The Importance of Comorbidity Data to Cancer Statistics and Routine Collection by Cancer Registrars

Information Forum
Commission on Cancer

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Introduction

- Patients with cancer often have other diseases, illnesses, or conditions in addition to their index cancer
- These other conditions are generally referred to as comorbidities
- Although not a feature of the cancer itself, comorbidity is an important attribute of the patient
- Direct impact on the care of patients, cancer statistics, and the assessment of quality of care
Comorbidity Impact on Therapy

The use of preferred therapy might be contraindicated due to the presence of comorbid ailments

- The comorbid ailment(s) may render an overall prognosis so poor for the patient that an otherwise desirable treatment for the index cancer may be denied

- A particular type of comorbid ailment(s) may affect the patient's ability to tolerate a particular type of therapy
Prostate Cancer Example

- Desch et al studied treatment recommendations for local or regional prostate cancer.
- As comorbidity increased, the proportion of men receiving no treatment rose correspondingly.
- Fewer than 30% of men with the most significant level of comorbidity received surgery, radiation therapy, or combinations of aggressive therapy as compared with almost 55% of men who had no comorbid ailments.

Greenfield et al conducted a retrospective review to examine degree of appropriateness of initial treatment for elderly patients with breast cancer.

Sample included women with breast carcinoma that received their primary cancer management at one of seven hospitals in southern California.

Appropriate treatment defined according to criteria map that incorporates widely accepted practice standards.

*JAMA* 1987; 257:2766-2770
**Relationship of the Comorbidity Index (CI) to Physician Management of Breast Cancer**

<table>
<thead>
<tr>
<th>CI Score</th>
<th>Inappropriate</th>
<th>Appropriate</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>None, Mild</td>
<td>53 (19%)</td>
<td>231 (81%)</td>
<td>284</td>
</tr>
<tr>
<td>Severe</td>
<td>37 (41%)</td>
<td>53 (59%)</td>
<td>90</td>
</tr>
<tr>
<td>Total</td>
<td>90 (24%)</td>
<td>284 (76%)</td>
<td>374</td>
</tr>
</tbody>
</table>

$P<0.001 \chi^2=17.640$ Yates corrected
### Advanced Stage Head and Neck Cancer Example

<table>
<thead>
<tr>
<th>Severe Comorbidity</th>
<th>Initial Treatment Radiation Therapy Only</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
<td>84/311 (27%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Present</td>
<td>23/45 (51%)</td>
<td>2.82 (1.50-5.29)</td>
</tr>
<tr>
<td>Total</td>
<td>107/356 (30%)</td>
<td></td>
</tr>
</tbody>
</table>
Poor Quality of Care?
Sound Clinical Judgment?
Impact of Comorbidity on Prognosis

- In many cancers, comorbidity prognostically more important than tumor size or TNM stage

- Particularly important for slow growing cancers and cancers which affect older people

- Comorbidity can create significant prognostic differences in patients with the same morphologic and histologic manifestations of the index disease
Overall Survival

$N = 3378$
Impact of Comorbidity on Survival

N = 3378

Log Rank = 186.0, p < 0.001
Prostate Cancer
N = 1687

Proportion Surviving
Survival Duration (Months)

Severe
Moderate
Mild
None

Log Rank = 55.2, p < 0.001
Breast Cancer

N = 665

Proportion Surviving

Survival Duration (Months)

Log Rank = 18.2, p < 0.0004
Colorectal Cancer

$N = 469$

Log Rank = 12.3, $p < 0.004$
Lung Cancer

N = 984

Survival Duration (Months)

Log Rank = 0.87, p < 0.83
### Results of Logistic Regression: Multivariable Analysis of Comorbidity

<table>
<thead>
<tr>
<th>Category</th>
<th>Adjusted RR*</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Reference</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>1.0</td>
<td>0.9 – 1.2</td>
</tr>
<tr>
<td>Moderate</td>
<td>1.6</td>
<td>1.3 – 1.9</td>
</tr>
<tr>
<td>Severe</td>
<td>1.6</td>
<td>1.3 – 2.0</td>
</tr>
</tbody>
</table>

* Adjusted for Age, Gender, Race, Site, and TNM Stage
Interaction Between Comorbidity, Treatment, and Survival

- Is the observed decrease in survival for patients with severe comorbidity actually due to less aggressive treatment?
- Cox Proportional Hazards analysis performed to examine independent impact of comorbidity on survival
- Null hypothesis: After controlling for tumor site, size, and initial treatment, comorbidity has no impact on survival for patients with H&N cancer
## Cox Proportional Hazards Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Adjusted Risk Ratio*</th>
<th>95% CI</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Site</strong></td>
<td>Larynx</td>
<td>1</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Oral Cavity</td>
<td>1.230</td>
<td>1.022-1.479</td>
<td>0.0283</td>
</tr>
<tr>
<td></td>
<td>Orophrynx</td>
<td>1.127</td>
<td>0.947-1.340</td>
<td>0.1776</td>
</tr>
<tr>
<td><strong>TNM</strong></td>
<td>Stage I</td>
<td>1</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Stage II</td>
<td>1.267</td>
<td>1.003-1.600</td>
<td>0.0472</td>
</tr>
<tr>
<td></td>
<td>Stage III</td>
<td>1.787</td>
<td>1.421-2.248</td>
<td>0.0001</td>
</tr>
<tr>
<td></td>
<td>Stage IV</td>
<td>2.758</td>
<td>2.177-3.492</td>
<td>0.0001</td>
</tr>
<tr>
<td><strong>Prognostic</strong></td>
<td>Absent</td>
<td>1</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>Comorbidity</strong></td>
<td>Present</td>
<td>1.462</td>
<td>1.176-1.818</td>
<td>0.0006</td>
</tr>
</tbody>
</table>

* Adjusted for Initial Treatment
Quality of Care Example

- Greenfield et al studied differences in mortality rates for 969 patients with incident cases of breast, colorectal, and prostate cancers across seven hospitals in southern California.

- Of the seven hospitals, the three with the highest mortality had been pinpointed by the Los Angeles Times as high mortality outliers.

*JAMA* 1988; 260:2253-2255
The percentage of patients with severe comorbidity scores ranged from 9% to 18% across the seven hospitals (p<0.01).

The rankings of hospitals varied depending on whether one adjusted for age, comorbidity level, or cancer stage.
Comorbidity assessment important even when it is not independently statistically significant.

Hillner found decrease likelihood of axillary node dissection with increasing comorbidity.

After adjusting for age and size of primary tumor, comorbidity no longer associated with node dissection.

Inclusion of comorbidity allowed for more robust conclusions about age.

*Breast Cancer Research & Treatment* 1996;40:75-86
Comorbidity Education Program

To demonstrate that the teaching program developed at Barnes-Jewish Hospital has broad generalizability to cancer registrars at five different oncology data centers across the United States
# Nationwide Comorbidity Network

<table>
<thead>
<tr>
<th>Hospital Name</th>
<th>City, State</th>
<th># of Registrars</th>
<th>Estimated cases/year</th>
<th>Commission on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington Hospital Center</td>
<td>Washington, D.C.</td>
<td>3</td>
<td>818</td>
<td>Teaching Hospital</td>
</tr>
<tr>
<td>North Kansas City Hospital</td>
<td>Kansas City, MO</td>
<td>1</td>
<td>583</td>
<td>Community Hospital</td>
</tr>
<tr>
<td>Queen of the Valley Hospital</td>
<td>Napa, CA</td>
<td>1</td>
<td>377</td>
<td>Community Hospital</td>
</tr>
<tr>
<td>Dakota Clinic</td>
<td>Fargo, ND</td>
<td>3</td>
<td>948</td>
<td>Community Hospital</td>
</tr>
<tr>
<td>Hannibal Regional Hospital</td>
<td>Hannibal, MO</td>
<td>1</td>
<td>216</td>
<td>Community Hospital</td>
</tr>
</tbody>
</table>
Results of Comorbidity Education Program

- Demonstrated almost perfect agreement in the coding of severity of comorbidity
- Coding comorbidity was easy to do
- Satisfaction with the education program was high
- Coding comorbidity required ~6% additional time
Conclusions

- Comorbidity is important in the selection of treatment, prognosis, and evaluation of quality of care.

- The results of the cancer registrar education program demonstrate that comorbidity can be accurately and efficiently obtained from the medical records of patients with newly diagnosed cancers.
Comorbidity should be added as a required data element to hospital-based and central cancer registries