**Regression result**

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**Econometric Specification**

To investigate how the medicare insurance type influence the length of stay in hospital for asthma patients, we firstly consider the basic model:

= β0 + + β24 + β25 + β26 + *ε* i

i = 1,2…. 81097

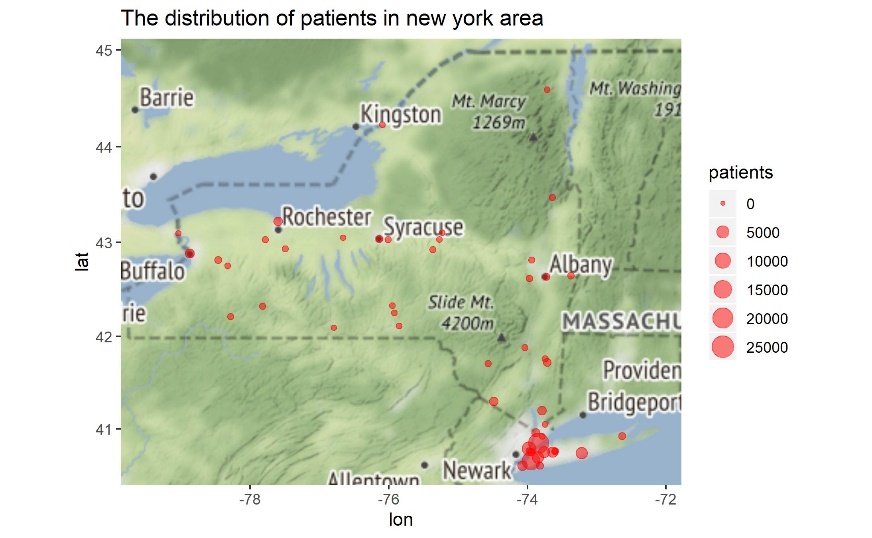
where i is the patient.

β0 is the baseline patient, represent the length of stay for patient with Black/African American race , Multi-ethnicity, Elective type of admission, discharge year is 2014, extreme severity of illness, extreme risk of mortality, Blue Cross/Blue Shield health care insurance.

X represents the patient information, including race, ethnicity, admission type, discharge year, severity of the illness, treatment method, total charges and age.

We can see the distribution of patients in each hospital from Figure1, most of the patients are in New York City. However, there are also many patients scattered in other counties. We want to control the characteristics of the county that might affect the length of stay in the hospital. For example, people in New York City might have higher quality medical facilities and income than in rural areas, which might influence the length of stay in the hospital. We know that regressions relying on across county variation are problematic due to potential omitted variable bias. Thus, we add location fixed effects to focus on within county variation.

Figure1 The distribution of patients in New York Area



The specification is as follows:

= + β23 + β24 + β25 ++ *ε* i

i = 1,2…. 81097

X represents the patient information, including race, ethnicity, admission type, discharge year, severity of the illness, treatment method, total charges and age.

**Regression Result**

As we can see from the Table1, for model 1, if we keep other factors unchanged, compared with blue shield and blue cross insurance type, patients with private health insurance have a significantly shorter length of stay in hospital. Patients with Medicare or Medicaid insurance have a significantly longer length of stay in hospital. It shows that the type of health insurance has a significant influence on the length of stay in the hospital. However, for model2, after we control the characteristics of the county, which might influence the variable we interested in, the length of stay in the hospital for patients with private health is not significantly shorter than other insurance payment methods. It might account for two reasons. On the one hand, Blue Cross Blue Shield is a typical health insurance provider because it is neither a for-profit privately-owned company nor a program run by the federal government. Blue Cross Blue Shield has partnered with several private health insurances, it has little difference with some private insurance. On the other hand, different private health insurance in the various counties might have different terms or conditions, which leads to a different length of stay in the hospital. After we control these across county variation and focus on the within county variation, we get a different result.

Let's look at other factors that might influence the length of stay in hospital:

For the race, in model 1, we can see white patients have a significantly longer length of stay in the hospital, but in model 2, we get the opposite result.

For ethnicity, compared with patients with multi-ethnic, patients who are not span/Hispanic have a significantly longer length of stay in the hospital. However, after control these across county variations, it is not significantly. It might because the change of the length of stay in the hospital for patients of a different ethnicity in each county is not that huge.

For the attributes that reveal the patients' severity of illness, for the type of admission, It's a little weird. If the patients have the elective type of admission, he tends to stay in hospital longer compared with other types of admission type, such as emergency and urgent. To solve this problem, we further detect the severity of the illness, it shows the more severe the disease, the longer the length of stay in hospital. For the risk of mortality, the higher risk of mortality, the longer length of stay in hospital.

For the treatment method, compared with patients who are treated as a medical method, patients who are treated as surgical tends to have a significantly shorter length of stay in the hospital. It might because patients who need conservative treatment need to stay in the hospital for further observation.

For age and total charges, the older the patient, the higher the total charges they spend, the longer they stay in the hospital.

Table1 Regression Result

|  |  |  |
| --- | --- | --- |
|  | Model 1 | Model 2(fixed effect) |
| (Intercept) | 1.10 \*\*\* |  |
|  | (0.11) |  |
| RaceMulti-racial | -0.48 \*\*\* | -0.47 \*\*\* |
|  | (0.06) | (0.06) |
| RaceOther Race | -0.14 \*\*\* | -0.12 \*\*\* |
|  | (0.01) | (0.01) |
| RaceWhite | 0.12 \*\*\* | -0.05 \*\*\* |
|  | (0.01) | (0.01) |
| EthnicityNot Span/Hispanic | 0.28 \*\*\* | 0.10 |
|  | (0.07) | (0.07) |
| EthnicitySpanish/Hispanic | 0.20 \*\* | 0.15 \* |
|  | (0.07) | (0.07) |
| EthnicityUnknown | 0.65 \*\*\* | 0.51 \*\*\* |
|  | (0.08) | (0.08) |
| admissionEmergency | -0.70 \*\*\* | -0.62 \*\*\* |
|  | (0.06) | (0.06) |
| admissionNewborn | -0.64 | -0.18 |
|  | (1.04) | (1.01) |
| admissionNot Available | -0.33 | -0.17 |
|  | (0.40) | (0.38) |
| admissionTrauma | -0.32 | -0.23 |
|  | (0.52) | (0.51) |
| admissionUrgent | -0.41 \*\*\* | -0.47 \*\*\* |
|  | (0.07) | (0.06) |
| year2015 | -0.18 \*\*\* | -0.17 \*\*\* |
|  | (0.01) | (0.01) |
| year2016 | -0.38 \*\*\* | -0.37 \*\*\* |
|  | (0.01) | (0.01) |
| severity2 | 0.10 \*\*\* | 0.08 \*\*\* |
|  | (0.01) | (0.01) |
| severity3 | 0.42 \*\*\* | 0.35 \*\*\* |
|  | (0.02) | (0.02) |
| severity4 | 0.30 \*\*\* | 0.14 \*\* |
|  | (0.05) | (0.05) |
| mortalityMajor | 0.06 | 0.12 \* |
|  | (0.05) | (0.05) |
| mortalityMinor | -0.15 \*\* | -0.07 |
|  | (0.06) | (0.06) |
| mortalityModerate | -0.13 \* | -0.06 |
|  | (0.06) | (0.05) |
| isSurgicalSurgical | -1.04 \*\*\* | -1.26 \*\*\* |
|  | (0.09) | (0.09) |
| paymentMedicaid | 0.16 \*\*\* | 0.15 \*\*\* |
|  | (0.02) | (0.02) |
| paymentMedicare | 0.29 \*\*\* | 0.27 \*\*\* |
|  | (0.02) | (0.02) |
| paymentPrivate Health Insurance | -0.07 \*\* | -0.03 |
|  | (0.02) | (0.02) |
| emergencyY | 0.06 \*\* | 0.07 \*\*\* |
|  | (0.02) | (0.02) |
| charges | 0.00 \*\*\* | 0.00 \*\*\* |
|  | (0.00) | (0.00) |
| new\_age | 0.01 \*\*\* | 0.01 \*\*\* |
|  | (0.00) | (0.00) |
| nobs | 81097 | 81097 |
| r.squared | 0.67 | 0.69 |
| adj.r.squared | 0.67 | 0.69 |
| sigma | 1.47 | 1.42 |
| statistic | 6434.82 | 2484.20 |
| p.value | 0.00 | 0.00 |
| df | 81070.00 | 81022.00 |
| df.residual | 81070.00 | 81022.00 |
| \*\*\* p < 0.001; \*\* p < 0.01; \* p < 0.05. | | |