# ICU DYNAMICS
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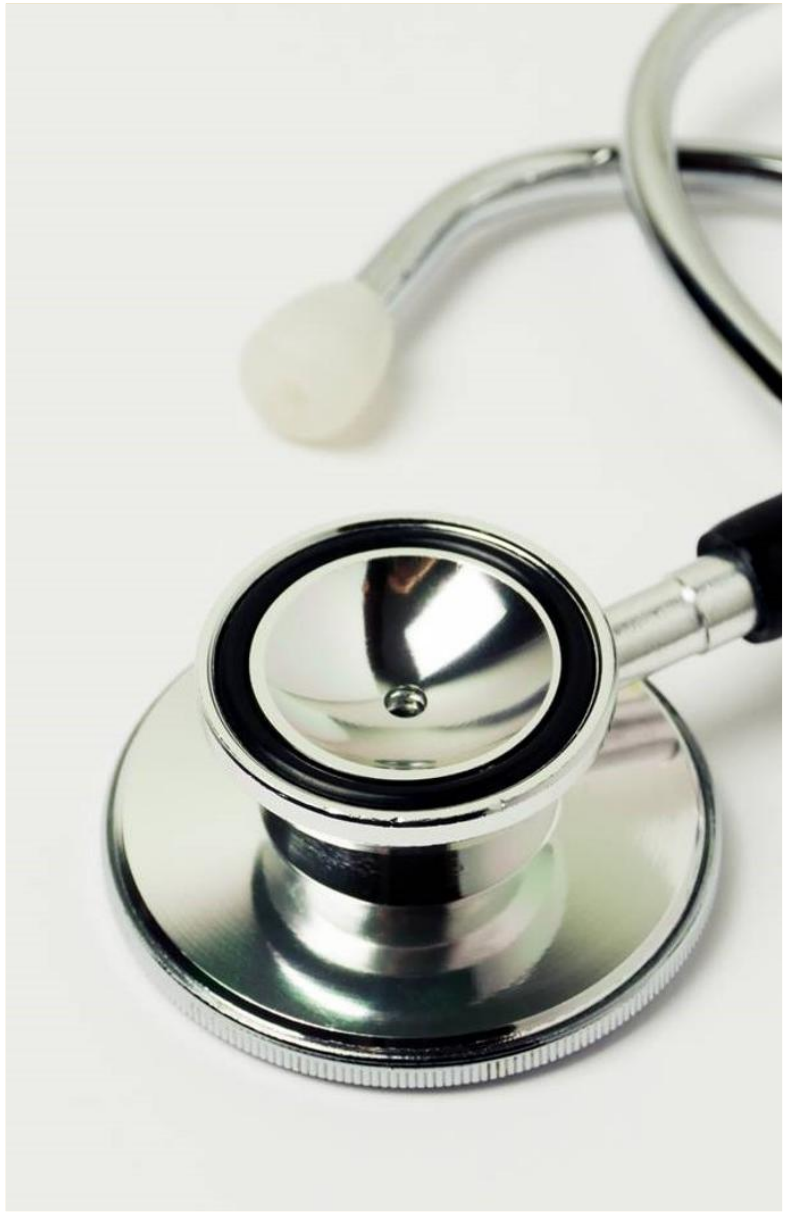
# AGENDA

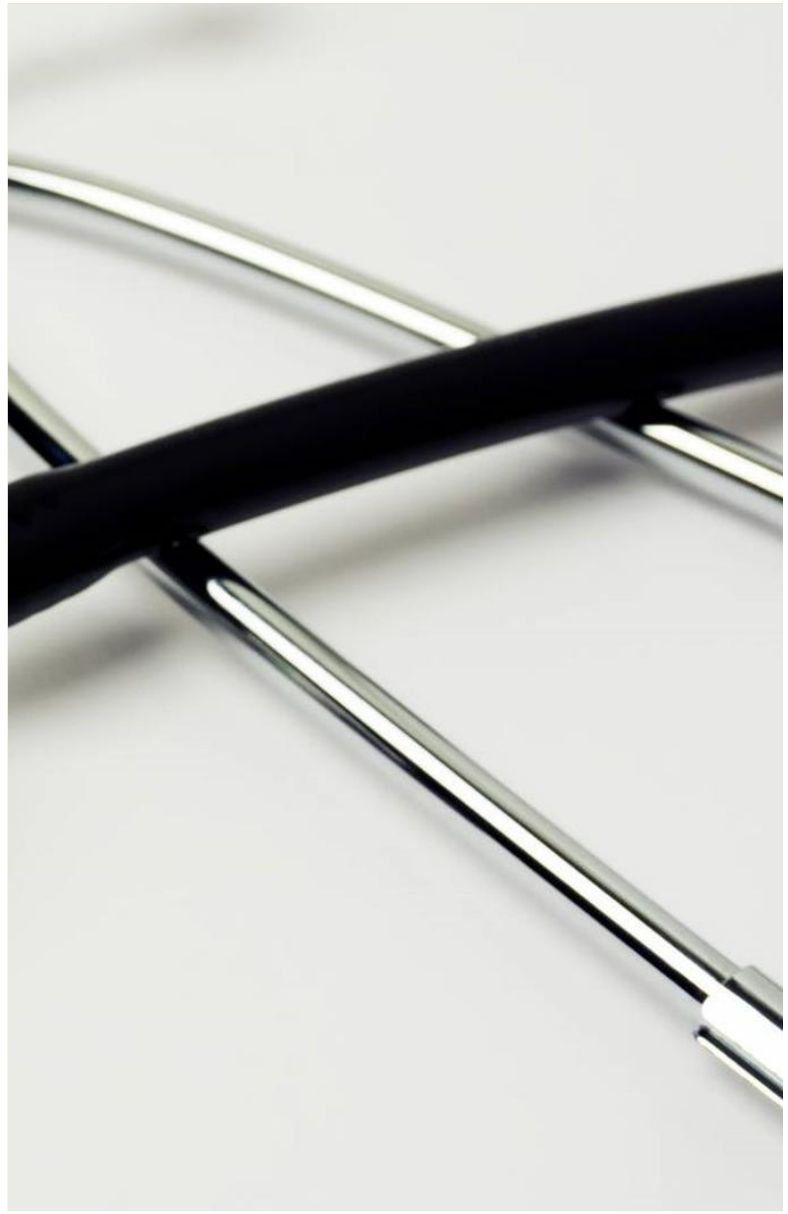
Frequency of ICU Visits

High freq

ICU Trends over 10 Years

Ward Progressions



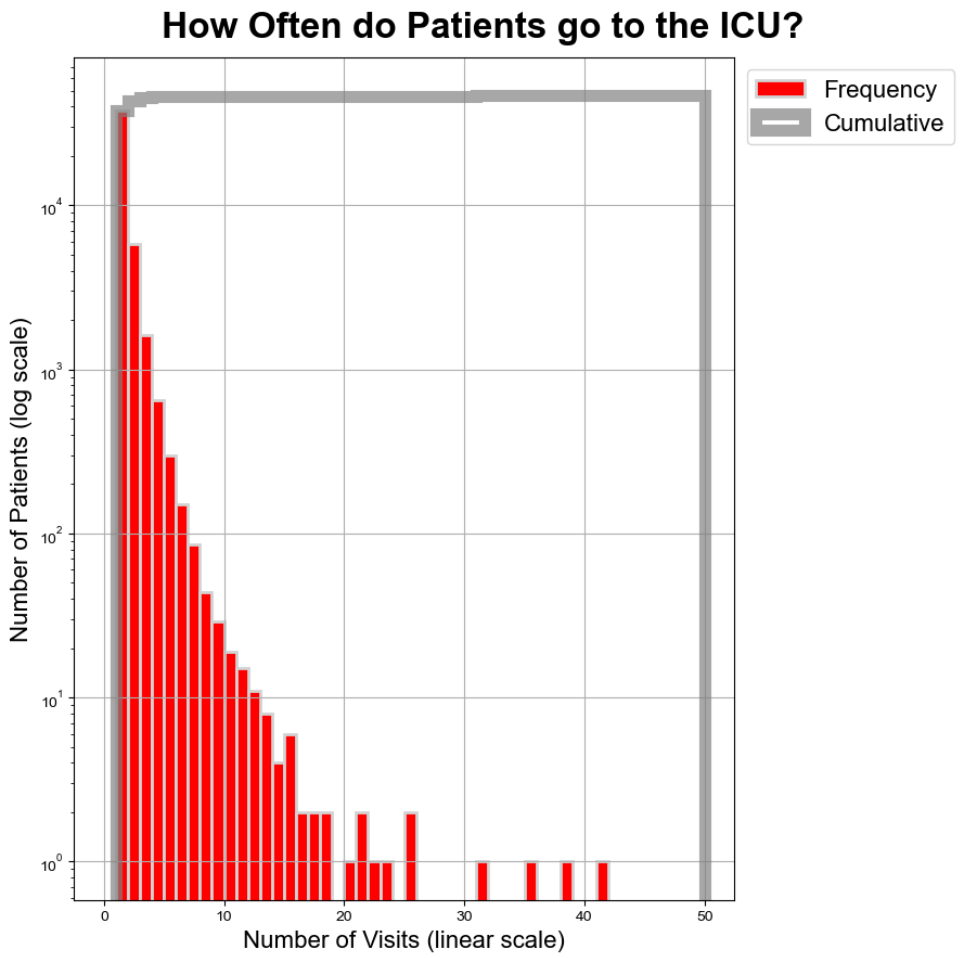


# INTENSIVE CARE UNIT VISITS

- Intensive Care Units are critical facilities to support effective healthcare
- We examine how often these resources are used by patients in the MIMIC III dataset
- After that evaluation, we will dig deeper into what happens with patients who visit ICU more frequently

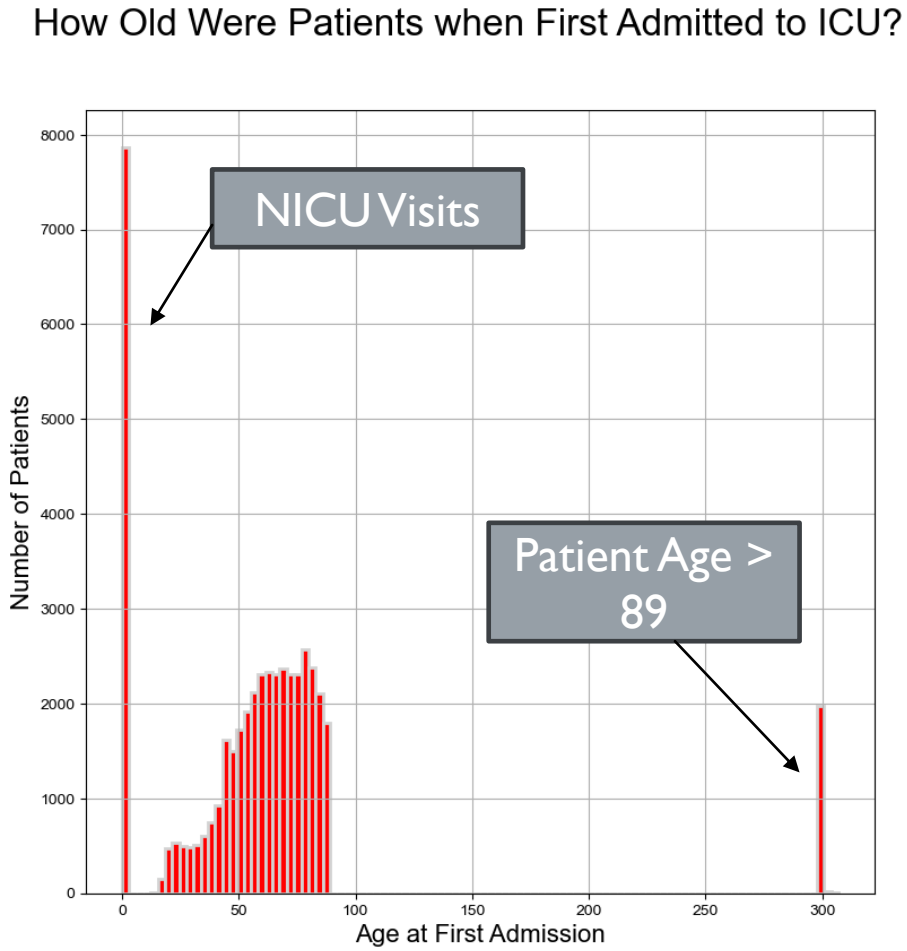
# ICU VISIT FREQUENCY

- We look at how often patients go to the ICU
- Of the patients who visit the ICU at least once, the majority only have 1 or 2 visits
- However, some patients have dozens of visits; we will examine patients who are visiting the ICU more than 10 times in the dataset



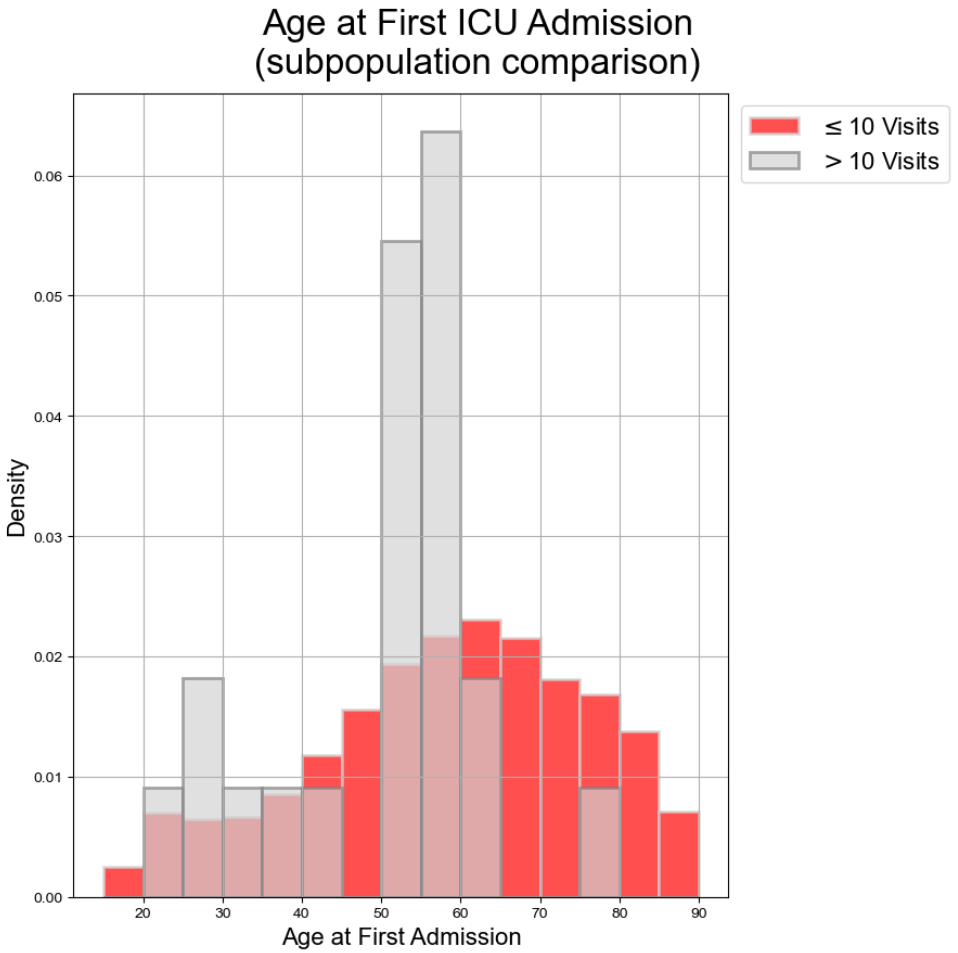
# AGE AT FIRST ADMISSION

- We look at the age of patients who went to the ICU had their first visit
- We see two spikes, one early in life and one at age 300:
  - The early in life visits are exclusively NICU visits
  - The age 300 are patients whose ages were greater than 89 and those were masked to help preserve anonymity



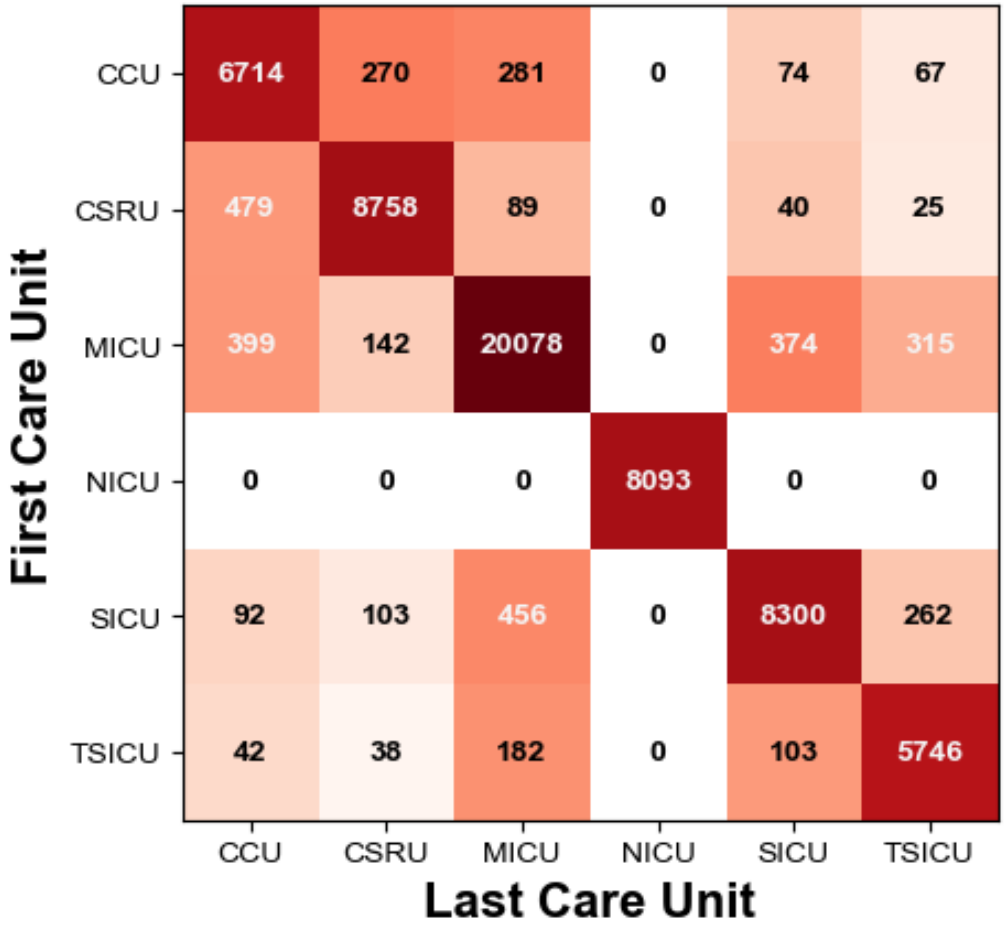
# AGE AT FIRST ADMISSION COMPARISON

- We are curious if there is a difference in age profiles between
- For this analysis, we ignore NICU visits and only look at patients who are still alive in the dataset
- We note some spikes in the 25–30-year-old, 50-55-, and 55–60-year-old bins



# SINGLE ICU PER VISIT?

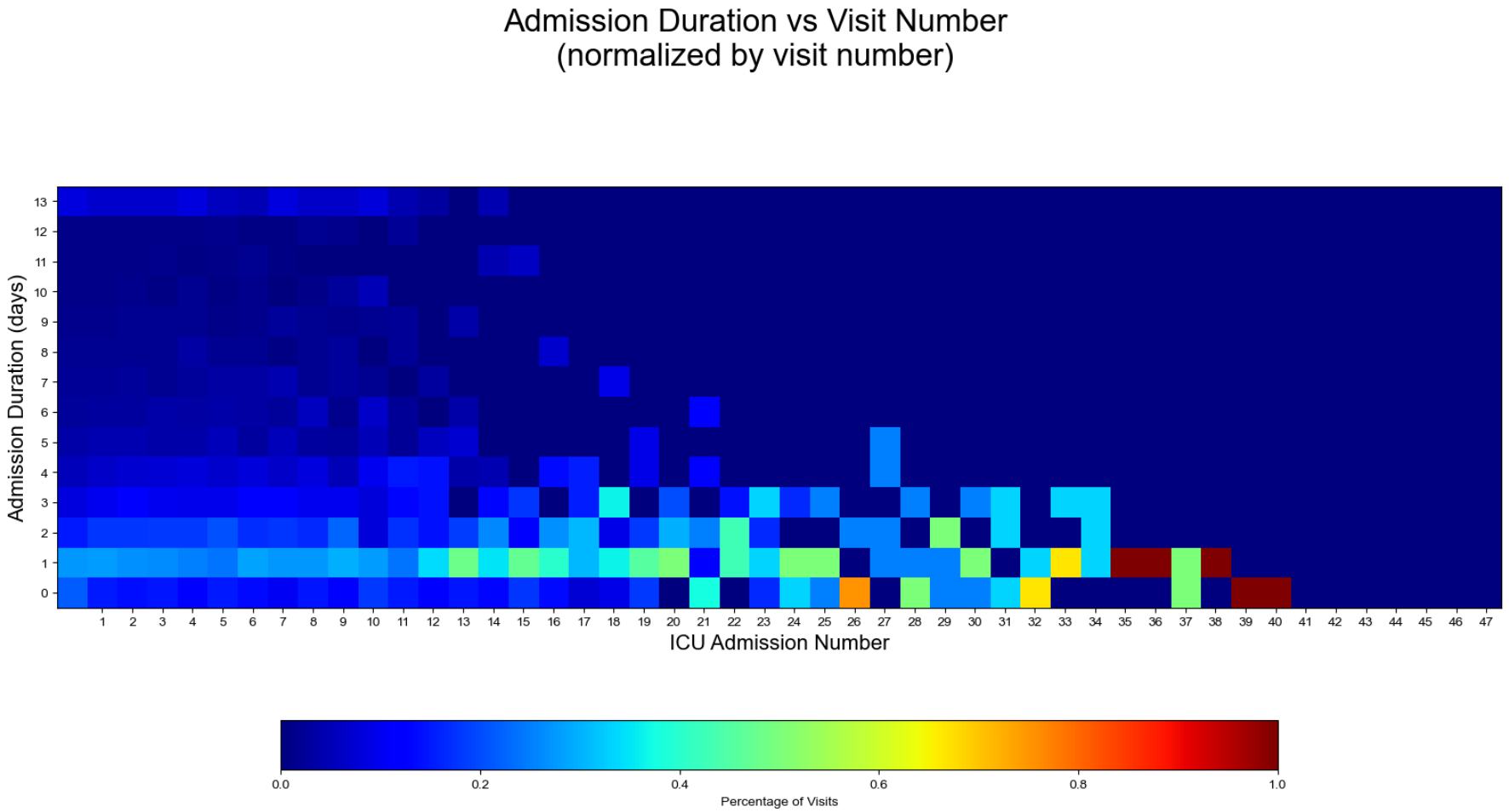
- When admitted to the ICU, how often do patients leave from the same ICU from which they were admitted?
- As expected, most of the time, patients leave from the same ICU that they are admitted
- We note that for NICUs, patients are exclusively discharged from the NICU when admitted to the NICU, which is probably expected
- Since patients move around, can we see what happens to them between the admitted ICU and discharged ICU?



# STAY DURATION BY VISIT NUMBER

- On the following slide, we examine how duration lengths vary with visit number by a patient
- Do patients that go more often require more time potentially? Or are they visits for targeted reasons so durations tend to be shorter?
- For analysis, we clip visit lengths at 14 days and we normalize by visit number
  - For the avoidance of doubt, that means that the frequencies for each visit number add to 1

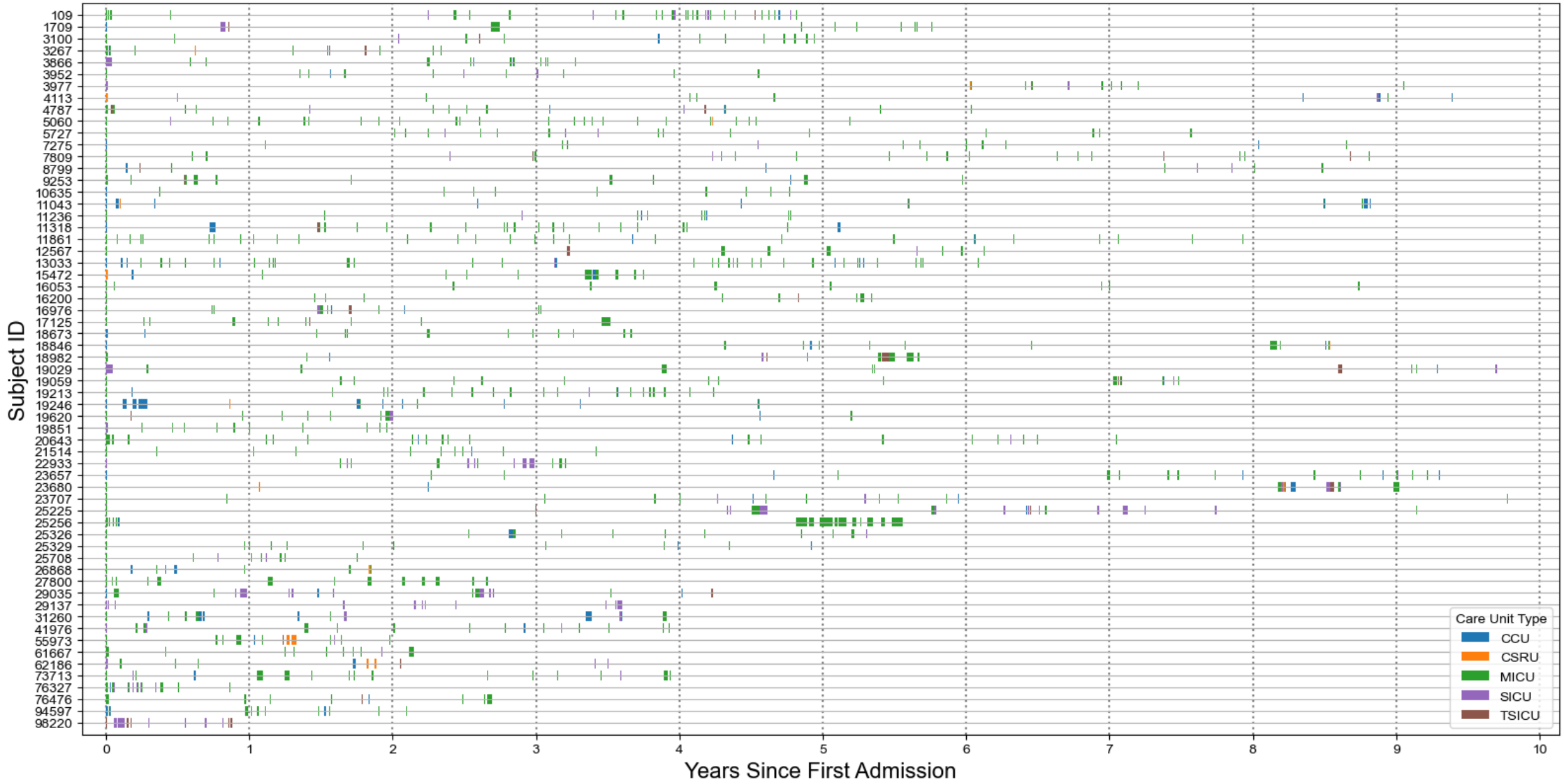
# STAY DURATION BY VISIT NUMBER



# FREQUENT VISITOR ADMISSION PATTERNS

- From the first admission by high frequency visitors (>10 visits in dataset), what is the timing of the visits for the following 10 years from the first admissions
- We examine if these are grouped together or sporadic on the following slide
  - You will see both sporadic and concentrated visits
- The *x*-axis is set such that each patients' first visit starts at 0 years
- The width of each bar is proportional to the stay duration

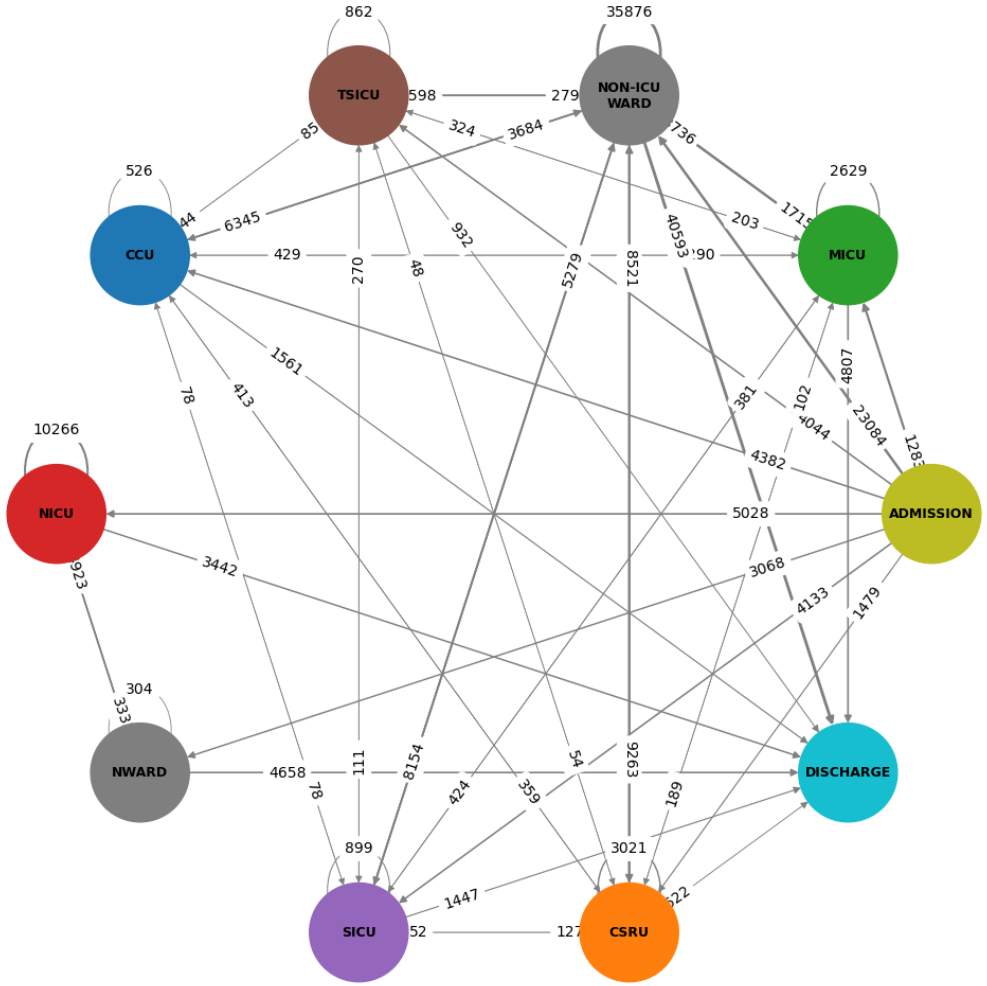
# ICU Visit Timing over 10 Years
# Patients w/ more than 10 ICU visits



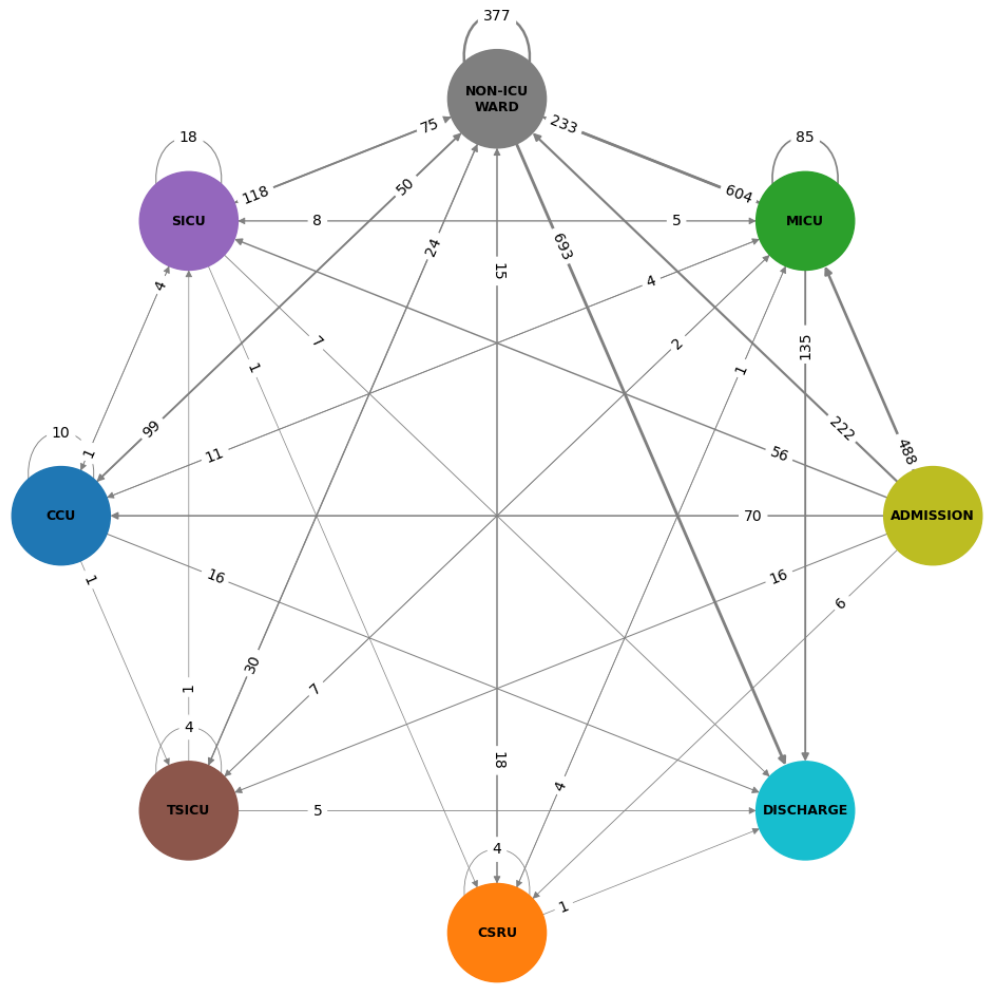
# WHAT HAPPENS ONCE ADMITTED?

- For the high frequency visitors, we examine the transfer patterns using a network diagram
- We will see if there are any interesting patterns between the high frequency visitors and the rest of the population

## Patient Ward Transfer Network
## (Patients < 10 Visits)




## Patient Ward Transfer Network
## (Patients ≥ 10 Visits)



# COMMENTS

- There appear to be several interesting observations that were noted; more research could be performed to see if there are any commonalities in cohorts that have experience one way or another
- These patterns may be interesting to study to see if there are systemic issues that could potentially be avoided to improve patient health outcomes