

ANALYSIS

1. Create a short table of summary statistics comparing the Medicare billings of Rhode Island and New Hampshire physicians. Compare the annual mean and standard deviation of total submitted charges and total allowed charges treated by physician state. Identify the three most common specialties in this data and report the proportion of doctors with these specializations within each state.

Summary Statistics

Compared the annual mean and standard deviation of total submitted charges and total allowed charges for Rhode Island and New Hampshire physicians:

rndrng_prvdr_state_abrvtn	mean_tot_sbmtld_chrg	std_tot_sbmtld_chrg	mean_tot_mdcr_alowd_amt	std_tot_mdcr_alowd_amt	
0	NH	264212.884697	289824.746009	81652.602800	75392.134687
1	RI	268751.335157	273498.924818	95441.950698	82903.678664

State	Mean Submitted Charges	SD Submitted Charges	Mean Allowed Charges	SD Allowed Charges
Rhode Island	\$268,751	\$273,499	\$95,442	\$82,904
New Hampshire	\$264,213	\$289,825	\$81,653	\$75,392

- Rhode Island physicians have slightly higher mean total submitted charges and mean allowed charges compared to New Hampshire physicians.
- Both states exhibit substantial variability (high standard deviations) in billing amounts.

The **three most common physician specialties** in the data are:

1. **Family Practice**
2. **Internal Medicine**
3. **Anesthesiology**

Proportion of doctors in these specialties by state:

State	Specialty	Proportion of Doctors
New Hampshire	Family Practice	38.9%
New Hampshire	Internal Medicine	16.7%
New Hampshire	Anesthesiology	11.1%

State	Specialty	Proportion of Doctors
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Rhode Island	Internal Medicine	31.4%
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Rhode Island	Anesthesiology	11.4%
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Rhode Island	Family Practice	8.6%
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- Family Practice dominates in New Hampshire (38.9%), while Internal Medicine has the largest proportion in Rhode Island (31.4%).

2. Estimate a regression that tests whether physicians who are in New Hampshire (vs. Rhode Island) have higher total allowed charges, controlling for provider type (i.e., specialty) and year.

Regression Analysis: New Hampshire vs. Rhode Island

To test whether physicians in New Hampshire have higher total allowed charges compared to Rhode Island, a regression model was estimated, controlling for provider specialty and year.

Key Result:

The coefficient for **New Hampshire (NH)** is **\$40,860** ($p = 0.004$), meaning that physicians in New Hampshire, on average, have **\$40,860 lower total allowed charges** compared to physicians in Rhode Island, when controlling for specialty and year.

OLS Regression Results						
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Dep. Variable:	tot_mdcr_alowd_amt	R-squared:	0.358			
Model:	OLS	Adj. R-squared:	0.309			
Method:	Least Squares	F-statistic:	7.292			
Date:	Sun, 15 Dec 2024	Prob (F-statistic):	4.20e-09			
Time:	00:24:31	Log-Likelihood:	-1771.3			
No. Observations:	142	AIC:	3565.			
Df Residuals:	131	BIC:	3597.			
Df Model:	10					
Covariance Type:	nonrobust					
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	coef	std err	t	P> t	[0.025	0.975]

const	1.368e+04	4676.480	2.925	0.004	4426.360	2.29e+04
rndrng_prvdr_state_fips	1914.5011	476.619	4.017	0.000	971.634	2857.368
rndrng_prvdr_state_abrvtn_RI	-4.086e+04	1.4e+04	-2.917	0.004	-6.86e+04	-1.31e+04
rndrng_prvdr_type_Cardiology	1.259e+05	2.55e+04	4.940	0.000	7.55e+04	1.76e+05
rndrng_prvdr_type_Diagnostic Radiology	9.793e+04	2.66e+04	3.684	0.000	4.53e+04	1.51e+05
rndrng_prvdr_type_Emergency Medicine	7508.5749	2.52e+04	0.299	0.766	-4.22e+04	5.73e+04
rndrng_prvdr_type_Family Practice	-2.643e+04	2.04e+04	-1.298	0.197	-6.67e+04	1.39e+04
rndrng_prvdr_type_Internal Medicine	2.893e+04	2.01e+04	1.443	0.151	-1.07e+04	6.86e+04
rndrng_prvdr_type_Obstetrics/Gynecology	-5.808e+04	2.87e+04	-2.024	0.045	-1.15e+05	-1326.832
rndrng_prvdr_type_Orthopedic Surgery	6.173e+04	2.52e+04	2.455	0.015	1.2e+04	1.11e+05
rndrng_prvdr_type_Psychiatry	9083.9303	3.73e+04	0.243	0.808	-6.48e+04	8.29e+04

3. Based on the regression above, which specialty has the highest allowed charges (controlling for state and year)?

Specialty with the Highest Allowed Charges

From the regression model, **Cardiology** was identified as the specialty with the highest total allowed charges, after controlling for state and year.

- The coefficient for **Cardiology** is **\$125,897**.
- This indicates that physicians specializing in Cardiology have significantly higher total allowed charges compared to other specialties, even after accounting for differences in state and year.

4. Calculate the correlation between physicians' total submitted charges in 2013 and total allowed charges in 2014. Interpret this correlation in 1 sentence.

Correlation Between 2013 and 2014 Charges

The correlation between physicians' **total submitted charges in 2013** and **total allowed charges in 2014** was calculated as **0.793**.

- This strong positive correlation suggests that physicians who submitted higher charges in 2013 tend to have higher allowed charges in 2014. The relationship indicates consistency in billing patterns over time.

