

# Title: Identifying the DEAD: Development and Validation of a Patient-Level Model to Predict Death Status in Population-Level Claims

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## Electronic Supplementary Material 3

### Characteristics of some incorrect predictions

There were 727 patients who did not have death recorded within 61 days of end of observation but had a predicted risk of 0.9 or greater. There were 2233 patients who had death recorded within 61 days of end of observation but had a predicted risk of 0.1 or lesser.

In the 727 patients who were assigned a high risk of death by the model 34 of these patients had a death record at some point in time. 15 out of the 34 occurred within 180 days and 19 out of the 34 occurred within 365 days.

The table below shows the covariates with the greatest difference in incidence between the 727 patients who did not have death recorded within 61 days of end of observation but had a predicted risk of 0.9 or greater (FPs) and the 2233 patients who had death recorded within 61 days of end of observation but had a predicted risk of 0.1 or lesser (FNs). The patients who the model predicted to be dead at the end of the observation were generally sicker patients who had inpatient and ER visits in the prior year.

Covariate	FNs incidence (N= 2233)	FPs incidence (N= 727)	incidence difference
procedure_occurrence during day -365 through 0 days relative to index: Radiologic examination, chest; single view, frontal	0.212	0.937	0.724
procedure_occurrence during day -365 through 0 days relative to index: Initial hospital care, per day, for the evaluation and management of a patient, which requires these 3 key components: A comprehensive history; A	0.172	0.821	0.649

comprehensive examination; and Medical decision making of high complexity. Counseling and/or coordination of			
procedure_occurrence during day -30 through 0 days relative to index: Radiologic examination, chest; single view, frontal	0.042	0.681	0.639
procedure_occurrence during day -365 through 0 days relative to index: Subsequent hospital care, per day, for the evaluation and management of a patient, which requires at least 2 of these 3 key components: A detailed interval history; A detailed examination; Medical decision making of high complexity. Counseling and/or coor	0.150	0.787	0.636
procedure_occurrence during day -365 through 0 days relative to index: Subsequent hospital care, per day, for the evaluation and management of a patient, which requires at least 2 of these 3 key components: An expanded problem focused interval history; An expanded problem focused examination; Medical decision making of moder	0.186	0.821	0.635
observation during day -365 through 0 days relative to index: Ground mileage, per statute mile	0.188	0.809	0.621
condition_era group during day -365 through 0 days relative to index: Heart disease	0.319	0.930	0.611
condition_era group during day -365 through 0 days relative to index: Cardiac arrhythmia	0.177	0.773	0.596
measurement during day -365 through 0 days relative to index: Electrocardiogram, routine ECG with at least 12 leads; interpretation and report only	0.234	0.827	0.593
procedure_occurrence during day -365 through 0 days relative to index: Critical care, evaluation and management of the critically ill or critically injured patient; first 30-74 minutes	0.093	0.671	0.579
visit_occurrence concept count during day -365 through 0 concept_count relative to index: Inpatient Visit	0.236	0.813	0.576
condition_era group during day -30 through 0 days relative to index: Heart disease	0.097	0.659	0.562
visit_occurrence concept count during day -30 through 0 concept_count relative to index: Inpatient Visit	0.050	0.607	0.557
procedure_occurrence during day -365 through 0 days relative to index: Emergency department visit for the evaluation and management of a patient, which requires these 3 key components within the constraints imposed by the urgency of the patient's clinical condition and/or mental status: A comprehensive history; A comprehensi	0.218	0.765	0.547

condition_era group during day -365 through 0 days relative to index: Respiratory insufficiency	0.060	0.602	0.542
condition_era group during day -365 through 0 days relative to index: Respiratory failure	0.056	0.591	0.536
visit_occurrence concept count during day -365 through 0 concept_count relative to index: Emergency Room Visit	0.386	0.922	0.535
condition_era group during day -365 through 0 days relative to index: Kidney disease	0.170	0.704	0.535
procedure_occurrence during day -30 through 0 days relative to index: Subsequent hospital care, per day, for the evaluation and management of a patient, which requires at least 2 of these 3 key components: An expanded problem focused interval history; An expanded problem focused examination; Medical decision making of moder	0.038	0.572	0.534
observation during day -30 through 0 days relative to index: Ground mileage, per statute mile	0.053	0.576	0.523
condition_era group during day -365 through 0 days relative to index: Pneumonitis	0.090	0.611	0.521
condition_era group during day -365 through 0 days relative to index: Renal impairment	0.123	0.642	0.519
procedure_occurrence during day -30 through 0 days relative to index: Subsequent hospital care, per day, for the evaluation and management of a patient, which requires at least 2 of these 3 key components: A detailed interval history; A detailed examination; Medical decision making of high complexity. Counseling and/or coor	0.034	0.547	0.514
condition_era group during day -365 through 0 days relative to index: Acute respiratory failure	0.050	0.563	0.512
condition_era group during day -365 through 0 days relative to index: Vascular disorder	0.318	0.831	0.512
condition_occurrence during day -365 through 0 days relative to index: Acute respiratory failure	0.048	0.556	0.508
condition_occurrence during day -365 through 0 days relative to index: Dyspnea	0.159	0.667	0.508
condition_era group during day -365 through 0 days relative to index: Inflammatory disorder of lower respiratory tract	0.174	0.681	0.507
condition_era group during day -365 through 0 days relative to index: Dyspnea	0.160	0.667	0.507
condition_era group during day -365 through 0 days relative to index: Difficulty breathing	0.161	0.667	0.506
condition_era group during day -365 through 0 days relative to index: Renal failure syndrome	0.089	0.589	0.500

condition_era group during day -365 through 0 days relative to index: Measurement finding below reference range	0.195	0.686	0.491
condition_era group during day -365 through 0 days relative to index: Pneumonia	0.080	0.568	0.488
condition_era group during day -365 through 0 days relative to index: Lung consolidation	0.080	0.568	0.488
observation during day -365 through 0 days relative to index: Ambulance service, advanced life support, emergency transport, level 1 (als 1 - emergency)	0.126	0.612	0.486
procedure_occurrence during day -30 through 0 days relative to index: Initial hospital care, per day, for the evaluation and management of a patient, which requires these 3 key components: A comprehensive history; A comprehensive examination; and Medical decision making of high complexity. Counseling and/or coordination of	0.031	0.514	0.483
condition_era group during day -365 through 0 days relative to index: Measurement finding outside reference range	0.275	0.752	0.477
procedure_occurrence during day -365 through 0 days relative to index: Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, complete, with spectral Doppler echocardiography, and with color flow Doppler echocardiography	0.137	0.612	0.476
condition_era group during day -365 through 0 days relative to index: Hemoglobin low	0.185	0.660	0.475
condition_era group during day -365 through 0 days relative to index: RBC count abnormal	0.185	0.660	0.475
condition_era group during day -365 through 0 days relative to index: RBC count low	0.185	0.660	0.475
condition_era group during day -365 through 0 days relative to index: Hemoglobin level outside reference range	0.185	0.660	0.475
procedure_occurrence during day -30 through 0 days relative to index: Critical care, evaluation and management of the critically ill or critically injured patient; first 30-74 minutes	0.020	0.492	0.472
condition_era group during day -365 through 0 days relative to index: Heart failure	0.109	0.580	0.472
condition_era group during day -365 through 0 days relative to index: Acute genitourinary disorder	0.064	0.534	0.470
procedure_occurrence during day -365 through 0 days relative to index: Initial hospital care, per day, for the evaluation and management of a patient, which requires these 3 key components: A comprehensive history; A	0.118	0.587	0.470

comprehensive examination; and Medical decision making of moderate complexity. Counseling and/or coordination			
visit_occurrence concept count during day -30 through 0 concept_count relative to index: Emergency Room Visit	0.099	0.567	0.467
condition_occurrence during day -365 through 0 days relative to index: Acute renal failure syndrome	0.054	0.516	0.462
condition_era group during day -365 through 0 days relative to index: Acute renal failure syndrome	0.054	0.516	0.462
condition_era group during day -365 through 0 days relative to index: Acute renal impairment	0.054	0.516	0.462
condition_era group during day -365 through 0 days relative to index: Acute nephropathy	0.056	0.517	0.461
condition_era group during day -365 through 0 days relative to index: Acute respiratory disease	0.223	0.680	0.457
measurement during day -30 through 0 days relative to index: Electrocardiogram, routine ECG with at least 12 leads; interpretation and report only	0.044	0.501	0.456
condition_occurrence during day -365 through 0 days relative to index: Pneumonia	0.074	0.530	0.456
condition_era group during day -365 through 0 days relative to index: Congestive heart failure	0.097	0.546	0.449
condition_era group during day -365 through 0 days relative to index: Lesion of lung	0.104	0.550	0.446
condition_occurrence during day -365 through 0 days relative to index: Congestive heart failure	0.096	0.538	0.442
condition_era group during day -365 through 0 days relative to index: Inflammatory disorder of the respiratory tract	0.268	0.708	0.440
condition_era group during day -365 through 0 days relative to index: Inflammatory disorder of the respiratory system	0.272	0.711	0.439
condition_era group during day -365 through 0 days relative to index: Structural disorder of heart	0.195	0.631	0.437
condition_era group during day -30 through 0 days relative to index: Cardiac arrhythmia	0.056	0.492	0.436
procedure_occurrence during day -365 through 0 days relative to index: Computed tomography, head or brain; without contrast material	0.124	0.558	0.435
condition_era group during day -365 through 0 days relative to index: Pleural effusion	0.064	0.491	0.427
condition_era group during day -365 through 0 days relative to index: Acute disease of cardiovascular system	0.108	0.535	0.427
condition_occurrence during day -365 through 0 days relative to index: Pleural effusion	0.063	0.486	0.422

condition_occurrence during day -365 through 0 days relative to index: Respiratory symptom	0.110	0.530	0.420
condition_era group during day -365 through 0 days relative to index: Respiratory symptom	0.110	0.530	0.420
condition_era group during day -365 through 0 days relative to index: Chronic disease of respiratory system	0.184	0.602	0.418
condition_era group during day -365 through 0 days relative to index: Pain of truncal structure	0.343	0.757	0.413
procedure_occurrence during day -365 through 0 days relative to index: Subsequent hospital care, per day, for the evaluation and management of a patient, which requires at least 2 of these 3 key components: A problem focused interval history; A problem focused examination; Medical decision making that is straightforward or o	0.099	0.510	0.411
condition_occurrence during day -365 through 0 days relative to index: Essential hypertension	0.368	0.774	0.407
condition_occurrence during day -365 through 0 days relative to index: Anemia	0.146	0.552	0.406
condition_era group during day -365 through 0 days relative to index: Supraventricular arrhythmia	0.086	0.486	0.400
condition_era group during day -365 through 0 days relative to index: Pain	0.496	0.895	0.399
condition_era group during day -365 through 0 days relative to index: Inflammation of specific body organs	0.442	0.840	0.398
condition_era group during day -365 through 0 days relative to index: Peripheral vascular disease	0.183	0.580	0.398
condition_era group during day -365 through 0 days relative to index: Radiology result abnormal	0.112	0.506	0.395
condition_era group during day -365 through 0 days relative to index: Imaging result abnormal	0.112	0.506	0.395
condition_era group during day -365 through 0 days relative to index: Pain finding at anatomical site	0.491	0.882	0.390
condition_era group during day -365 through 0 days relative to index: Soft tissue lesion	0.322	0.710	0.387
condition_era group during day -365 through 0 days relative to index: Atrial arrhythmia	0.082	0.466	0.384
procedure_occurrence during day -365 through 0 days relative to index: Hospital discharge day management; more than 30 minutes	0.118	0.502	0.384
condition_era group during day -30 through 0 days relative to index: Respiratory insufficiency	0.019	0.399	0.380
condition_era group during day -30 through 0 days relative to index: Respiratory failure	0.017	0.396	0.379

condition_era group during day -365 through 0 days relative to index: Essential hypertension	0.458	0.836	0.379
condition_era group during day -365 through 0 days relative to index: Hypertensive disorder	0.458	0.836	0.378
condition_era group during day -365 through 0 days relative to index: Inflammation of specific body systems	0.476	0.849	0.373
condition_era group during day -365 through 0 days relative to index: Tracheobronchial disorder	0.203	0.575	0.372
measurement during day -365 through 0 days relative to index: Blood count; complete (CBC), automated (Hgb, Hct, RBC, WBC and platelet count) and automated differential WBC count	0.358	0.729	0.371
condition_era group during day -365 through 0 days relative to index: Fibrillation	0.074	0.444	0.370
condition_occurrence during day -365 through 0 days relative to index: Abnormal findings on diagnostic imaging of lung	0.077	0.447	0.370
condition_era group during day -365 through 0 days relative to index: Abnormal findings on diagnostic imaging of lung	0.077	0.447	0.370
condition_era group during day -30 through 0 days relative to index: Acute respiratory disease	0.035	0.399	0.364
condition_era group during day -365 through 0 days relative to index: Arteriosclerotic vascular disease	0.167	0.531	0.363
condition_occurrence during day -365 through 0 days relative to index: Atrial fibrillation	0.072	0.433	0.362
condition_era group during day -365 through 0 days relative to index: Atrial fibrillation	0.072	0.433	0.362
procedure_occurrence during day -365 through 0 days relative to index: Radiologic examination, chest, 2 views, frontal and lateral	0.233	0.591	0.359
condition_era group during day -30 through 0 days relative to index: Inflammation of specific body systems	0.098	0.453	0.354
condition_era group during day -30 through 0 days relative to index: Acute respiratory failure	0.014	0.367	0.353
condition_era group during day -365 through 0 days relative to index: Chest pain	0.176	0.528	0.352
condition_era group during day -365 through 0 days relative to index: Bronchiolar disease	0.133	0.484	0.351
condition_era group during day -30 through 0 days relative to index: Inflammation of specific body organs	0.088	0.439	0.351
condition_era group during day -365 through 0 days relative to index: Chronic obstructive lung disease	0.133	0.483	0.350

condition_era group during day -365 through 0 days relative to index: Malignant neoplastic disease	0.148	0.498	0.350
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