

## Overview

- We obtained information on comorbidities from two sources: Data reported directly to the California Cancer Registry (CCR) and data reported to the California Office of Statewide Health Planning and Development (OSHPD) by hospitals and ambulatory surgery centers.
- By probabilistically linking CCR and OSHPD data we located 11,844 tumors for which we were able to obtain ICD-9 codes for comorbidities from both sources.
- We categorized ICD-9 codes based on Charlson and Elixhauser comorbidity indexes.
- OSHPD records contained 52% more comorbidities than were reported to the CCR.
- Most of the comorbidities reported to the CCR were also found in OSHPD, however large numbers of comorbidities found in OSHPD were not reported to the CCR.

## Background

Comorbidities are vital to understanding the burden of cancer, but often go underreported to central registries. Despite the inclusion of 10 comorbidity fields in the NAACCR record layout, reporting remains inconsistent and is only a required data item for CoC hospitals.

As an alternative source of collecting comorbidity information, we looked at data from the California Office of Statewide Health Planning and Development(OSHPD). OSHPD creates three datasets containing comorbidity information: Patient Discharge Data (PDD), Emergency Department Data (EDD) and Ambulatory Surgery Data (ASD). Each dataset contains identifiers for linkage and up to 25 diagnoses in the form of ICD-9 codes.

CCR data was previously linked with OSHPD data and records were obtained for a large proportion of patients (74%). Of particular interest for this study was the comparison of comorbidity values for patients for whom we had comorbidity data from both sources.

## Objective

We aimed to compare comorbidities obtained from OSHPD to those reported to the CCR by tumor site and comorbidity category.

## Results

Comorbidity Counts by Category: OSHPD and CCR

Comorbidity Category	OSHPD	CCR	Kappa
Hypertension, uncomplicated	6,588	6,529	.57
Tobacco use disorder	2,960	1,113	.30
Diabetes, uncomplicated	2,638	2,409	.72
Chronic pulmonary disease	2,506	1,950	.62
Cardiac arrhythmias	2,043	1,231	.54
Weight loss/malnutrition	1,483	507	.43
Obesity	1,341	1,090	.60
Hypothyroidism	1,336	1,267	.66
Renal failure	1,099	544	.49
Congestive heart failure	1,098	627	.58
Liver disease	1,040	725	.56
Depression	1,025	704	.46
Coagulopathy	970	280	.32
Hypertension, complicated	912	333	.40
Other neurological	805	351	.45
Anemias	793	324	.39
Myocardial infarction	610	303	.45
Cerebrovascular disease	551	354	.40
Diabetes, complicated	497	235	.38
Peripheral vascular disorder	472	317	.42
Valvular disease	461	255	.46
Pulmonary circulation disorders	357	121	.40
Ulcer disease	291	141	.40
Rheumatic Disease	289	203	.58
Psychoses	137	84	.51
Dementia	126	148	.48
Paralysis	80	51	.58
HIV/AIDS	62	55	.55
<b>Total Tumors</b>	<b>11,844</b>	<b>11,844</b>	
<b>Total Comorbidities</b>	<b>33,509</b>	<b>22,758</b>	

## Methods

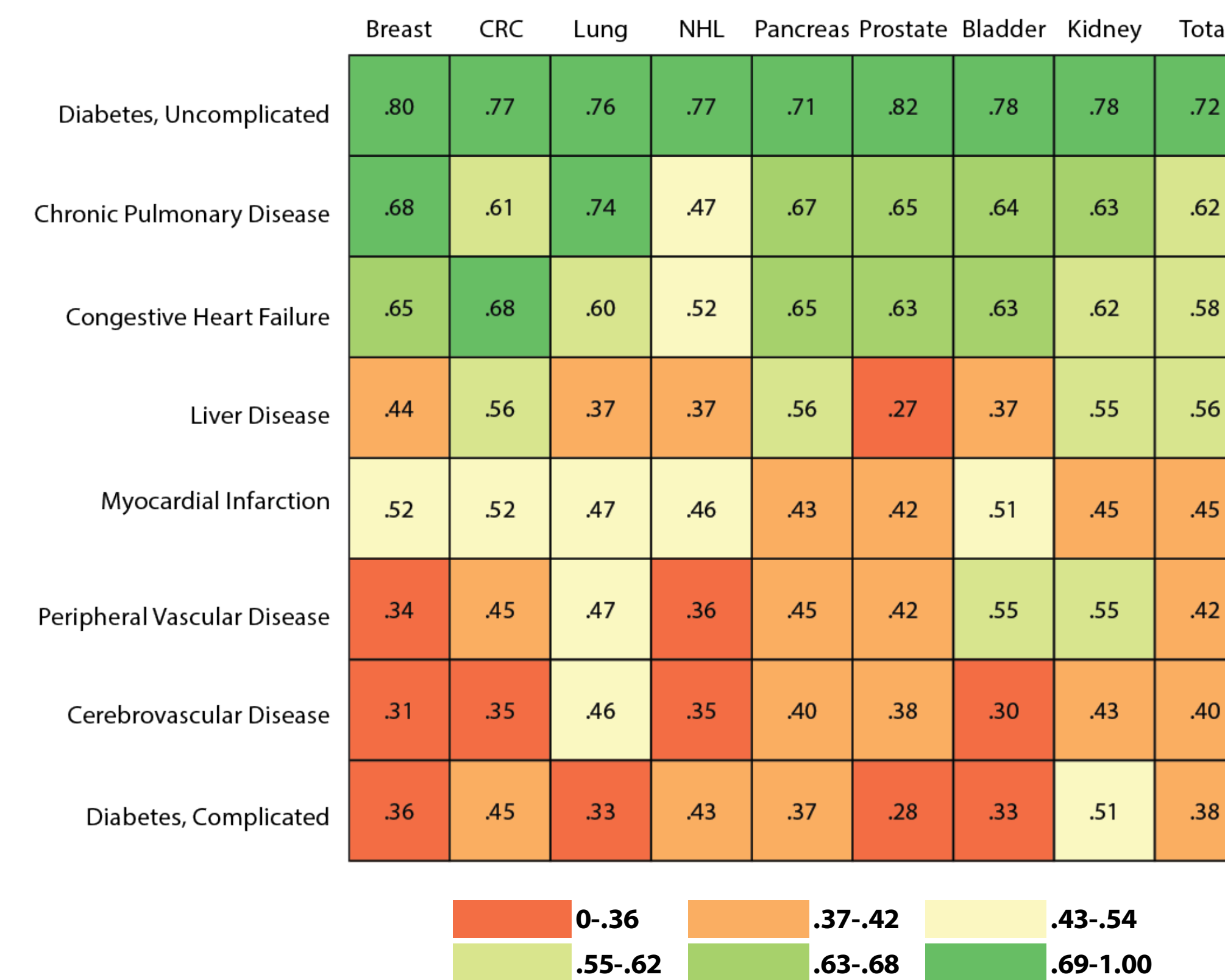
We used CCR data to locate all patients diagnosed with cancer in California between February 1<sup>st</sup>, 2011 and June 30<sup>th</sup>, 2011. We probabilistically linked these patients with OSHPD PDD, EDD and ASD data based on social security number, date of birth, sex and zip code. We then identified patients with at least one comorbidity reported to the CCR and at least one obtained from OSHPD where the discharge or visit was

between 30 days before and 180 days after the date of cancer diagnosis. Comorbidities were classified by ICD-9 code into categories based on the Charlson and Elixhauser comorbidity indexes. We calculated the kappa statistic to measure the agreement of the reporting sources by comorbidity category and tumor site.

## Results (cont.)

OSHPD records contained 52% more comorbidities than were reported to the CCR (33,458 compared to 21,949). CCR data had an average of 2.07 comorbidities per patient while OSHPD data contained 3.00. For some conditions, such as uncomplicated hypertension, uncomplicated diabetes and hypothyroidism, CCR comorbidities were nearly as complete as OSHPD. However, for other conditions such as tobacco use disorder and cardiac arrhythmias, CCR data lagged considerably. The overall kappa for all sites and comorbidities was .57. Uncomplicated diabetes had the highest kappa at .72 while Tobacco Use Disorder had the lowest at .30. Most conditions showed a moderate agreement between the sources with a kappa between .4 and .6.

Kappa Statistic by Comorbidity Category for Select Cancer Sites



## Conclusion

Linking CCR data with OSHPD produces more comorbidities than CCR data alone among patients for whom data is available from both sources. Most conditions showed moderate agreement between the sources with differentiation by condition. Although we were able to capture more comorbidities from OSHPD than were reported to the CCR, we were unable to determine the accuracy of data collected. Further studies using a gold-standard dataset are needed to determine the accuracy of data collected through these methods.