

Market Power and Hospital Prices: Evidence from New Hampshire

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Introduction

Abstract

This thesis evaluates how the market power of insurers and hospitals in geographical sub-markets determines the prices insurers and hospitals negotiate for hospital care. I will compare how much the variation in prices is explained by variation in costs versus variation in the context of bilateral negotiations between hospitals and insurers, specifically how this context is affected by market power. New Hampshire publishes carrier-specific prices by hospital for outpatient medical procedures and services on the NH HealthCost website and therefore provides a unique case-study of insurer versus hospital market power. This allows me to compare the prices each insurer pays for the exact same services, and study how these prices may be related to the relative market power of insurers and hospitals.

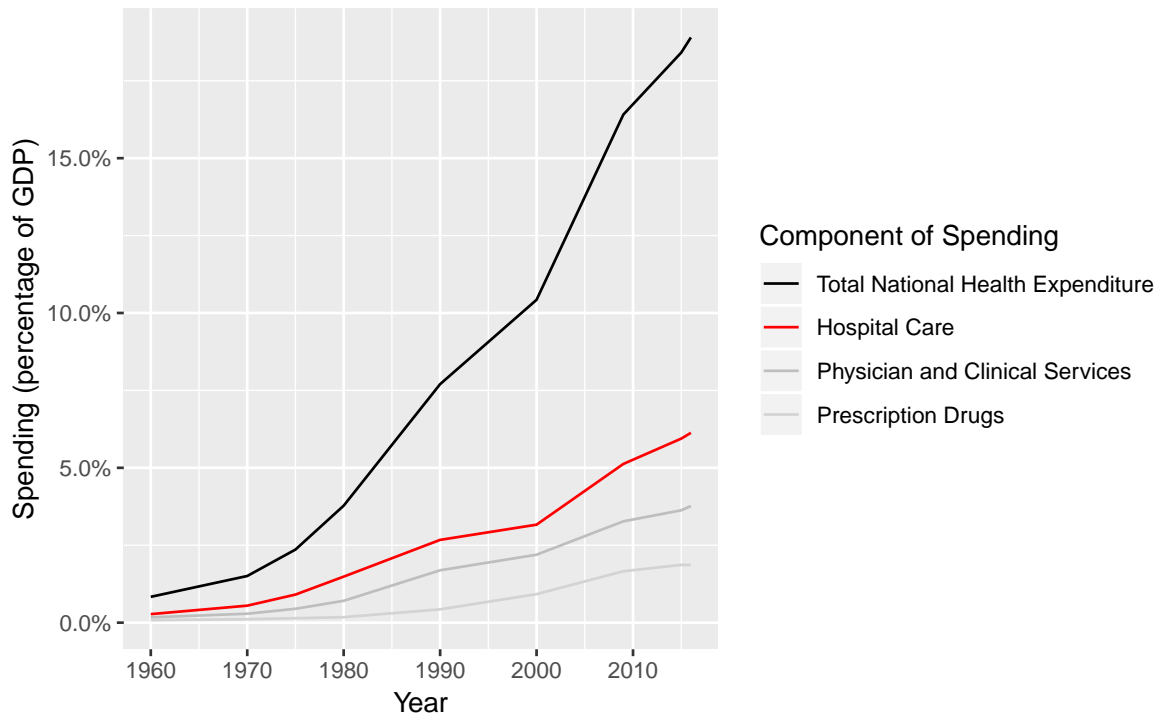
Motivation

The U.S.'s expenditure on health care has grown rapidly over the last few decades and has outpaced that of many peer countries without significant returns to quality (e.g. OECD 2017; Etehad and Kim 2017; Reinhardt et al., 2004). A substantial body of research has determined that the biggest driver behind the U.S. health care expenditure is not greater utilization or social spending but quite simply higher prices (e.g. Anderson et al., 2003; Papanicolas et al., 2018). Given that the \$3.3 trillion spent on health care annually (17.9% of GDP) (Centers for Disease Control and Prevention 2017) erodes the budgets of families and individuals, state and local governments, and the federal government, understanding the sources of variation in these prices is of tremendous import.

Industry Background

I focus on hospital prices because hospital care constitutes the largest component of U.S. health care spending at 32.4% (\$1.0825 trillion) of national health expenditure while physician and clinical services compose only 19.9% and prescription drugs account for 9.8% (Centers for Disease Control and Prevention 2017).

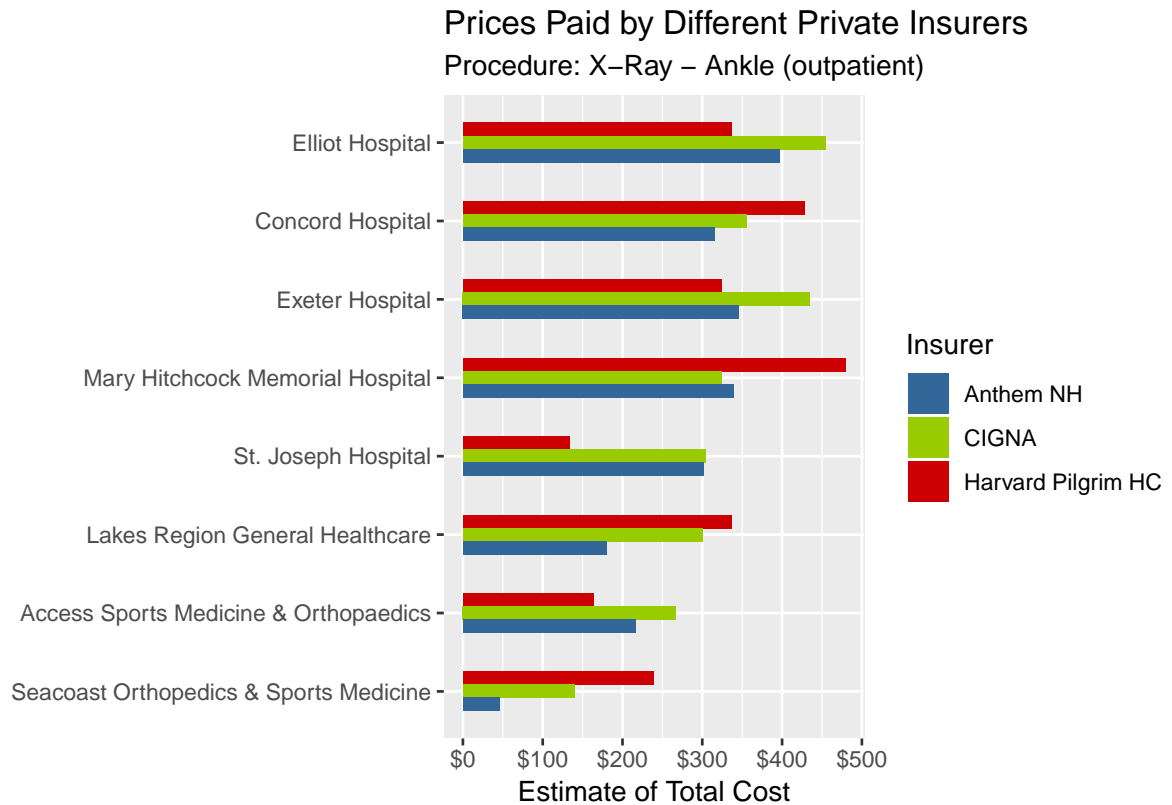
Health Care Spending in the U.S. over time



Source: Centers for Disease Control and Prevention 2017

For public programs like Medicare, 95% of the variation in expenditure is explained by variation in the quantity of care delivered, but for the privately insured, only about half of the variation in expenditure is due to the quantity of care delivered while half is purely driven by price variation (Cooper et al., 2015). Given that the largest portion of Americans (49%) receive health care coverage from their employer through private insurance companies rather than through Medicare and Medicaid (Kaiser Family Foundation 2017), this price variation among private insurers affects what many Americans pay out of pocket for their healthcare. Moreover, this variation persists even when costs and quality are held constant: for the exact same service, hospitals are able to charge different payers vastly different amounts. Below are some visual examples from the data that illustrate this variation between the three major private payers in New Hampshire (Anthem - NH, CIGNA, and Harvard Pilgrim Health Care) for the exact same service at the exact same hospital.

For hospitals which had a price range between insurers >\$100 for ankle x-rays:



Theoretical Framework

Both the hospital and the insurer are often interested in maximizing their profit margins per patient, even if the hospital is a non-profit (Horwitz 2005), and maximizing the number of patients they serve. Hospitals want to receive higher prices for their services but also to be included in insurers' networks, as patients facing lower out-of-pocket costs when going to hospitals in network may be more likely to go to these hospitals. Insurers want to pay lower prices for hospitals' services to minimize their costs but also want to attract enrollees by including convenient hospitals in their network. Thus, this is the bargaining environment in which bilateral hospital-insurer contracts are negotiated and the work below examines the impact on prices.

Data Sources

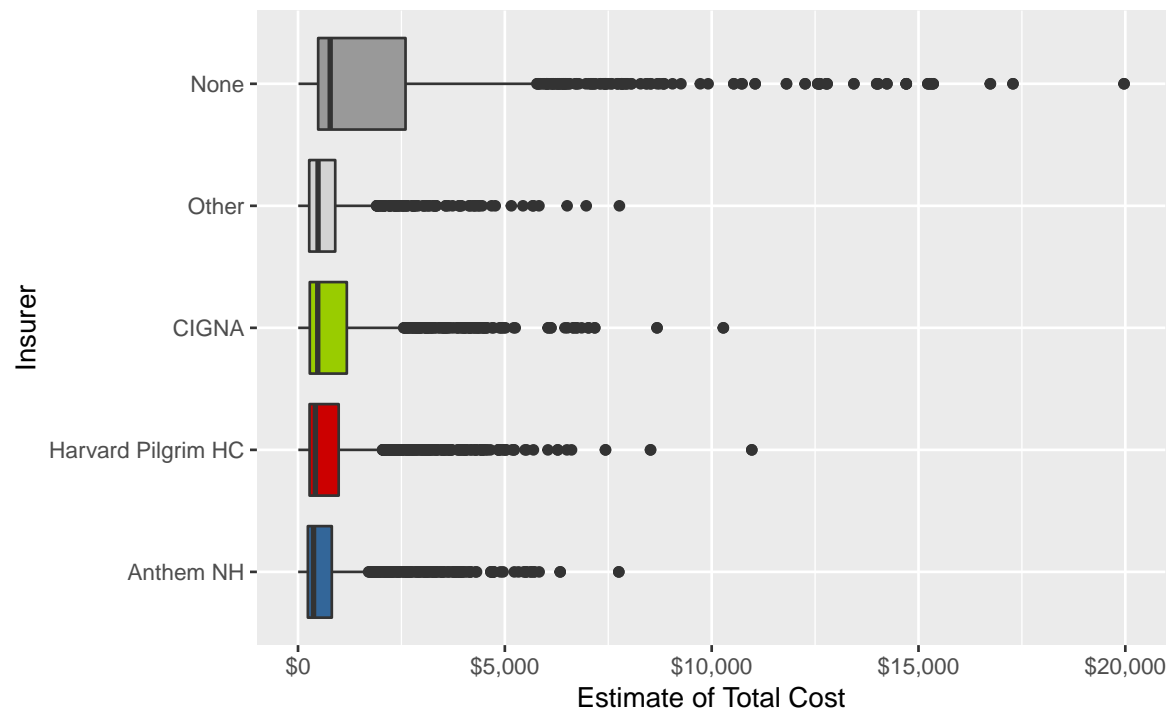
Raw data from NH HealthCost

The primary source of data on hospital costs comes from NH HealthCost which provides insurer-hospital specific estimations of total costs (reimbursements) for a long list of outpatient services and procedures. I copy and pasted this information for particular medical procedures and services into Excel spreadsheets (one for each

medical procedure/service). At first, I attempted to mimic the 8 selected services analyzed in Cooper et al. (2018) (Inpatient, Hip Replacement, Knee Replacement, Cesarean Section, Vaginal Delivery, PTCA, Colonoscopy, and Lower Limb MRI), but the website only had data for colonoscopies and MRIs. I therefore chose to first look at radiology services only as these types of services (CT scans, MRIs, X-rays) should be reasonably assumed to have constant costs and quality within the same hospital. This allowed me to construct a data set containing the estimated price for each procedure and each provider-insurer combination for which data was available.

The following boxplot depicts the various distributions of estimated prices for each private insurer.

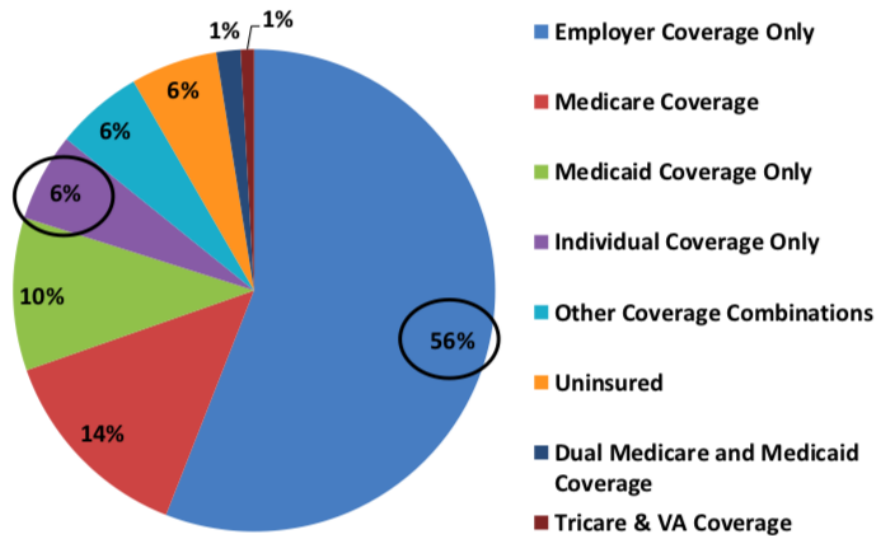
**Distribution of Cost Estimates Across Major Private Payers
(27 procedures)**



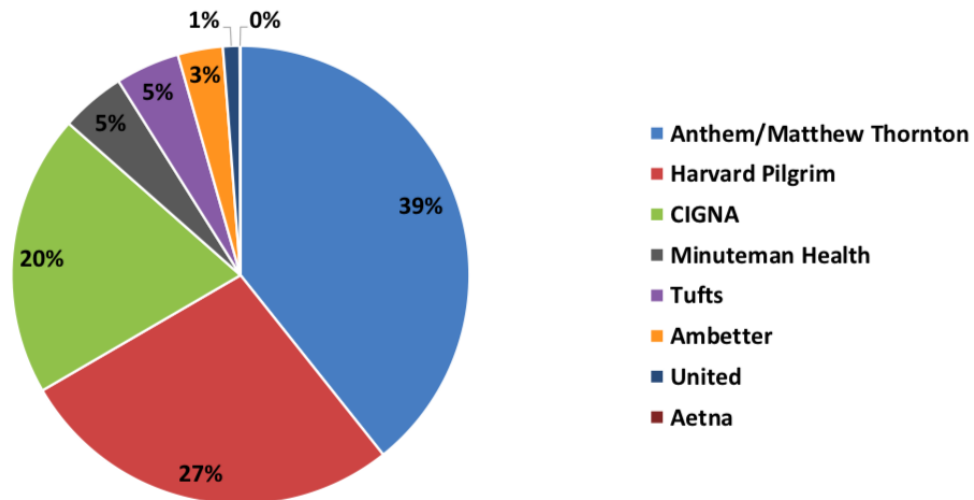
Insurance Coverage in New Hampshire

The pie charts below are taken from the NH Insurance Department 2017 Final Report of Health Care Premium and Claim Cost Drivers (published November 2018) and illustrate relevant information about the insurance market in New Hampshire.

New Hampshire Residents by Health Insurance Status in 2017



Source: U.S. Census Bureau. 2017 American Community Survey 1-Year Estimate. The "Other Coverage Combinations" category includes those persons with two or more types of health insurance coverage that are not in the following six multi-coverage categories: With employer-based and direct-purchase coverage; With employer-based and Medicare coverage; With direct-purchase and Medicare coverage; With Medicare and Medicaid/means-tested public coverage; Other private only combinations; Other public only combinations. The ACS does not explicitly state that the NH PAP population is designated as Medicaid, but based on the size of the Medicaid and Individual membership, it is assumed that NH PAP is designated as Medicaid.



Location of New Hampshire Hospitals (from Google Maps data):

CMS Data on Provider ID and Medicare Reimbursement:

Methodology

The goal of this analysis is to determine whether there is a statistical difference between the prices hospitals charge Anthem, Harvard Pilgrim, and CIGNA in New Hampshire. That is, for the same service at the same hospital, is one insurer consistently paying a higher amount than the other two?

I create dummy variables for each of the insurers and a new variable (“percent_of_anthem”) which is the price as a percentage of the price Anthem pays for the same procedure at the same hospital. Data on the price Anthem pays certain hospitals for certain procedures is unavailable either because Anthem does not have a contract with that hospital or price information is simply not available for that particular procedure. This leads 1360 observations of 4511 total observations to be dropped from the analysis, leaving 3151 observations (unique hospital-insurer-procedure combinations) remaining. With the remaining data, I regress the “percent_of_anthem” variable on each insurer dummy variable (with the Anthem dummy being excluded) and include procedure fixed effects and hospital fixed effects to isolate within-hospital variation of prices and therefore plausibly control for quality and costs.

The results are listed below and show that CIGNA pays on average 24.594% *more* than Anthem and Harvard Pilgrim pays on average 12.936% *more* than Anthem.

```
##
## =====
##                                     De
##                                     -----
##                                     p
## -----
## CIGNA
##
##
## Harvard_Pilgrim_HC
##
##
## factor(provider_name)Advanced Foot
##
##
## factor(provider_name)Afc Urgent Care
##
##
```

```

## factor(provider_name)Affiliates In Podiatry
##
##
## factor(provider_name)Alice Peck Day Memorial Hospital
##
##
## factor(provider_name)Andrea M Dionne, DO
##
##
## factor(provider_name)Androscoggin Valley Hospital
##
##
## factor(provider_name)Anna Jaques Hospital
##
##
## factor(provider_name)Appledore Medical Group
##
##
## factor(provider_name)Atlantic Orthopaedics
##
##
## factor(provider_name)Atlantic Urology Associates
##
##
## factor(provider_name)Atrius Health
##
##
## factor(provider_name)Bedford Ambulatory Surgical Center
##
##
## factor(provider_name)Bedford Ambulatory Surgical Center Imaging
##
##
## factor(provider_name)Bedford Commons OBGYN
##
##
## factor(provider_name)Bedford Podiatry Group
##
##
## factor(provider_name)Bedford Women's Care Associates
##
##
## factor(provider_name)Capital Orthopaedic Surgery Center
##
##

```



```

## factor(provider_name)Catholic Medical Center
##
##
## factor(provider_name)Center For Diagnostic Imaging
##
##
## factor(provider_name)Concord Ambulatory Surgery Center
##
##
## factor(provider_name)Concord Endoscopy Surgery Center
##
##
## factor(provider_name)Concord Hospital
##
##
## factor(provider_name)Concord Imaging Center
##
##
## factor(provider_name)Concord OBGYN
##
##
## factor(provider_name)Concord Orthopaedics
##
##
## factor(provider_name)Convenient MD
##
##
## factor(provider_name)Core Physicians
##
##
## factor(provider_name)Cottage Hospital
##
##
## factor(provider_name)Dartmouth-Hitchcock (Concord)
##
##
## factor(provider_name)Dartmouth-Hitchcock (Keene)
##
##
## factor(provider_name)Dartmouth-Hitchcock (Manchester)
##
##
## factor(provider_name)Dartmouth-Hitchcock (Nashua)
##
##

```

```

## factor(provider_name)Dartmouth-Hitchcock Clinic
##
##
## factor(provider_name)Dartmouth-Hitchcock Medical Center
##
##
## factor(provider_name)Derry Imaging Center
##
##
## factor(provider_name)Dover Foot
##
##
## factor(provider_name)Dover Women's Health
##
##
## factor(provider_name)Elliot Hospital
##
##
## factor(provider_name)Elliot One-Day Surgery Center
##
##
## factor(provider_name)Elliot Physician Network
##
##
## factor(provider_name)Essex Orthopaedics
##
##
## factor(provider_name)Exeter Hospital
##
##
## factor(provider_name)ExpressmedExpressmed
##
##
## factor(provider_name)Feminist Health Center of Portsmouth
##
##
## factor(provider_name)Foot Health Center of Merrimack Valley
##
##
## factor(provider_name)Foundation Medical Partners
##
##
## factor(provider_name)Four Seasons Imaging
##
##

```

```

## factor(provider_name)Franklin Regional Hospital
##
##
## factor(provider_name)Frisbie Memorial Hospital
##
##
## factor(provider_name)Garrison Women's Health Center
##
##
## factor(provider_name)Granite State Lab
##
##
## factor(provider_name)Granite State Podiatry Associates
##
##
## factor(provider_name)Greater Salem Family Footcare Associates
##
##
## factor(provider_name)Harbour Women's Health
##
##
## factor(provider_name)Hillside Surgery Center
##
##
## factor(provider_name)Huggins Hospital
##
##
## factor(provider_name)Krislan of New England
##
##
## factor(provider_name)Kristin Visco, Dpm Aacfas
##
##
## factor(provider_name)Laboratory Corporation of America
##
##
## factor(provider_name)Laconia Clinic
##
##
## factor(provider_name)Lahey Health
##
##
## factor(provider_name)Lakes Region General Healthcare
##
##

```

```

## factor(provider_name)Lawrence General Hospital
##
##
## factor(provider_name)Littleton Regional Healthcare
##
##
## factor(provider_name)Lowell General Hospital
##
##
## factor(provider_name)LRGHealthcareLRGHealthcare
##
##
## factor(provider_name>Maine Health
##
##
## factor(provider_name)Manchester Obstetrical Associates
##
##
## factor(provider_name)Manchester Urology Associates
##
##
## factor(provider_name)Martin's Point Health Care
##
##
## factor(provider_name)Mary Hitchcock Memorial Hospital
##
##
## factor(provider_name)Mary Jo Montanarella, MD
##
##
## factor(provider_name)Memorial Hospital
##
##
## factor(provider_name)Merrimack Valley Endoscopy Center
##
##
## factor(provider_name)Michael P. Romanowsky Family Medicine
##
##
## factor(provider_name)Monadnock Community Hospital
##
##
## factor(provider_name)Monadnock OBGYN Associates
##
##

```

```

## factor(provider_name)New England Foot
##
##
## factor(provider_name)New Hampshire Neurospine Institute
##
##
## factor(provider_name)New Hampshire Orthopaedic Center
##
##
## factor(provider_name)Northeast Endoscopy Center
##
##
## factor(provider_name)Northeast Urologic Surgery
##
##
## factor(provider_name)Northeastern Vermont Regional Hospital
##
##
## factor(provider_name)Orchard Surgical Center
##
##
## factor(provider_name)Orthopaedic Surgical Associates
##
##
## factor(provider_name)Orthopaedics Northeast
##
##
## factor(provider_name)Parkland Medical Center
##
##
## factor(provider_name)Partners For Women's Health
##
##
## factor(provider_name)Pentucket Medical Associates
##
##
## factor(provider_name)Peter Joseph Degnan, MD
##
##
## factor(provider_name)Portsmouth Ambulatory Surgery Center
##
##
## factor(provider_name)Portsmouth Foot
##
##

```

```

## factor(provider_name)Portsmouth Regional Hospital
##
##
## factor(provider_name)Quest Diagnostics
##
##
## factor(provider_name)Saco River Medical Group
##
##
## factor(provider_name)Seacoast Orthopedics
##
##
## factor(provider_name)Shields Imaging
##
##
## factor(provider_name)Southern New Hampshire Internal Medicine Associates
##
##
## factor(provider_name)Southern NH Medical Center
##
##
## factor(provider_name)Speare Memorial Hospital
##
##
## factor(provider_name)Springfield Medical Care System
##
##
## factor(provider_name)St. Joseph Hospital
##
##
## factor(provider_name)Steward Medical Group
##
##
## factor(provider_name)Stratham Ambulatory Surgery Center (paradigm )
##
##
## factor(provider_name)Terrance George Hanlon, MD
##
##
## factor(provider_name)The Surgery Center of Greater Nashua
##
##
## factor(provider_name)Thomas Vaill King, MD
##
##

```

```

## factor(provider_name)Upper Connecticut Valley Hospital
##
##
## factor(provider_name)Valley Regional Hospital
##
##
## factor(provider_name)Veterans Administration Medical Center
##
##
## factor(provider_name)Weeks Medical Center
##
##
## factor(provider_name)Wentworth Surgery Center
##
##
## factor(provider_name)Wentworth-Douglass Hospital
##
##
## factor(provider_name)William Albert Selleck, MD
##
##
## factor(provider_name)Women's Life Imaging
##
##
## factor(provider_name)York Hospital
##
##
## factor(procedure)Blood test for complete blood cell count (hemoglobin)
##
##
## factor(procedure)Bone Density Scan (outpatient)
##
##
## factor(procedure)Colonoscopy with biopsy (outpatient)
##
##
## factor(procedure)Colonoscopy with polyp removal (outpatient)
##
##
## factor(procedure)CT - Abdomen
##
##
## factor(procedure)CT - Chest (outpatient)
##
##

```

Pel

```

## factor(procedure)CT - Head&Brain, without dye
##
##
## factor(procedure)Diagnostic colonoscopy (outpatient)
##
##
## factor(procedure)Mammogram (outpatient)
##
##
## factor(procedure)MRI - Back (outpatient)
##
##
## factor(procedure)MRI - Brain (outpatient)
##
##
## factor(procedure)MRI - Knee (outpatient)
##
##
## factor(procedure)MRI - Pelvis (outpatient)
##
##
## factor(procedure)MRI - Shoulder, Elbow, or Wrist
##
##
## factor(procedure)Myocardial Imaging (outpatient)
##
##
## factor(procedure)Ultrasound - Abdominal, Complete
##
##
## factor(procedure)Ultrasound - Abdominal, Limited
##
##
## factor(procedure)Ultrasound - Breast (outpatient)
##
##
## factor(procedure)Ultrasound - Head and Neck
##
##
## factor(procedure)Ultrasound - Pelvic (outpatient)
##
##
## factor(procedure)Ultrasound - Pregnancy (outpatient)
##
##

```



```

## factor(procedure)Ultrasound - Pregnancy follow-up
##
##
## factor(procedure)Ultrasound - Transvaginal (non-maternity)
##
##
## factor(procedure)Urine Capacity Measurement
##
##
## factor(procedure)X-Ray - Abdomen
##
##
## factor(procedure)X-Ray - Ankle (outpatient)
##
##
## factor(procedure)X-Ray - Chest (outpatient)
##
##
## factor(procedure)X-Ray - Foot (outpatient)
##
##
## factor(procedure)X-Ray - Hand
##
##
## factor(procedure)X-Ray - Hip
##
##
## factor(procedure)X-Ray - Knee (outpatient)
##
##
## factor(procedure)X-Ray - Middle Back (Spine, Thoracic)
##
##
## factor(procedure)X-Ray - Neck (Spine, Cervical)
##
##
## factor(procedure)X-Ray - Pelvis
##
##
## factor(procedure)X-Ray - Shoulder (outpatient)
##
##
## factor(procedure)X-Ray - Spine (outpatient)
##
##

```

```

## factor(procedure)X-Ray - Wrist (outpatient)
##
##
## Constant
##
##
## -----
## Observations
## R2
## Adjusted R2
## Residual Std. Error 44
## F Statistic 4.264
## =====
## Note: *p<0.1

```