

Analyzing Encounter Duration in the SVH System



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Research Question

How do specific operational variables including **clinical diagnosis, seasonal demand, and department** impact patient **Length of Stay (LOS)**?

Why is reducing LOS important?

Optimize Capacity & Throughput

- Ensure bed availability

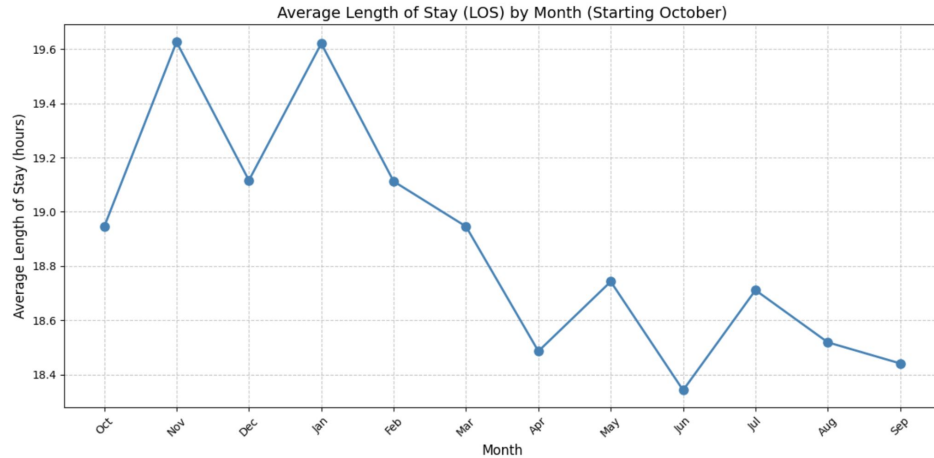
Enhance Patient Safety

- Lower the risk of secondary respiratory infections

Drive Economic Efficiency

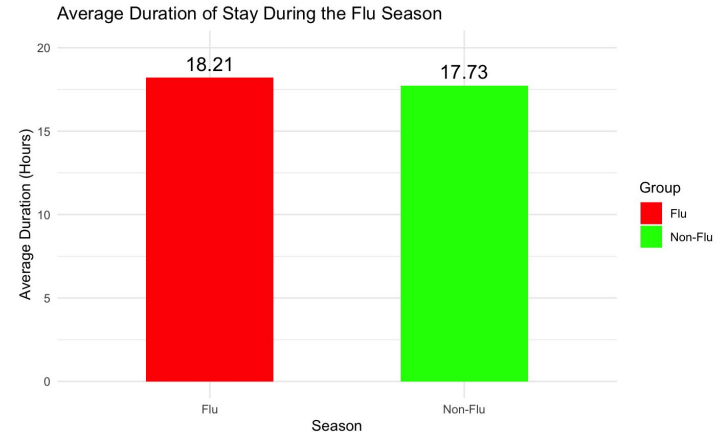
- Reduce the total cost per encounter
- Maximize resource allocation during peak demand

How does Seasonality affect LOS?



Flu Season

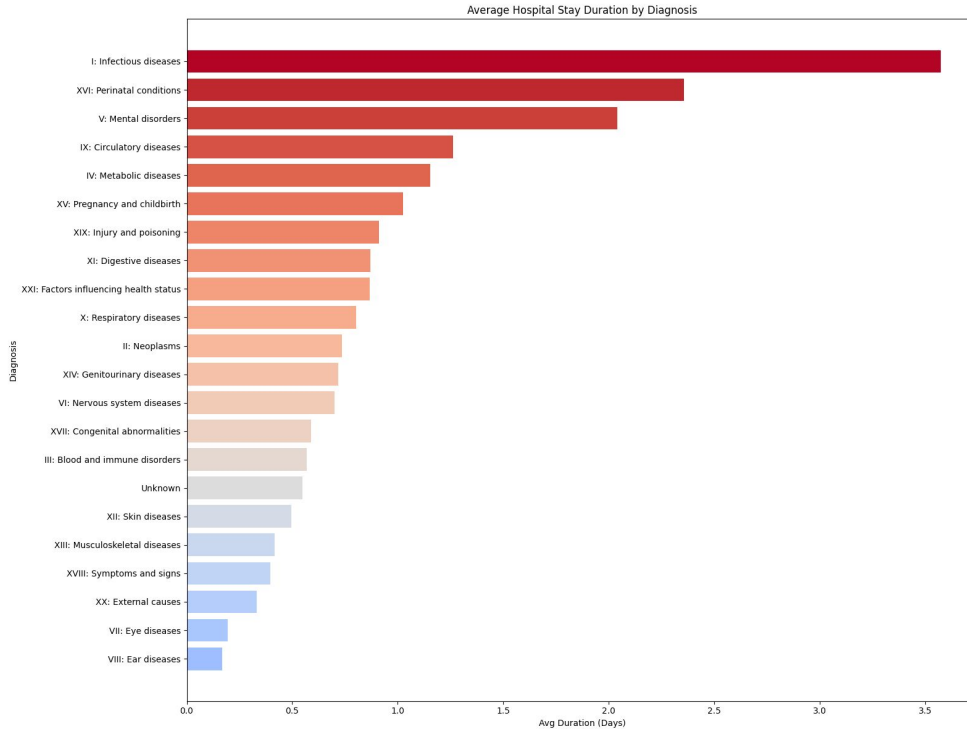
Non-flu Season



Odds ratio: 0.97, $p < 0.001$

Log-link Gamma GLM

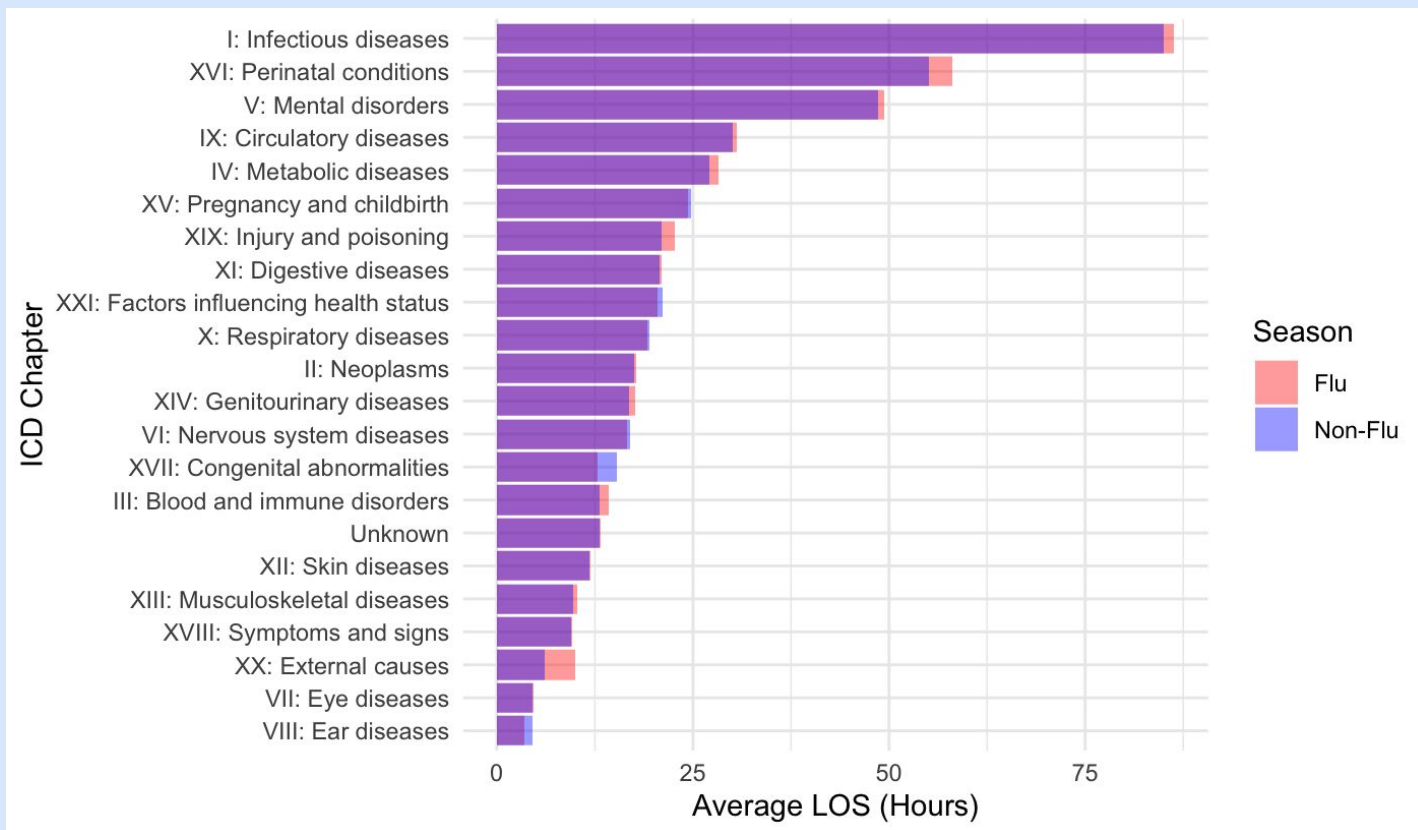
How does Diagnosis affect LOS?



Diagnosis	Avg Length of Stay (Hours)
I: Infectious diseases	85.74
XVI: Perinatal conditions	56.57
V: Mental disorders	49
IX: Circulatory diseases	30.29
IV: Metabolic diseases	27.69
XV: Pregnancy and childbirth	24.59
XIX: Injury and poisoning	21.84
XI: Digestive diseases	20.86
XXI: Factors influencing health status	20.8
X: Respiratory diseases	19.3
II: Neoplasms	17.64
XIV: Genitourinary diseases	17.23
VI: Nervous system diseases	16.84
XVII: Congenital abnormalities	14.15
III: Blood and immune disorders	13.68
Unknown	13.14
XII: Skin diseases	11.89
XIII: Musculoskeletal diseases	10.02
XVIII: Symptoms and signs	9.52
XX: External causes	7.95
VII: Eye diseases	4.64
VIII: Ear diseases	4.03

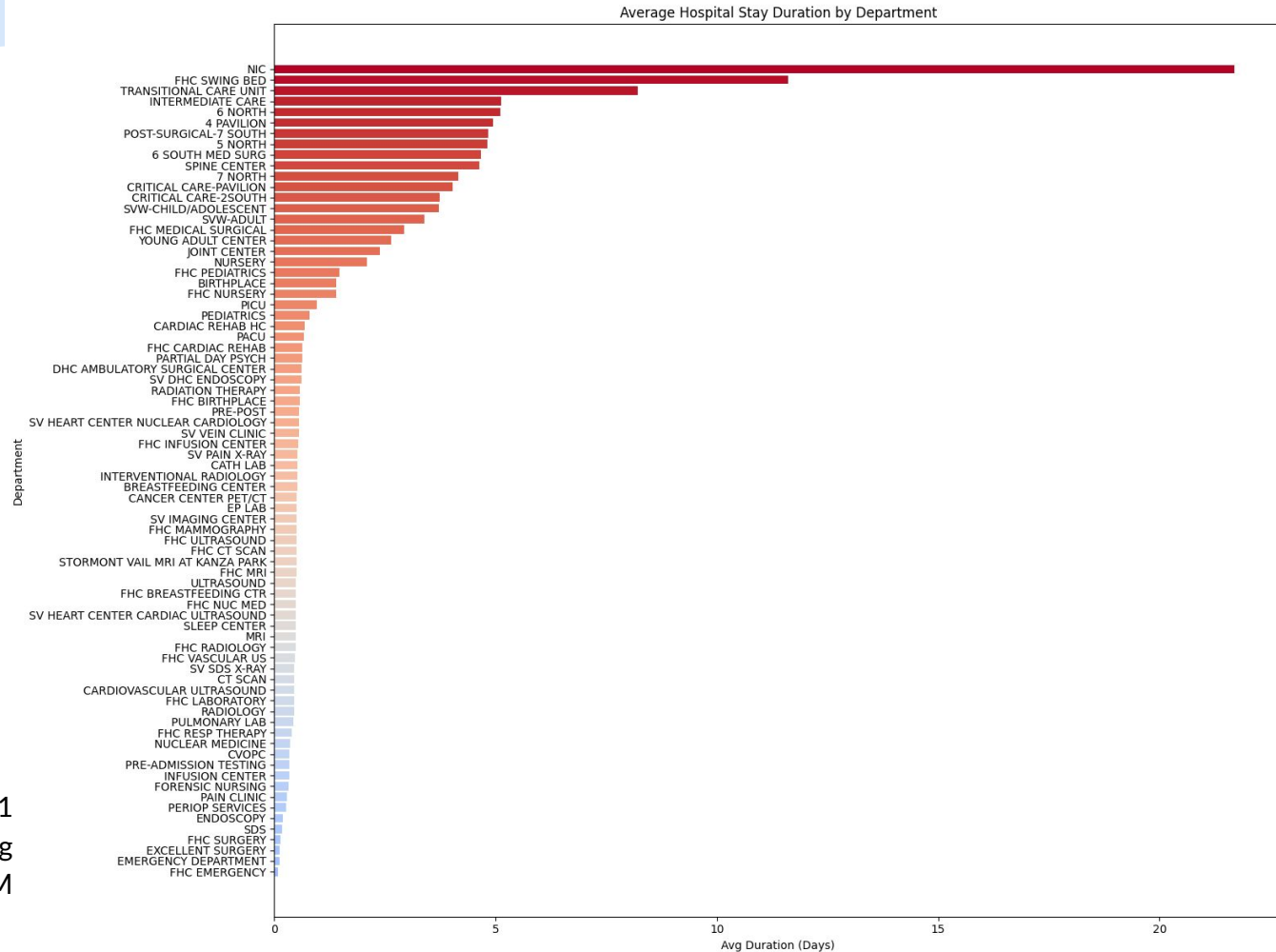
$p < 0.001$
 Analysis of Deviance using
 Log-link Gamma GLM

Diagnosis, Seasonality, and LOS

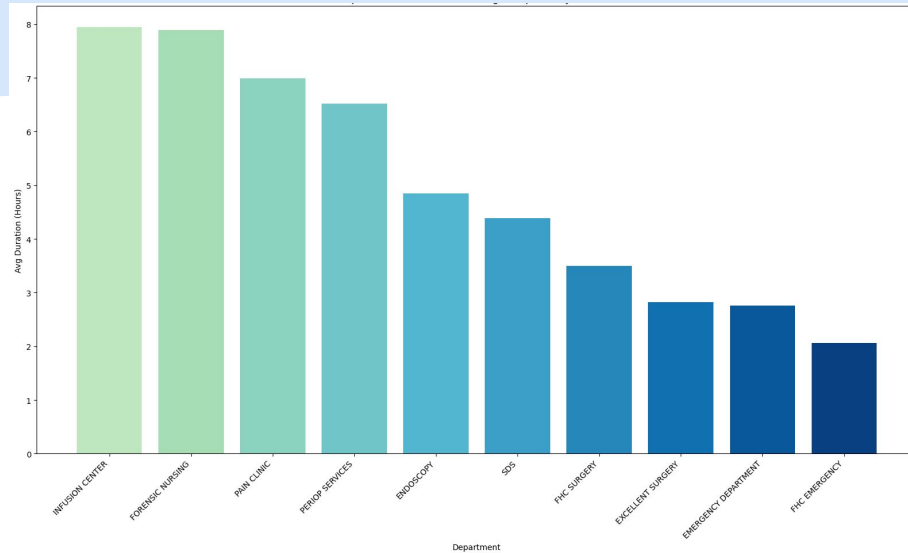
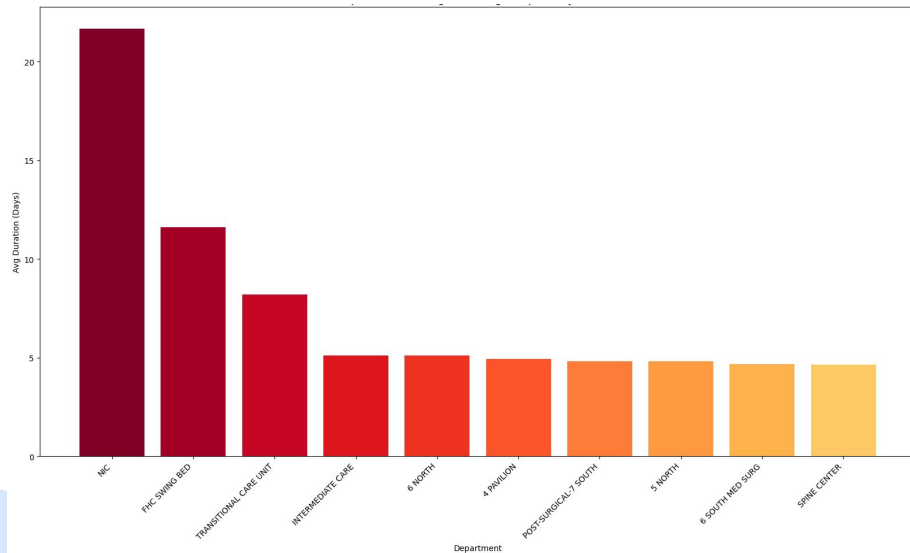


How does department affect LOS?

$p < 0.001$
Analysis of Deviance using
Log-link Gamma GLM

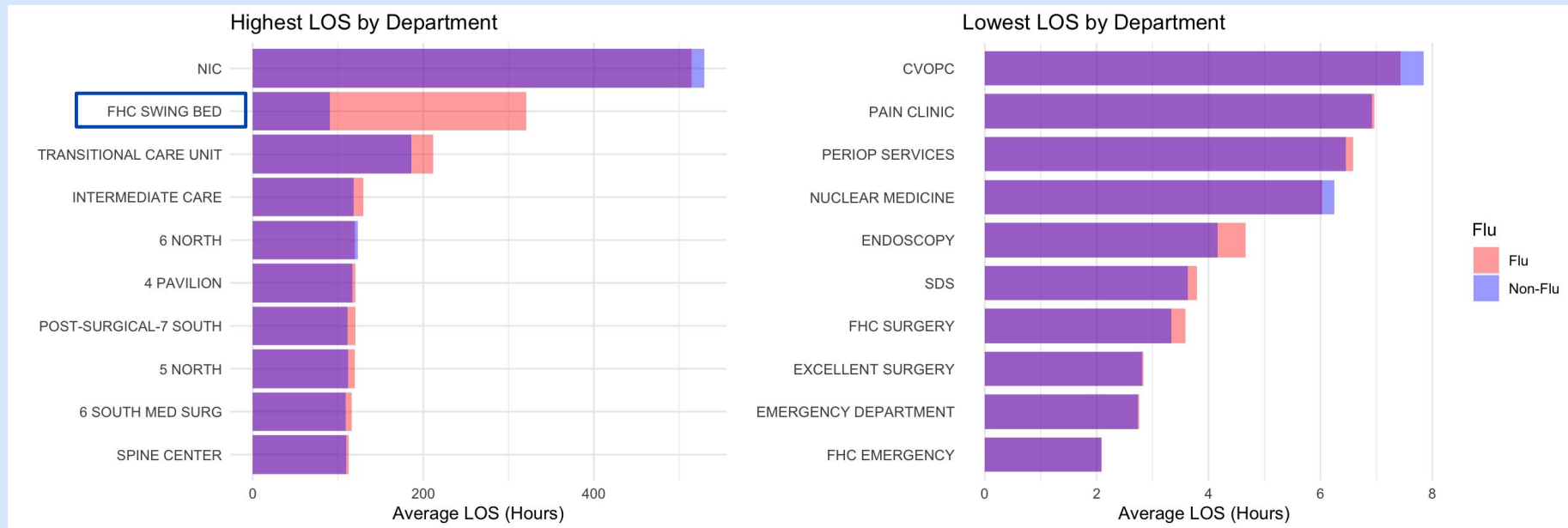


Departments With Highest Average LOS (in days)



Departments With Lowest Average LOS (in hours)

Department, Seasonality, and LOS



Predictive Models



R ²		Top 5 Features
Model		
Random Forest	0.4172	IsInpatientAdmission, DepartmentKey, AdmitMinute, AdmitDay, AdmitHour
Linear Regression	0.3507	AdmissionSource_Born Outside of this Hospital, AdmissionSource_Federal Hospital, AdmissionSource_TRANSFER FROM ACUTE TO SDU-MEDICARE ONLY, AdmissionSource_Born Outside this Hospital, AdmissionSource_ER VISIT FROM HOME
XGBoost	0.4716	IsInpatientAdmission, AdmissionType_Newborn, DepartmentKey, AdmissionSource_Born Inside this Hospital, IsEdVisit
Single Decision Tree	0.4204	IsInpatientAdmission, DepartmentKey, AdmitHour, IsEdVisit, AdmitMinute

Our Findings!

- **Diagnosis, seasonal demand, and department are all significant predictors of LOS!**
- A patient's average LOS is more likely to increase during flu season
- LOS was elevated during the flu season for 15 out of 22 diagnosis groups
- FHC Swing Bed department has a substantial increase in LOS during flu season