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*ACE-27 with Dr. Piccirillo from
Washington University St. Louis*

August 18, 2009

Introduction

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

Observational Research

- n Majority (>95%) of cancer patients in this country are not enrolled in clinical trials
- n Receive care at local hospitals based on community standards and guidelines developed by national specialty organizations
- n Federal law and professional licensing board requirements mandate that local hospitals collect and maintain important demographic, tumor, treatment, and follow-up information about cancer patients
- n This detailed information is collected at the hospital level by trained cancer registrars and is maintained within hospital-based tumor registries

- n Cancer registry systems provide an outstanding opportunity to study important aspects of cancer care, including studies of treatment effectiveness, outcomes, and quality of care (IOM Report)
- n However, adjustment methods are essential to control for non-random assignment
- n To improve the performance of risk-adjustment methodologies, important therapeutic and prognostic characteristics of the patient must be available for analysis

*Institute of Medicine Report, National Cancer Policy Board.
Ensuring Quality Cancer Care. 1999.*

- n Given the fact that the severity of comorbidity may impact on selection and outcomes of treatment, it is imperative to measure and include comorbidity assessment when using data from observational research
- n Unfortunately, no tumor registry system collects comorbidity information on a regular basis

Comorbidity Instruments

- n Several instruments have been developed to classify different comorbid diseases and to quantify the severity of the overall comorbid condition
- n These instruments have been used to classify comorbidity in several types of cancers and have performed well
- n Few of the instruments were specifically designed to study comorbidity in cancer patients



Chart-Based Record Review

n Kaplan-Feinstein Index

J Chron Dis. 1974;27:387-404

n Charlson Comorbidity Index

J Chron Dis 1987;40(5):373-383

n The Index of Co-Existent Disease

Med Care 1993;31(2):141-154.

n **Adult Comorbidity Evaluation-27**

J Reg Management 2001;28:125-131

Claims-Based Assessment

n Modifications of Charlson

- Dartmouth-Manitoba ICD-9 conversion algorithm

J Clin Epidemiol 1993;46:1075-1090

- Deyo et al

J Clin Epidemiol 1992;45:613-619

n Elixhauser Model

Med Care 1998;36:8-27

n Klabunde et al -- in and out-patient claims

J Clin Epidemiol 2000;53:1258-1267

n Von Korff et al chronic disease score from automated pharmacy records

J Clin Epidemiol 1992;45:197-203

Comparison of Comorbidity Collection Methods

Chart-Based Approach

n Advantages

- Score can be assigned to the majority of patients
- Very accurate assessment of comorbidity

n Disadvantages

- Additional work effort

Claims-Based Approach

n Advantages

- Available in many states for many people
- Less expensive alternative

n Disadvantages

- Information may not be available for all patients in a tumor registry
- Less complete and accurate assessment

Commission On Cancer Initiative

- n COC mandated that beginning January 1, 2003 all new cases must include comorbidity and complications
- n These elements are to be coded using the ICD-9-CM codes
- n Present program mandated by the CoC will lead to inaccurate and misleading comorbidity and complication information

J Reg Management 2003;30:117-122

Adult Comorbidity Evaluation-27

- n 27-item comorbidity index for patients with cancer
- n Developed through modification of the
Kaplan-Feinstein Comorbidity Index (KFI)
- n Modifications were made through discussions with clinical experts and a review of the literature
- n Validated in study of 19,268 cancer patients treated at Barnes-Jewish Hospital

JAMA 2004;291:2441-2447

Example

Congestive Heart Failure

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

Overall Comorbidity Score

None, Mild, Moderate, or Severe

- n Algorithm developed by Kaplan and Feinstein
- n Highest ranked single ailment
- n 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	

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
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Chronic exertional angina	Moderate
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Major depression controlled with medication	Mild
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Diabetes requiring insulin	Moderate
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Overall Comorbidity Score

Example

Condition	Decompensation
Chronic exertional angina	Moderate
Major depression controlled with medication	Mild
Diabetes requiring insulin	Moderate
Overall Comorbidity Score	Severe

Adult Comorbidity Evaluation-27

Cogent comorbid ailment	Grade 3 Severe Decompensation	Grade 2 Moderate Decompensation	Grade 1 Mild Decompensation
Cardiovascular System			
Myocardial Infarct	<ul style="list-style-type: none"> ▪ MI ≤ 6 months 	<ul style="list-style-type: none"> ▪ MI > 6 months ago 	<ul style="list-style-type: none"> ▪ Old MI by ECG only, age undetermined
Angina / Coronary Artery Disease	<ul style="list-style-type: none"> ▪ Unstable angina 	<ul style="list-style-type: none"> ▪ Chronic exertional angina ▪ Recent (≤ 6 months) Coronary Artery Bypass Graft (CABG) or Percutaneous Transluminal Coronary Angioplasty (PTCA) ▪ Recent (≤ 6 months) coronary stent 	<ul style="list-style-type: none"> ▪ ECG or stress test evidence or catheterization evidence of coronary disease without symptoms ▪ Angina pectoris not requiring hospitalization ▪ CABG or PTCA (>6 mos.) ▪ Coronary stent (>6 mos.)
Congestive Heart Failure (CHF)	<ul style="list-style-type: none"> ▪ Hospitalized for CHF within past 6 months ▪ Ejection fraction < 20% 	<ul style="list-style-type: none"> ▪ Hospitalized for CHF >6 months prior ▪ CHF with dyspnea which limits activities 	<ul style="list-style-type: none"> ▪ CHF with dyspnea which has responded to treatment ▪ Exertional dyspnea ▪ Paroxysmal Nocturnal Dyspnea (PND)
Arrhythmias	<ul style="list-style-type: none"> ▪ Ventricular arrhythmia ≤ 6 months 	<ul style="list-style-type: none"> ▪ Ventricular arrhythmia > 6 months ago ▪ Chronic atrial fibrillation or flutter ▪ Pacemaker 	<ul style="list-style-type: none"> ▪ Sick Sinus Syndrome
Hypertension	<ul style="list-style-type: none"> ▪ DBP > 130 mm Hg ▪ Severe malignant papilledema or other eye changes ▪ Encephalopathy 	<ul style="list-style-type: none"> ▪ DBP 115-129 mm Hg ▪ Secondary cardiovascular symptoms: vertigo, epistaxis, headaches 	<ul style="list-style-type: none"> ▪ DBP 90-114 mm Hg ▪ DBP < 90 mm Hg while taking antihypertensive medications
Venous Disease	<ul style="list-style-type: none"> ▪ Recent PE (≤ 6 mos.) ▪ Use of venous filter for PE's 	<ul style="list-style-type: none"> ▪ DVT controlled with Coumadin or heparin ▪ Old PE > 6 months 	<ul style="list-style-type: none"> ▪ Old DVT no longer treated with Coumadin or Heparin
Peripheral Arterial Disease	<ul style="list-style-type: none"> ▪ Bypass or amputation for gangrene or arterial insufficiency < 6 months ago ▪ Untreated thoracic or abdominal aneurysm (>6 cm) 	<ul style="list-style-type: none"> ▪ Bypass or amputation for gangrene or arterial insufficiency > 6 months ▪ Chronic insufficiency 	<ul style="list-style-type: none"> ▪ Intermittent claudication ▪ Untreated thoracic or abdominal aneurysm (< 6 cm) ▪ s/p abdominal or thoracic aortic aneurysm repair

Web-Based Comorbidity Education Program

 Washington
University in St. Louis
SCHOOL OF MEDICINE



SITEMAN CANCER CENTER

 BARNES JEWISH
Hospital

 BJC HealthCare™



Welcome to the Coding Comorbidity Course

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. Survival rates are lower for patients with a greater number and severity of comorbid conditions. Comorbidity also has direct impact on the care of patients, selection of initial treatment, and evaluation of treatment effectiveness. When reporting statistical survival data, hospital-based and national cancer registries do not routinely take into account these coexisting medical ailments.

The goal of this online coding course is to assist in the education and training of Certified Tumor Registrars and other individuals dedicated to collecting and reporting information on patients with cancer. The website should also serve as a resource to answer questions and to guide continued accurate and valid collection of comorbid information. We are most interested in all comments from users of this website so we may improve this work for future users.

Thank You,

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[Clinical Outcomes Research Office](#)

[Lori Grove, CTR](#)

Coordinator of BJC Oncology Data Services

Program sponsored by the National Cancer Institute Cancer Education Grant.

*Web-Based Comorbidity
Education Program*

<http://cancercomorbidity.wustl.edu>

*Prevalence of Comorbidity Across
the Age Groups*

Methods

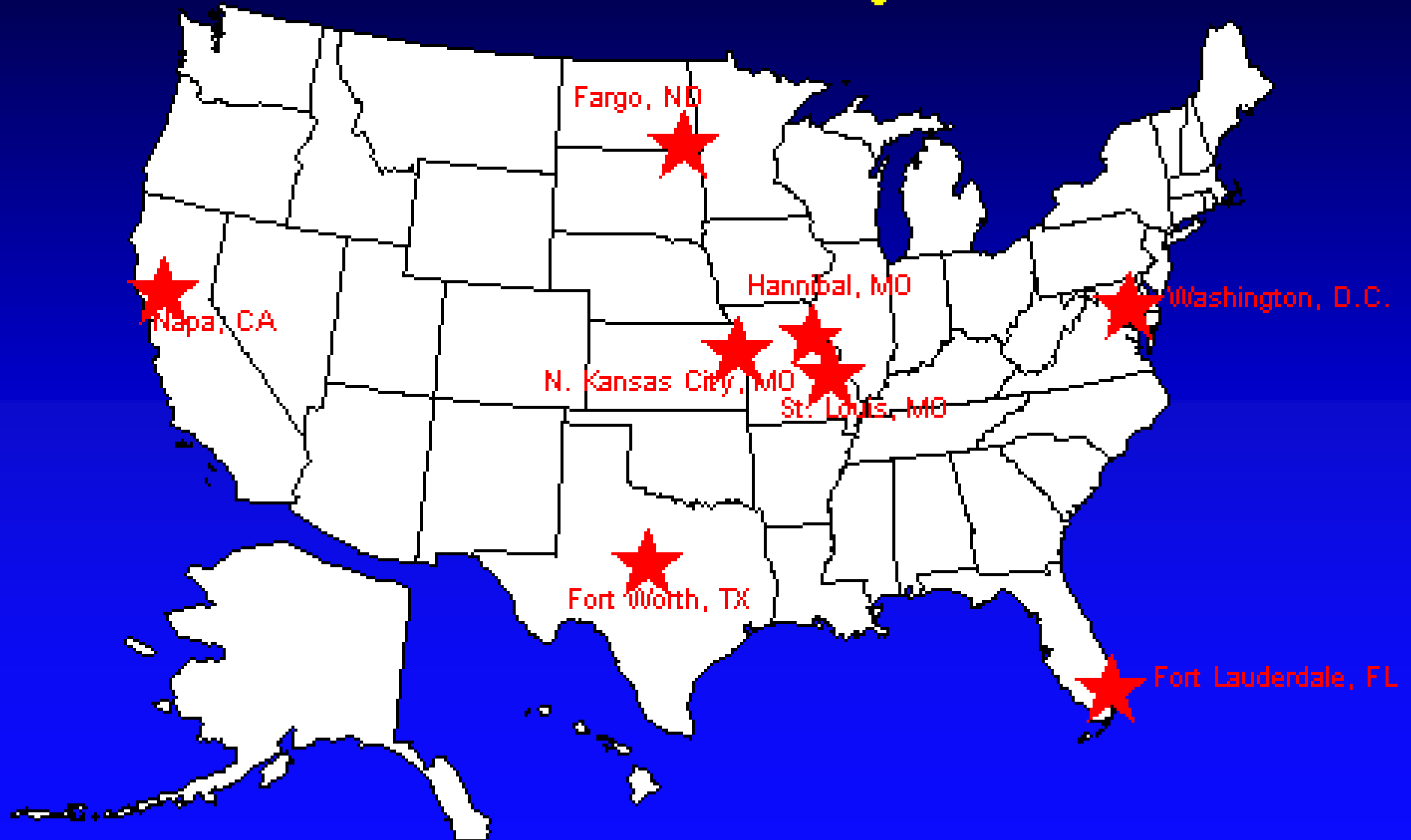
Prospective observational cohort study

22,620 adult cancer patients

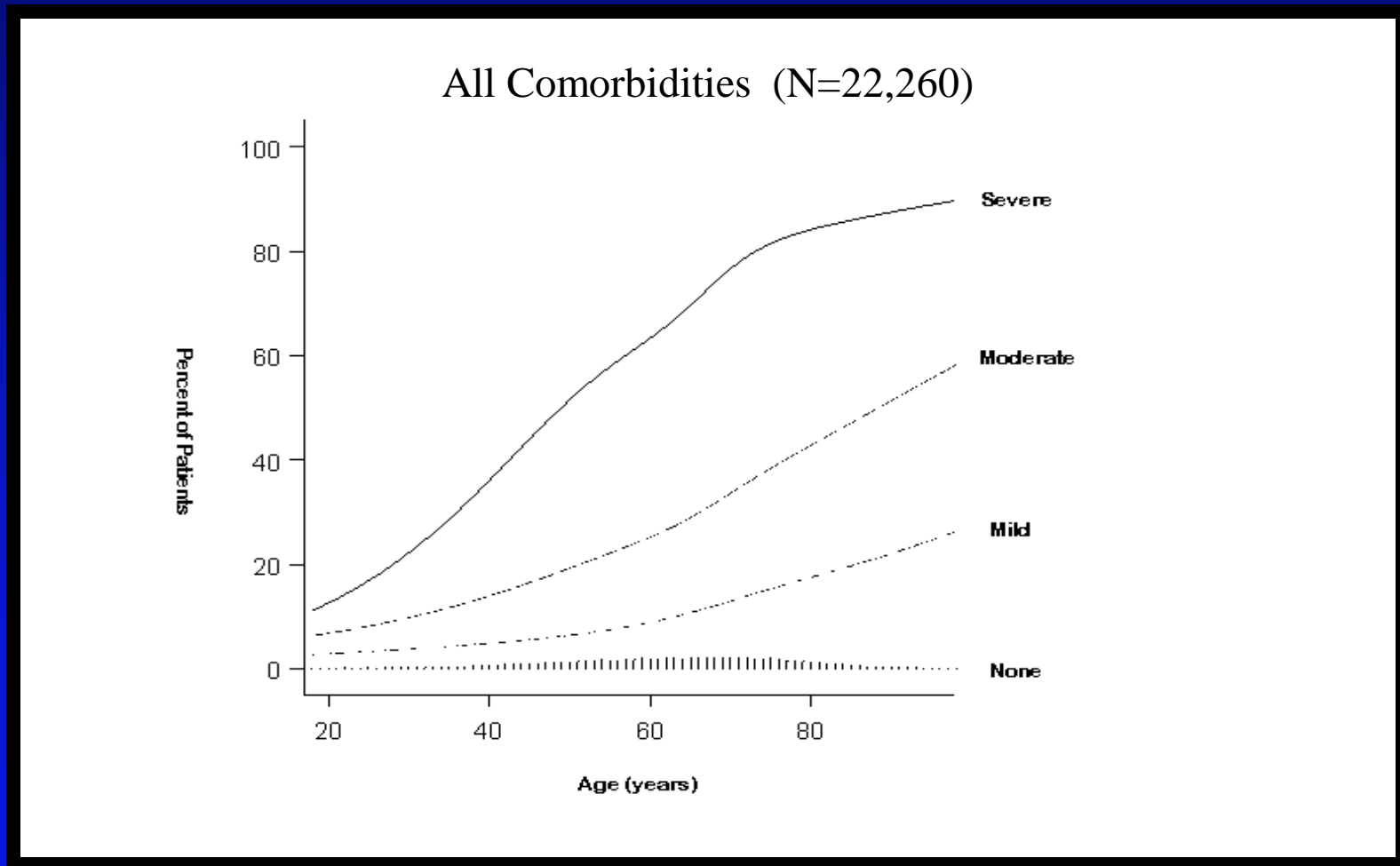
10,851 \geq age 65 (48%)

Treated at 8 US hospitals

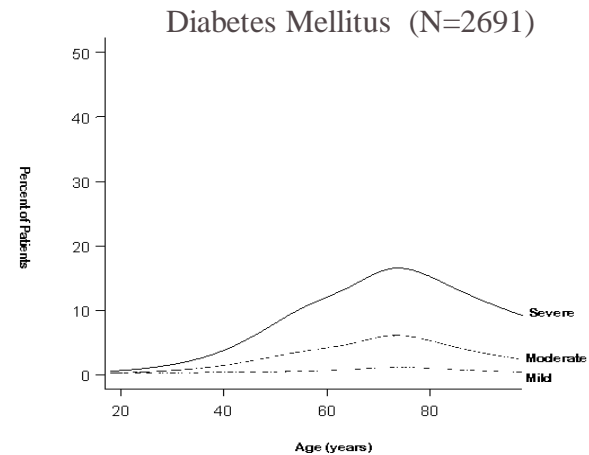
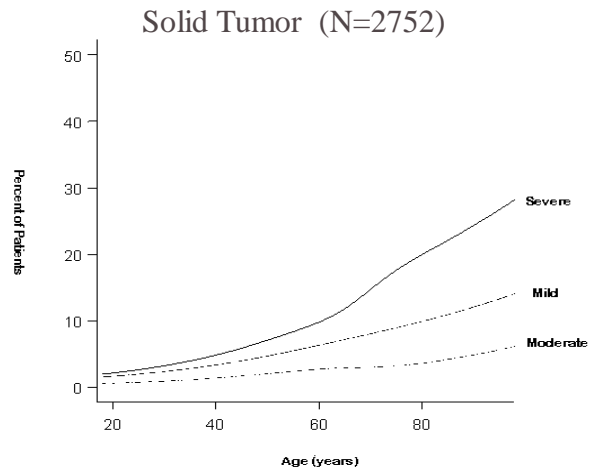
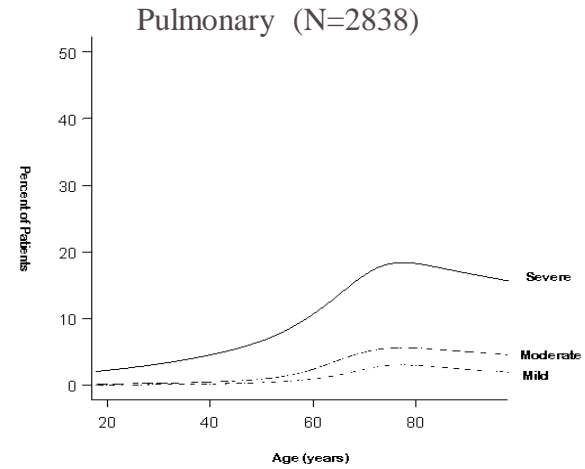
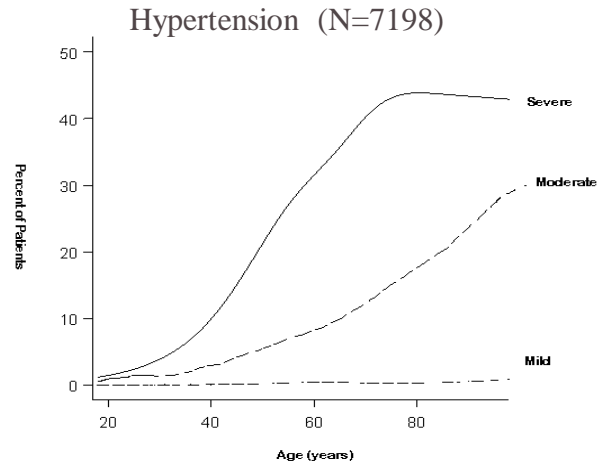
Nationwide Comorbidity Network



Changing Prevalence of Comorbidity Across Age Groups

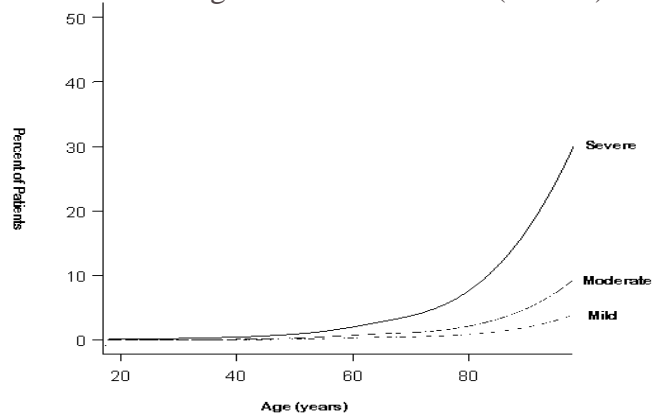


Changing Prevalence of Individual Comorbid Ailments

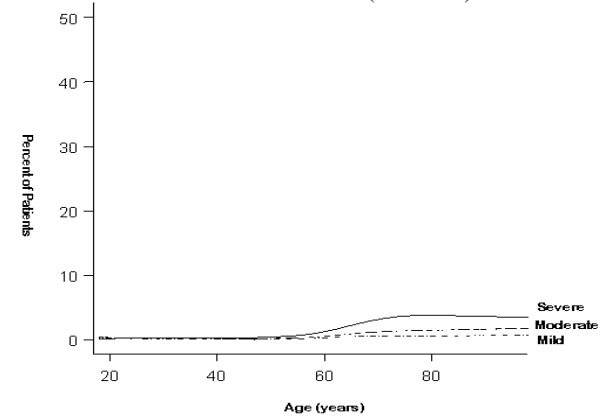


Changing Prevalence of Individual Comorbid Ailments

Congestive Heart Failure (N=793)



Vascular Disease (N=457)



Impact of Comorbidity

n Therapy

n Prognosis

n Assessment of Quality of Care

Comorbidity Impact on Therapy

- n The use of preferred therapy might be contraindicated due to the presence of comorbid ailments
- n There are two distinct ways that comorbid ailments might impact on type of therapy

- n The comorbid ailment(s) may render an overall prognosis so poor for the patient that she may be denied an otherwise desirable treatment for the index cancer
- n A particular type of comorbid ailment(s) may affect the patient's ability to tolerate a particular type of therapy

Prostate Cancer Example

- n Desch et al studied treatment recommendations for local or regional prostate cancer
- n As comorbidity increased, the proportion of men receiving no treatment rose correspondingly
- n 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

Med Care 1996;34:152-622

Breast Cancer Example

- n Greenfield et al conducted a retrospective review to examine whether physicians provided less vigorous treatment for elderly patients with breast cancer
- n Sample included women with breast carcinoma who received their primary cancer management at one of seven hospitals in Southern California
- n Appropriate treatment defined according to *criteria map* that incorporated widely accepted practice standards

JAMA 1987;257:2766-2770

Relationship of the Comorbidity Index (CI) to Physician Management of Breast Cancer

Number of Patients With Treatment			
CI Score	Inappropriate	Appropriate	Total
None, Mild	53 (19%)	231 (81%)	284
Severe	37 (41%)	53 (59%)	90
Total	90 (24%)	284 (76%)	374 (100%)

$P < 0.001$ $\chi^2 = 17.640$ Yates corrected

Advanced Head and Neck Cancer

Prognostic Comorbidity	Initial Treatment Radiation Therapy Only	Risk Ratio (95% CI)
Absent	100/534 (19%)	1.0
Present	38/74 (51%)	3.60 (2.38-5.44)
Total	138/608 (22%)	

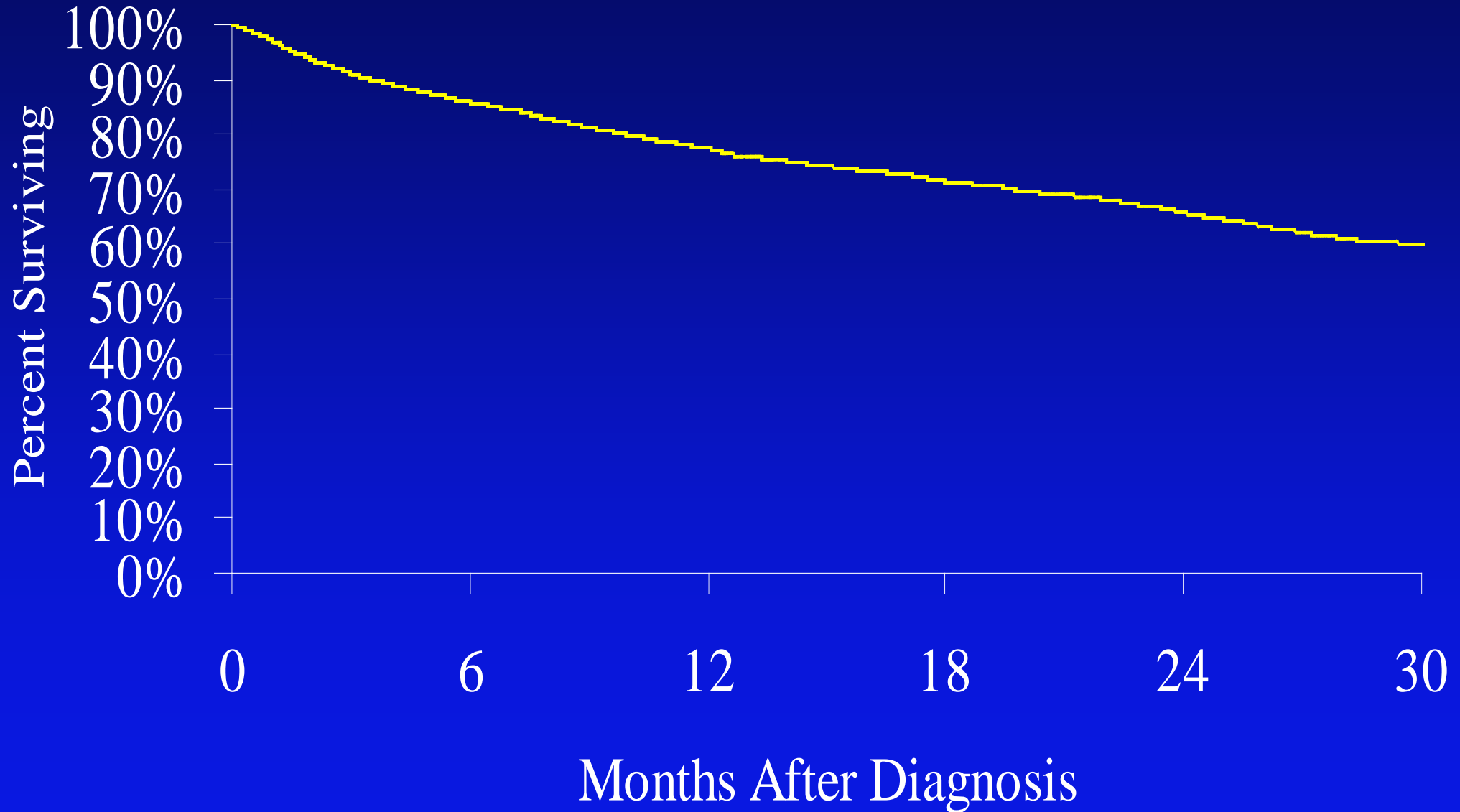
Poor Quality of Care?

Sound Clinical Judgment?

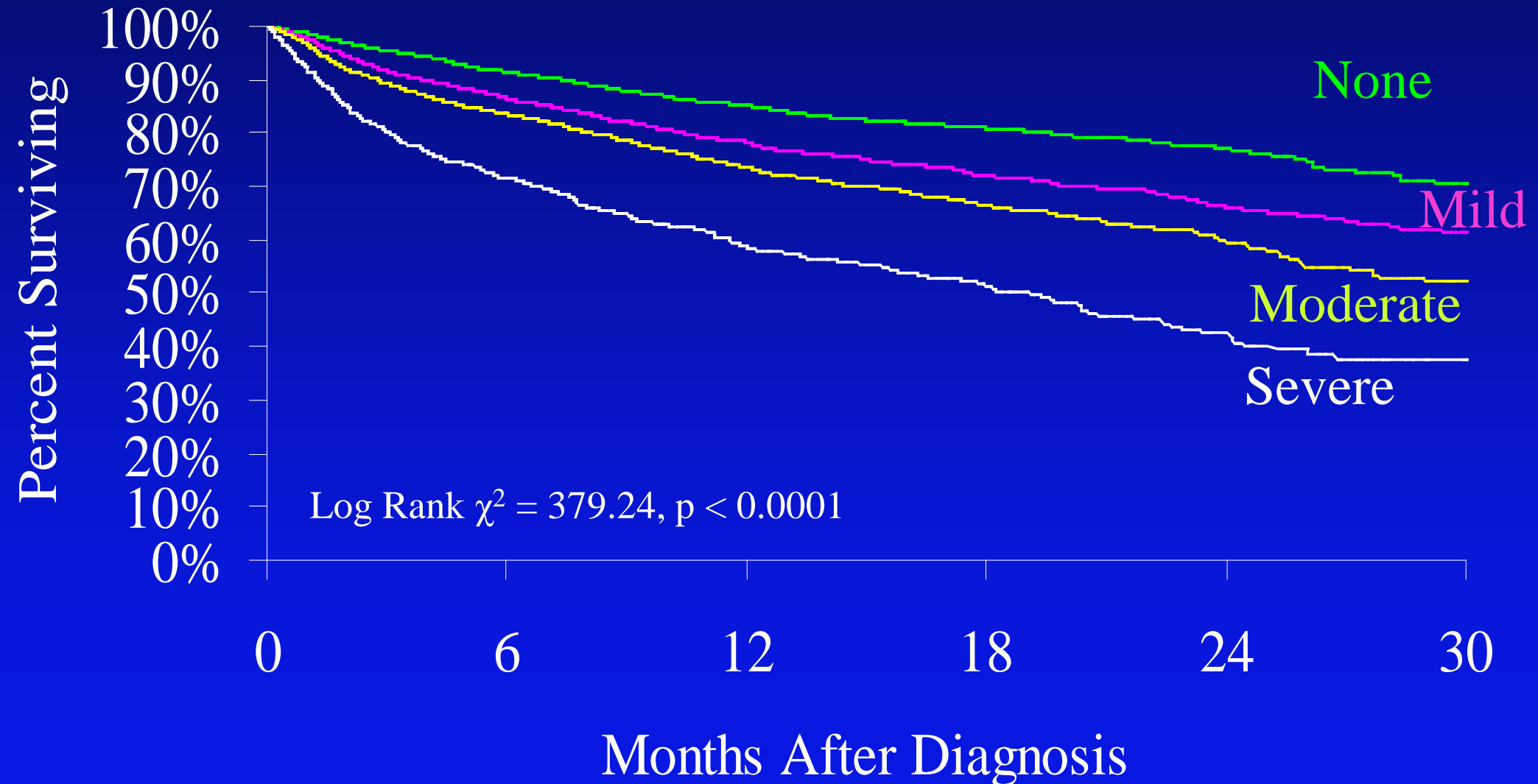
Impact of Comorbidity on Prognosis

- n In many cancers, comorbidity prognostically more important than tumor size or TNM stage
- n Particularly important for slow growing cancers and cancers which affect older people
- n Comorbidity can create significant prognostic differences in patients with the same morphologic and histologic manifestations of the index disease

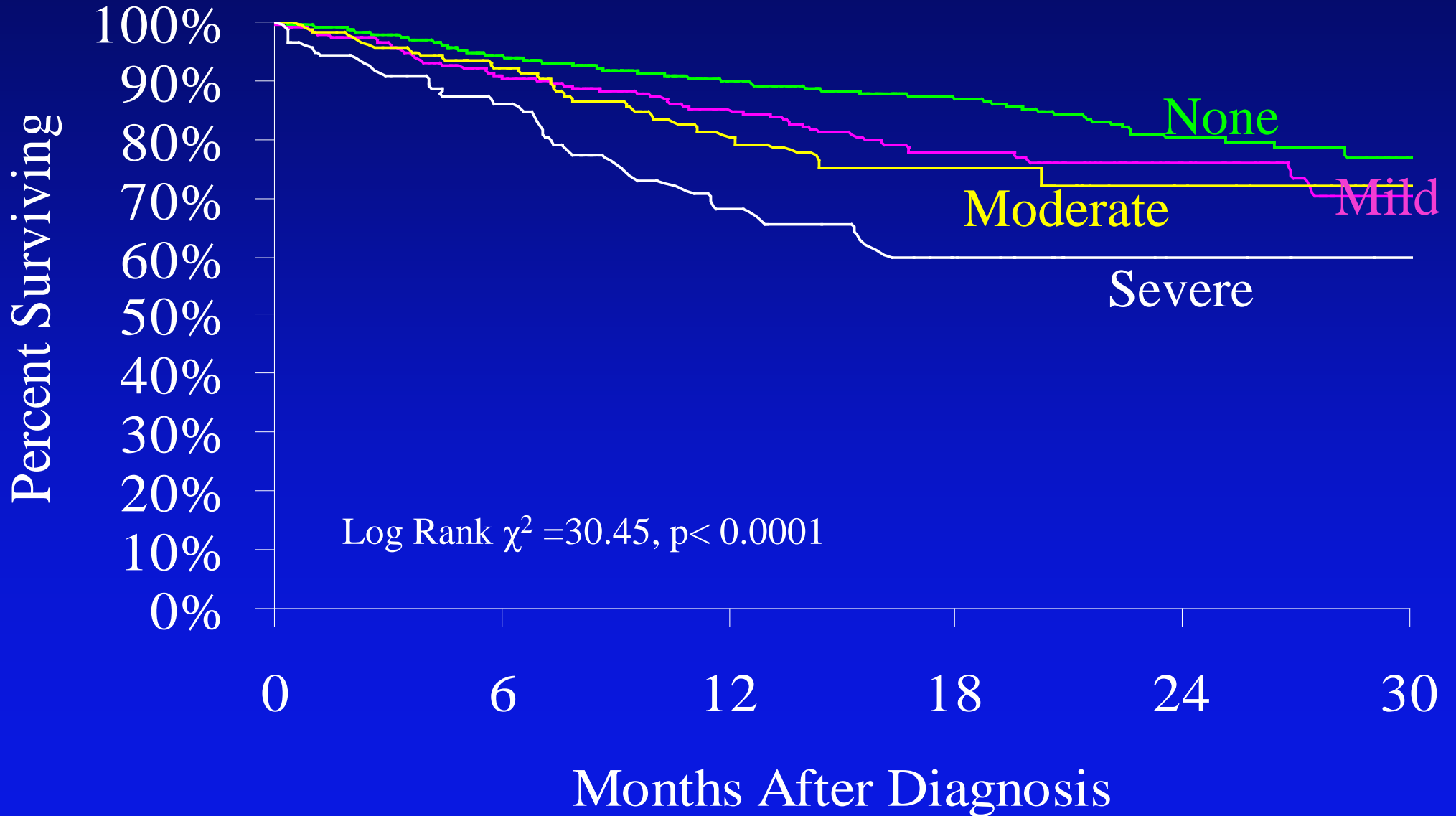
Overall Survival



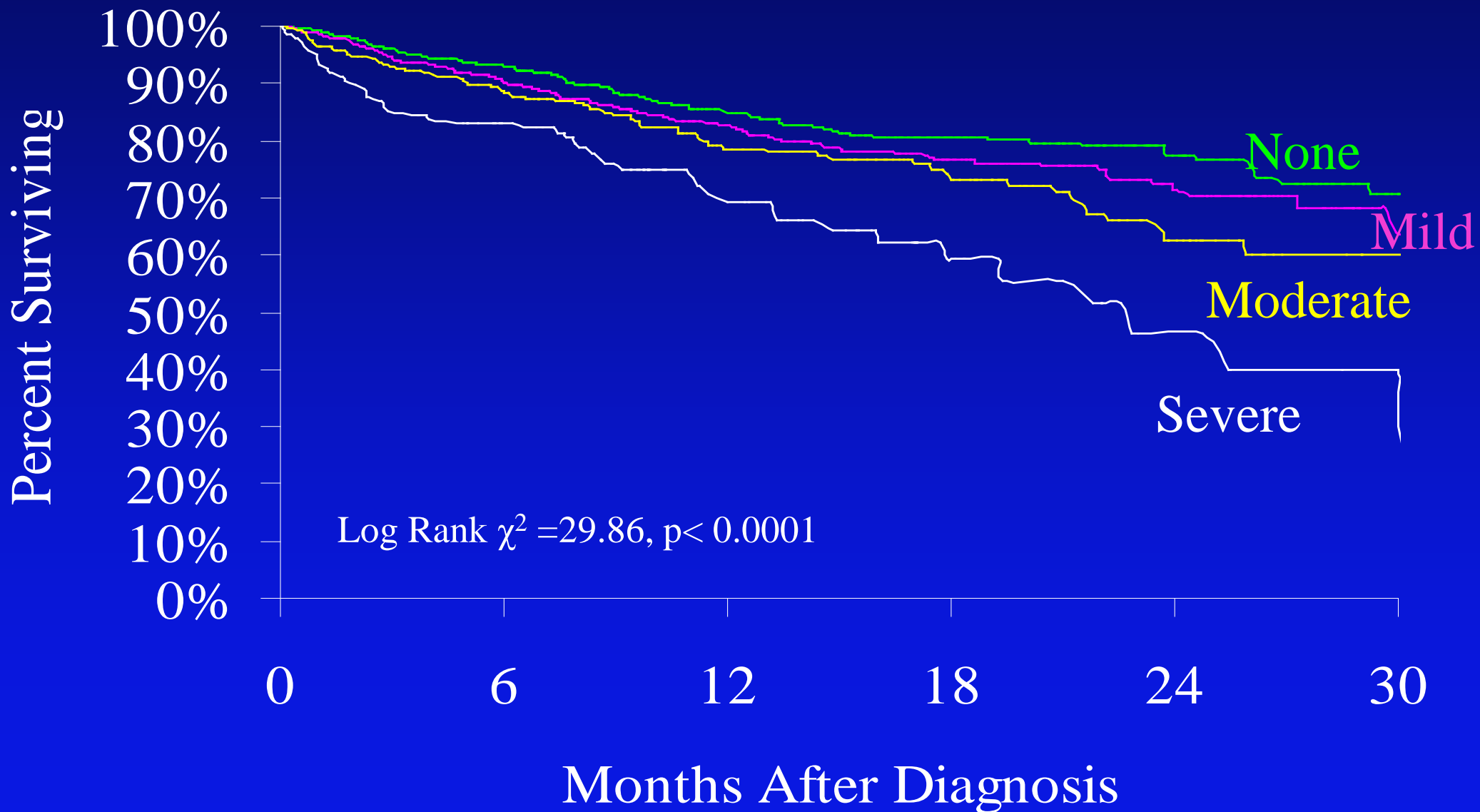
Prognostic Impact of Comorbidity



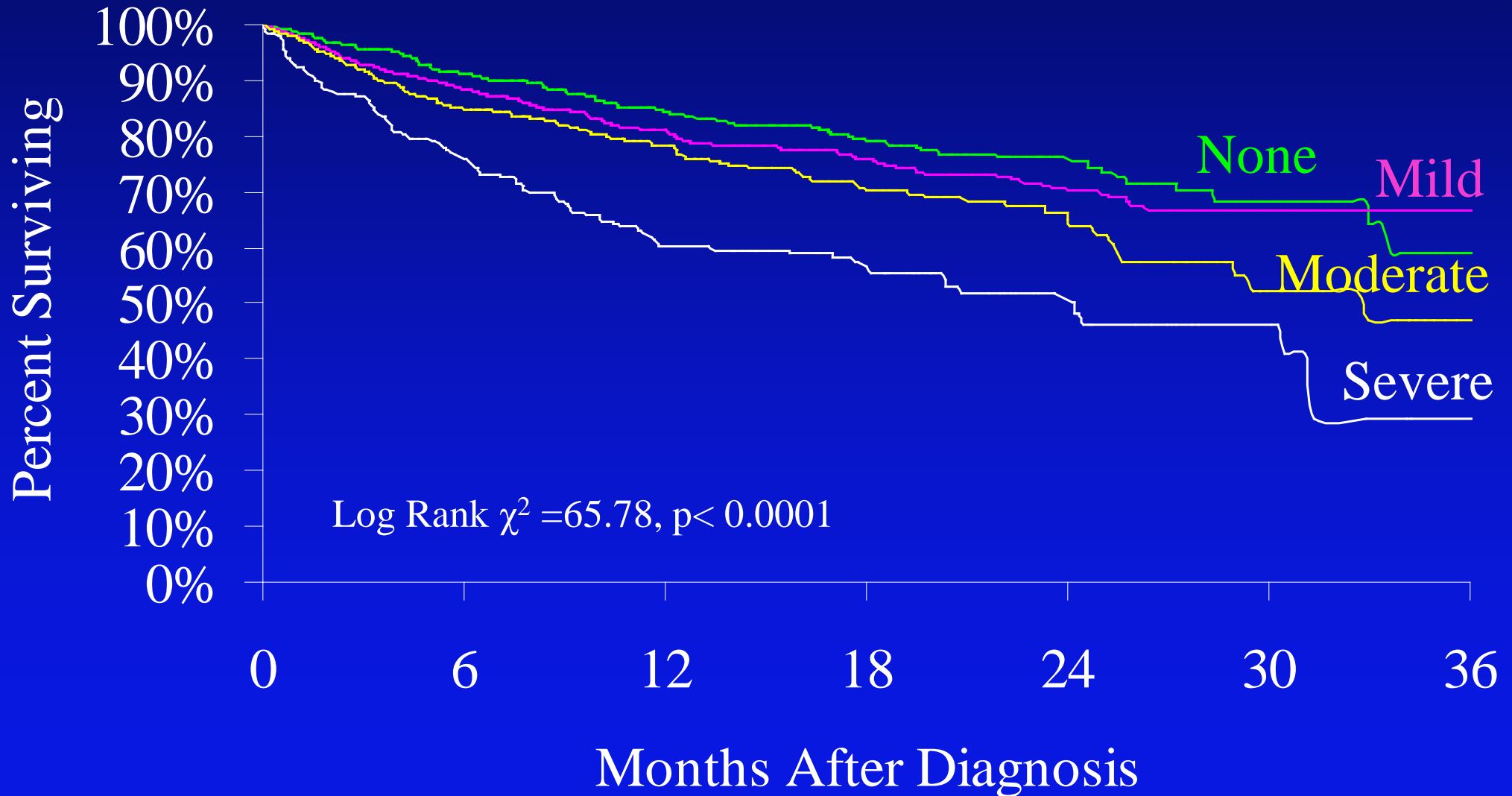
Age <50



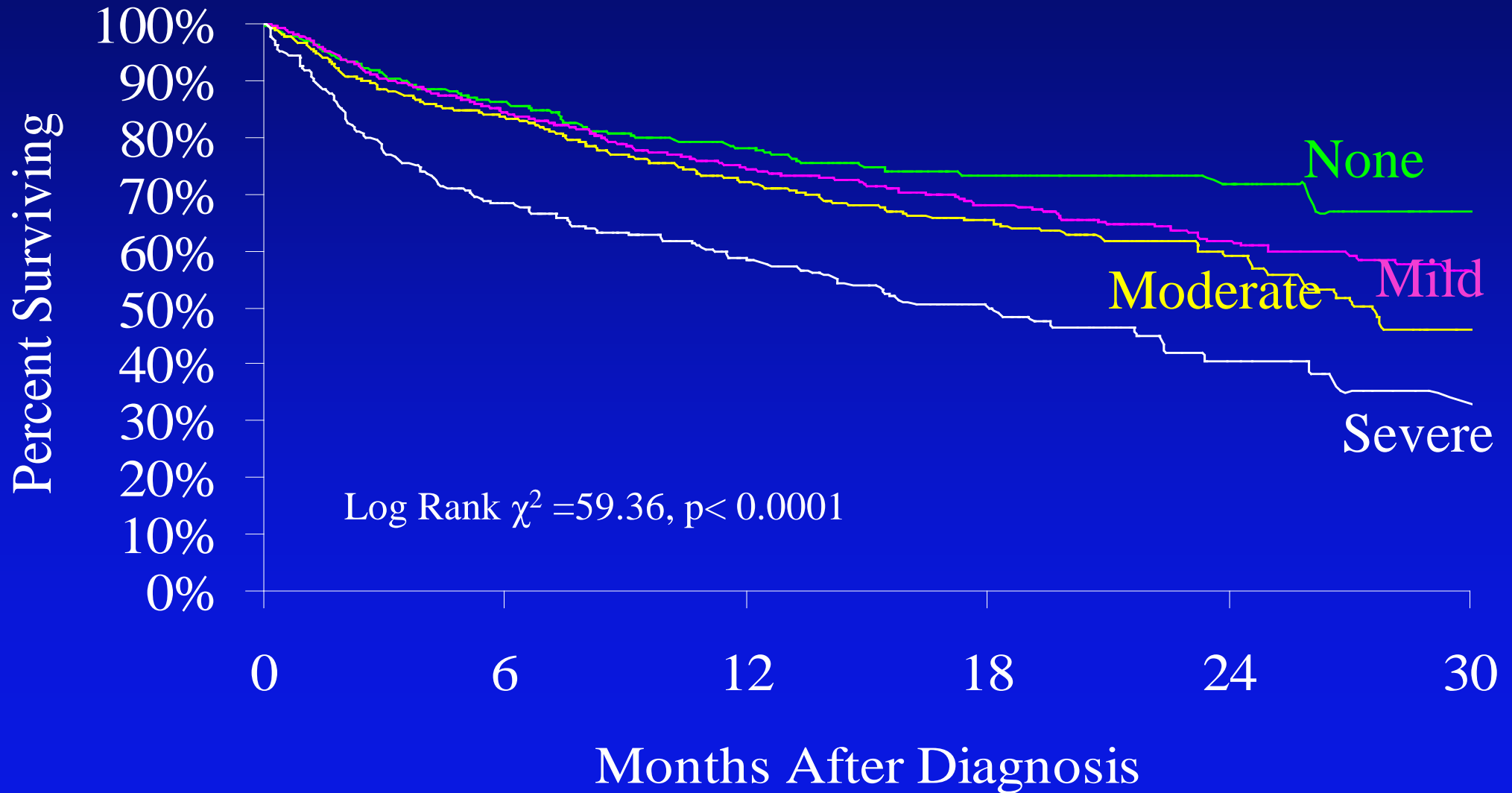
$50 \leq \text{Age} < 60$



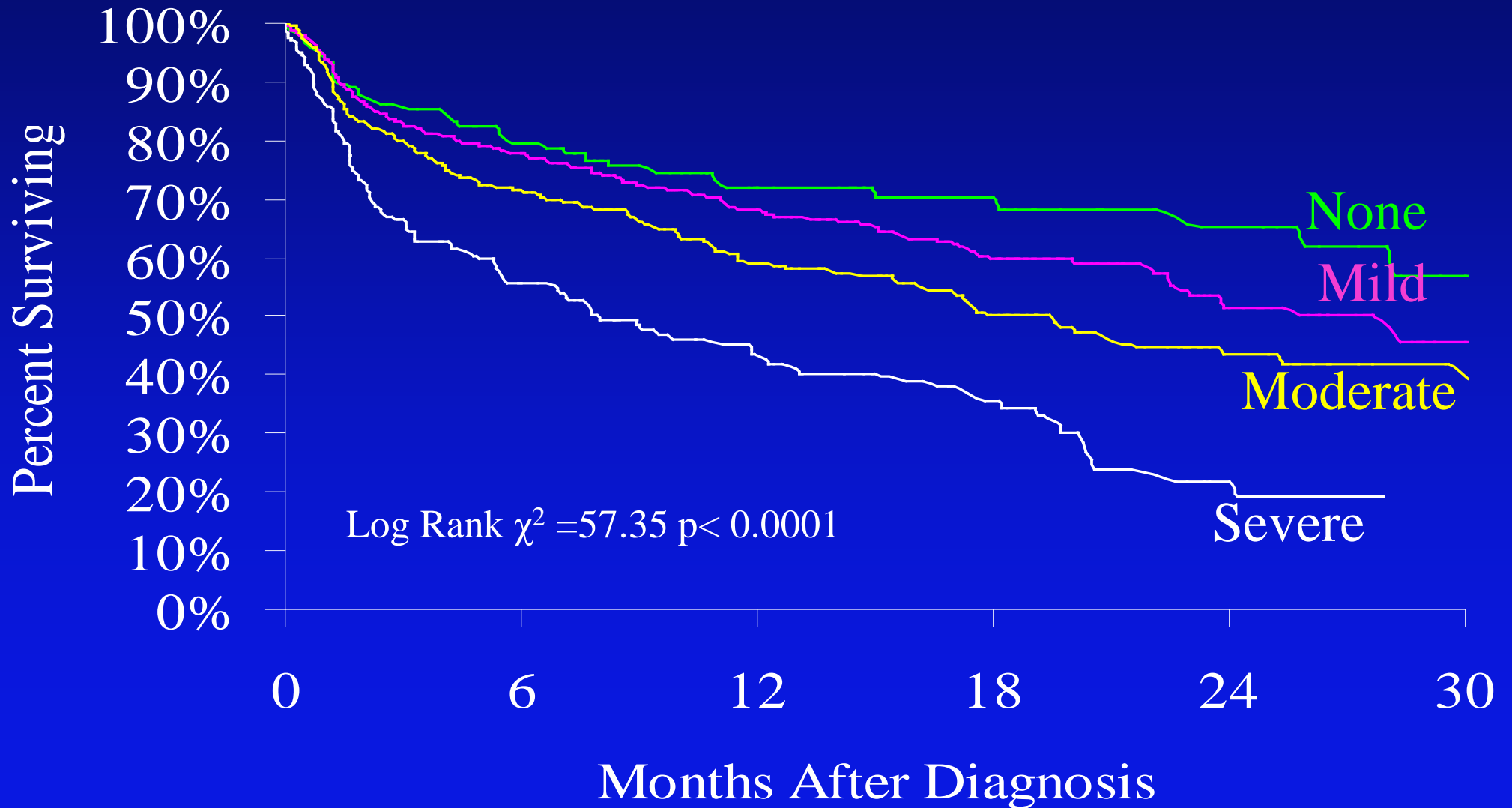
$60 \leq \text{Age} < 70$



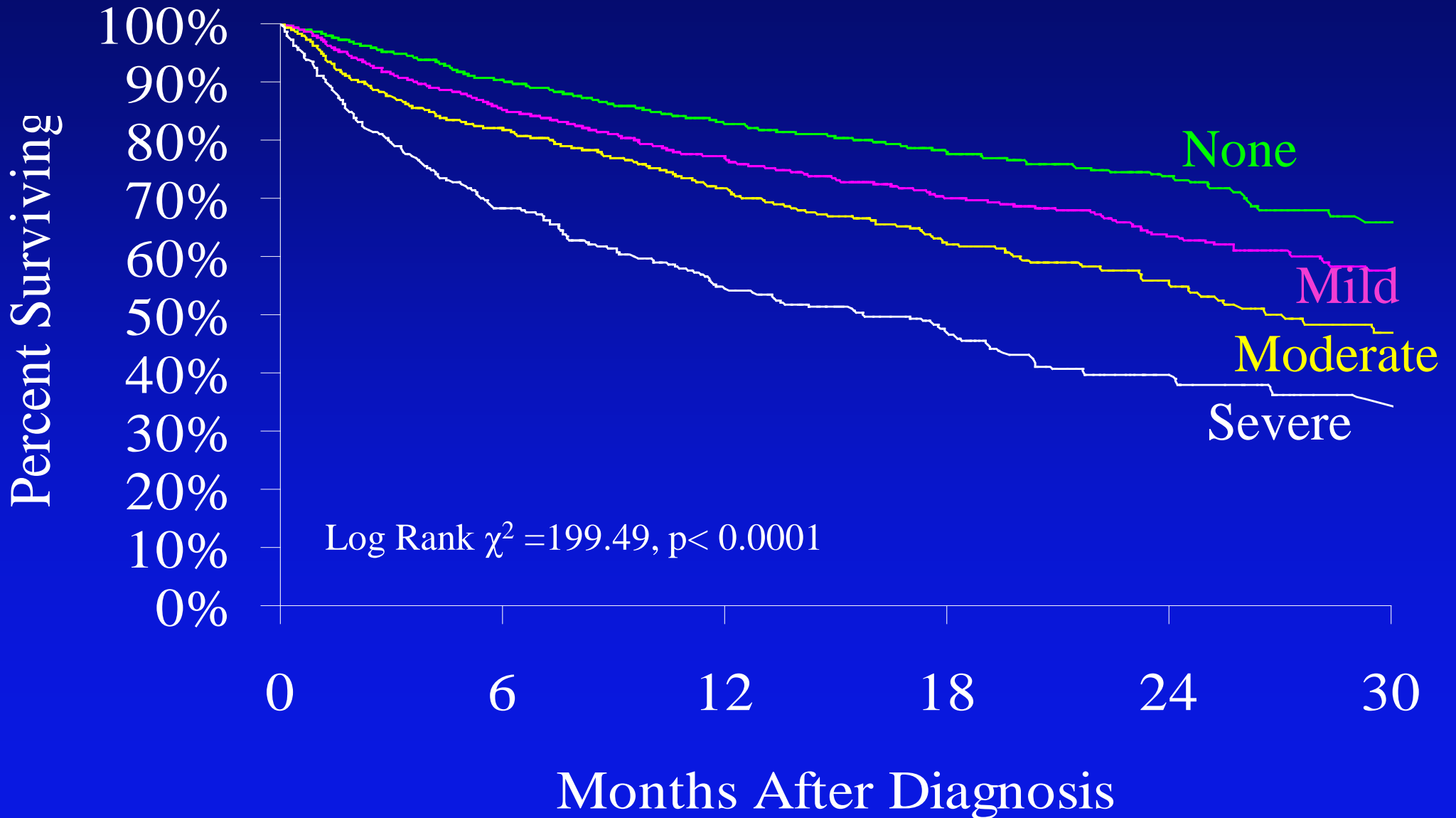
$70 \leq \text{Age} < 80$



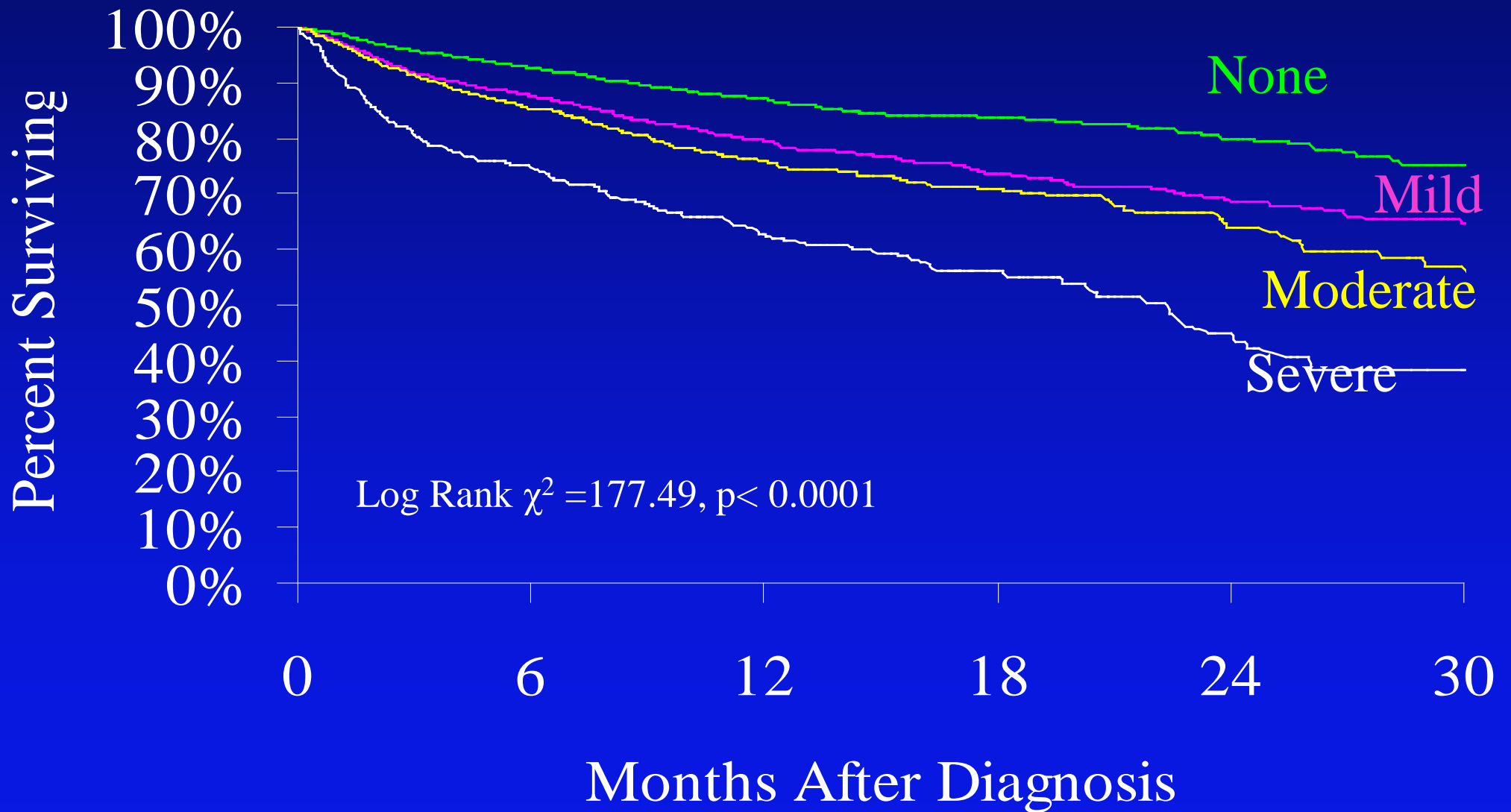
Age ≥ 80



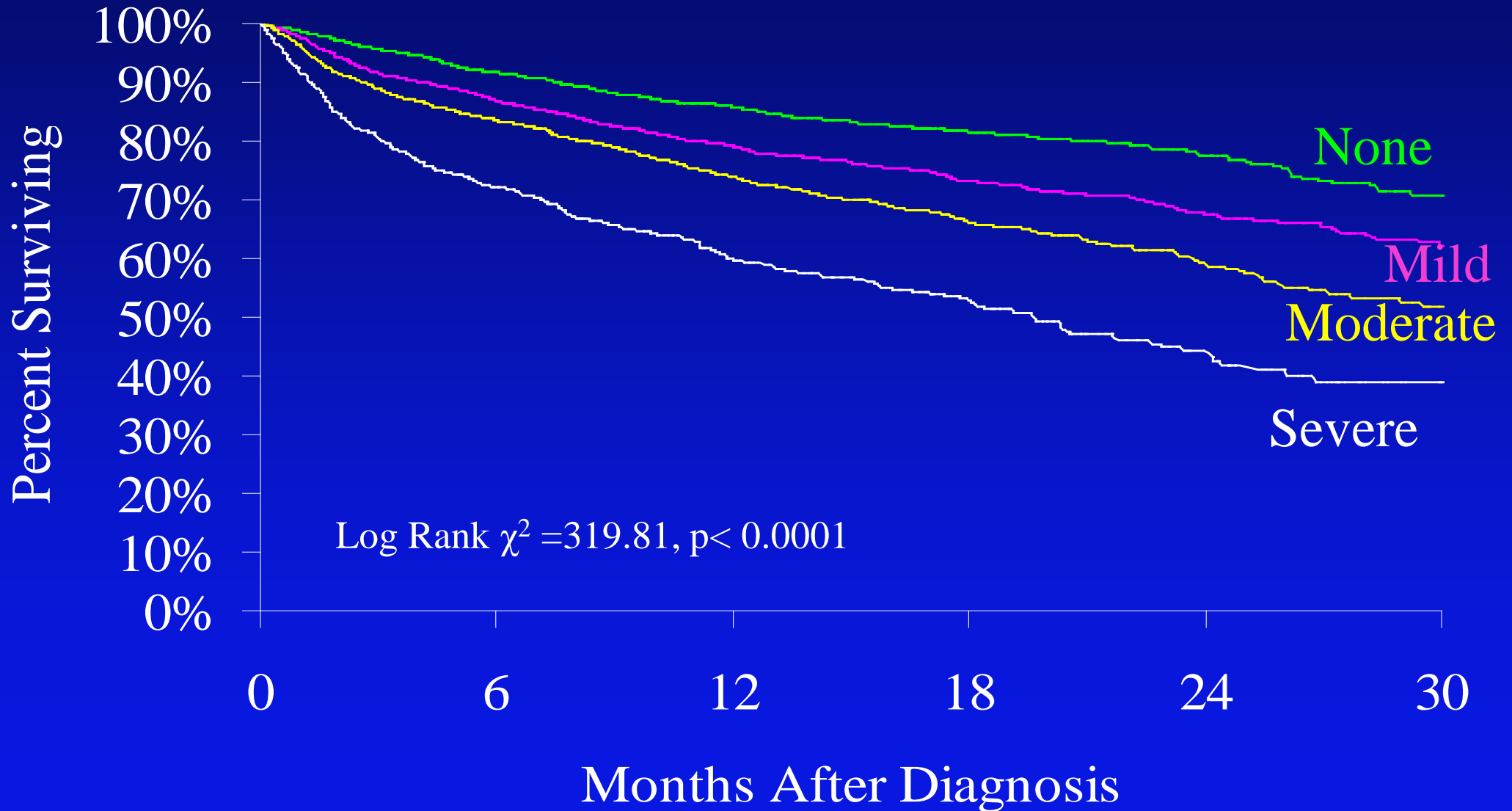
Men



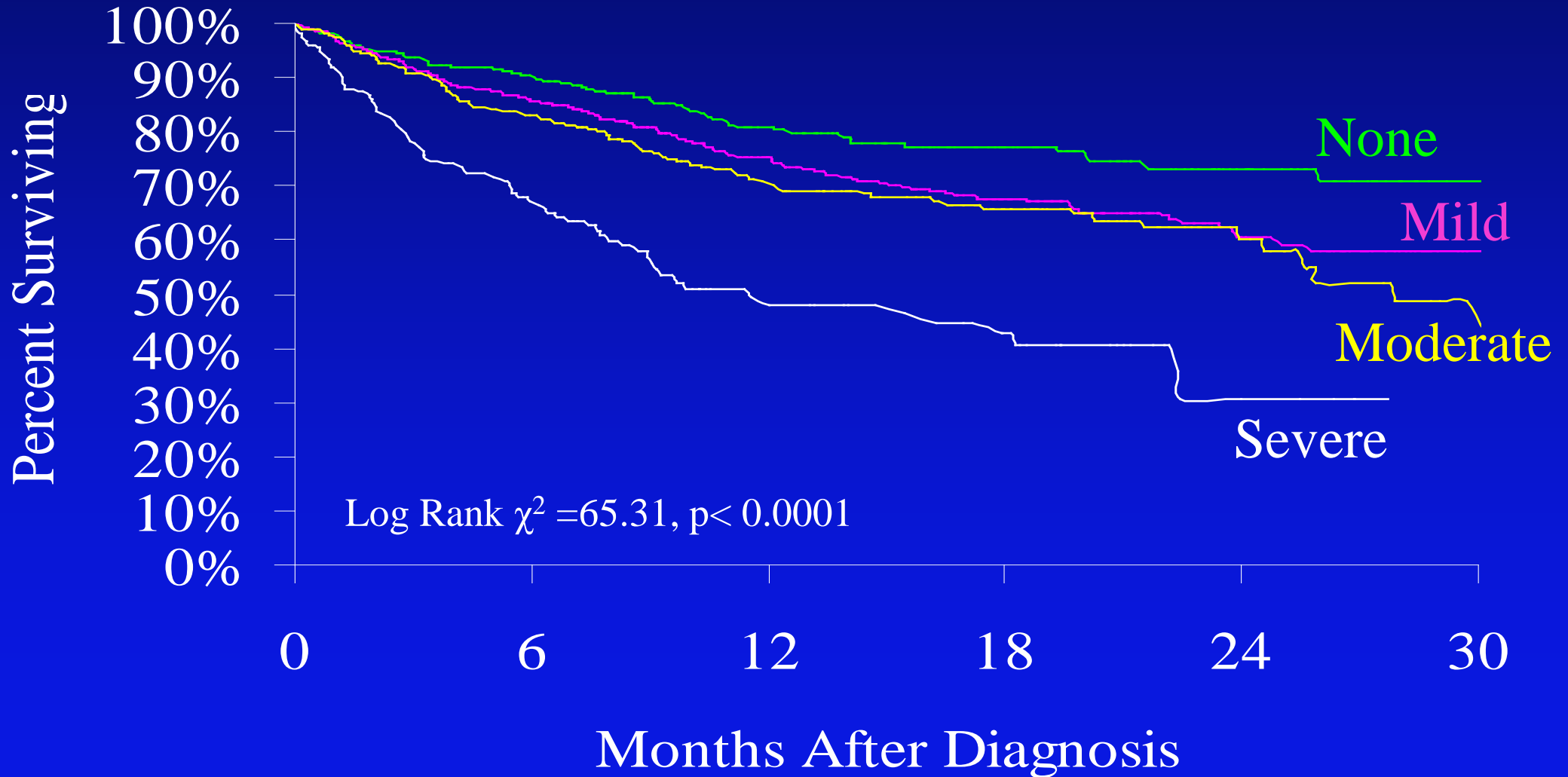
Women



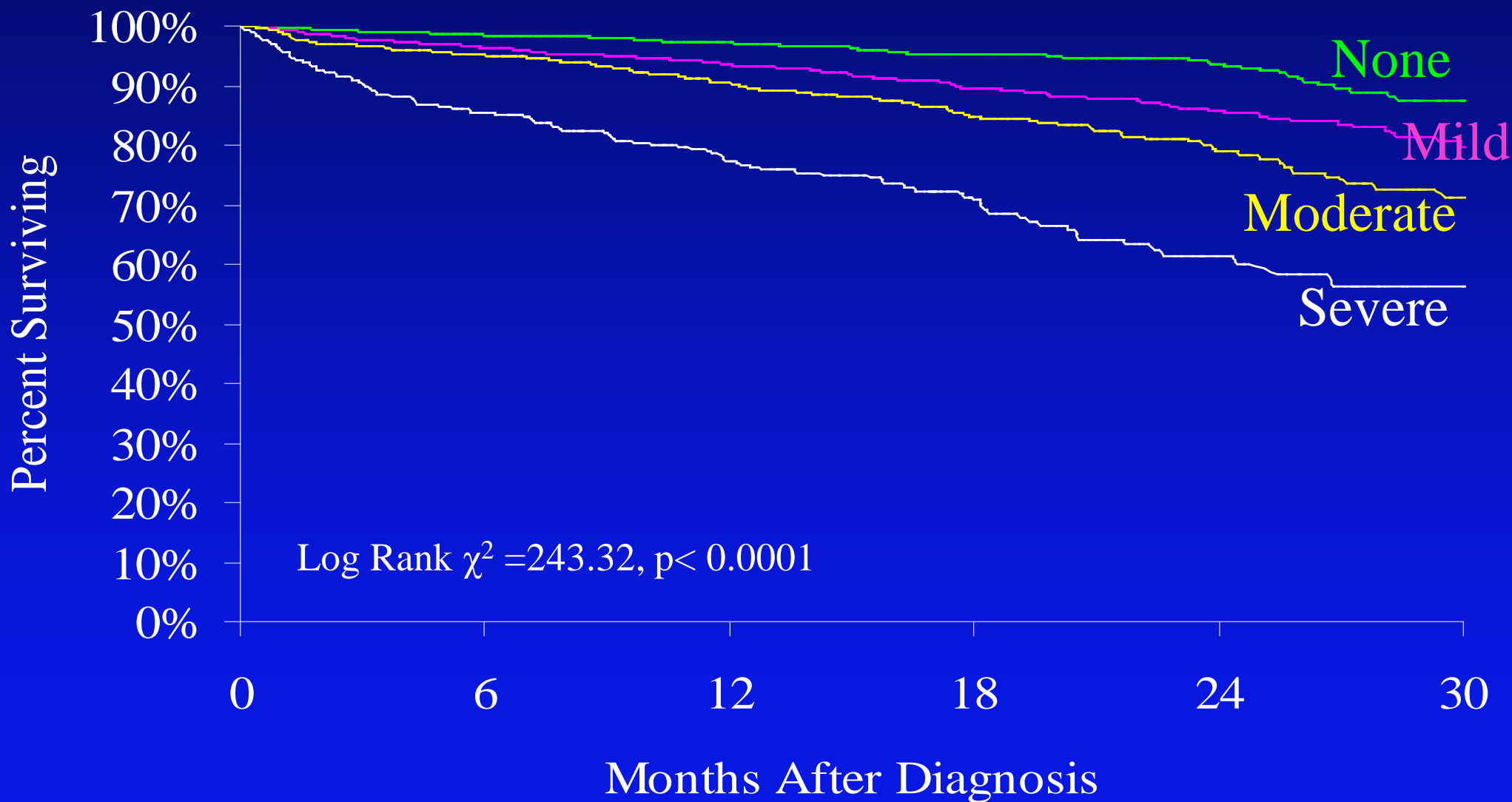
White



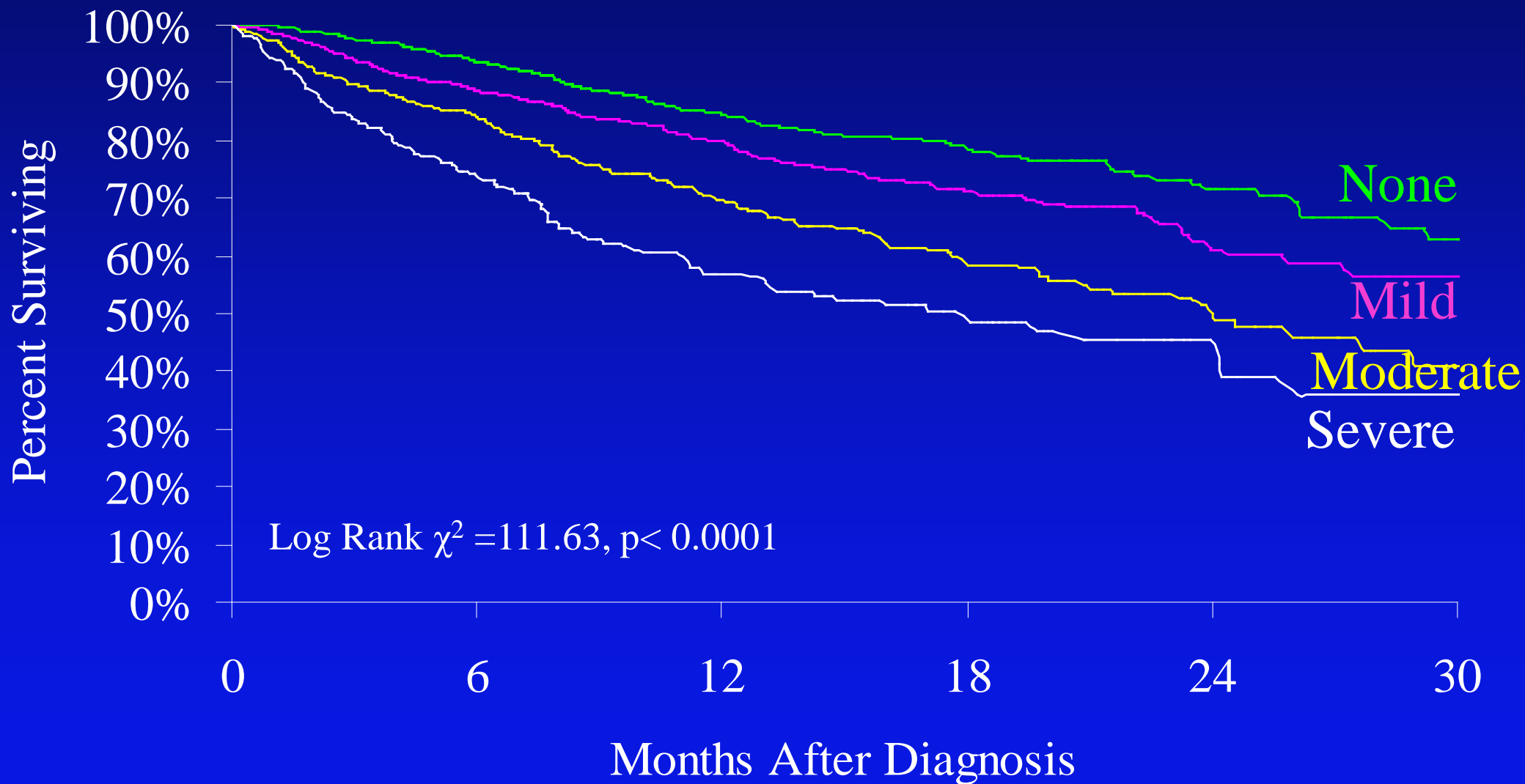
Black



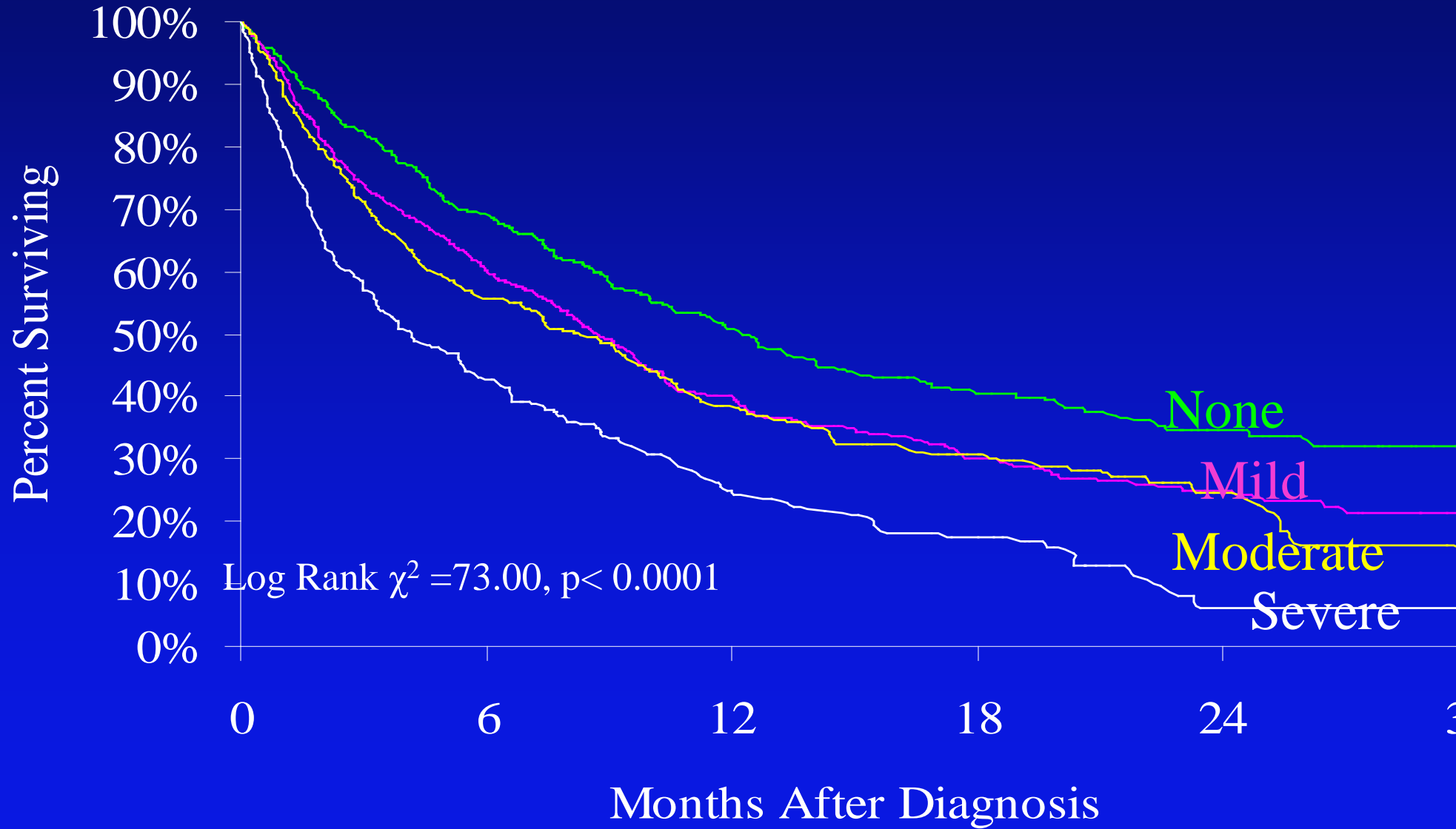
Localized



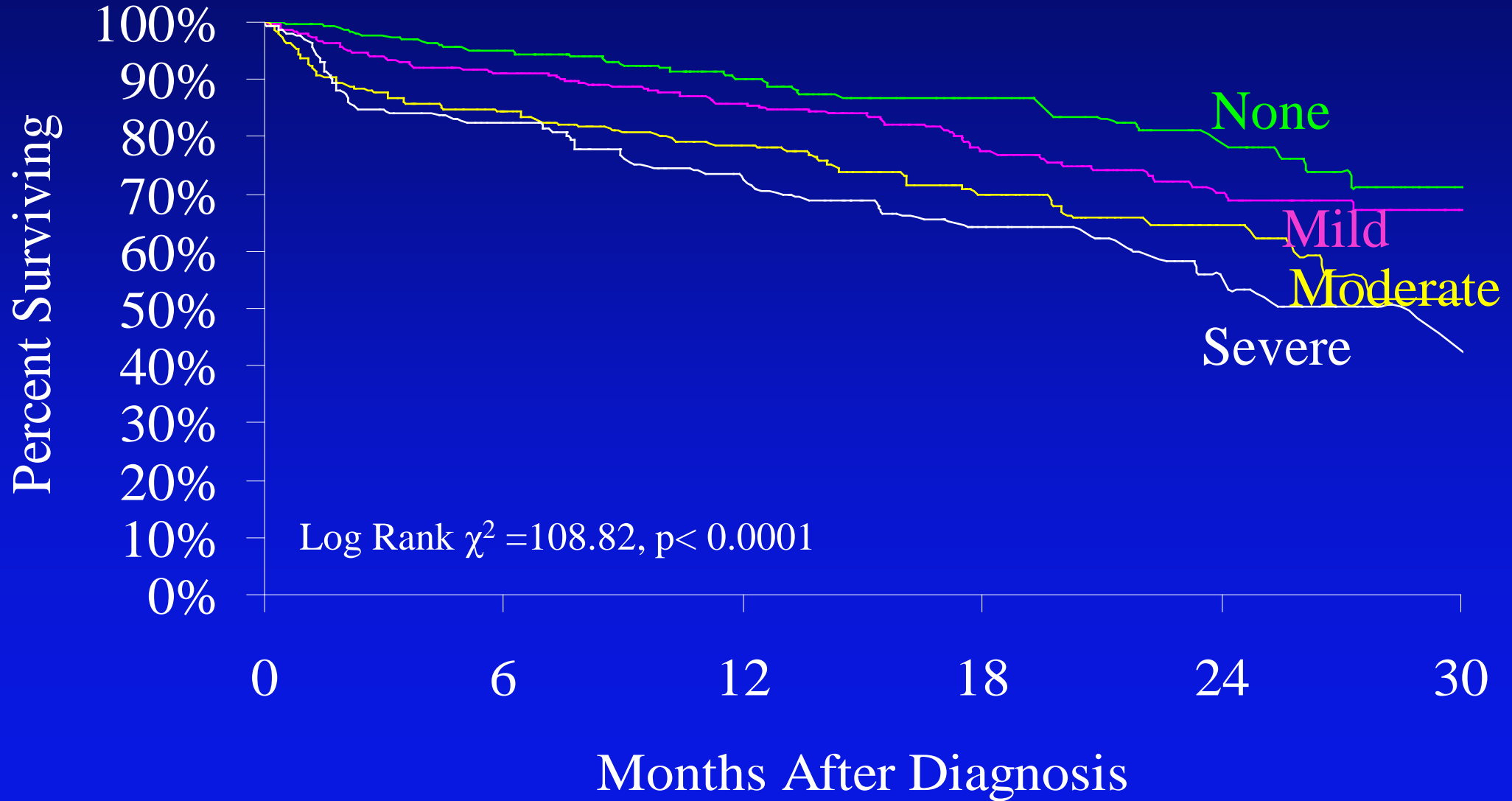
Regional



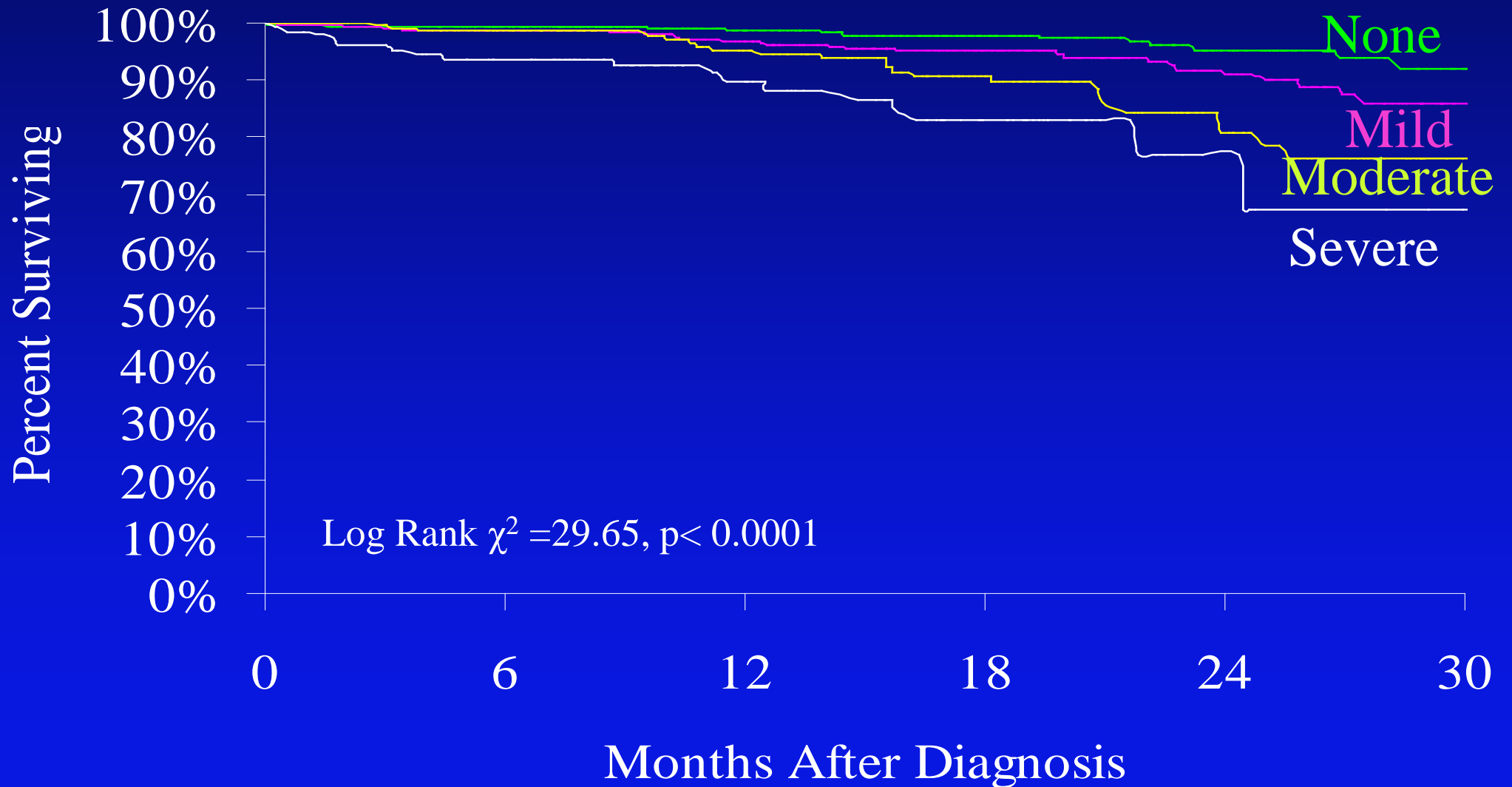
Distant



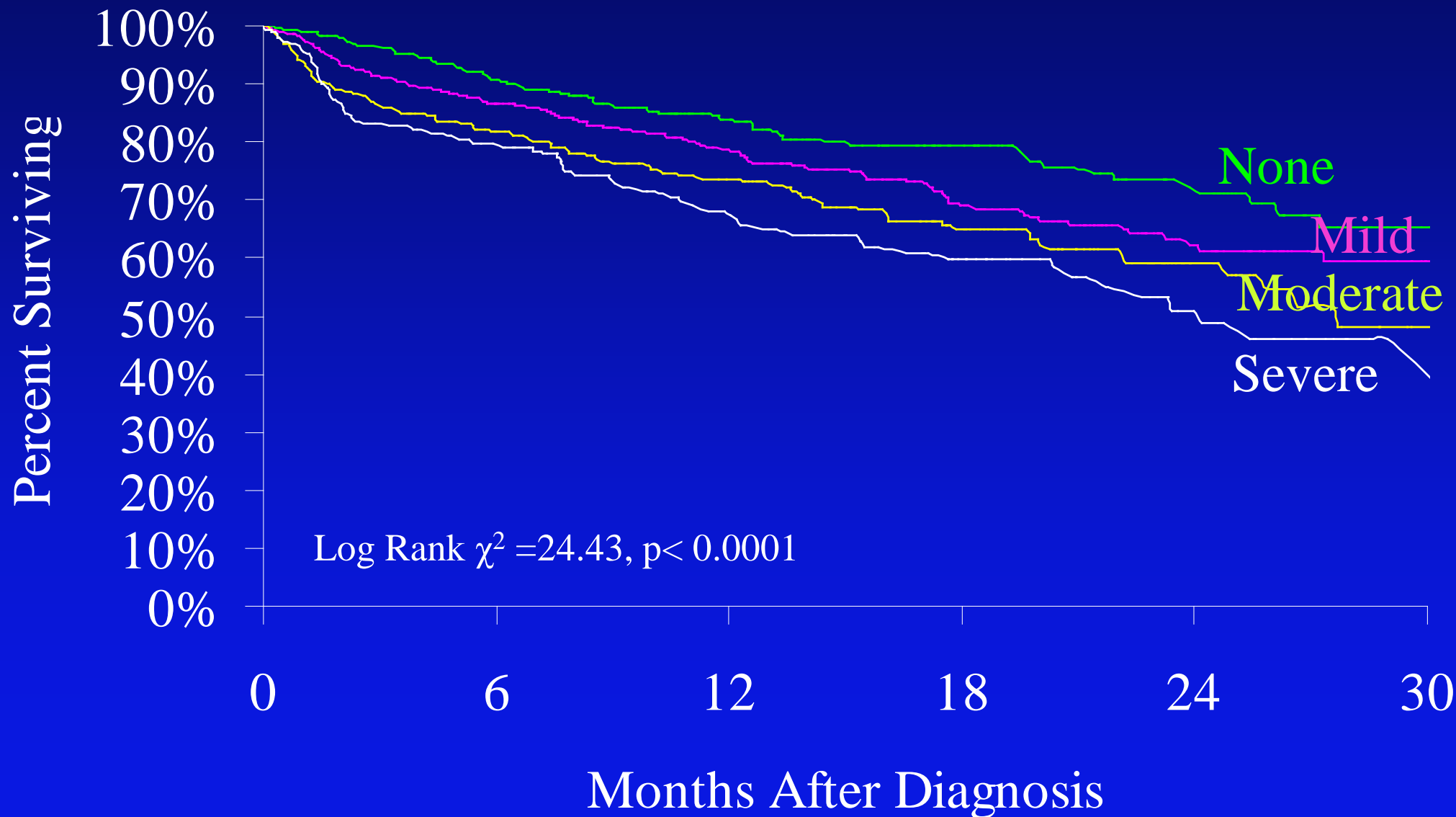
Prostate



Breast



Colorectal



PROGNOSTIGRAM

Demonstration

Independent Prognostic Impact Cox Proportional Hazards

Variable	Category	HR*	95% CI
Comorbidity	None	Ref	--
	Mild	1.44	1.29-1.62
	Moderate	1.71	1.51-1.94
	Severe	2.78	2.44-3.18

* Adjusted for age, gender, race, site, and morphologic stage

Log Likelihood χ^2 Square= 2787.94, p<0.0001

C Statistic =0.81

Quality of Care Assessment

Inclusion of comorbidity information in cancer registries can improve quality of cancer care assessment

Quality of Care Example

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

- n The percentage of patients with severe comorbidity scores ranged from 9% to 18% across the seven hospitals ($p < 0.01$)
- n The rankings of hospitals varied depending on whether one adjusted for age, comorbidity level, or cancer stage

Quality of Care Example

- n Begg et al used SEER-Medicare linked database to study the relationship between volume of major cancer surgeries performed and hospital operative mortality rate
- n Comorbidity severity score generated from Medicare discharge summary from index hospitalization

JAMA 1998;280:1747-1751

- n Higher surgical volume was linked with lower mortality
- n Volume/Mortality relationship persisted even after adjustment for age and comorbidity
- n Comorbidity information allowed authors to rebut complaint that high volume hospitals were selecting less sick patients

Clarify Impact of Other Variables

- n Comorbidity assessment important even when it is not independently statistically significant
- n Hillner found decrease likelihood of axillary node dissection with increasing comorbidity
- n After adjusting for age and size of primary tumor, comorbidity no longer associated with node dissection
- n Inclusion of comorbidity allowed for more robust conclusions about age

Breast Cancer Research & Treatment 1996;40:75-86

Conclusions

- n Comorbidity is important
 - The selection of treatment
 - Estimates of prognosis
 - Evaluation of quality of care
- n Valid instruments exist to collect comorbid information
- n Web-based program exists to train cancer registrars and other health professionals to code co-morbidity

Conclusions

- n Continued exclusion of comorbidity impedes the scientific study of cancer and the humanistic care of patients
- n Valid comorbidity assessment should be added as a required data element to hospital-based and central cancer registries

More Questions?

Dorina Kallogjeri, MPH

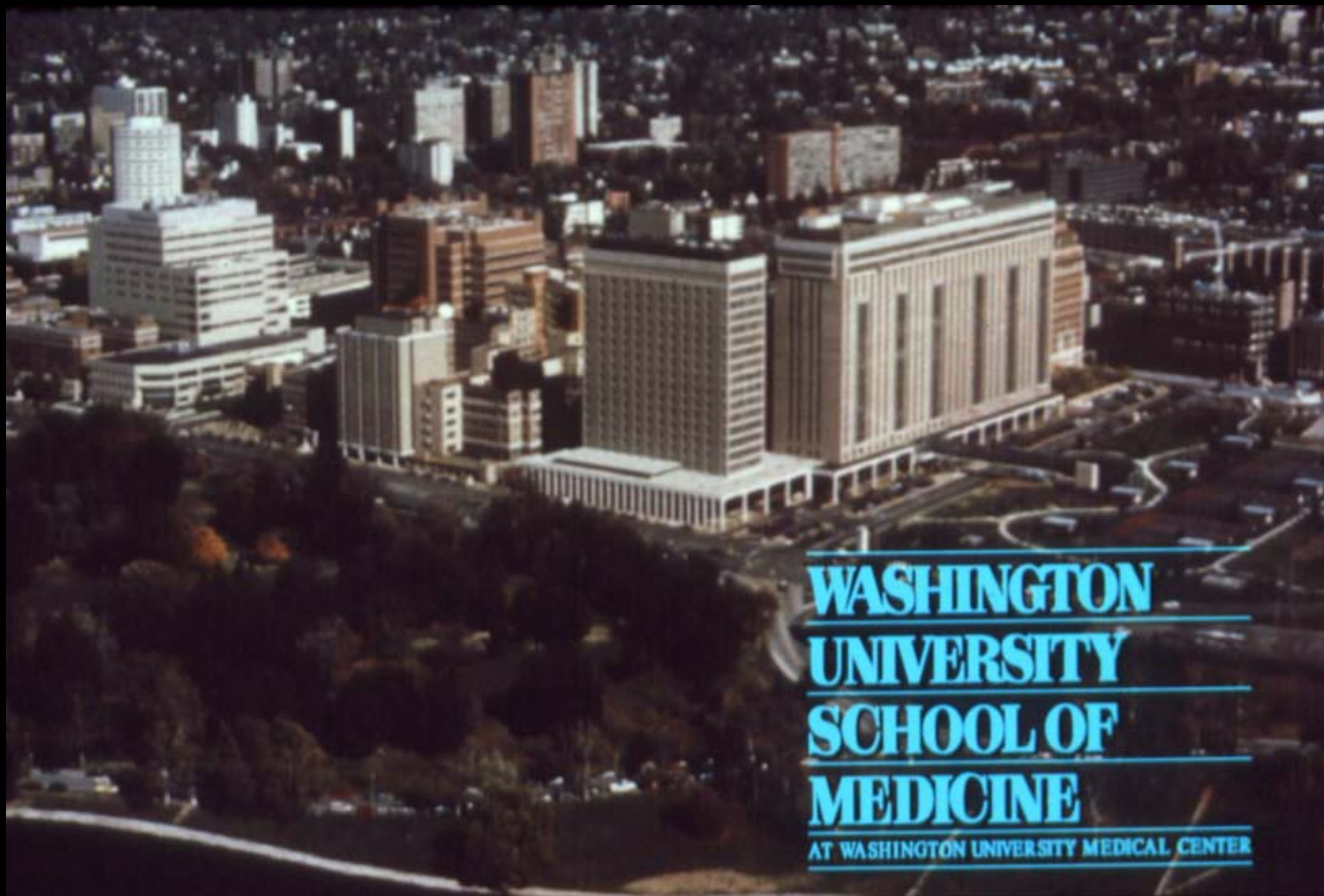
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*Clinical Outcomes Research
Web Site*

<http://oto.wustl.edu/clinepi/>





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