

## BACKGROUND

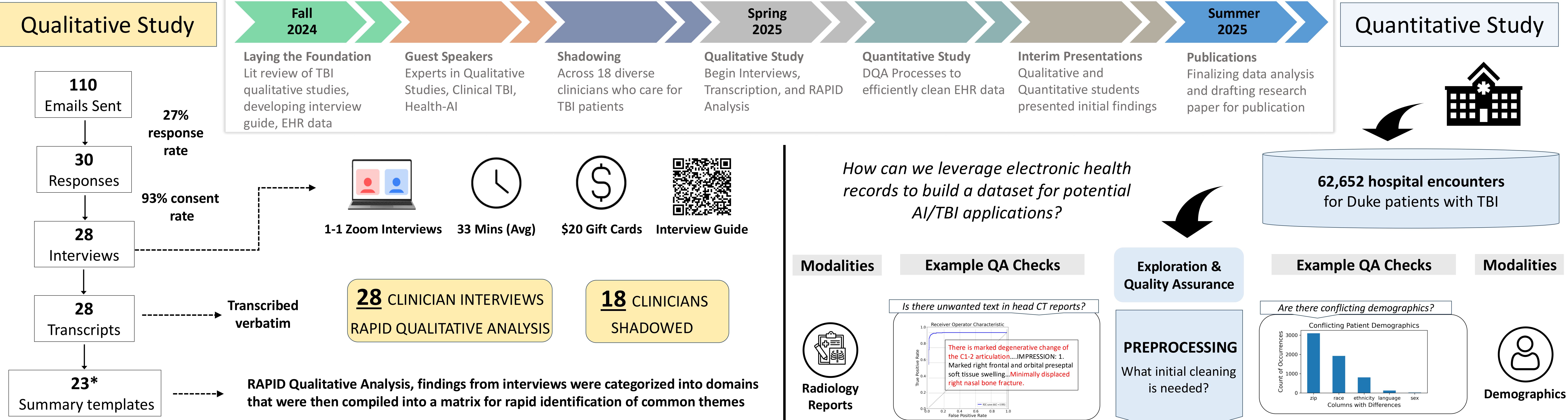
Traumatic brain injury (TBI), caused by a physical blow to the brain, affects nearly 5 million Americans annually and is a leading cause of death and disability in young adults. Accurate prognosis and treatment remain challenging due to complex patient data and conditions.

## GOALS

- Uncovering care gaps in TBI to inform AI solutions
- Clinically Validate EHR Data using QA Frameworks

## TEAM COMPOSITION

This project unites 21 students from diverse fields—engineering, anthropology, statistics, CS, neuroscience, economics, and medicine—combining interviews, shadowing, and rapid qualitative analysis with the curation and analysis of multimodal EHR data from TBI patients.



## RESULTS

### Participant Age Distribution

Age

### Participant Sex Distribution

Female  
Male

### Provider Role Distribution

PT  
SLP  
MD  
RN  
Clin. Pharm  
PA-C

### Challenges with TBI Care

- Inconsistencies in documentation and summarizing EMR data
- High variability of patient outcomes despite similar data

### How can AI Improve TBI Care?

- Enhancing workflow efficiency
- An aide for predicting early prognosis
- Justification for insurance coverage

### Barriers to AI Implementation

- Provider education required due to limited familiarity
- Lack of trust (when does it fail?)
- Potential for bias and inconsistencies

"...just because of one spelling mistake or one error from one person, it could completely change what the AI model was producing for us."

"I am sure that there are patterns there that, I am blind to... I think it would be amazing to have a system that can actually use that data in real time and tell me [if, for a specific patient, I] need to be targeting different things."

"[hypothetically] if we have 'this' demographic [and] 'this' insurance, based on 'this' level of alertness and 'this' outcome measure - [physical therapists] should try to see this person 3 times a week at the minimum."

### Key Deliverables

Curated Dataset → Interactive Findings → Qual. Analysis → Manuscripts

### Building successful EHR applications requires input from diverse stakeholders.

### Exploration & Quality Assurance

**PREPROCESSING**  
What initial cleaning is needed?

### CONFORMANCE

Do values, types, and ranges match our expectations?

### COMPLETENESS

How frequent/missing is the data?

### PLAUSIBILITY

Is the data credible in a clinical context?

### ADJUDICATION

What feedback do stakeholders have?

### Example QA Checks

- Modalities:** Radiology Reports, Flowsheets, Diagnoses, Labs
- Example QA Checks:**
  - Is there unwanted text in head CT reports? (Receiver Operator Characteristic plot)
  - Do GCS values match established scale? (Glasgow Coma Scale distribution)
  - How often do different diagnoses occur? (ER ICD Codes Top 5)
  - Do we observe temporal variation for labs? (BICARBONATE\_ARTERIAL Value Distribution by Year)

### Example QA Checks

- Modalities:** Demographics, Orders, Chief Complaints, Admission-Discharge-Transfer
- Example QA Checks:**
  - Are there conflicting demographics? (Conflicting Patient Demographics bar chart)
  - Are order times standardized? (Order Distribution By Time line chart)
  - What is the frequency of chief complaints? (Top 3 Chief Complaints pie chart)
  - What are the common patient pathways? (Patient pathway diagram)

Quant Team Members → What data to exclude? To repull? Evidence of bias? How best to visualize? ← Clinicians Domain Experts