A Revised SAS Macro for Computing the Charlson Score

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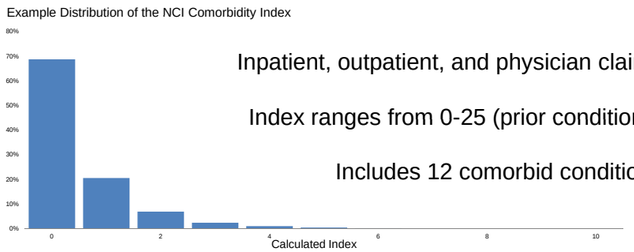
Purpose

The ICD-9 and CPT-4 codes used to create Charlson scores have changed over time. This project assessed if revising the codes in the NCI adaptation of the Charlson Index changes our estimate of the prevalence of comorbid conditions in cancer patients.

NCI Comorbidity Index

SAS Macros developed by the NCI to estimate the burden of comorbid illness in cancer patients from SEER-Medicare data.



Inpatient, outpatient, and physician claims.

Index ranges from 0-25 (prior conditions).

Includes 12 comorbid conditions.

Software available on NCI Health Services and Economics Branch website:

http://healthservices.cancer.gov/seermedicare/program/comorbidity.html

History of the NCI Comorbidity Index

- 1987 Charlson et al. develop weighted index to predict risk of death from comorbid conditions based on hospitalized patients.
- 1992 Deyo et al. adapt Charlson index to ICD-9-CM diagnosis and procedure codes using 1985 Medicare inpatient data.
- 1993 Romano et al. suggest additional ICD-9 codes and recommend tailored algorithms for specific disease cohorts.
- 2000 Klabunde et al. develops NCI Comorbidity Indices of the Charlson Score for inpatient and physician claims using 1991 SEER-Medicare breast and prostate cancer data. Results show importance of including physician claims in measuring comorbidity from Medicare claims.
- 2007 Klabunde et al. combine inpatient and outpatient indices into one NCI Comorbidity Index from breast, prostate, colorectal, and lung cancer data improving efficiency of index.

Methods

Define Study Population

- SEER patients diagnosed with cancer 1992-1996, 1997-2007.
- Medicare Parts A & B coverage, No HMO enrollment.
- Age 66+.
- Exclude death certificate or autopsy diagnosis.
- First diagnosis of cancer.
- Cancers with malignant behavior.

Identify comorbidities

- Each patient's claims were reviewed for 1 year prior to diagnosis.
- Medicare data included: Hospital (Medpar), Outpatient facility, physician supplier (carrier).
- ICD-9-CM diagnosis, ICD-9-CM procedure, and CPT procedure codes were used to identify comorbid conditions.

Compare Condition Frequencies and Prevalence Rates

- Original NCI index, remove CPT codes, proposed code changes.
- All cancers, cancer subgroups: lung, colorectal, prostate, breast.
- Diagnosis year.

Proposed Changes

Comorbid Conditions	Proposed Changes
Moderate/severe liver disease	Update ICD-9 disease and procedure codes.
Cerebrovascular disease	Drop CPT codes.
Peripheral vascular disease (surgical definition only)	Update ICD-9 procedure codes. Drop CPT codes.
Moderate/severe renal disease	Update ICD-9 disease codes. Revise definition to include ICD-9 procedure codes
Peripheral vascular disease (diagnosis definition only)	Update ICD-9 disease codes
Paralysis	
Dementia	
Mild liver disease	
Congestive heart failure (CHF)	
Chronic pulmonary disease	
Diabetes with complications	
Diabetes	Drop one ICD-9 code
AIDS	NO CHANGE
Rheumatologic disease	
Ulcers	
Old myocardial infarction (MI)	
Acute myocardial infarction (MI)	

Breast Cancer Results

1997-2007 N=97,371

Comorbid Conditions	Frequency (Prevalence*) Current (with CPT)	Revised with CPT	Revised without CPT	Percent Change* (Revised-Current) / Current Revised with CPT	Revised without CPT
Conditions with CPT codes					
Moderate/severe liver disease	92 (0%)	105 (0%)	102 (0%)	14%	11%
Cerebrovascular disease (CVD)	4905 (5%)	5300 (5%)	5300 (5%)	8%	8%
Peripheral vascular disease (surgical)	148 (0%)	261 (0%)	235 (0%)	76%	59%
Conditions with code revisions					
Moderate/severe renal disease	1771 (2%)	2234 (2%)	2234 (2%)	26%	26%
Peripheral vascular disease (diagnosis)	2996 (3%)	6609 (7%)	6609 (7%)	121%	121%
Paralysis	422 (0%)	573 (1%)	573 (1%)	36%	36%
Dementia	1499 (2%)	2789 (3%)	2789 (3%)	86%	86%
Mild liver disease	348 (0%)	403 (0%)	403 (0%)	16%	16%
Congestive heart failure (CHF)	7301 (7%)	7731 (8%)	7731 (8%)	6%	6%
Chronic pulmonary disease	10342 (11%)	10524 (11%)	10524 (11%)	2%	2%
Diabetes with complications	3211 (3%)	4532 (5%)	4532 (5%)	41%	41%
Diabetes	17155 (18%)	17056 (18%)	17056 (18%)	-1%	-1%

*Example calculations are presented in the Appendix

Conclusions

- Excluding CPT codes has minimal effect on disease ascertainment.
- Addition of ICD-9 diagnostic and procedure codes increases disease ascertainment.
- •. Proposed changes have greatest impact on PVD and dementia conditions.
- Retirement of old codes increases the gap in ascertainment rates over time (not shown).
- Slight variation in results by cancer site (not shown).

References

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Appendix

Example calculations
Moderate/ severe liver disease, "revised with CPT"

Prevalence 105 / 97371 = 0.0011
0.0011*100 = 0.11%

Percent Change (105 – 92) / 92 = 0.1413
0.1413*100 = 14.13%

For more information about SEER, visit http://seer.cancer.gov/

For more information about the Surveillance Research Program, visit http://surveillance.cancer.gov/