

7th Annual Epidemiology, Biostatistics and Clinical
Research Methods Summer Session

June 20-24, 2005

A Cancer Example: Using VA Databases for Research

Colon Cancer Treatment in the VA and Medicare

Session Objectives

- To provide an overview of an ongoing research project focusing on cancer that uses VA databases
- Show how to define a cancer cohort
- Show how to identify an important clinical process/treatment measure
- Introduce measurement topics about choice of datasets and specific variables

Session Objectives

- **To provide an overview of an ongoing research project focusing on cancer that uses VA databases**
- Show how to define a cohort
- Show how to identify an important clinical process/treatment measure
- Show how choice of dataset and specific variables may affect measurement and internal validity

Quality and Costs of Colon Cancer Care in VA and Medicare

- VA HSR&D Service IIR 03-196
- Ongoing study
 - April 2004 – March 2008

Background

- 73% of vets eligible for VA healthcare in 1999 were also Medicare beneficiaries
 - USH Report , 2002
- Evidence of quality of care problems for general medical illnesses in multiple provider situations
 - Borowsky & Cowper, 1999
 - Petersen, et al., 2001

Colon Cancer

- Third most commonly diagnosed cancer
- Rank third among cancer deaths in US
- Five-year survival
 - Early stage disease (Stage I and II) estimated between 68% and 92%
 - Late stage estimated at 8%
 - (Ries, et al., 2002)
 - Among veterans treated at VA hospitals estimated at 40%
 - (Dominitz, et al., 1998)

Colon Cancer Management Strategies By Stage

■ Stage 0

- Local excision or simple polypectomy with clear margins

■ Stage I & II

- Wide surgical resection and anastomosis
- Adjuvant CTX in CCT only

■ Stage III

- Wide surgical resection and anastomosis
- Adjuvant CTX

Colon Cancer Management Strategies By Stage

■ Stage IV

- Surgical resection/anastomosis or bypass of primary lesions
- Radiation therapy to the primary tumor
- Surgical resection of isolated metastases (liver, lung, ovaries)
- Adjuvant CTX
- Clinical trials evaluating new drugs and biologic therapy

Study Aims

- Assess and compare colon cancer initial surgical & adjuvant treatment patterns, controlling for stage of cancer and comorbidity
- Characterize and compare healthcare use and cost patterns for colon cancer care
- Examine factors that explain healthcare system choice, delays in colon cancer initial surgical and adjuvant treatment, healthcare use, and costs

Study Design

- Retrospective cohort 1999-2001
- Dually VA & Medicare eligible and enrolled individuals
- Diagnosis of colon cancer in VA or any one of eight regional NCI SEER Registries
- Minimum follow-up 3 years for each individual
 - Through CY2004
- Healthcare use & costs across VA & Medicare

Sampling Frame

- All veterans eligible to use VHA healthcare services, beginning in 1997
 - Used VA healthcare
 - Enrolled with the VA to receive their healthcare services
 - Were eligible due to special disability or compensation benefits through the VA

Study Population

- Dually eligible for VA & Medicare benefits (at least 66 years old as of the beginning of each year, 1999–2001)
- Matched and linked to a 1999-2001 incident cancer record at the VA's Central Cancer Registry or one of the 10 participating NCI regional SEER registries
- Participating SEER registries: Atlanta, California, Connecticut, Detroit, Hawaii, Iowa, Kentucky, Louisiana, Utah, Western Washington

Quality of Care Measures

- Surgical Treatment
 - Yes/no, Timing and Type
- Adjuvant Chemotherapy
 - Yes/no, Timing and Type

Other Outcomes

- Healthcare Use & Costs
 - Inpatient
 - Outpatient
 - Extended care/nursing home
 - Hospice
 - Home Health
 - Medications/Prescriptions

VA Health Care Use Datasets

■ Inpatient

- **PM** – Acute Care Main File
- **PB** – Acute Care Bed Section File
- **PP** – Acute Care Procedure File
- **PS** – Acute Care Surgery File

■ Long Term/Extended Care

- **XM** – Extended Care Main File
- **XB** – Extended Care Bed Section File
- **XP** – Extended Care Procedure File
- **XS** – Extended Care Surgery File

More VA Healthcare Use Data sets

■ Outpatient Care

- **SE** – Outpatient Event File
- **SC** – Outpatient Procedure File
- **SG** – Outpatient Diagnosis File

■ Fee-Basis Care

- **FEE_INPT** – Fee Basis Inpatient File
- **FEE_MED** – Fee Basis Outpatient File

Still More VA Datasets

■ Observation Care

- **PMO** – Observation Care Main File
- **PBO** – Observation Care Bed Section File
- **PPO** – Observation Care Procedure File

■ Contract Care

- **NM** – Non – VA Care Main File
- **NB** – Non – VA Care Bed Section File
- **NP** – Non – VA Care Procedure File
- **NS** – Non – VA Care Surgery File

Medicare Claims Data Files

- **MEDPAR** - Medicare Provider Analysis and Review File
- **INPT** – Medicare Inpatient File
- **SNF** – Medicare Skilled Nursing Facility File
- **HHA** – Medicare Home Health Agency File
- **HOSPICE** – Medicare Hospice File
- **OUTPT** – Medicare Outpatient File
- **DME** – Medicare Durable Medical Equipment File
- **CARRIER** – Medicare Carrier File (Formerly: Physician/ Supplier)

Patient Demographics

- VA Enrollment Database
 - Time of enrollment
- VA Inpatient Main
 - At time of event/hospital admission
- Medicare Denominator
 - At time of enrollment and updated each year
 - Available only for those Medicare enrolled

Cancer Diagnosis

■ SEER Diagnosis

- Provides dates, staging, extent of disease

■ Diagnosis and Procedure Codes

- Requires Expert input
- Requires decision rules
- Careful consideration of inclusion and exclusion criteria

Current Status

- Negotiating requests from SEER Registries to identify our cohort of incident cases
- Refining algorithms to identify surgery and CTX
- Refining comorbidity measures
- Redefining health care use categories based on clinically relevant phases of care
 - Diagnosis
 - Surgery
 - CTX
 - Follow-up

Session Objectives

- To provide an overview of a research project focusing on cancer that uses VA databases
- **Show how to define a cohort using administrative and claims data**
- Show how to identify an important clinical process/treatment measure
- Show how choice of dataset and specific variables may affect measurement and internal validity

What if SEER Data Were Not Available?

- How can VA and Medicare data be used to explore colon cancer treatment patterns?
- Explore definitions and cohort algorithms using 1999 data
- Identify and compare treatment for colon cancer patients treated in VA and Medicare in 1999

Defining a Colon Cancer Cohort Without Tumor Registry Data

- Example Using Medicare & VA
 - Determine data fields to use for cohort definition
- Calendar Year 1999 Only
 - Requires conversion of VA data from FY to CY
 - Medicare Data in CY format

Define Cohort: ICD9CM Codes

153	MALIGNANT NEOPLASM COLON
1530	MAL NEO HEPATIC FLEXURE
1531	MAL NEO TRANSVERSE COLON
1532	MAL NEO DESCEND COLON
1533	MAL NEO SIGMOID COLON
1534	MALIGNANT NEOPLASM CECUM
1535	MALIGNANT NEO APPENDIX
1536	MALIG NEO ASCEND COLON
1537	MAL NEO SPLENIC FLEXURE
1538	MALIGNANT NEO COLON NEC
1539	MALIGNANT NEO COLON NOS

Search these datasets...

■ VA Data

- Medical SAS Inpatient & Outpatient
- Fee-Basis Inpatient & Outpatient

■ Medicare Data

- MedPAR
- Institutional: Inpatient, Outpatient, Skilled Nursing, Hospice, HHA
- Non-Institutional: Physician/Supplier (Carrier), DME

...for patient records with 153 – 153.9 ICD-9 disease codes

- **DXLSF = Length of Stay Diagnosis**
Condition responsible for the major part of the full stay
- **DXPRIME = Principal Diagnosis** Condition chiefly responsible for the admission
- **DXF2 through DXF10** ICD-9 codes that represent patient problems beyond the principal reason for the encounter.

Measurement Special Topic: Dates

- **Medicare files = Calendar years**
- **VA files = Fiscal years**

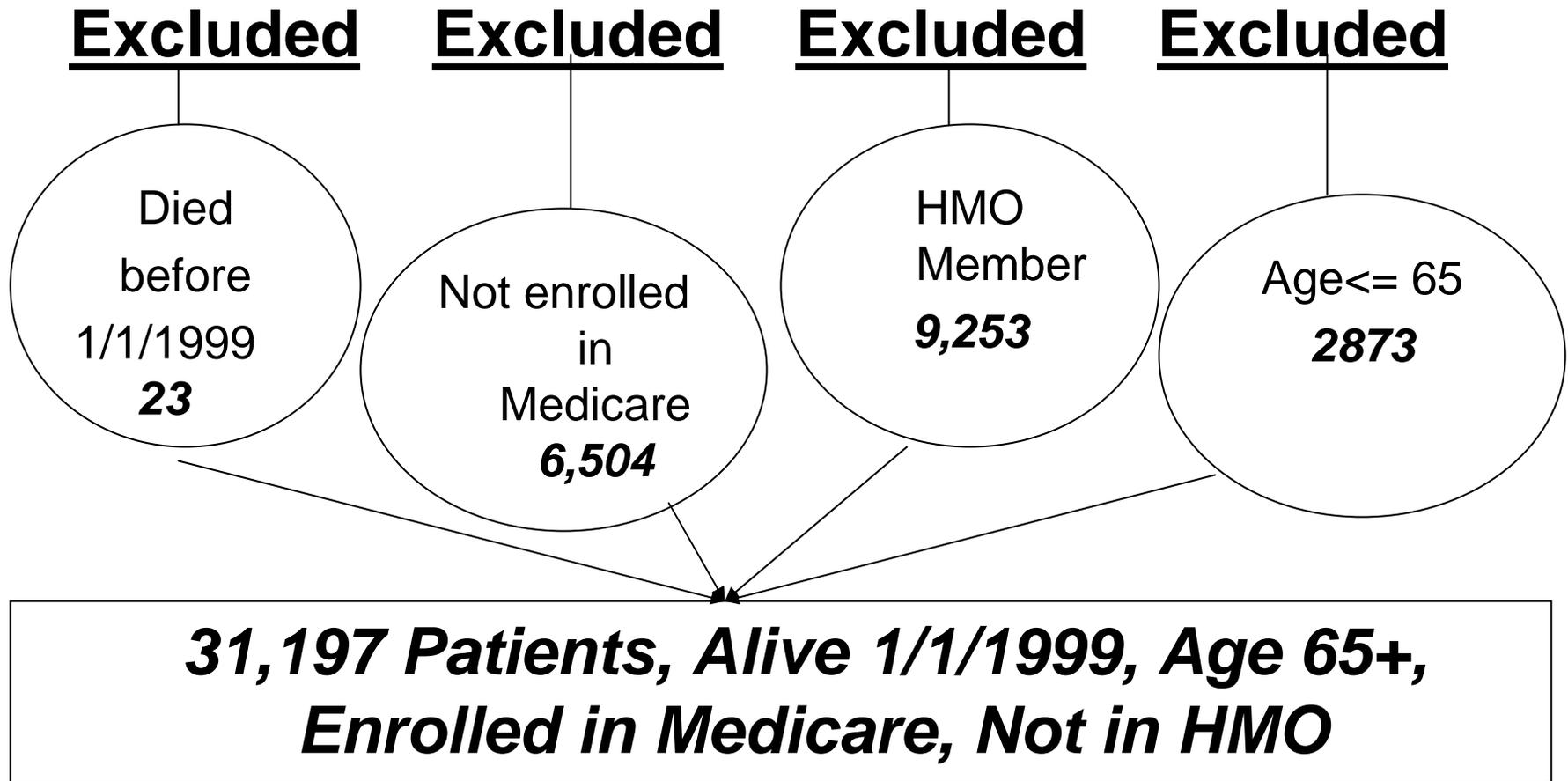
Create a Colon Cancer Cohort

48,518 Colon Cancer patients in VA and Medicare Files

Merge with Medicare Denominator file to acquire demographic data

43,094 CC patients found in Denom File

Create a Colon Cancer Cohort



Measurement Special Topic: “Rule Out” Diagnoses

- A diagnosis might be recorded as being present, when the correct coding would be "rule out" the condition
- Goal: Identify & delete “rule out” diagnoses to minimize false positives

Special Topic:

“Rule Out” Diagnoses

- Delete cases w/ diagnosis codes not on two different claims more than 30 days apart, or
- Develop a clinical definition for the target diagnosis, e.g., Patients with:
 - At least 2 occurrences of codes in the 153 range on different days, or
 - At least 1 occurrence of a code in the 153 range plus evidence of a colectomy

Create a Colon Cancer Cohort

Excluded

Only one occurrence of a colon
cancer DX and no Colectomy

11,463

19,734 Qualified CC Patients, with ≥ 1 CC DX

Session Objectives

- To provide an overview of a research project focusing on cancer that uses VA databases
- Show how to define a cohort
- **Show how to identify an important clinical process/treatment measure**
- Highlight measurement issues & implications for internal validity

Identifying Colectomy Cases

- To increase likelihood of finding evidence of adjuvant therapy - analysis restricted to patients who had a colectomy during the first 6 months of 1999
- Searched for ICD-9 procedure codes or CPT-4 codes

Identifying Colectomy Cases

ICD-9 Colectomy Procedure Codes

Code	Label
4571	MUTIPLE SEGMENT RESECTION OF LARGE INTESTINE
4572	CECETOMY
4573	RIGHT HEMICOLECTOMY
4574	RESECTION OF TRANSVERSE COLON
4575	LEFT HEMICOLECTOMY
4576	SIGMOIDETOMY
4579	OTHER PARTIAL EXCISION OF LARGE INTESTINE
458	TOTAL INTRA-ABDOMINAL COLECTOMY

Identifying Colectomy Cases

CPT-4 Colectomy Surgery Codes

Code	Label
44140	COLECTOMY, PARTIAL
44141	W/ SKIN LEVEL CECOSTOMY OR COLOSTOMY
44143	W/ END COLOSTOMY AND CLOSURE OF DISTAL SEGMENT
44144	W/ RESECTION, W/COLOSTOMY OR ILEOSTOMY & CREATION OF MUCOFISTULA
44145	W/ COLOPROCTOSTOMY (LOW PELVIC ANASTOMOSIS)
44146	W/ COLOPROCTOSTOMY (LOW PELVIC ANASTOMOSIS), WITH COLECTOMY
44147	ABDOMINAL AND TRANSANAL APPROACH
44150	COLECTOMY, TOTAL, ABDOMINAL, W/O PROCTECTOMY, W/ ILEOSTOMY
44151	W/ CONTINENT ILEOSTOMY
44152	W/ RECTAL MUCODECTOMY, ILEOANAL ANASTOMOSIS, W/ OR W/O LOOP
44153	W/ RECTAL MUCODECTOMY, ILEOANAL ANASTOMOSIS, CREATION OF ILEAL RESERVOIR, WITH OR WITHOUT LOOP ILEOSTOMY
44155	COLECTOMY, TOTAL, ABDOMINAL. WITH PROCTECTOMY, WITH ILEOSTOMY
44156	W/ CONTINENT ILEOSTOMY
44160	COLECTOMY W/ REMOVAL OF TERMINAL ILEUM AND ILEOCOLOSTOMY

Search these datasets

■ VA Data

- Medical SAS Inpatient & Outpatient
 - Procedure & Surgery
- Fee-Basis Inpatient & Outpatient

■ Medicare Data

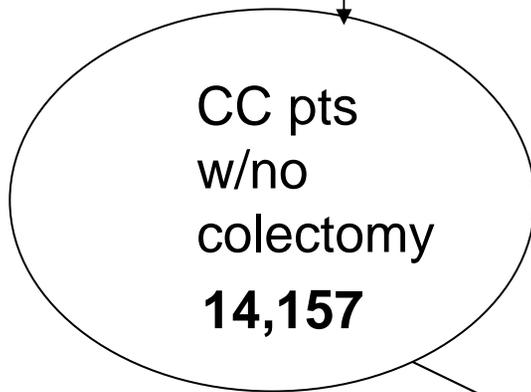
- MedPAR
- Institutional: Inpatient, Outpatient, Skilled Nursing, Hospice, HHA
- Non-Institutional: Physician/Supplier (Carrier), DME

Measurement Special Topic: Procedures vs. Surgeries

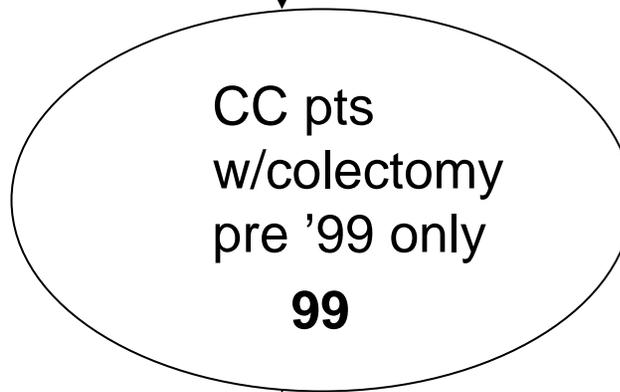
- **Surgery** = Procedure performed in main or specialized operating room
- **Procedure** in Facility A may = Surgery in Facility B
- Look at both the Surgery and Procedure datasets

Identifying Colectomy Cases

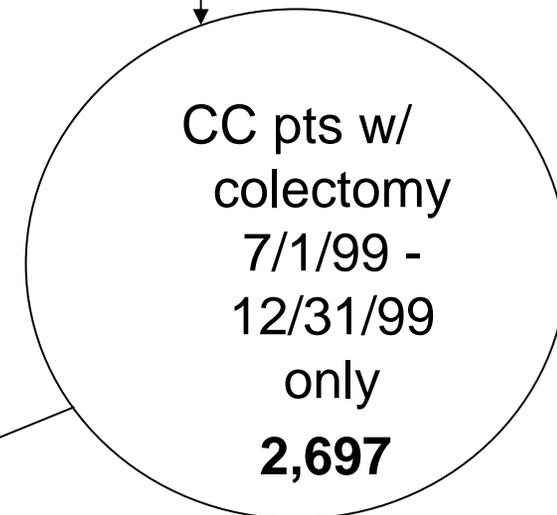
Excluded



Excluded



Excluded



2,781 CC pts w/colectomy 1/1/99 – 6/30/99

Measurement Special Topic: Dates

- Some files (e.g., VA Inpatient Surgery) show **surgery or procedure day**
- Some files (e.g., VA Inpatient Main) include **admission and discharge date**
- Some files, (e.g., Medicare Physician/Supplier claims) include only **from-through dates**

Measurement Special Topic: Dates

- No reliable date of diagnosis in claims or administrative data
- Cohort includes a mix of Incident cases + Prevalent cases

Identifying Adjuvant Chemotherapy (CTX) Events

- Methods adapted from the work of Warren, et al., 2002
 - High level of agreement between Medicare claims and the medical record abstractions conducted as part of the NCI's Patterns of Care Study
 - Agreement at 88% and a kappa statistic of 0.73.
 - Sensitivity of the Medicare claims data 90%
 - Medicare claims had the greatest sensitivity to capture 5-FU specifically ($\geq 75\%$)
- Multiple claims data files are required to identify all chemotherapy administrations, especially Part B, Physician/Supplier and DME

CTX Measurement

HCPCS Chemotherapy Codes:

Code	Label
J9190	Fluorouracil 500 mg
Q0084	Chemo Admin Infus Tech Only Visit
etc.	

CTX Measurement

CPT-4 Chemotherapy Codes:

Code	Label
96400	CHEMOTHERAPY, SC/IM
96405	INTRALESIONAL CHEMO ADMIN
96406	INTRALESIONAL CHEMO ADMIN
96408	CHEMOTHERAPY, PUSH TECHNIQUE
96410	CHEMOTHERAPY, INFUSION METHOD
etc.	

CTX Measurement

ICD-9 Diagnosis Chemotherapy Codes:

Code	Label
E9331	ANTINEOPLASTIC AND IMMUNOSUPPRESSIVE DRUGS
E9307	ANTINEOPLASTIC ANTIBIOTICS
V581	CHEMOTHERAPY
V662	FOLLOWING CHEMOTHERAPY
V672	FOLLOWING CHEMOTHERAPY

CTX Measurement

ICD-9 Procedure Chemotherapy Code:

Code	Label
9925	INJECTION OR INFUSION OF CANCER CHEMOTHERAPY SUBSTANCE

Revenue Center Chemotherapy Codes:

Code	Label
0331	RADIOLOGY THERAPEUTIC - CHEMOTHERAPY INJECTED
0332	RADIOLOGY THERAPEUTIC - CHEMOTHERAPY ORAL
0335	RRADIOLOGY THERAPEUTIC - CHEMOTHERAPY IV

CTX Distribution

Chemo Code	Label	Frequency	Percent of Chemo Cohort
J9190	FLUOROURACIL 500 MG	616	66.59%
96408	CHEMOTHERAPY ADMINISTRATION, INTRAVENOUS, PUSH TECHNIQUE	480	51.89%
V581	CHEMOTHERAPY	446	48.22%
96410	INFUSION TECHNIQUE, UP TO ONE HOUR	397	42.92%
96412	INFUSION TECHNIQUE, 1 TO 8 HOURS	276	29.84%
9925	INJECTION OR INFUSION OF CANCER CHEMOTHERAPY SUBSTANCE	141	15.24%
0335	RADIOLOGY THERAPEUTIC - CHEMOTHERAPY IV	127	13.73%
Q0084	CHEMO ADMIN INFUS TECH ONLY VIST	108	11.68%
96400	CHEMOTHERAPY, SCIM	101	10.92%
Q0083	CHEMO ADMIN NOT INFUS TECH ONLY VST	70	7.57%
V672	FOLLOWING CHEMOTHERAPY	61	6.59%

Adjuvant CTX & Demographics

N = 2,700	Chemotherapy						Total		P Value
	No			Yes					
	N	Col%	Row%	N	Col%	Row%	N	Col%	
Sex									
Female	63	3.47	67.02	31	3.5	32.98	94	3.48	0.9663
Male	1,752	96.53	67.23	854	96.5	32.77	2,606	96.52	
Race									
Non-black	1,669	91.96	67.6	800	90.4	32.4	2,469	91.44	0.1736
Black	146	8.04	63.2	85	9.6	36.8	231	8.56	
Age									
66-75	797	43.91	61.98	489	55.25	38.02	1,286	47.63	< .0001
76-85	906	49.92	70.45	380	42.94	29.55	1,286	47.63	
86+	112	6.17	87.5	16	1.81	12.5	128	4.74	

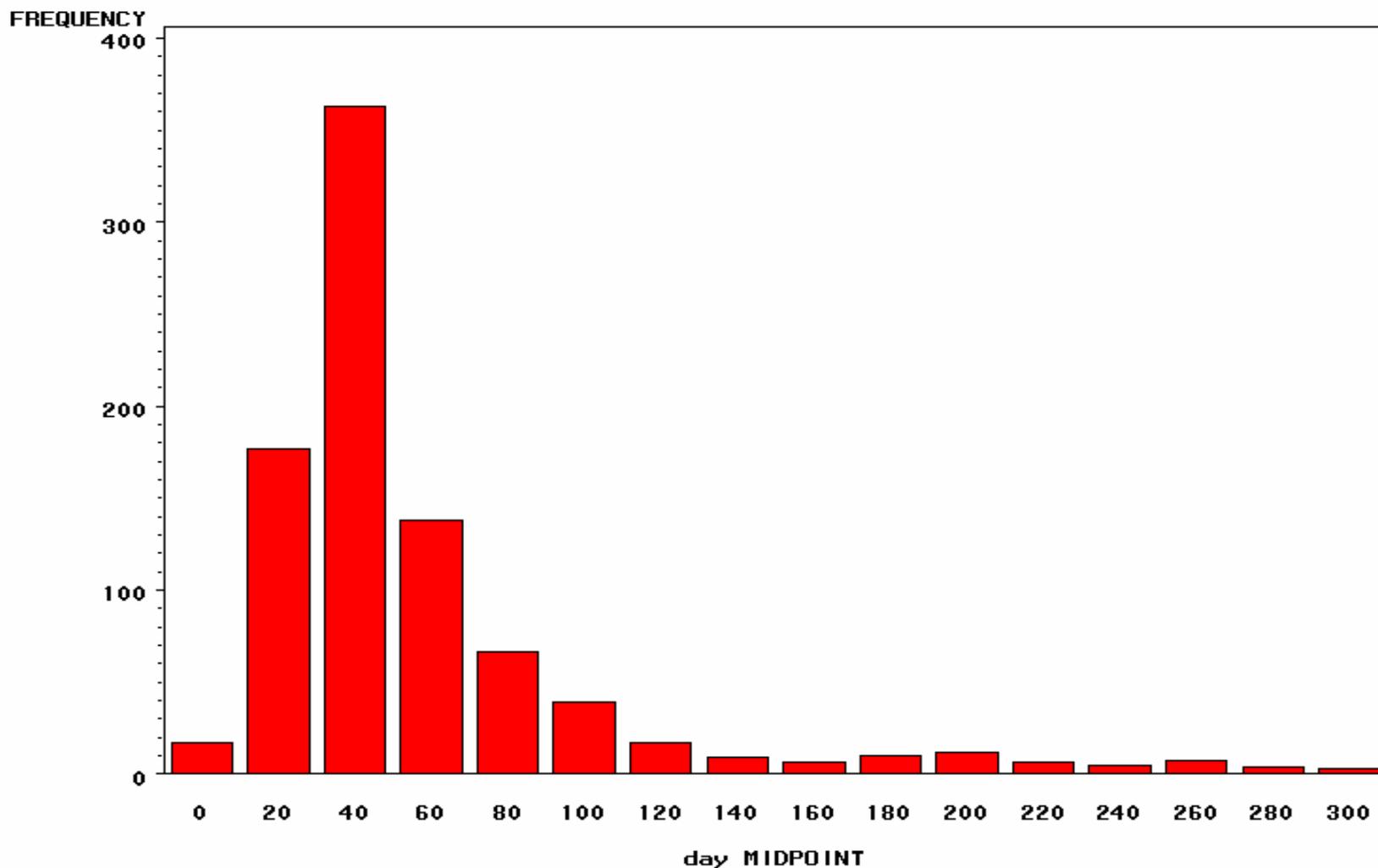
Adjuvant CTX & Demographics

N = 2,700	Chemotherapy						Total		P Value
	No			Yes					
	N	Col%	Row%	N	Col%	Row%	N	Col%	
Priority Level									
High	1,212	66.78	69.66	528	59.66	30.34	1,740	64.44	0.0009
Low	303	16.69	61.46	190	21.47	38.54	493	18.26	
Unknown	300	16.53	64.24	167	18.87	35.76	467	17.3	
State Buyin									
No	1,688	93	66.9	835	94.35	33.1	2,523	93.44	0.1842
Yes	127	7	71.75	50	5.65	28.25	177	6.56	
Urban									
Rural	909	50.08	68.09	426	48.14	31.91	1,335	49.44	0.3422
Urban	906	49.92	66.37	459	51.86	33.63	1,365	50.56	

Adjuvant Tx & Risk Scores

N = 2,700	Chemotherapy						Total		P Value
	No			Yes					
	N	Col%	Row%	N	Col%	Row%	N	Col%	
HCC Risk Score									
Low	547	30.14	81.28	126	14.24	18.72	673	24.93	< .0001
Low-Med	428	23.58	63.22	249	28.14	36.78	677	25.07	
Med-High	398	21.93	58.88	278	31.41	41.12	676	25.04	
High	442	24.35	65.58	232	26.21	34.42	674	24.96	
Charlson Index									
0	538	29.64	64.82	292	32.99	35.18	830	30.74	0.0121
1	601	33.11	65.61	315	35.59	34.39	916	33.93	
2	340	18.73	67.06	167	18.87	32.94	507	18.78	
3	173	9.53	73.62	62	7.01	26.38	235	8.7	
4	104	5.73	74.82	35	3.95	25.18	139	5.15	
5	38	2.09	76	12	1.36	24	50	1.85	
6	12	0.66	85.71	2	0.23	14.29	14	0.52	
7	5	0.28	100	.	.	.	5	0.19	
8	4	0.22	100	.	.	.	4	0.15	

Frequency of Surgery Date to Chemo Date Day Count



QUESTIONS?