp; POST-TRAUMATIC INFECTIONS</td>
<td>2%</td>
</tr>
<tr>
<td>207 DISORDERS OF THE BILIARY TRACT W/CC</td>
<td>2%</td>
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</table>

Top 10 Non-Cancer Specific DRGs on inpatient accounts discharged by a Surgical Oncologist

Patients received care by an Oncologist, and may have a diagnosis code for a cancer... but if our dataset only included DRGs that mention cancer, we would have missed these.
ICD-9 codes only: What would we miss?

Cancer-specific Dx is...

26% Primary Dx
7% Among top 3 Secondaries
67% Not

Patient received care by an Oncologist...

but if our dataset only included patients with a primary diagnosis of cancer, we would miss 1/3 of the patients seen by Surgical Oncology...

Specialists only – what would we miss?

1. Oncology Specialists generate 68% of profit

2. Other Docs, Ca Dx Primary, 24% of profit, driven mostly by outpatient imaging and inpatient surgery (such as Thoracic, Orthopedic, ENT)

3. Other Docs, Ca Dx next three positions, 8% of profit, driven mostly by inpatient care and outpatient imaging. Top divisions at discharge are Orthopedic Surgery and Pulmonary.

Comprehensive definition of Oncology

- All patients with Oncology-related ICD-9 diagnosis or DRG codes, including screening, history, and other V-codes, regardless of physician or location seen; and
- All patients seen by Oncology specialists, regardless of diagnosis.
Using data in strategic planning

"Are you doing strategic planning without comprehensive data analysis? You may as well write a letter to Santa Claus."

Our strategic approach

- Disease-specific strategic priorities
  - Continuum of care for breast cancer, GI cancer, etc.
  - Modality-specific business plans and budgets still necessary, but modalities do not drive strategic thinking and analyses
- Taking several factors into account
  - Current clinical and research strengths
  - Research opportunities and outcomes (if we increase GI cancer volume, do we have clinical trials to put patients on?)
  - Disease-specific national (research) and local (providers) competitive forces
  - Disease-specific performance metrics including market share, payer mix, profitability and clinical research accrual
  - Disease-specific gap analysis including clinical/operational, research, and marketing/financial domains
- Making the case for investing in cancer services and cancer research

Rationale for disease-centered approach

- Best way to link clinical/operational imperatives and research imperatives in an AMC
- Cancer is multi-modality (multi-disciplinary) disease. Financial outcomes are spread across many units, clinics, ancillary services.
  - How much of hospital’s business is cancer-driven?
  - How much of cancer business is driven by breast ca, GI ca, lung ca, prostate ca, etc.?
- Patients and referring physicians think in patient-centered, disease-centered way
- “Silos” and departmental fiefdoms are obstacles to patient-centered and disease-centered strategic thinking and program development
Challenges of disease-centered approach

- Hospital budgets, positions, people tend to be silo-based (by clinic, unit, specialty, ancillary service, etc.)
- Hospital data analysis tools follow these silos
- Senior administrators may resist having separate financial reports, plans, or even analysts that are cancer-centered
  - Concern that cancer service line would produce financial analyses that overlap other service areas or ancillaries
  - Concern that analyses would not be verifiable by anyone else using standard tools
  - Difficulty understanding this approach
  - Difficulty reconciling disease-centered strategies, investments, outcomes with silo-centered budgets
- Finding / training analyst(s) for sophisticated & specialized analyses

Cancer care continuum

- Screening for cancer – primary care, gastroenterologists, OB-GYNs, urologists, mammographers, etc.
- Diagnosis – all of the above plus pulmonologists, surgeons, pathologists, radiologists, urologists, etc.
- Surgery – surgical oncologists, ENT, thoracic, gynecological, GI, neuro, urological, general, etc.
- Medical – hematology-oncologists – range of services including chemotherapy, immunotherapy, hormonal therapy. Tertiary hospitals may have bone marrow / stem cell transplant. Adult and pediatrics separate.
- Radiation – radiation-oncologists (includes external beam [plain, IMRT, IGRT, proton] and brachytherapy [seeds, implants]
- Supportive, palliative and end-of-life care
  ➢ You need to “lasso” and analyze data from all parts of the continuum in order to understand the costs and contributions related to breast cancer, GI cancers, etc.
Ingredients

- Champion for importance and buy in
- Access to data
- Place to put data (system(s) to house and allow integration)
- Expert to mine and produce results from data (dedicated cancer-specific analyst)

Administrator Level Champion

- Cancer-experienced service line director
  - Reports through VPs to COO (high on organizational chart)
- Liaison with cancer center (research) director
- Responsible for all aspects of operational and budget / financial issues in oncology areas (needs data)
- Influence with affiliated departments

Access to Data

- Relationships with source owners
  - Hospital “Decision Support” (billing claims, cost integration)
  - Cancer registry
  - Schedule data
  - EMR / pathology, lab result data
- Develop processes for and schedule routine transfers of data,
  - Automate where possible (need a database developer/programmer)
System to house data

- Transfer data from sources into new repository
  - Programmer/developer to set up E-T-L (extract, transform, load) processes
  - Developer to build needed tables and relationships among them to allow integration
  - Ideal situation – reduce time spent getting and bringing data in so that most resources can be devoted to analyzing data.

VCU Massey Cancer Center Data Analysis System (MDAS)

“Our hospital wants us to use the existing system, can we create an Oncology ‘cube’?”

- Can you get all the information you need in a “cube” from an existing business intelligence data system?
  - Would it include outpatient care?
  - Would it capture the whole care continuum?
  - Would it allow you to categorize by disease type?
  - Would it allow you to categorize by modality of care?
The more “raw” the better

- We need to get the raw data to accomplish our analytic goals.
- We often need to drill-down to detailed charges, detailed payments & adjustments, detailed Dx and Procedure codes, assemble data in non-conventional ways (particular patients, specific time intervals, only charges of interest)
- We also need the flexibility to be able to answer new questions – about pre-cancer conditions; about non-cancer hematological diseases; about new modalities of care; etc.

Role of dedicated cancer analyst

- Experienced working with cancer data.
  - Cancer is complex…so are cancer data.
- Analysis of all cancer-related data
  - Knows the various data sources and what to ask for
- Covers all aspects of revenue cycle, utilization, market share, program development, business plans, strategic planning, research, performance improvement
- Understands the clinical operations (where things happen, when…)
- Liaison / collaborators with clinicians, administrators and researchers

Before we get to some examples…

- How many of you have ability to analyze hospital claims data across modalities for specific cancer types?
- Of those who don’t, how many would like to have such capabilities?
- Who has tried this, what obstacles and successes have you found?
Detailed financial analyses necessary to sustain & expand signature programs

Total Profit (Loss) for BMT-related MCVH Accounts

How?

• Worked very closely with service line administrator, BMT medical director, and managed care contracting director
• Thorough analyses linking the BMT registry with hospital & physician claims data
• Evaluation of all aspects of the revenue cycle – direct costs, indirect costs, coding, pricing, contract negotiations, and revenue sharing for globally-paid; compared to external benchmarks where possible
• Developed significant familiarity with transplant types, phases of transplants, contract terms, etc.
• Similar work done with other modalities of care

Three major ways to “slice and dice” cancer financials

• By disease: top 5-10 types
  – Group ICD-9 codes
• By payor: top 4-7 payor types
  – Group primary payors
• By modality: 4-7 categories
  – Inpt (Med, Surg), outpatient (3-5)
• Can easily combine any two of these in a simple analysis
Patient-based analyses following patient from diagnosis through treatment

- Hospital Cancer Registry
- Hospital, Physician, Pharm Claims

From diagnosis:
- Primary site of cancer
- Date of diagnosis
- Stage/spread of disease

Follow patient interactions over time:
- Capture all encounter dates and details
A closer look...

What we know from the cancer registry:

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<thead>
<tr>
<th>MRN</th>
<th>Date</th>
<th>Code</th>
<th>Description</th>
<th>tmt</th>
<th>surgtype</th>
<th>chemo#</th>
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</table>

What we gain from integrating billing claims:

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CEO: “What is the margin for each cancer stage?”

<table>
<thead>
<tr>
<th>Margin / Case</th>
<th>Profit (loss) / Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td>Regional</td>
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</table>

Consulting firm: “Close down palliative care program”

- Our cancer center opened one of first Palliative Care Units in the nation in May 2000.
- External consultants recommended closing it in 2002 because cases ending on the PCU had large negative margins.
- Detailed financial analyses of PCU patients, compared to other EOL admissions, convinced consultants that the unit produced significant cost-reduction toward the end of a long and expensive admission.
- Unit stayed open, program went on to win numerous national & international awards & grants; become training center; and produce numerous studies.
8 Hospital Study of Palliative Care


Analyses to capture clinical outcomes & quality of care

Facilitating, funding, and producing research

• Helped garnered $1 million in TICRC (tobacco) funding in 2008
• Helped garner $2.39 million in TICRC funding in 2010
• Helped garner major health economics grants
• Mission-critical data regarding cancer patient population for CCSG, CCOP (NCI) renewals
• Helped launch network of clinical research affiliates
• Helped to create new “core service” for informatics
• 15+ publications, 40+ presentations
How?

- Analyses of claims data & cancer registry to quantify patient volumes, demographics, treatments
- Analyses supporting clinical research grants – data backing proposal re: availability of patients, status quo of treatments, etc.
- Identification of possible participants in research – based on inclusion and exclusion criteria
- Creation of secondary datasets for in-depth research by our team or others

Understanding cancer markets

- Geographic analysis can be critically important for understanding and communicating the locations of patient population, providers, hospitals, and major highways
- Relevant to market analyses, outreach, marketing, and decisions about where to compete or where to collaborate
- Use layered maps based on same databases

Cancer incidence and providers
Conclusions
Silo-analyses provide limited value. Standard hospital data analysis tools are insufficient. Comprehensive, sophisticated cancer-specific analyses guide strategic business & research efforts.

Value of specialized analytics:
- You can capture all business (claims) being driven by cancer
- You can analyze that data and use the resulting business intelligence in disease-centered strategies and evaluations
- You can define and categorize flexibly depending on the question asked
- You can link multiple data sources / registries / databases together at patient level
- You can produce geographic analyses
- You can collaborate with researchers
- You can continually improve, strengthen and expand your databases for better, quicker analyses

Questions?
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