

# Measuring Empiric Antibiotic Spectrum Patterns Across Space and Time

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Background:

Humans are creatures of habit

Study Question:

When and where are empiric antibiotic choices broadest?

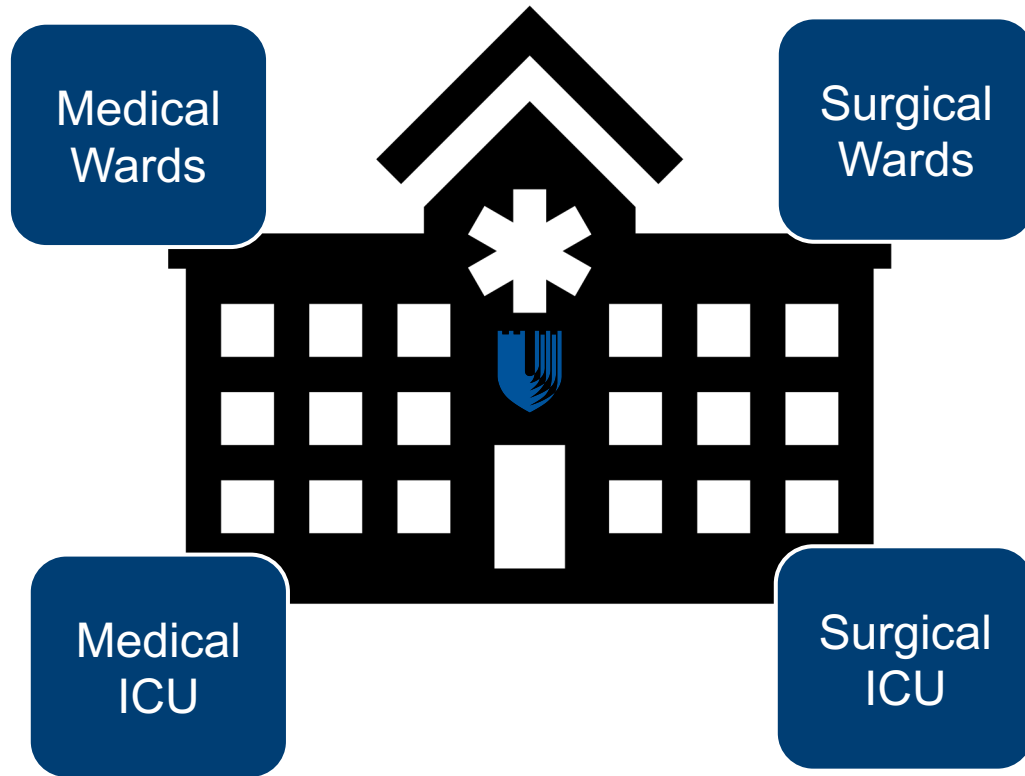
Hypothesis:

Empiric antibiotic use patterns are influenced by the spatial and temporal context of initial order placement

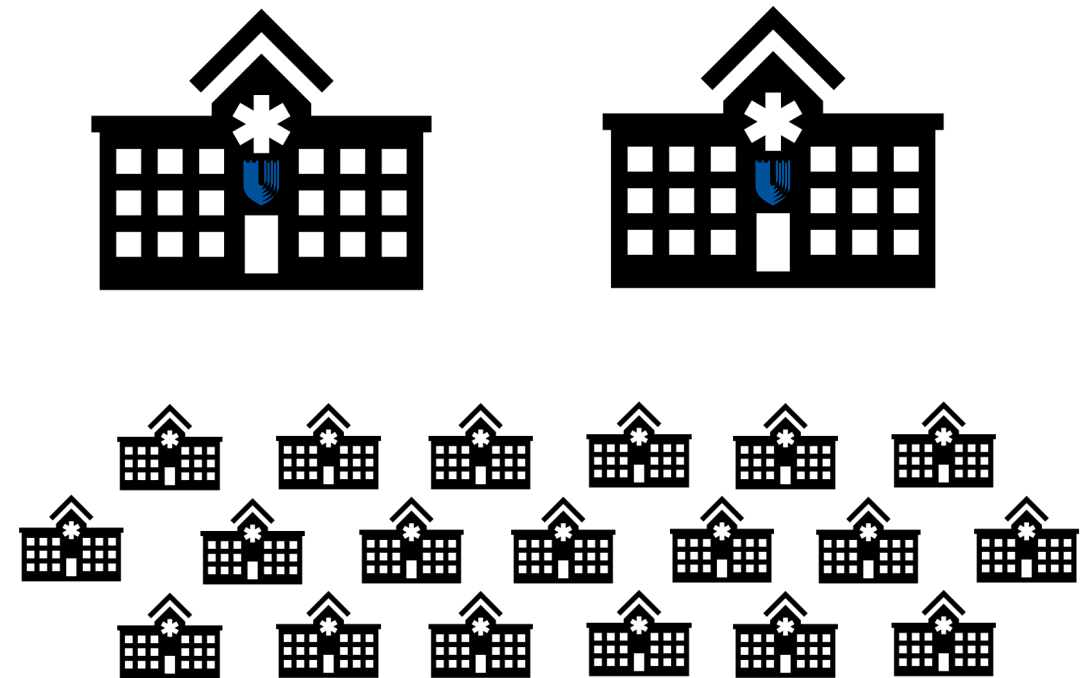


# “Space”

## Academic Medical Center



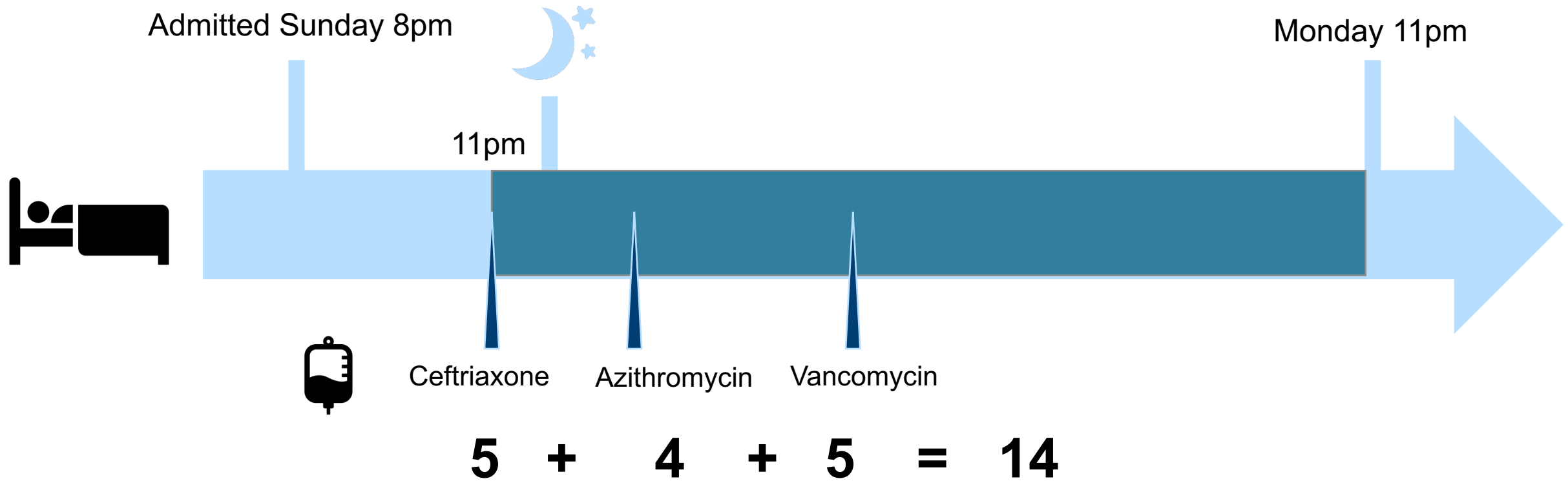
## Community Hospitals



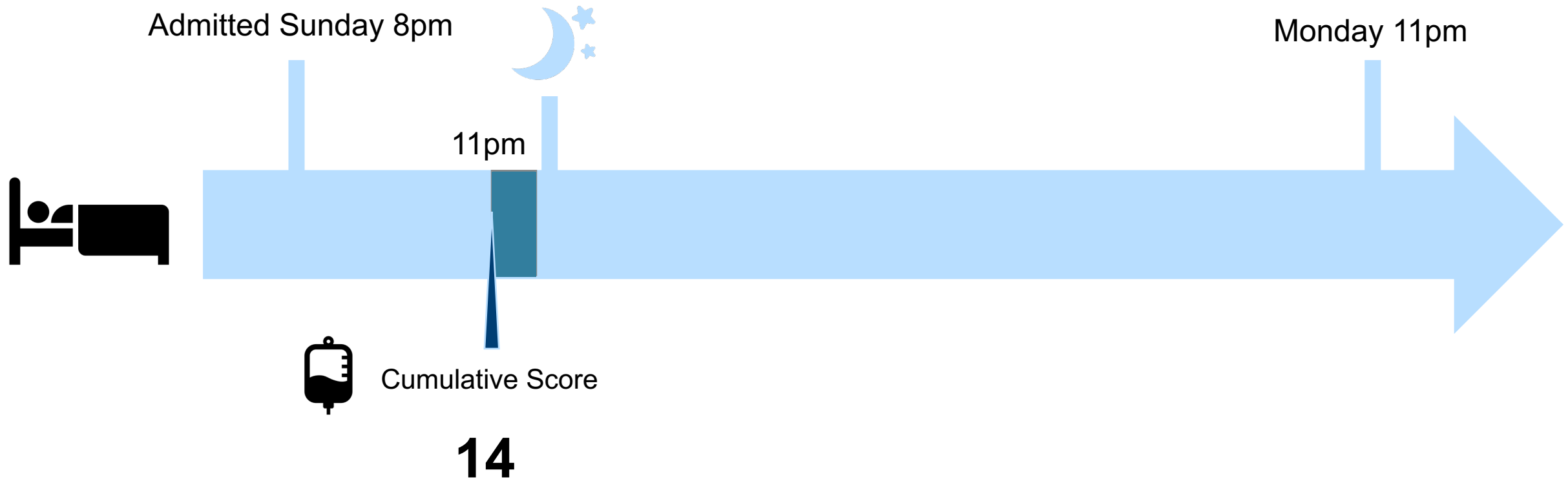
dason



# “Time”



# “Time”



# Methods – Scoring

11: Tigecycline

9: Ertapenem

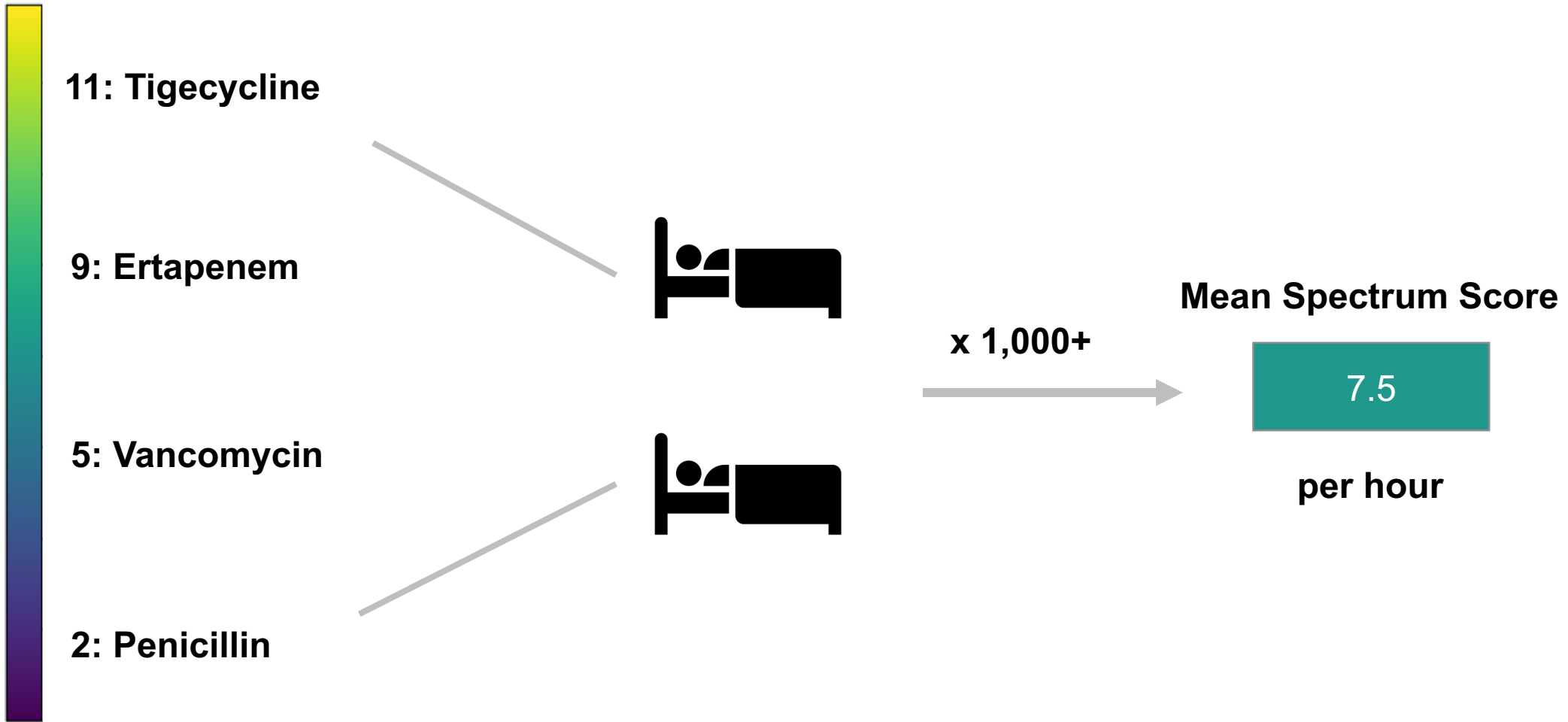
5: Vancomycin

2: Penicillin

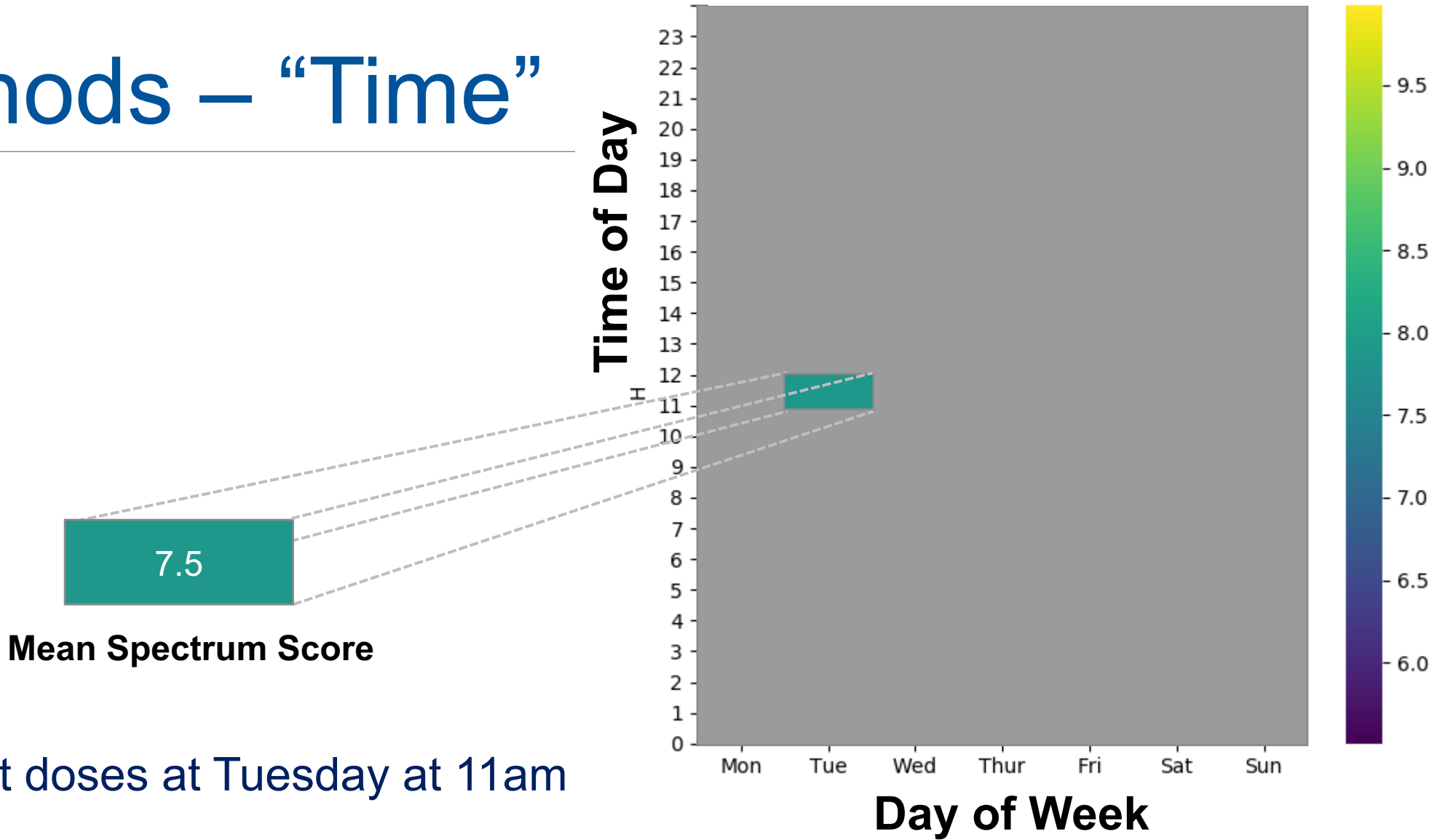
**Antibiotic Spectrum Index<sup>1</sup>:** Cumulative score with 1 point for each categories

Spectrum Categories	
MSSA	Pseudomonas
Enterococcus	MRSA
Anaerobes	Pen-resistant Strep pneumo
Bacteroides Fragilis	VRE
Moraxella/Haemophilus	Atypical
E. coli/Klebsiella	MDRO
Enterobacter/Serratia/Citrobacter	ESBL





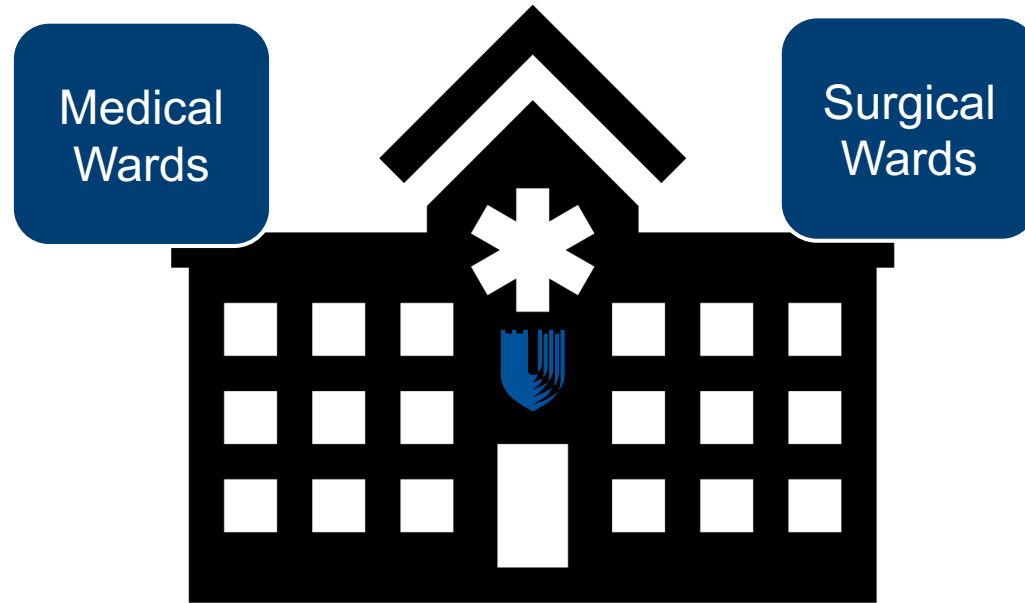
# Methods – “Time”



e.g. All first doses at Tuesday at 11am



# Results



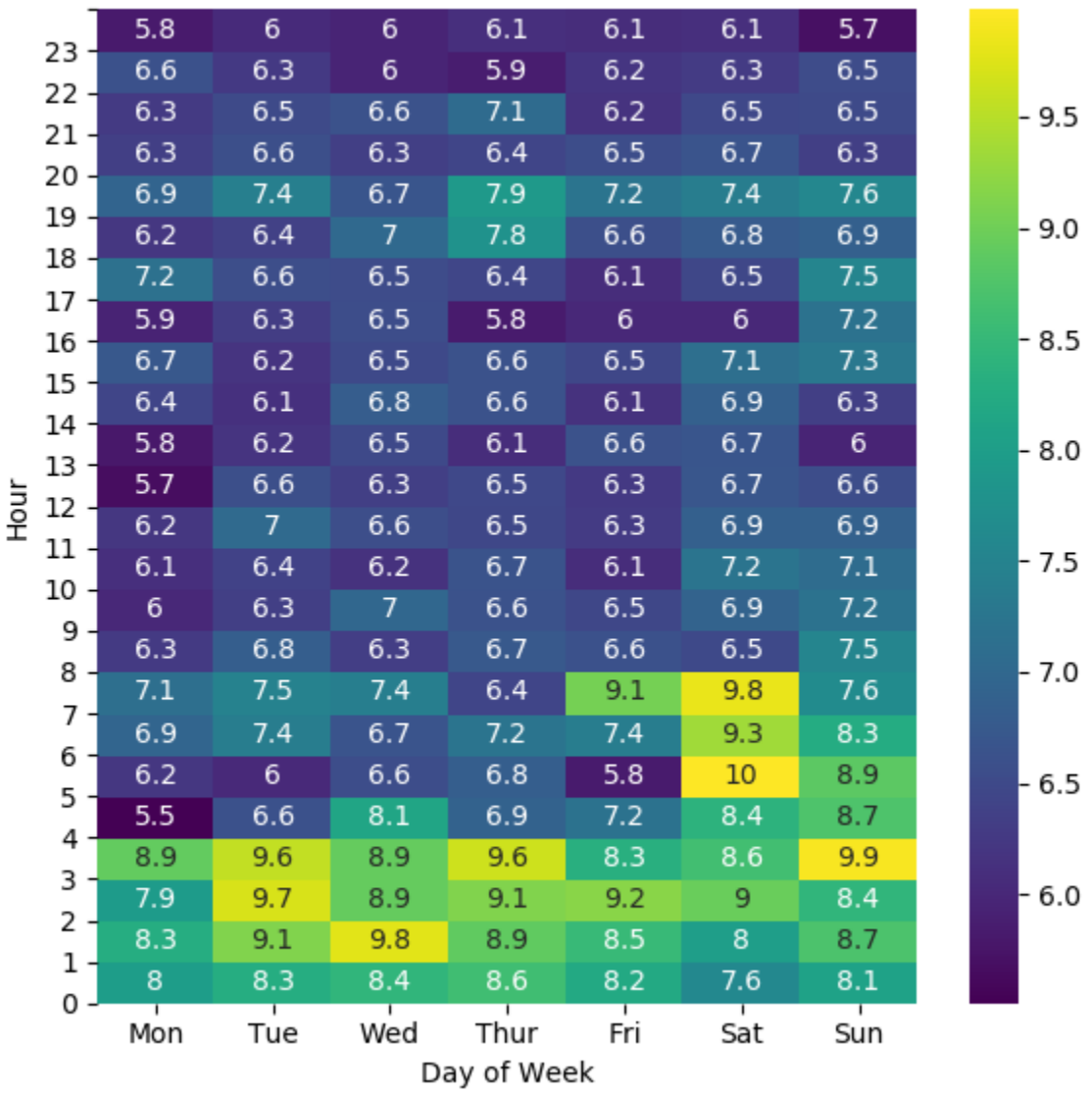
7/1/2014 – 7/1/2019

~47,000 unique admissions

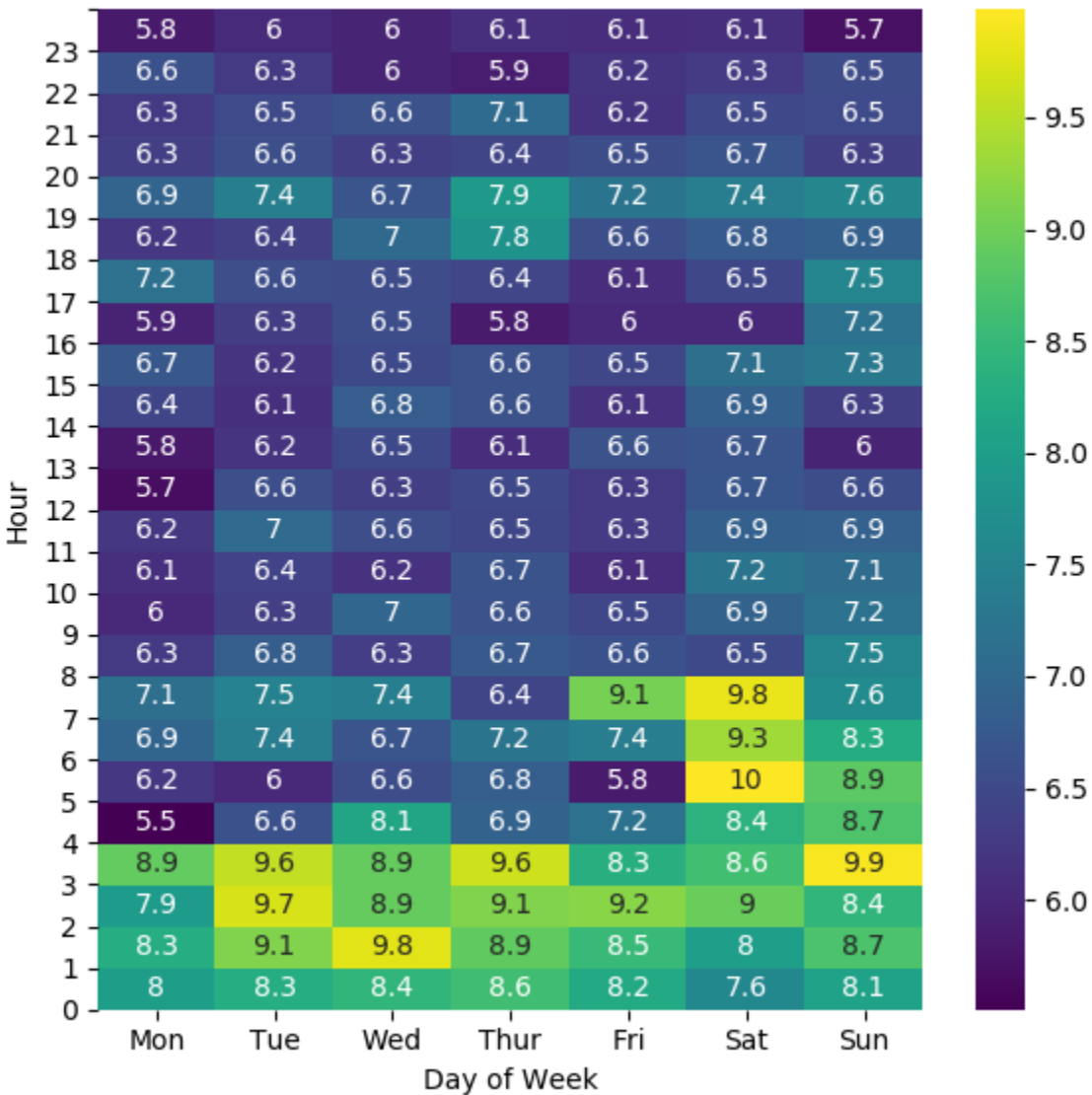


Duke Center for  
Antimicrobial Stewardship  
and Infection Prevention

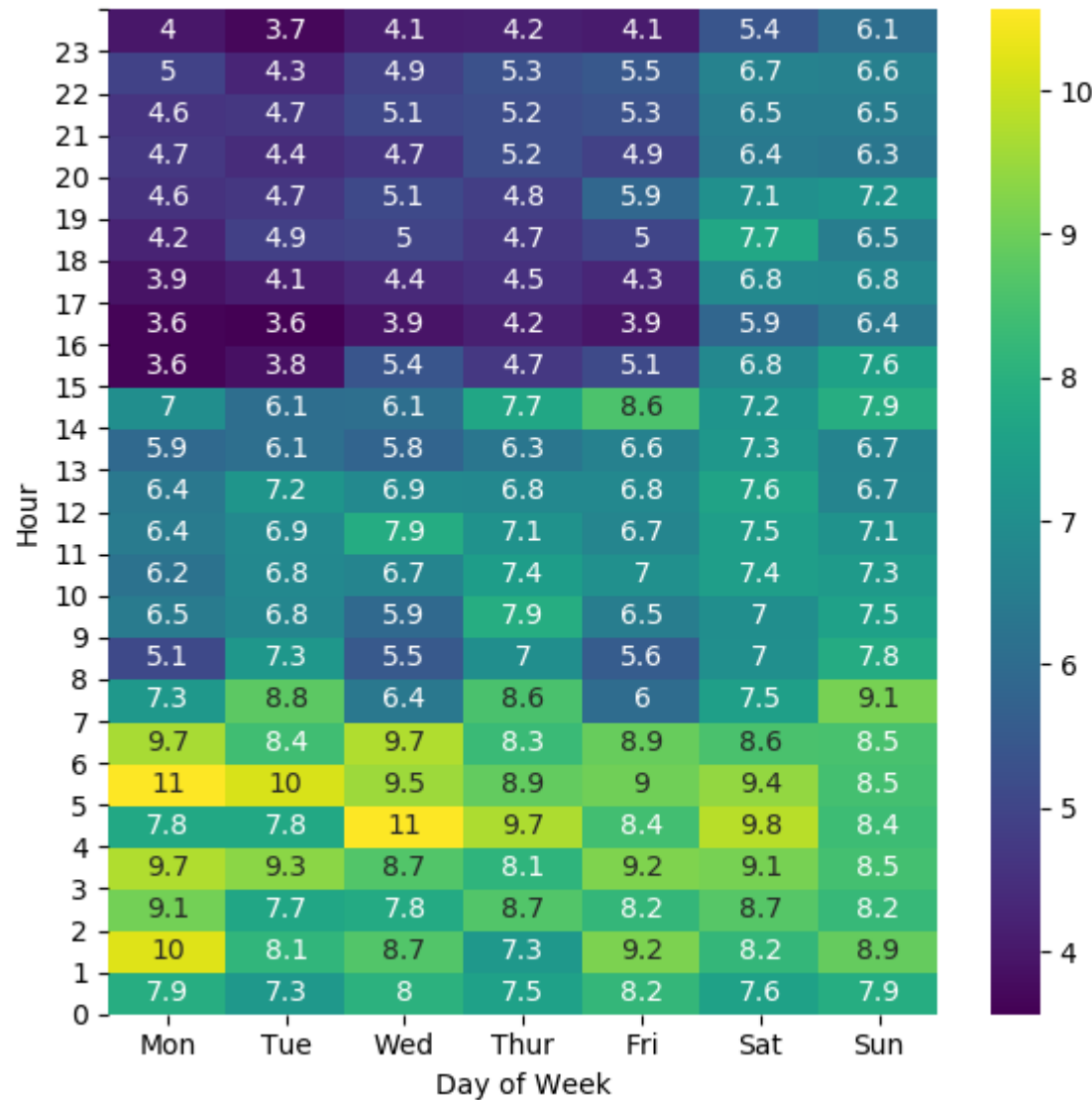
### Medical Ward, 24218 Admissions



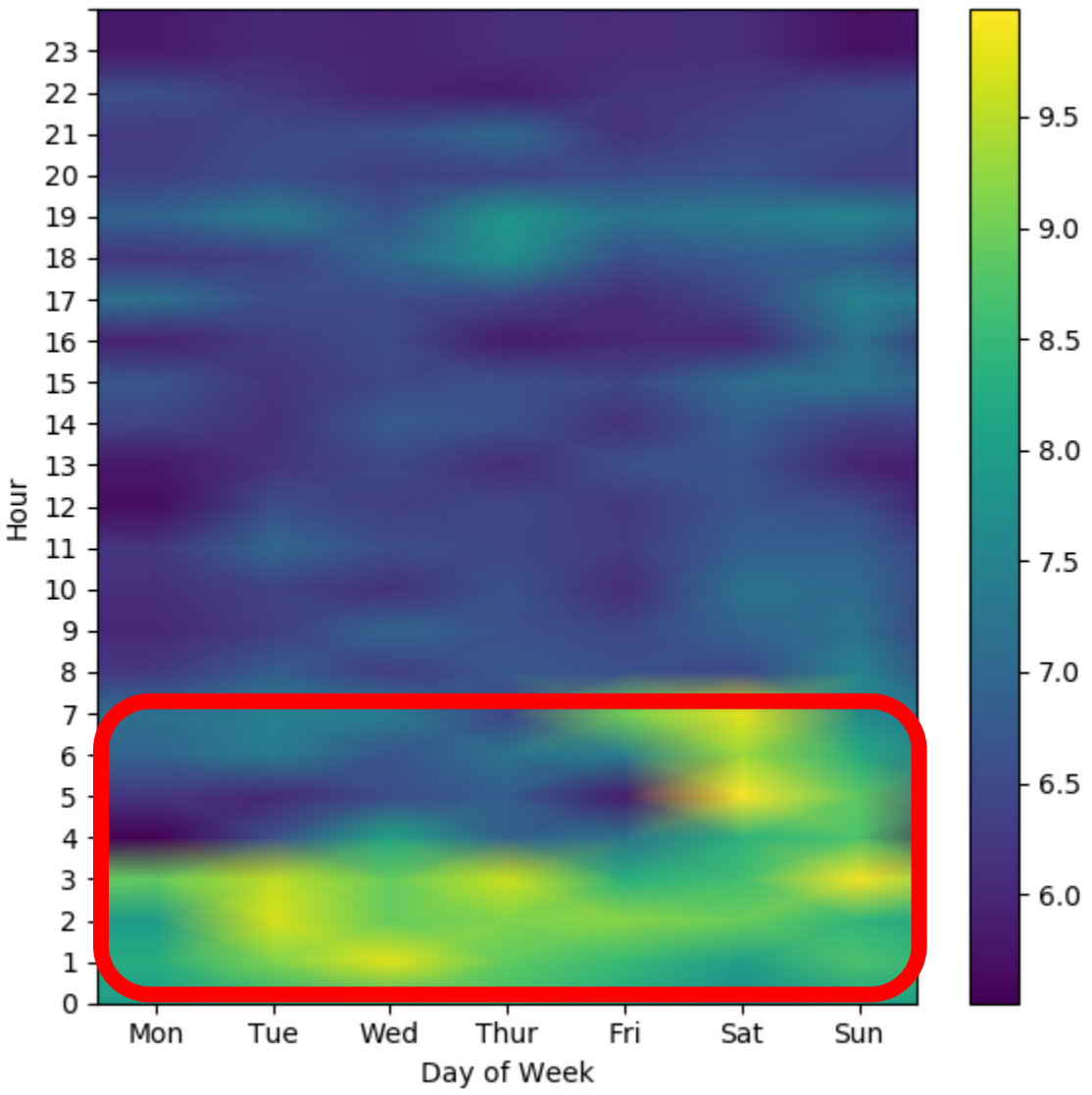
Medical Ward, 24218 Admissions



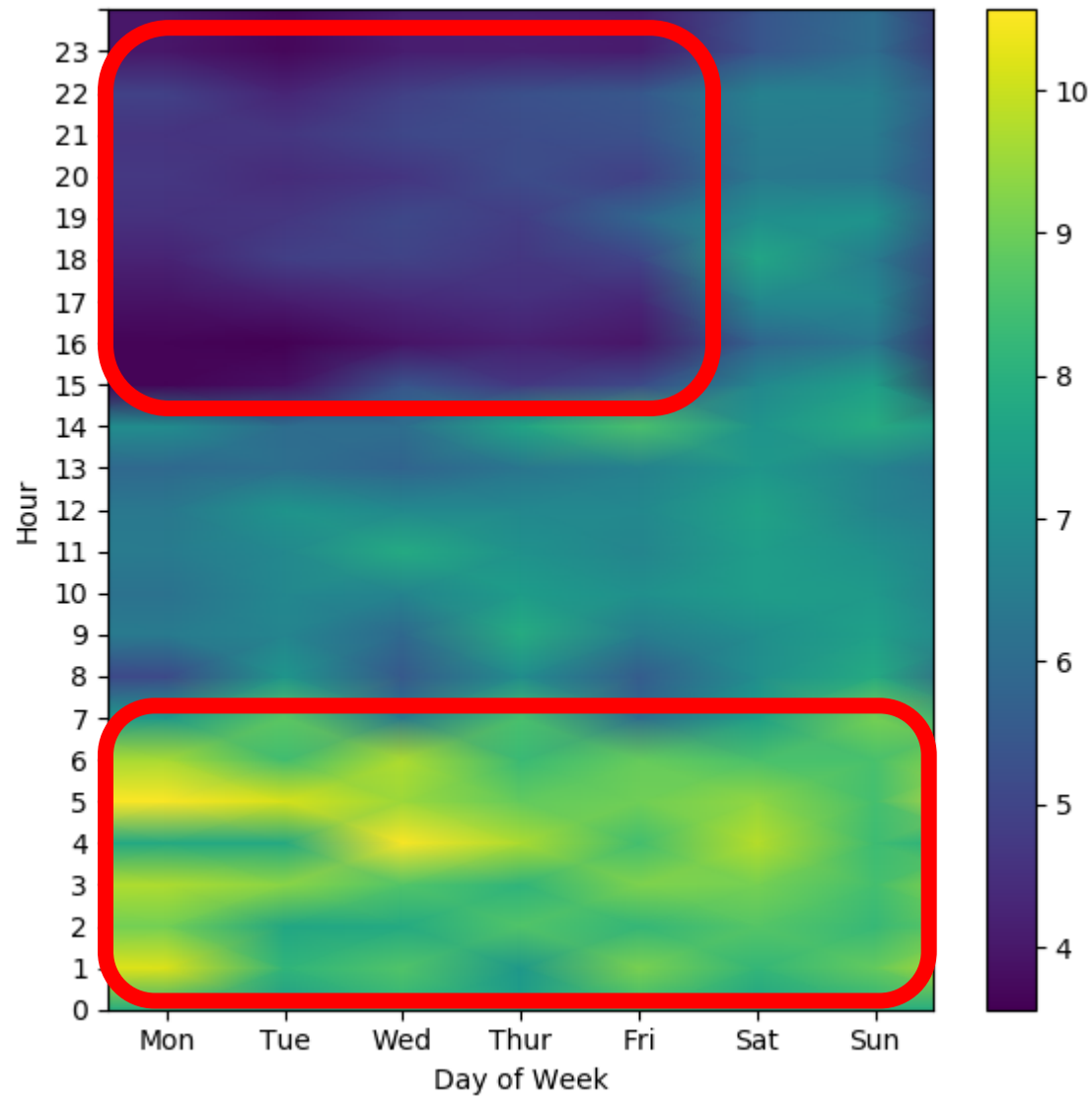
Surgical Ward, 23083 Admissions



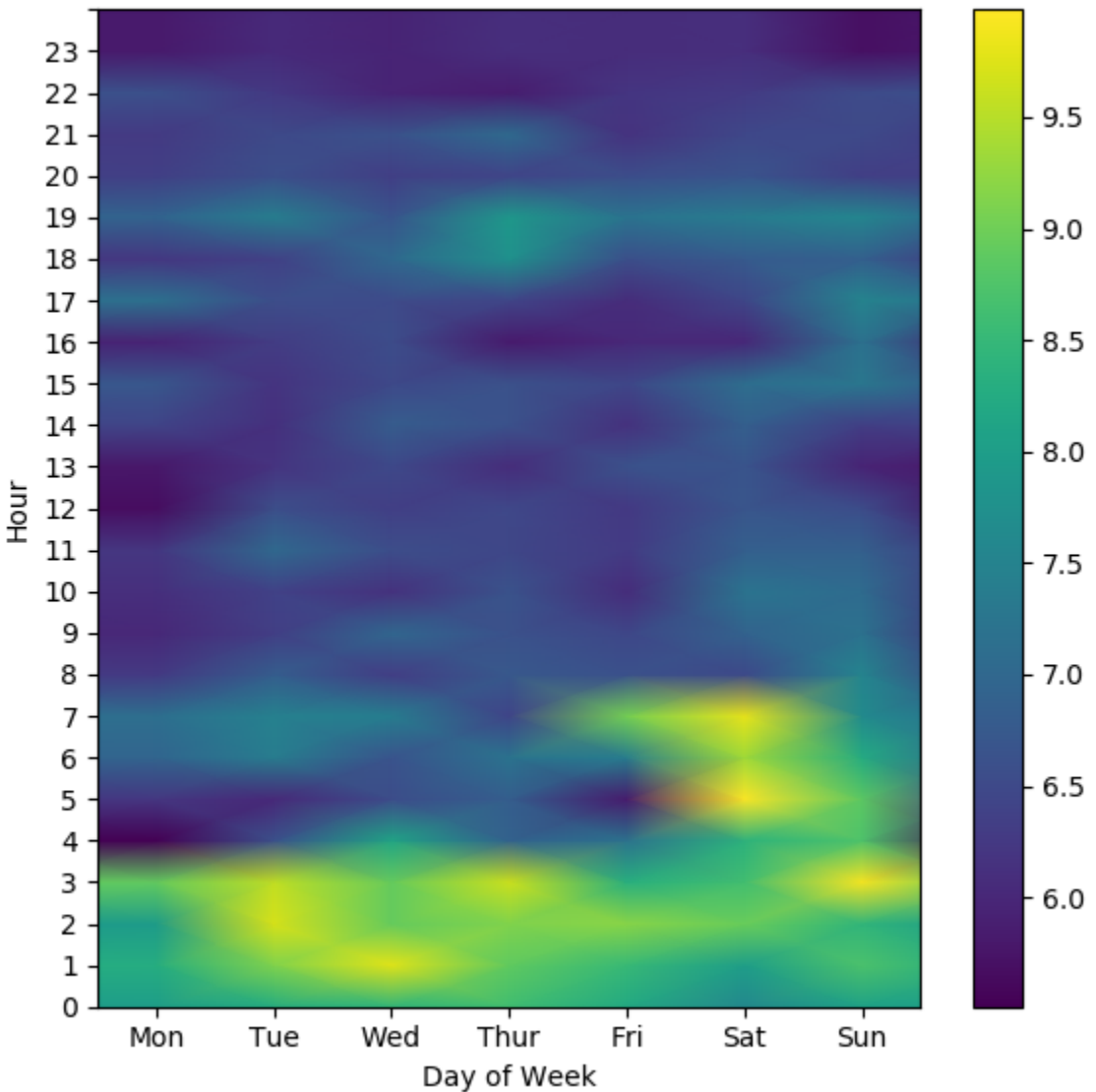
Medical Ward, 24218 Admissions



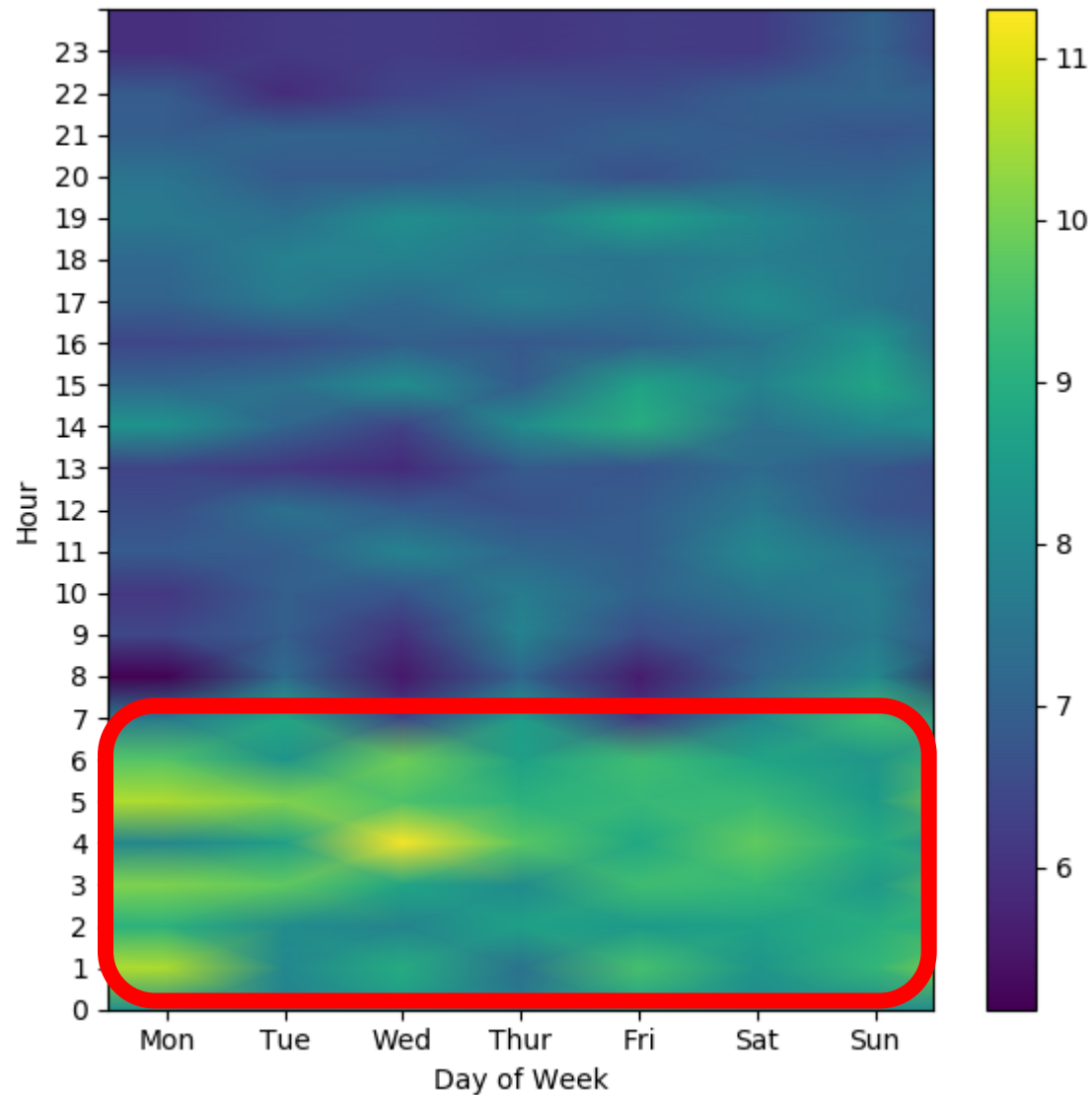
Surgical Ward, 23083 Admissions



Medical Ward, 24218 Admissions



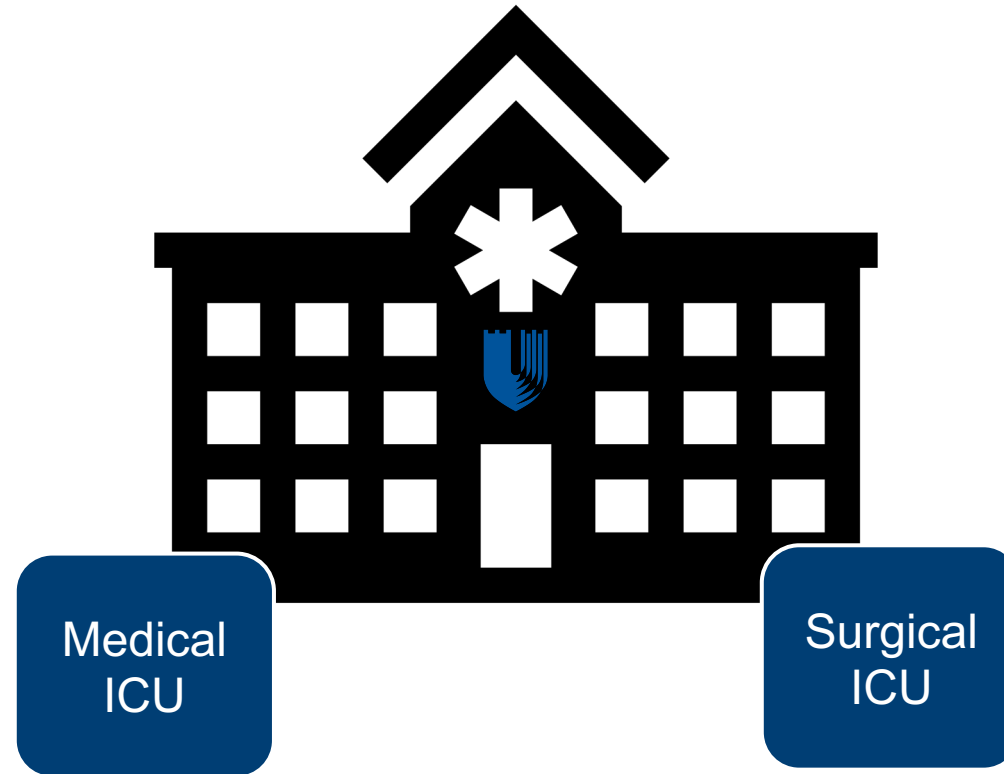
Surgical Ward, 14141 Admissions



Remove cefazolin doses



# Results

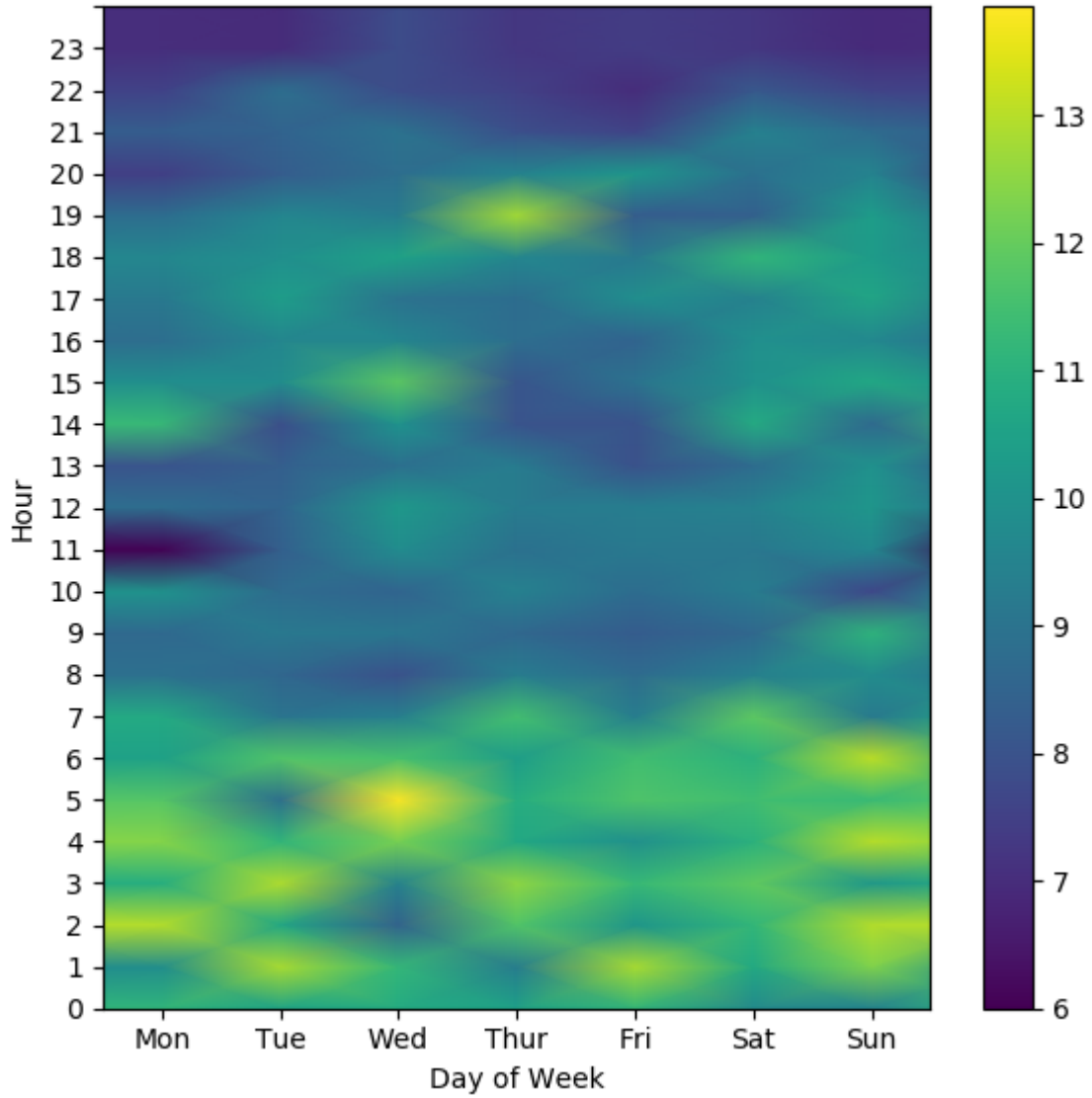


7/1/2014 – 7/1/2019

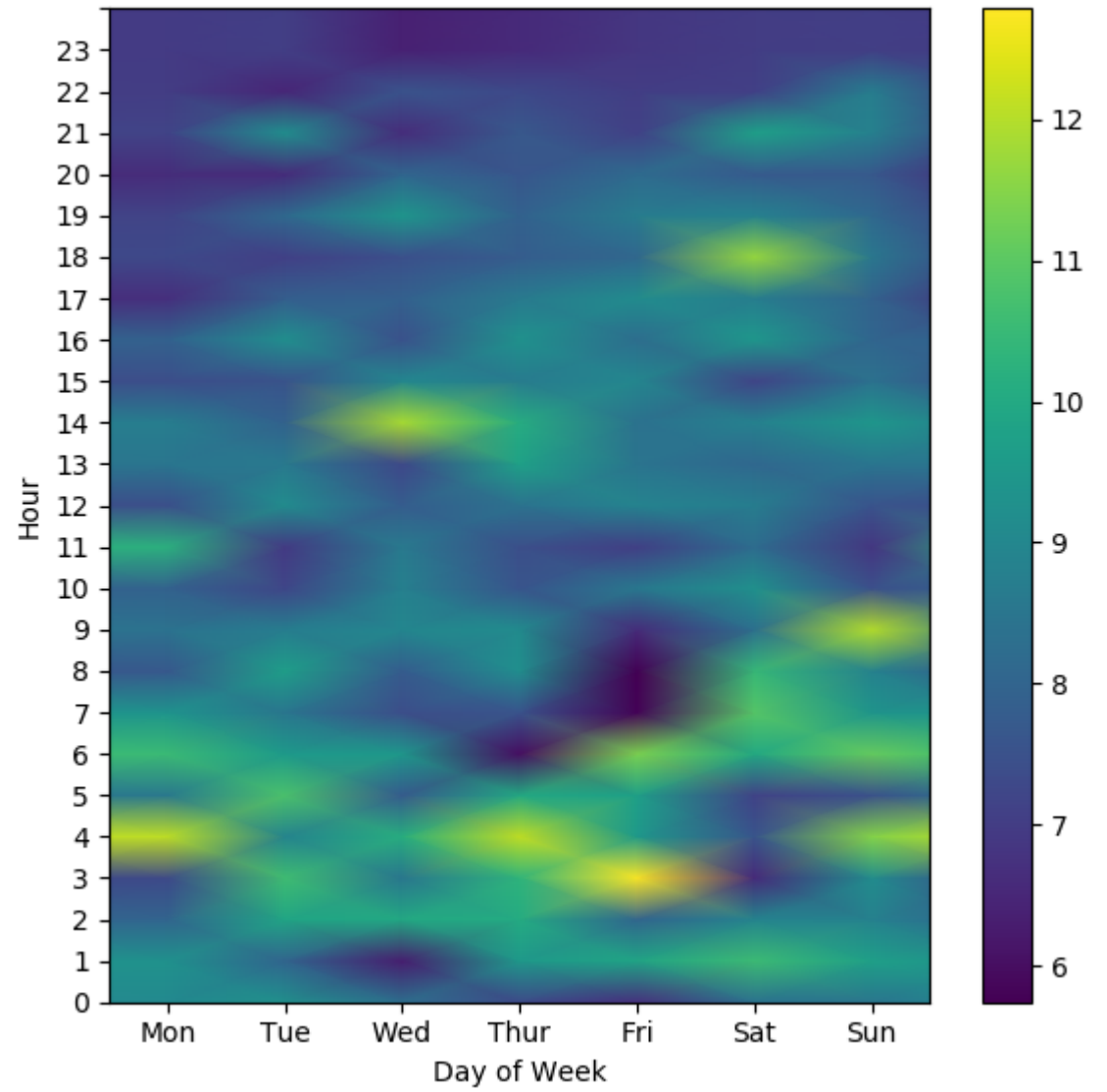
~13,000 unique admissions



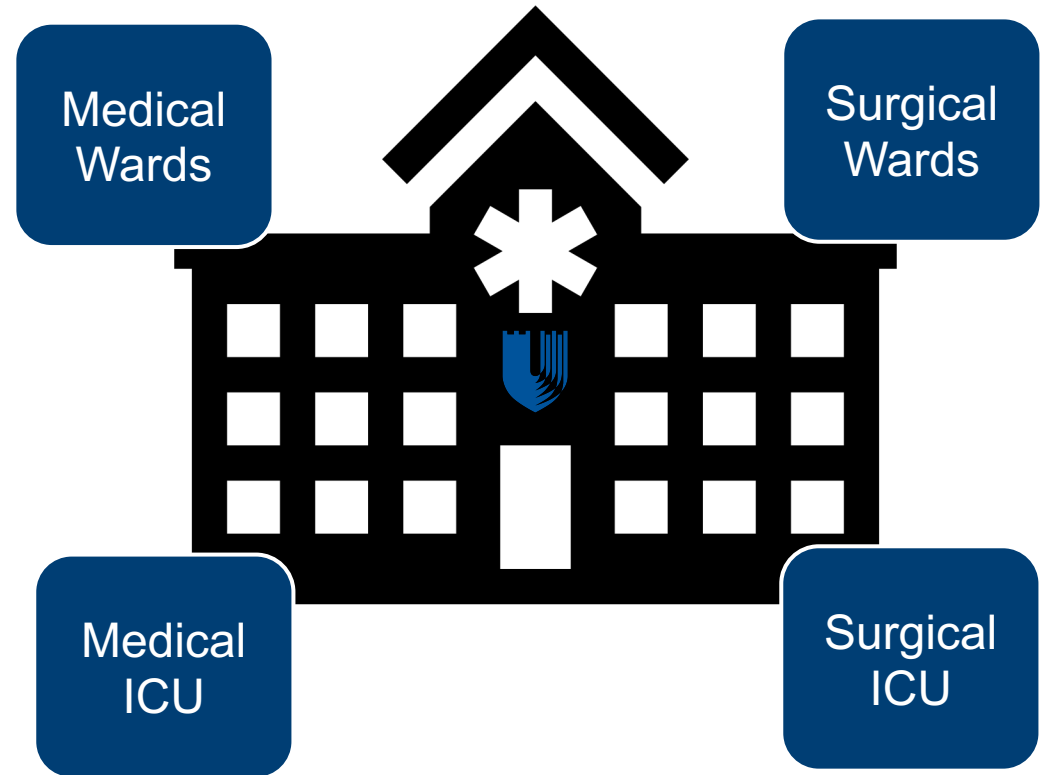
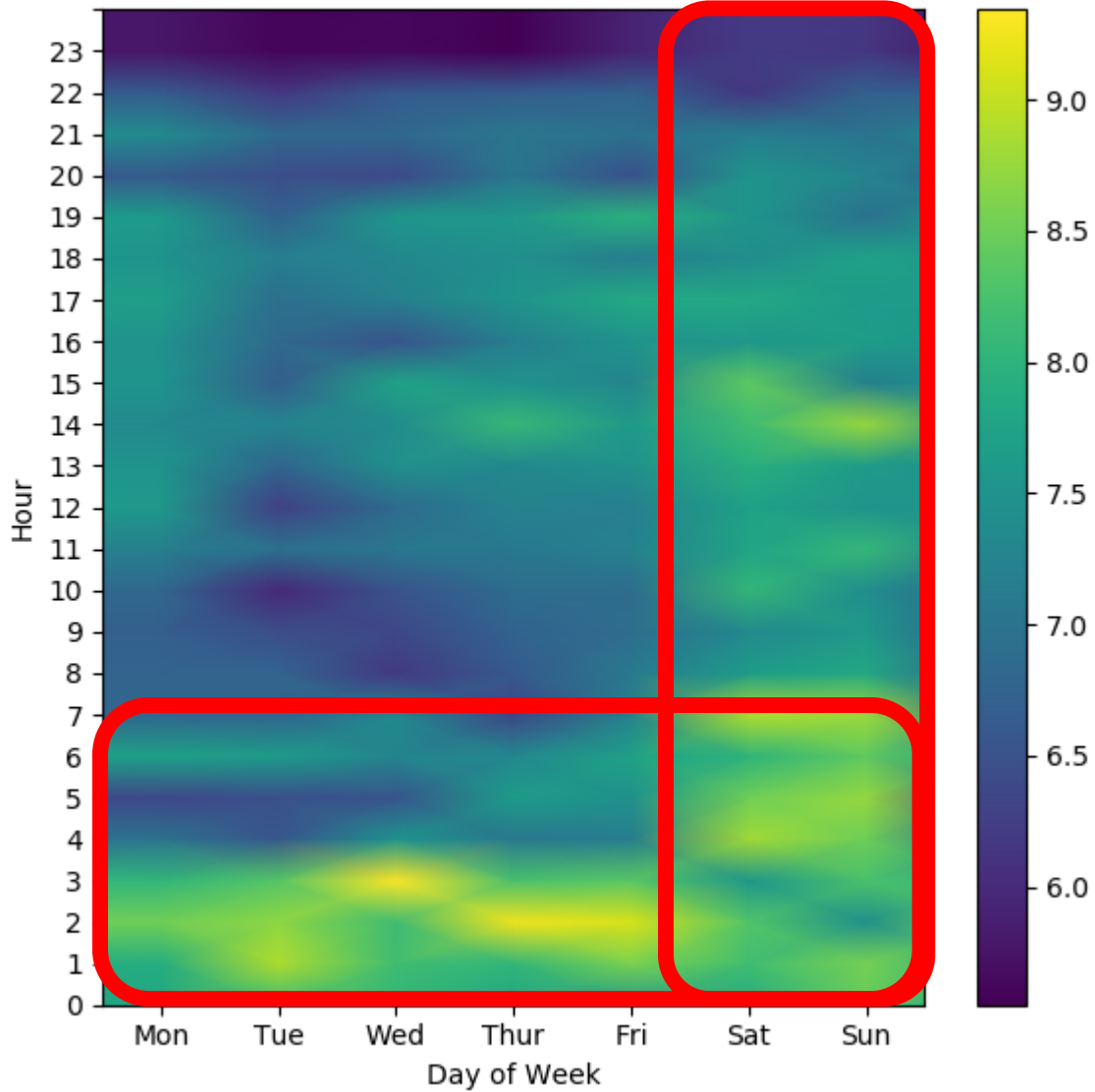
Medical Critical Care, 8674 Admissions



Surgical Critical Care, 4045 Admissions



Hospital Wide, 42506 Admissions

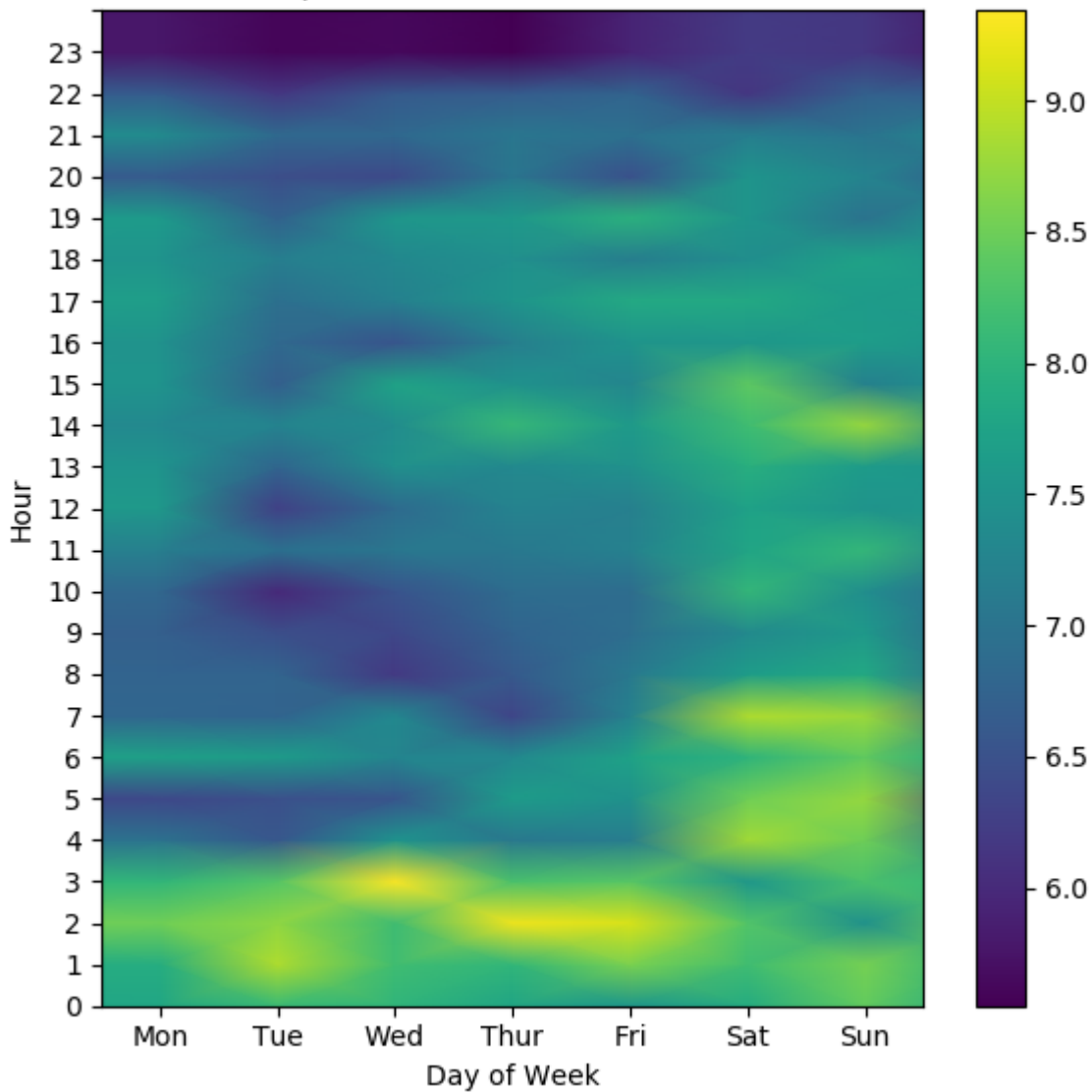


7/1/2018 – 7/1/2019

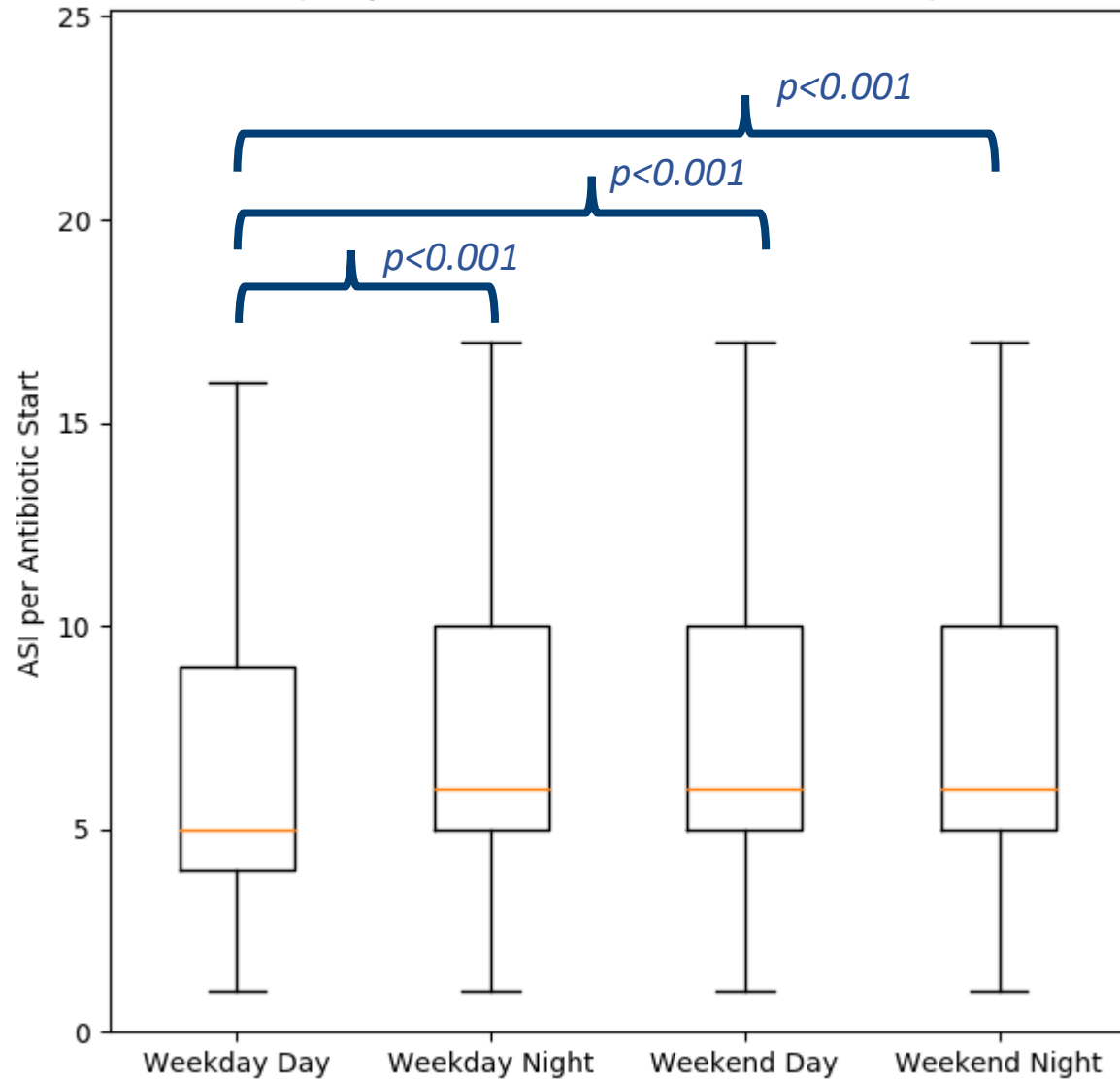
~42,000 unique admissions



Hospital Wide, 42506 Admissions

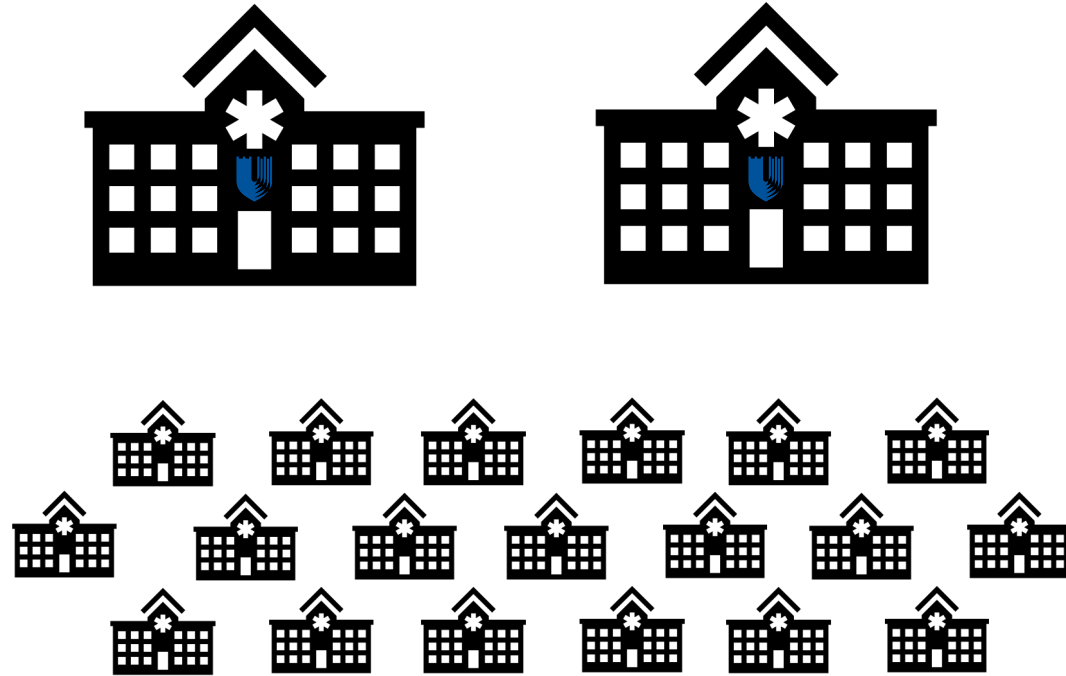


(Hospital-Wide, 42506 Antibiotic Starts)



# Results

## Community Hospitals



7/1/2018 – 7/1/2019

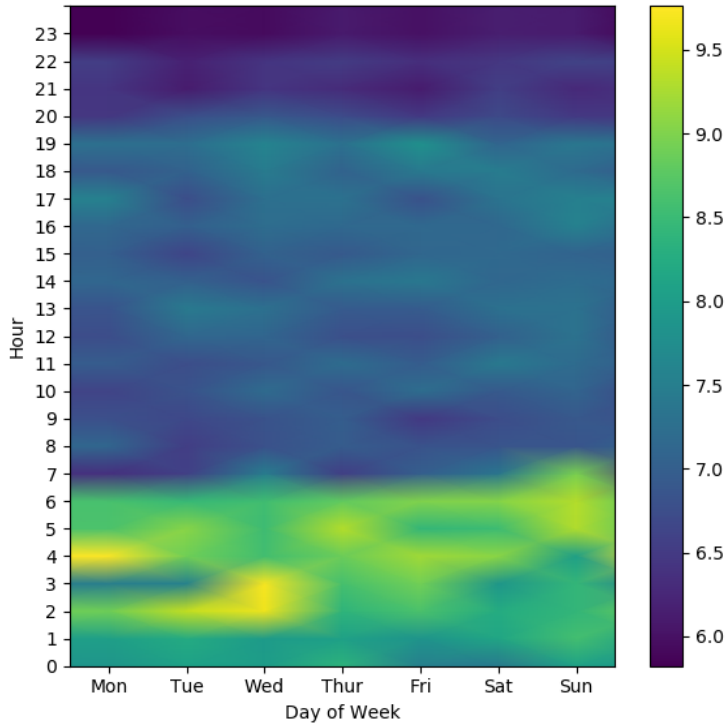
~87,000 unique admissions



# Community Hospitals

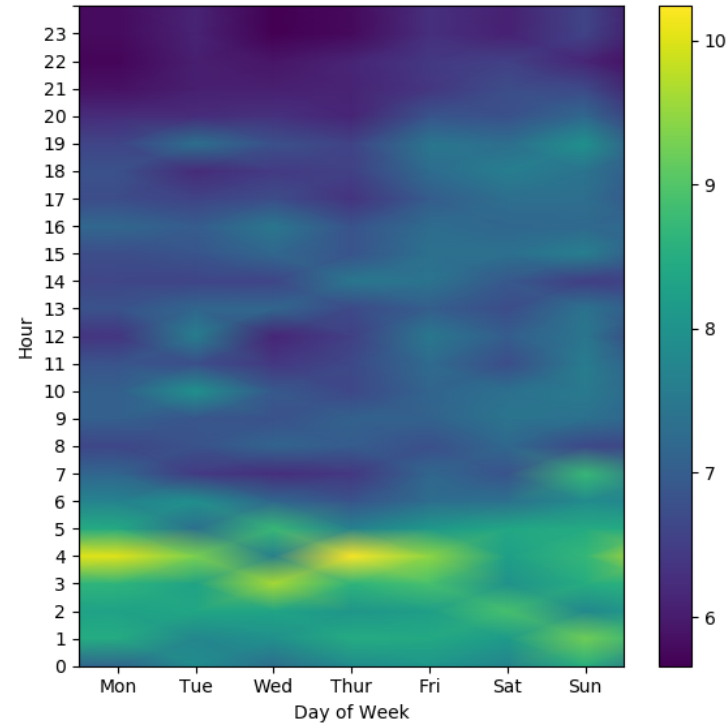
2 Duke Affiliated Hospitals  
24 Hospitals in DASON Network  
120 Hospital Units

## Medical Ward



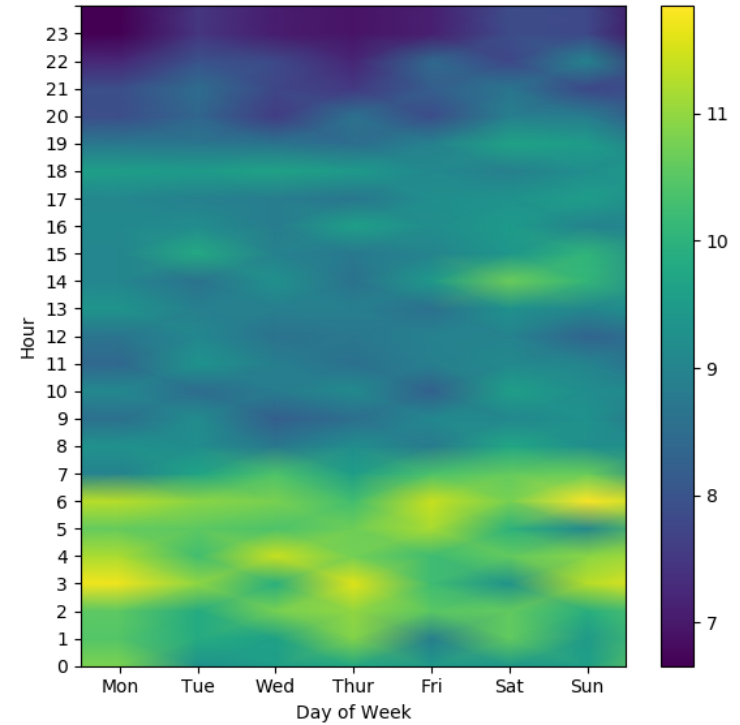
54 Units

## Surgical Ward



32 Units

## Med/Surg ICU



34 Units



# Limitations

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- **Electronic definitions are imperfect**
  - Prophylaxis doses are difficult to identify
  - Initial therapy may not be “empiric” and may instead be targeted
  - Bed transfer data makes ward specific antibiotic attribution difficult
  
- **Hypothesis generating, cannot identify causality**



# To Conclude Our Journey Through Space and Time

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- **When and Where:**

- Empiric antibiotic choices are broader on nights and weekends
- Conserved pattern between hospitals, medical, surgical wards
  - Less in medical ICU, not seen in surgical ICU

- **Next Questions:**

- **Why:** Limited access to procedures and decision support, sick vs. scheduled admissions, etc
- **Who:** Shift in personnel resources
- **How to change it?** (Or does it need to be changed?)



## **Bottom line:**

Nights and weekends remain potential opportunities for antibiotic stewardship efforts

