

## **THE IMPORTANCE OF COMORBIDITY TO CANCER STATISTICS – NCRA SILVER ANNIVERSARY CONFERENCE PRESENTATION COPYRIGHT NOTICE**

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*The Importance of Comorbidity for  
Cancer Statistics*

# *The Importance of Comorbidity to Cancer Statistics*

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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
- Comorbidity has direct impact on the care of patients, selection of initial treatment, and evaluation of treatment effectiveness

- 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
  - For example: breast; prostate; oral cavity, pharynx and larynx; bladder; ovary; uterus; and non-Hodgkin's lymphoma



- Based on recent cancer incidence rates, these cancers represent approximately two-thirds of all adult cancers
- While the importance of comorbidity is obvious, the American Joint Committee Tumor, Node, Metastasis (TNM) staging system and cancer registries do not include this important information

- As part of a National Cancer Institute-sponsored cancer education grant, five Certified Tumor Registrars (CTR) were taught to code comorbidity
- A modification of Kaplan-Feinstein Index was used to classify different comorbid diseases and to quantify the severity of the overall comorbid condition
- The goal of this presentation is to describe the results of the comorbidity education program and to demonstrate the impact of comorbidity

# *Kaplan-Feinstein Index*

- Developed from the study of comorbidity in patients with diabetes mellitus
- The KFI has been used to study the impact of comorbidity in several cancers
- Specific diseases and conditions are classified into four groups-- none, mild, moderate, or severe according to severity of organ decompensation and prognostic impact

Kaplan, Feinstein. *J Chron Dis.* 1974;27:387-404

# *Example*

## *Congestive Heart Failure*

- Mild – Exertional or paroxysmal dyspnea which has responded to treatment
- Moderate – Hospitalized more than six months ago
- Severe – Hospitalized within last 6 months or ejection fraction < 20%

# *Overall Comorbidity Score*

- Highest ranked single ailment
- In cases where two or more Moderate ailments occur in different organ systems, the Overall Comorbidity Score should be designated as Severe

# *Example*

CONDITION

DECOMPENSATION

---

Myocardial Infarct more than  
6 months ago

Moderate

DBP 90-114 mm Hg

Mild

History of alcohol abuse, but  
not presently drinking

Mild

---

Overall Comorbidity Score

Moderate

# *Example*

CONDITION

DECOMPENSATION

---

Chronic exertional angina

Moderate

Major depression controlled  
with medication

Mild

Diabetes requiring insulin

Moderate

---

Overall Comorbidity Score

Severe

# *Modified Kaplan-Feinstein Index*

- KFI modified for two important reasons:
  1. Did not include diabetes since this was index disease
  2. Did not include several other important conditions. For example, AIDS and dementia
- The investigators sought advice from clinical experts and the published literature to assign levels of comorbidity to the ailments not included in KFI



# *Modified Medical Comorbidity Form*

Identify the important medical comorbidities and grade severity using the index. Overall Comorbidity Severity Score is defined according to the highest ranked single ailment, except in the case where two or more Grade 2 ailments occur in different organ systems. In this situation, the patient's comorbid severity should be designated Grade 3.

<b>Cogent comorbid ailment</b>	<b>Grade 3 Severe Decompensation</b>	<b>Grade 2 Moderate Decompensation</b>	<b>Grade 1 Mild Decompensation</b>
<b>Cardiovascular System</b>			
Myocardial Infarct	M.I. w/in past 6 months	History of multiple M.I.s in past	M.I. more than 6 months ago. ECG evidence of coronary disease.
Angina	Hosp. for angina pectoris. Unstable angina. Severe CAD as documented by cath.	Chronic exertional angina. Recent CABG for severe CAD (w/in past 6 months). Angina pectoris not requiring hospitalization.	Acute angina. Angina attack compensated with treatment. CABG for severe CAD ( > 6 mo.)
Congestive Heart Failure	CHF w/in past 6 months H/o Transplant w/in past 6 months or acute rejection. Ejection < 20%	CHF > 6 months Transplant >6 months and/or no rejection	Exertional dyspnea. PND

# *Education Program*

- Entire education program lasted 10 hours
- The importance of comorbidity
- Use of the Modified Kaplan-Feinstein Instrument
- Documentation book and clinical examples
- Comments and observations were incorporated into the education program

# *Videotape*

The Whole Picture: Coding Comorbidity

# *Educational Program Assessment*

- CTR coding performance was assessed with weighted kappa statistic, sensitivity, specificity, and interviews
  - Trained research assistant and co-investigators served as “gold standard” for the assessment of overall comorbidity
  - Difficulty coding and time commitment

- Weighted kappa statistic – the degree of agreement beyond what would be expected by chance
  - .41 - .60 Moderate
  - .61 - .80 Substantial
  - .81 - 1.00 Almost perfect
- Sensitivity – the proportion of correctly identified individuals with severe comorbidity
- Specificity – the proportion of correctly identified individuals without severe comorbidity

- The study population consisted of five CTR from Barnes-Jewish Hospital
- Two senior registrars and three new registrars
- Registrars coded comorbidity severity from the medical records of new cancer patients

# *CTR Coding Performance*

<b>CTR</b>	<b>WEIGHTED KAPPA</b>	<b>SENSITIVITY</b>	<b>SPECIFICITY</b>
1 SENIOR	<b>0.95</b>	3/3 = <b>100%</b>	14/16 = <b>88%</b>
2 SENIOR	<b>0.93</b>	1/1 = <b>100%</b>	16/18 = <b>89%</b>
3 NEW	<b>0.85</b>	3/3 = <b>100%</b>	14/15 = <b>93%</b>
4 NEW	<b>0.79</b>	3/4 = <b>75%</b>	14/14 = <b>100%</b>
5 NEW	<b>0.86</b>	5/7 = <b>71%</b>	14/14 = <b>100%</b>

# *How difficult is coding comorbidity?*

CTR	How difficult is coding comorbidity?
1	Slightly
2	Not at all
3	Not at all
4	Slightly
5	Slightly

"Once it's incorporated into the routine, it's no big deal."

"Comorbidity is no harder than any other thing (in the abstraction)."

"It's hard to learn as a new abstracter, but for an experienced abstracter, it would be a snap."



# *How time consuming is coding comorbidity?*

<b>CTR</b>	<b>How time consuming?</b>	<b>Average time to abstract chart (minutes)</b>	<b>Average time to code comorbidity (minutes)</b>
<b>1</b>	<b>Slightly</b>	<b>30-60</b>	<b>2</b>
<b>2</b>	<b>Slightly</b>	<b>90</b>	<b>15</b>
<b>3</b>	<b>Not at all</b>	<b>30</b>	<b>1</b>
<b>4</b>	<b>Not at all</b>	<b>45-60</b>	<b>3</b>
<b>5</b>	<b>Not at all</b>	<b>90</b>	<b>2</b>

"You are weeding through the chart anyway, so it doesn't take much time."

# *Association of Baseline and Clinical Features with Survival*

<b>Variable</b>	<b>Category</b>	<b>N</b>	<b>Two-year survivors, n</b>	<b>Two-year survival rate, %</b>
<b>Total</b>	--	1721	756	44
<b>Age group</b> ***	≤ 50	273	145	53
	51-60	363	187	52
	61-70	494	218	44
	71-80	402	159	34
	≥ 80	189	47	25
<b>Gender</b>	Male	944	428	45
	Female	777	328	42

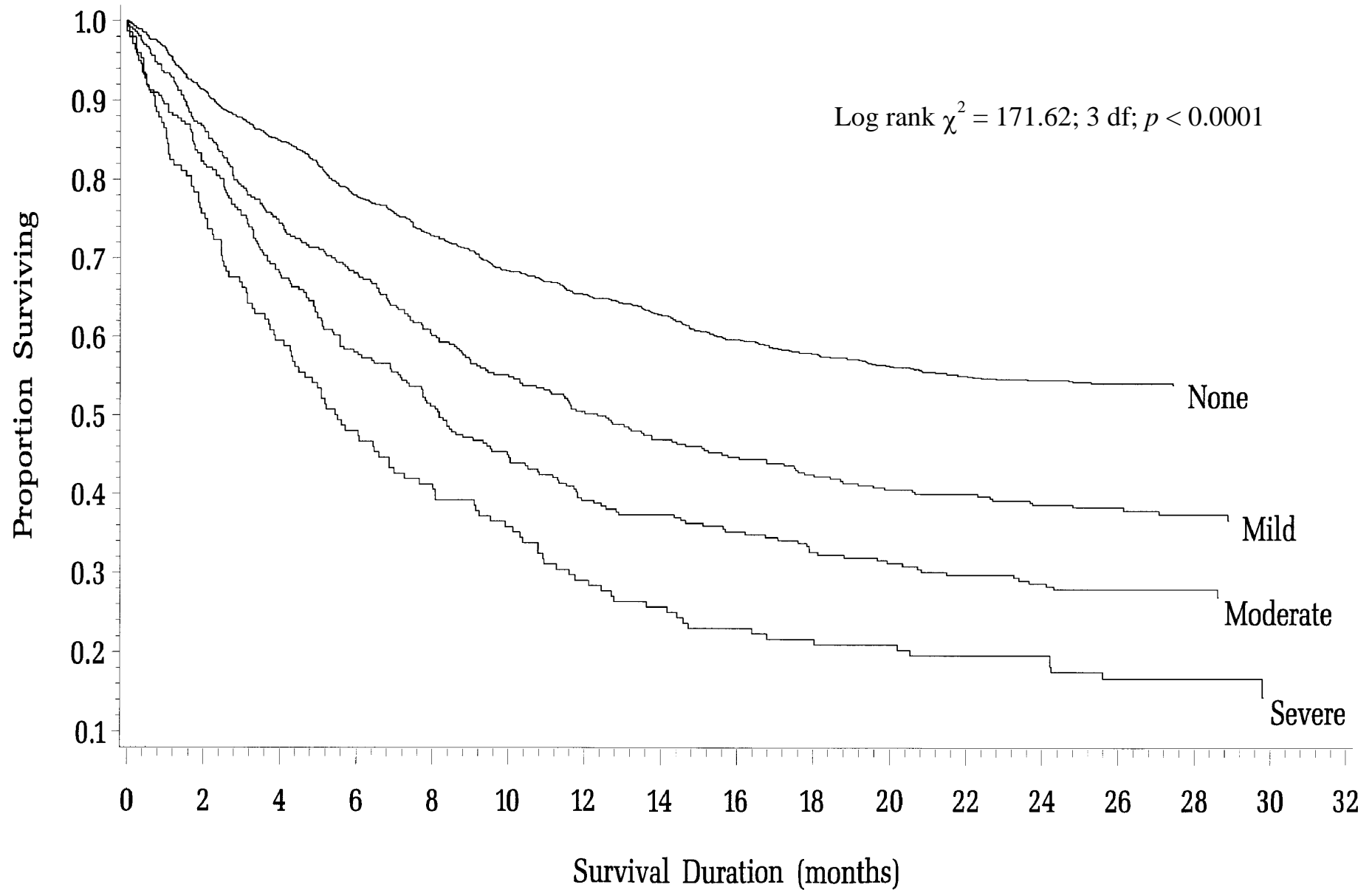
<b>Variable</b>	<b>Category</b>	<b>N</b>	<b>Two-Year survivors,n</b>	<b>Two-Year survival rate, %</b>
<b>Race***</b>	White	1378	652	47
	Black	333	101	30
<b>Comorbidity***</b>	None	668	352	53
	Mild	264	104	39
	Moderate	198	54	27
	Severe	101	22	22
<b>Anatomic Site***</b>	Prostate	298	272	91
	Breast	161	117	73
	Female	157	81	52
	Head & Neck	58	25	43
	Lung	254	49	19
	Brain	47	6	13
	Colorectal	57	6	10
	Other	689	200	29

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<b>Variable</b>	<b>Category</b>	<b>N</b>	<b>Two-Year survivors,n</b>	<b>Two-Year survival rate, %</b>
<b>TNM***</b>	In-Situ	27	24	89
	I	427	313	73
	II	198	127	64
	III	110	28	25
	IV	469	40	8

# Impact of Comorbidity on Survival

N = 1721



# *Cox Proportional Hazards Multivariate Regression Model*

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<b>Variable</b>	<b>Category</b>	<b>Risk Ratio</b>	<b>95% CI</b>	<b>p Value</b>
<b>Age</b>	≤50	1	--	--
	51-60	1.25	0.96-1.54	0.1137
	61-70	1.60	1.28-2.00	0.0001
	71-80	1.84	1.47-2.29	0.0001
	>80	2.48	1.93-3.19	0.0001
<b>Gender</b>	Male	1	--	--
	Female	1.19	1.03-1.38	0.016
<b>Race</b>	White	1	--	--
	Black	1.25	1.08-1.45	0.0037
<b>Comorbidity</b>	None	1	--	--
	Mild	1.34	1.14-1.58	0.0005
	Moderate	1.48	1.24-1.77	0.0001
	Severe	2.01	1.63-2.48	0.0001

<b>Variable</b>	<b>Category</b>	<b>Risk Ratio</b>	<b>95% CI</b>	<b>p Value</b>
<b>Anatomic Site</b>	Prostate	0.23	0.14-0.39	0.0001
	Breast	1.03	0.64-1.65	0.9070
	Female	1.74	1.13-2.68	0.0119
	Head & Neck	1	--	--
	Lung	2.12	1.47-3.07	0.0001
	Brain	2.48	1.55-3.97	0.0001
	Colorectal	2.30	1.47-3.61	0.0003
	Other	1.86	1.30-2.66	0.0006
<b>TNM Stage</b>	In-Situ	0.442	0.21-0.95	0.0359
	I	1	--	--
	II	1.21	0.93-1.58	0.1516
	III	2.64	2.11-3.29	0.0001
	IV	5.32	4.34-6.53	0.0001

# *Conclusions*

- Results show that CTRs can code comorbidity efficiently and effectively
- Severity of comorbidity is associated with survival even after controlling for other prognostic factors
- Therefore, comorbidity coding should be included in hospital-based and national cancer registries



## *Future Work*

- To demonstrate that the teaching program has broad generalizability to CTRs at five different oncology data centers across the United States (i.e., small, rural, community and large, urban centers)
- The intended outcome of this project is the demonstration of the validity and generalizability of the educational program created at Barnes-Jewish Hospital

- Once it has been demonstrated that comorbidity can be coded accurately and reliably at non-academic medical centers, we plan to work with the American College of Surgeons' Commission on Cancer and the National Cancer Registrars Association to advocate for the inclusion of comorbidity information in national cancer databases