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Comparing a medical records-based and a claims-based index for measuring comorbidity in patients with lung or colon cancer

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ABSTRACT

Objective: Ascertaining comorbid conditions in cancer patients is important for research and clinical quality measurement, and is particularly important for understanding care and outcomes for older patients and those with multi-morbidity. We compared the medical records-based ACE-27 index and the claims-based Charlson index in predicting receipt of therapy and survival for lung and colon cancer patients.

Materials and Methods: We calculated the Charlson index using administrative data and the ACE-27 score using medical records for Veterans Affairs patients diagnosed with stage I/II non-small cell lung or stage III colon cancer from January 2003 to December 2004. We compared the proportion of patients identified by each index as having any comorbidity. We used multivariable logistic regression to ascertain the predictive power of each index regarding delivery of guideline-recommended therapies and two-year survival, comparing the c-statistic and the Akaike information criterion (AIC).

Results: Overall, 97.2% of lung and 90.9% of colon cancer patients had any comorbidity according to the ACE-27 index, versus 59.5% and 49.7%, respectively, according to the Charlson. Multivariable models including the ACE-27 index outperformed Charlson-based models when assessing receipt of guideline-recommended therapies, with higher c-statistics and lower AICs. Neither index was clearly superior in prediction of two-year survival.

Conclusions: The ACE-27 index measured using medical records captured more comorbidity and outperformed the Charlson index measured using administrative data for predicting receipt of guideline-recommended therapies, demonstrating the potential value of more

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detailed comorbidity data. However, the two indices had relatively similar performance when predicting survival.

1. Introduction

The presence of medical comorbidities in cancer patients can affect therapeutic decisions[1,2] and prognosis,[3–6] and comorbidity ascertainment is therefore of particular importance in observational studies.[5] Accurate case mix measurement is also relevant for quality improvement efforts and pay-for-performance metrics[7] used by hospitals and health plans. The Institute of Medicine recently called for expanding the breadth of data collected on cancer interventions for older adults and individuals with multiple comorbid conditions[8]; improving comorbidity assessment will be particularly important to achieving this goal.

Although numerous methods have been applied to measurement of comorbidities in cancer patients, there is still no gold standard approach.[9] Some methods, such as the Adult Comorbidity Evaluation-27 (ACE-27) index,[3] require medical record review, while others, including the Charlson comorbidity index (CCI),[4] the Elixhauser index,[10] and a recently-developed combination of the CCI and Elixhauser,[11] can be performed using administrative data.

The CCI is the most commonly cited method of comorbidity measurement in cancer patients.[9,12] It was validated in a cohort of breast cancer patients for prediction of survival and implemented via medical record review to assess 19 conditions (Table 1); subsequent modifications, including those by Deyo,[13] Romano,[14] and Klabunde[15] enabled application to administrative claim data using ICD-9 diagnosis codes from hospitalizations and outpatient visits. The ACE-27 index was developed from the Kaplan–Feinstein index to measure comorbidity in cancer patients.[16] Using medical record review, it assesses the presence and severity of 26 individual conditions (Table 1) and assigns a summary comorbidity score based on the severity of the individually measured conditions. Severity of comorbidity according to this measure was associated with survival and rates of cancer recurrence in a hospital-based cancer registry.[3] Recent work has also shown that using individual, differentially weighted comorbid ailments in scoring of the ACE-27 may improve predictive model performance.[17]

Since medical records serve primarily clinical functions, but claims/encounter data exist primarily for billing and administrative purposes, the conditions captured by the CCI may differ from those obtained via the ACE-27. The ACE-27 also assesses more conditions and measures illness severity, such that the ability of these indices to capture comorbidity and predict outcomes may vary. Few data are available directly comparing the performance of the CCI and the ACE-27 in predicting survival or cancer treatment. Studies that used medical record abstraction to contrast the effectiveness of the indices in predicting mortality have yielded conflicting results. One study found that both indices, collected via medical record review, performed similarly well at predicting survival following colon cancer surgery.[6] Two other small European studies of laryngeal and bladder cancer patients that also assessed comorbidity from medical records found that the ACE-27 index was a better predictor of survival than the CCI.[18,19] These results are consistent with another recently published comparison of the CCI and ACE-27.[20] Prior studies suggest that the CCI collected from administrative data performs similarly well as when collected from medical records.[21,22]

Our goal was to compare comorbidity information obtained using the CCI based on administrative data with the ACE-27 based on medical record review among a large, population-based cohort of individuals with incident lung cancer (mean age, 67) or colon cancer (mean age, 68) in the Veterans Health Administration (VA). Specifically, we sought to understand whether the medical records-based ACE-27 provided sufficient additional information about comorbid illness burden and the association of comorbidity with treatment and survival in this population to justify the more intensive data collection efforts required to calculate it.

Table 1 – Individual comorbidities ascertained by the ACE-27 index[25] and the Charlson comorbidity index (CCI).[4]

ACE-27	CCI
Angina/CAD	
Arrhythmia	
Heart failure	Heart failure
Hypertension	
Myocardial infarction	Myocardial infarction
Peripheral arterial disease	Peripheral vascular disease
Venous thromboembolic disease	
Diabetes	Diabetes
	Diabetes with chronic complications
Hepatic disease	Mild liver disease
	Moderate or severe liver disease
Pancreatic disease	
Stomach/intestinal disorders	Peptic ulcer disease
HIV/AIDS	AIDS
	Any tumor[a]
Leukemia	Leukemia[a]
Lymphoma	Lymphoma[a]
Malignancy, solid tumor[b]	Metastatic solid tumor[a]
Dementia	Dementia
Neuromuscular disorders	
Paraplegia/hemiplegia	Paraplegia/hemiplegia
Stroke	Cerebrovascular disease
Psychiatric disorders	
Renal disease	Renal disease
Respiratory disease	Chronic pulmonary disease
Rheumatologic disease	Connective tissue disease
Alcohol abuse	
Substance abuse	
Obesity	

[a] The Klabunde modification of the Charlson index[15] (used in our study) excludes a history of cancer.
[b] In models including individual ACE-27 or Charlson elements in our study, we did not include a history of cancer as an independent variable.