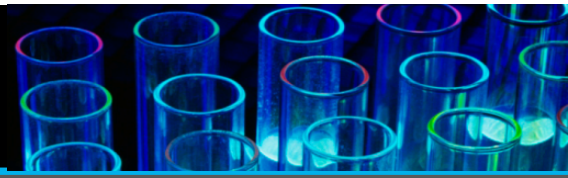
# Factors Affecting Length of Stay and Readmission Among Cystic Fibrosis Patients



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## Abstract

A fairly common disease known as cystic fibrosis affecting more than 30,000 people in America alone. CF includes symptoms such as lung persistent and shortness in breath - currently there is no cure although steady progress has been made over the decades.

Measures such as length of stay and 30-days readmission are often considered as promising quality indicator. In this paper, we attempt to explain the factors affecting the hospital quality metrics.

## Background

Length of stay and readmission rates among CF patients have always been a concern due to high costs and healthcare associated to these factors.

The findings from the paper are important for medical providers to understand the severity of illness, risk of mortality, BMI in affecting the length of stay and readmission rates. Additionally, the paper will help the hospital to understand their CF patients and to support decisions on resource allocation and inpatient care.

## Variables / Research

The variables included in the data:

1. Demographics (age, gender, race and ethnicity)
2. Conditions (BMI, severity of illness, risk of mortality)
3. Drugs prescribed (Ivacaftor, Lumacaftor)
4. Discharge disposition (Home/self-care, Home healthcare service)
5. Treatment and outcome (length of stay, readmissions)

## Methodology

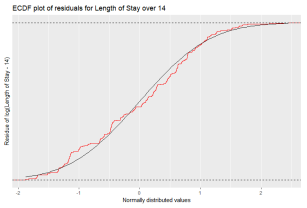
Sample size: A total of 638 observations obtained from a teaching hospital with 350-500 beds in a metropolitan area.

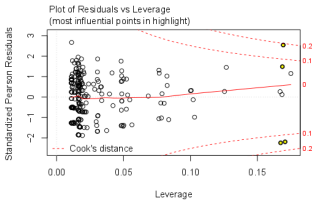
Targeted audience: Adult patients (aged 18 years old and above) who admitted for CF in 2015 and 2016.

Data descriptions:

1. About half of the CF patients aged 18-20 years old
2. Higher proportion of females (58% vs. 42% males)
3. Majority being “White or Caucasian” (95.6%)

## Results




- **Log-normal regression:**

  **Log (LOS-14) = 2.03 - 0.0080 * BMI - 0.34* I( SOI = Major) - 0.66 * I( SOI = Moderate) - 0.19 * I( ROM = Major) - 0.36 * I( ROM = Moderate) - 0.26* I( ROM = Minor)**

- P-values for coefficients are only significant for severity of illness, also among the strongest effects observed. However, R-squared is low and insignificant.
- **Logistic regression:**

  **Readmits = logit( - 1.58 + 0.096 * I( LOS > 14 ) – 0.069 * I( discharge disposition = HSELF)- 0.44 * I( prescription = Kalydeco ) – 0.19 * I( prescription = Orkambi) - 0.054 * I( SOI = Major ) + 0.029 * I( SOI = Moderate ) – 3.55 * I( SOI = Minor) + 0.17 * I( ROM = Major) – 0.071 * I( ROM = Moderate) – 0.53* I( ROM = Minor) + 0.02 * BMI )**

- Extremely low and insignificant goodness of fit
- No significant predictors can be found in log-normal and logistic regressions

## Discussion

- There are few limitations in the study:

1. Population group treated by this hospital - most admitted from its metropolitan area
2. Factors thought to be affecting the hospital quality metrics appeared to be insignificant when tested
3. Missing important factors such as chronic anemia, development of acute kidney injury, $FEV_1$
4. Lack of expert biomedical knowledge that prevented us from establishing causal connections from the weak relationships observed
5. Relatively small sample size used for regressions - excluded standard length of stay (14 days)
6. CF being a genetic disease, but none of the data are genetic related

## Conclusion

With limited sample size from the CF population and lack of important factors that affect length of stay and readmission rates, our data might not be sufficient to conduct the level of complexity that is required. Therefore results indicated should be interpreted with great caution.

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