Building Sustainability for AI Use Cases in Medical and Public Health Preparedness and Response

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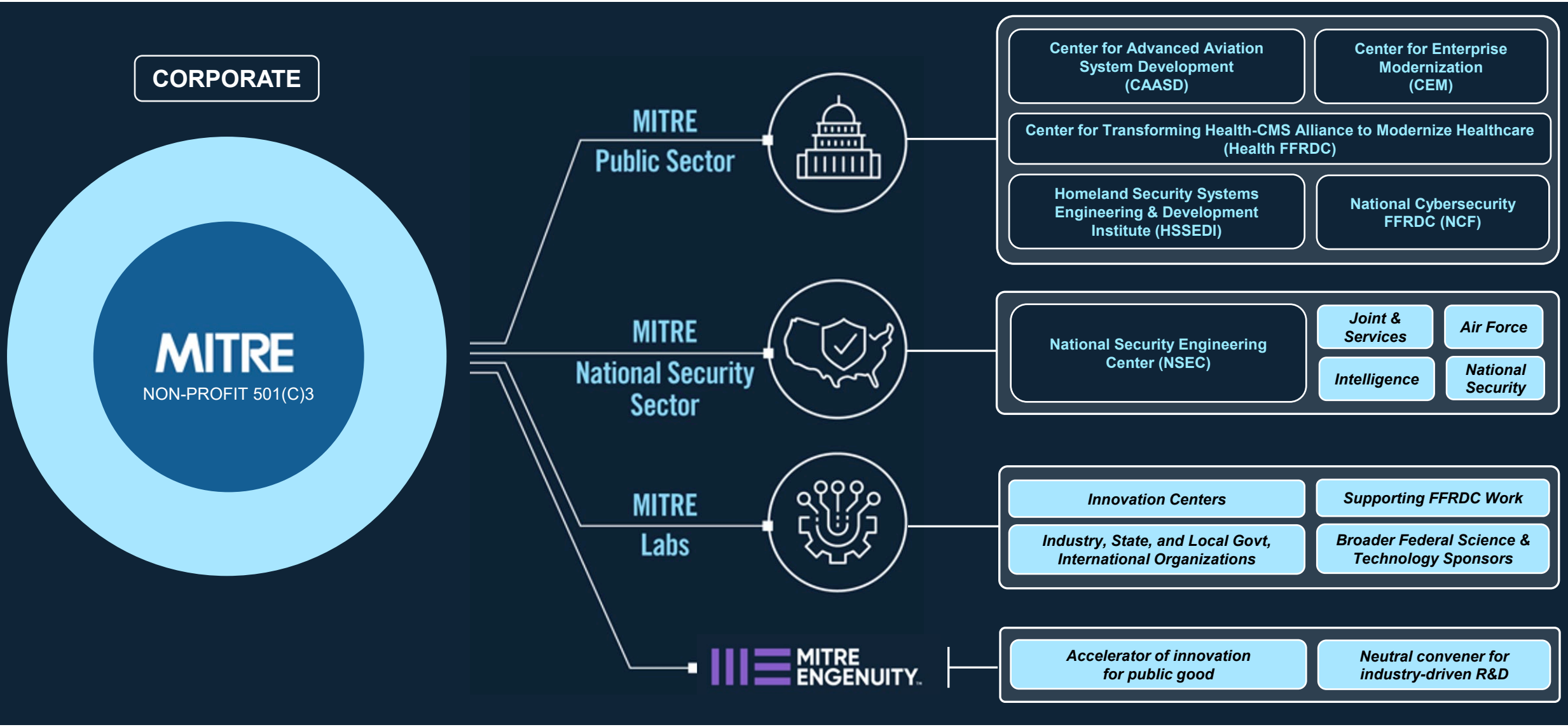
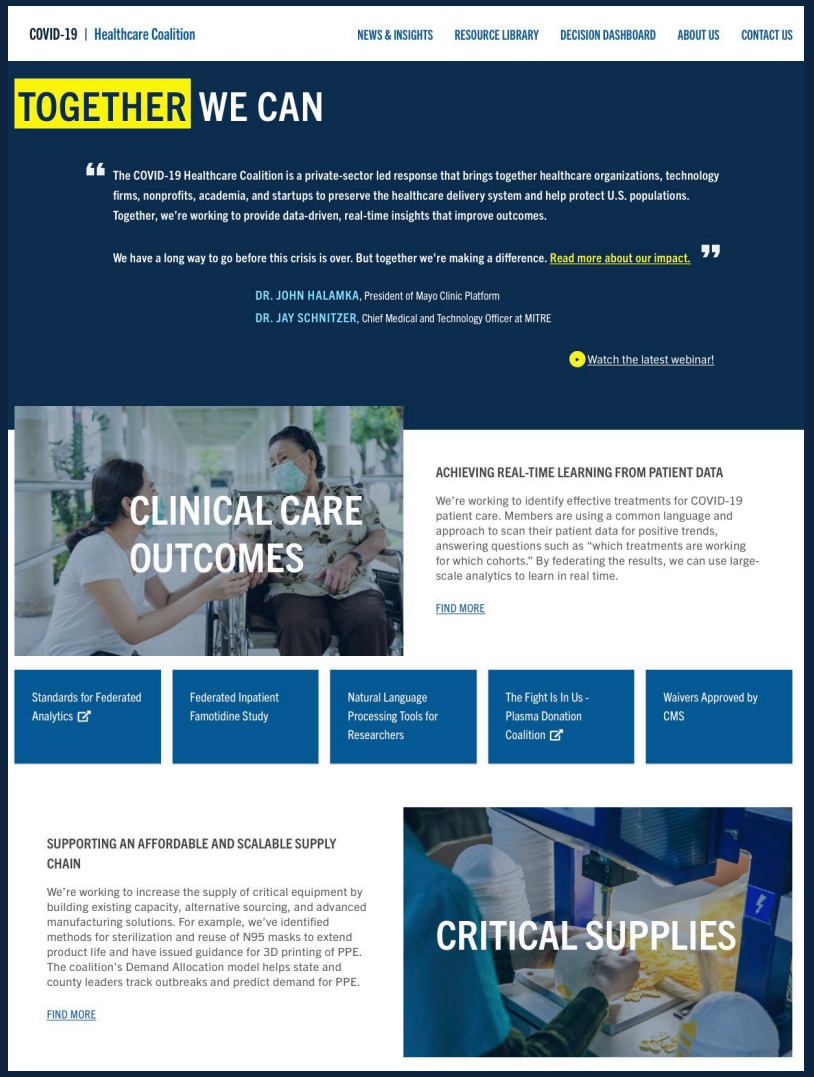
KEY

FFRDC | *Focus Area*



Background: COVID-19 Healthcare Coalition (C19HCC)

- The C19HCC was a private-sector led response that brought together healthcare organizations, technology firms, nonprofits, academia, and startups to preserve the healthcare delivery system and help protect U.S. populations
- Over 1,100 private sector partners worked together to provide data-driven, real-time insights to improve outcomes
- The C19HCC convened the leading Electronic Health Record (EHR) and healthcare analytics companies to perform *federated studies* on COVID-19



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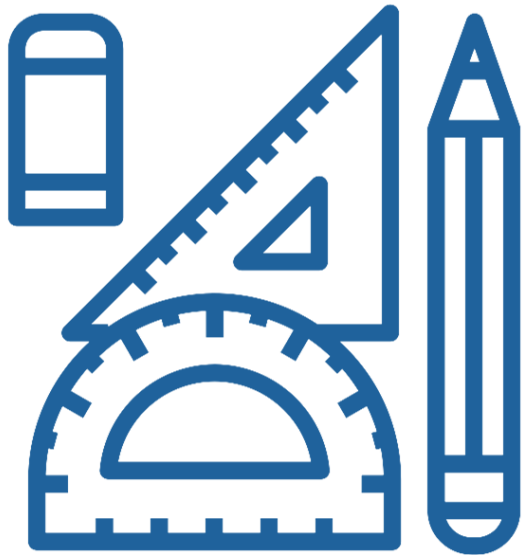
Federated Real-World Data (RWD) Studies

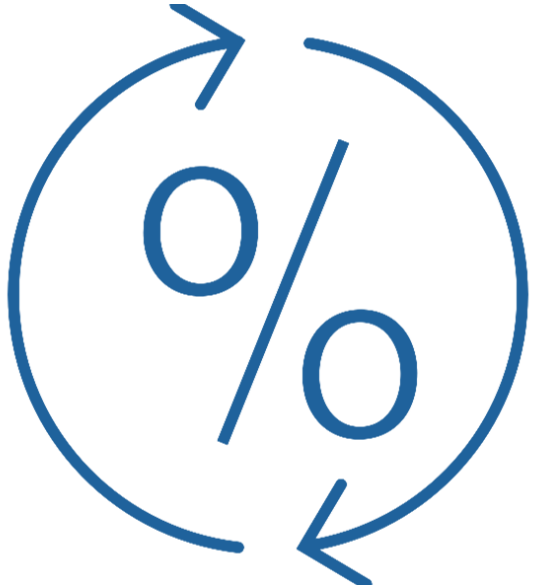


Design and Align

Agree on study design, cohorts and definitions

Run Queries

Implement queries and produce minimum viable aggregate results



Analyze and Refine

Produce statistics and address issues

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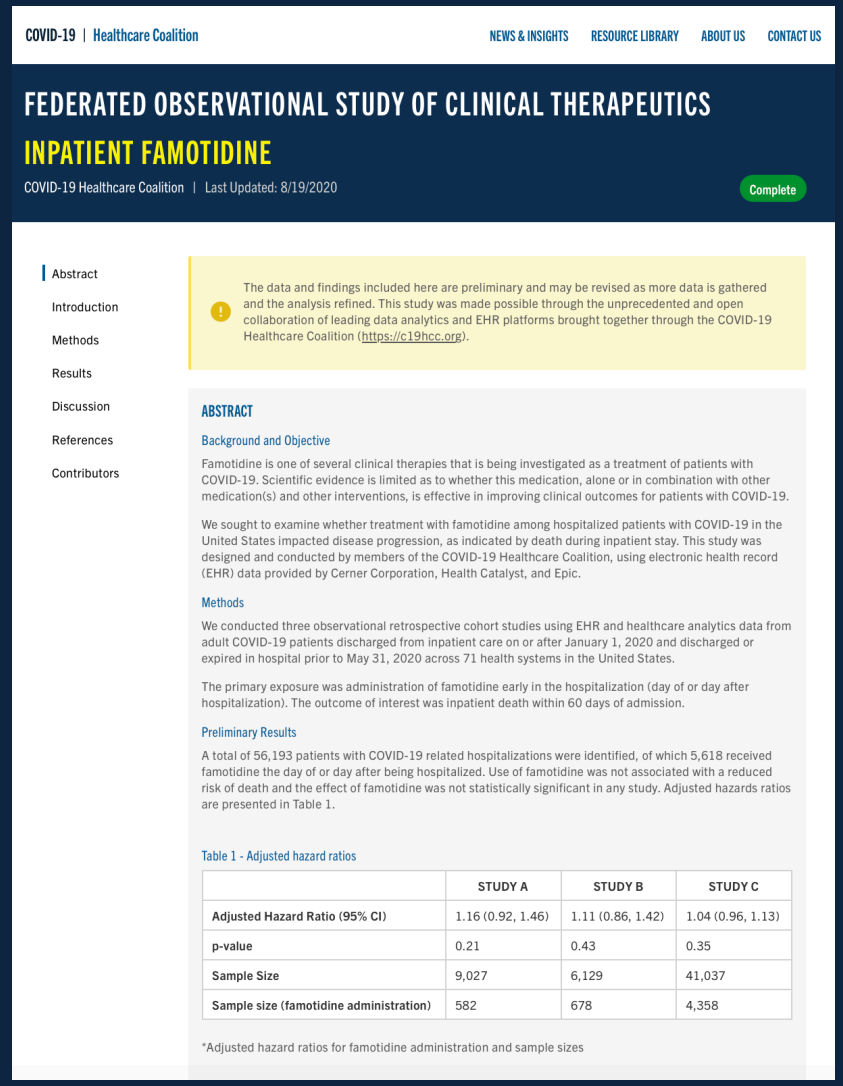
Famotidine Federated Study

Federated Queries Leveraging EHR and Healthcare Analytics Platform Data

Apr '20 → May '20 → Jun '20 → Jul '20

- **Partnered with:** Cerner, Epic, and Health Catalyst
- **High-level methods:** Built Cox proportional hazards model to examine relationship between mortality and famotidine, accounting for several comorbidities. The same model was run by each data vendor.
- **Key findings:** Famotidine was not found to have statistically significant impact on mortality for COVID-positive patients.
- **Surveillance benefit:** Evaluation of off-label use of readily available medications for treatment of novel disease



COVID-19 | Healthcare Coalition

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FEDERATED OBSERVATIONAL STUDY OF CLINICAL THERAPEUTICS

INPATIENT FAMOTIDINE

COVID-19 Healthcare Coalition | Last Updated: 8/19/2020

Complete

Abstract
Introduction
Methods
Results
Discussion
References
Contributors

The data and findings included here are preliminary and may be revised as more data is gathered and the analysis refined. This study was made possible through the unprecedented and open collaboration of leading data analytics and EHR platforms brought together through the COVID-19 Healthcare Coalition (https://c19hcc.org).

ABSTRACT

Background and Objective

Famotidine is one of several clinical therapies that is being investigated as a treatment of patients with COVID-19. Scientific evidence is limited as to whether this medication, alone or in combination with other medication(s) and other interventions, is effective in improving clinical outcomes for patients with COVID-19.

We sought to examine whether treatment with famotidine among hospitalized patients with COVID-19 in the United States impacted disease progression, as indicated by death during inpatient stay. This study was designed and conducted by members of the COVID-19 Healthcare Coalition, using electronic health record (EHR) data provided by Cerner Corporation, Health Catalyst, and Epic.

Methods

We conducted three observational retrospective cohort studies using EHR and healthcare analytics data from adult COVID-19 patients discharged from inpatient care on or after January 1, 2020 and discharged or expired in hospital prior to May 31, 2020 across 71 health systems in the United States.

The primary exposure was administration of famotidine early in the hospitalization (day of or day after hospitalization). The outcome of interest was inpatient death within 60 days of admission.

Preliminary Results

A total of 56,193 patients with COVID-19 related hospitalizations were identified, of which 5,618 received famotidine the day of or day after being hospitalized. Use of famotidine was not associated with a reduced risk of death and the effect of famotidine was not statistically significant in any study. Adjusted hazards ratios are presented in Table 1.

Table 1 - Adjusted hazard ratios

	STUDY A	STUDY B	STUDY C
Adjusted Hazard Ratio (95% CI)	1.16 (0.92, 1.46)	1.11 (0.86, 1.42)	1.04 (0.96, 1.13)
p-value	0.21	0.43	0.35
Sample Size	9,027	6,129	41,037
Sample size (famotidine administration)	582	678	4,358

*Adjusted hazard ratios for famotidine administration and sample sizes

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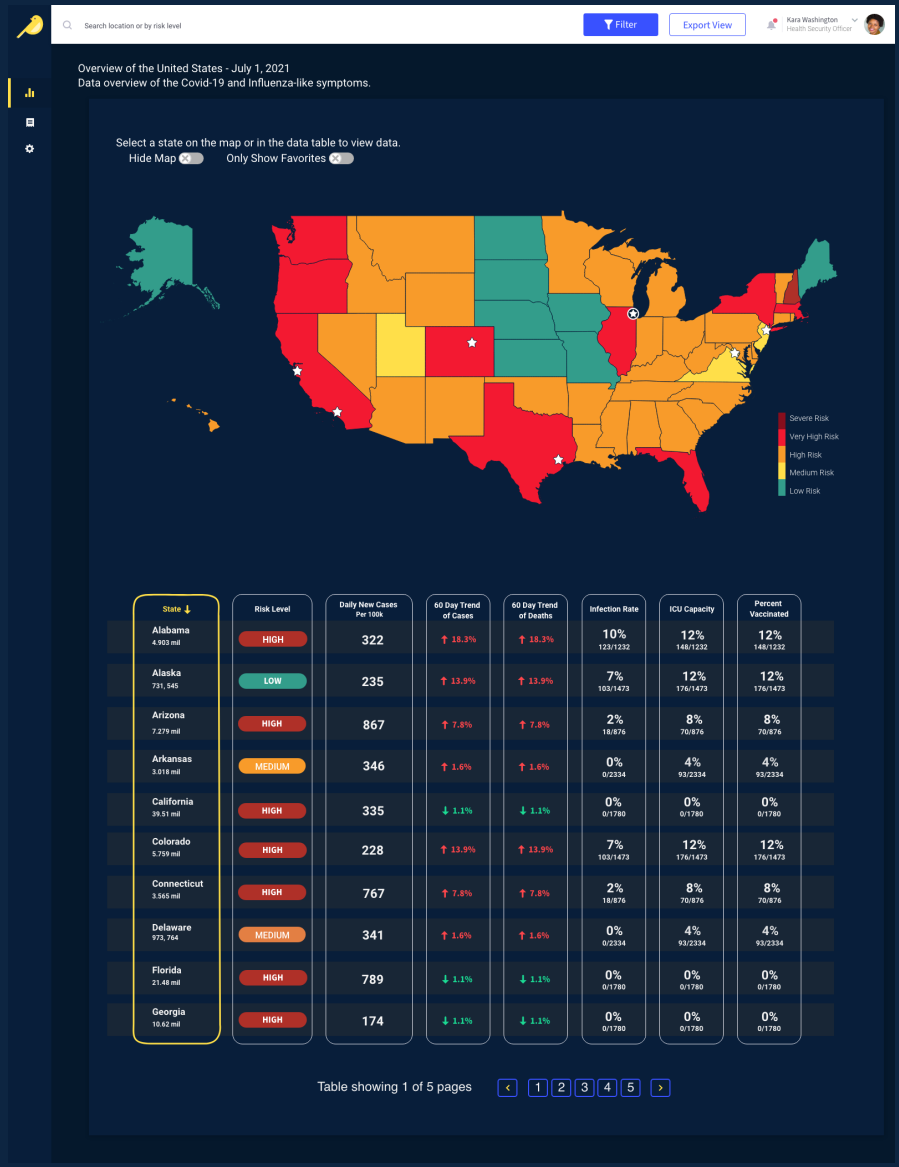
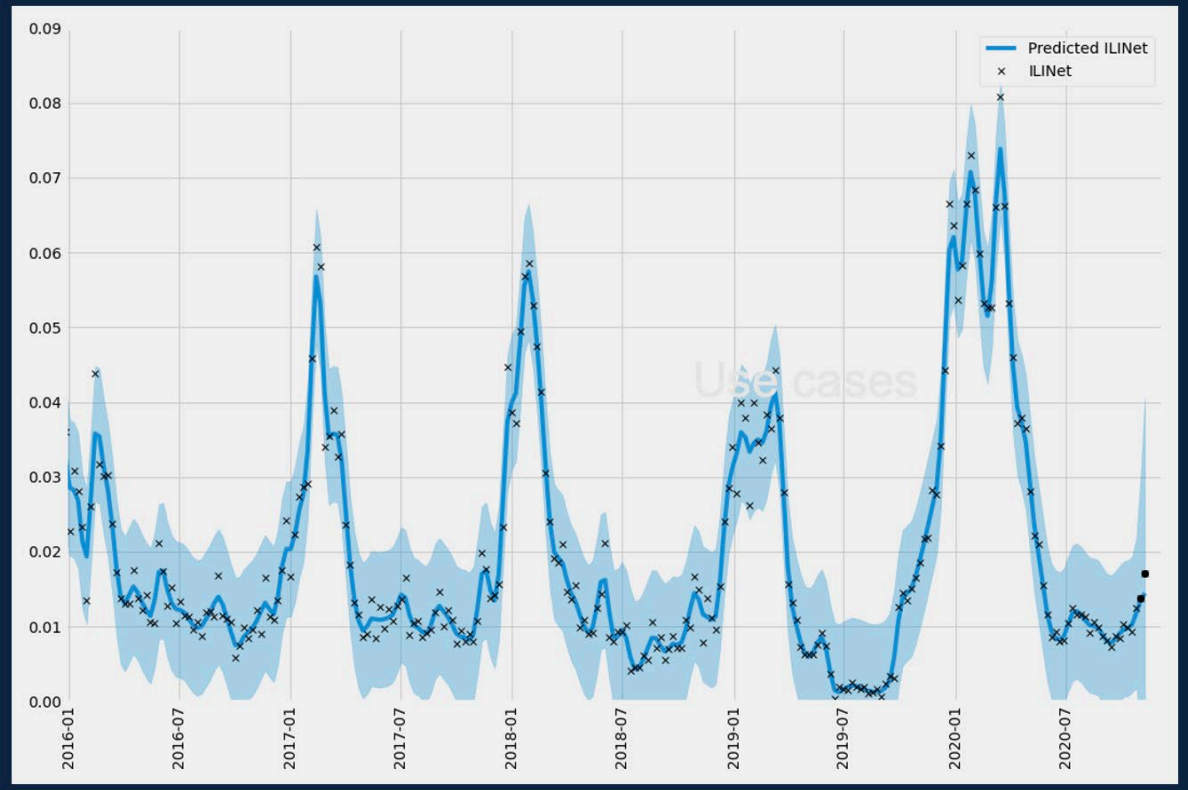
Astute Canary™

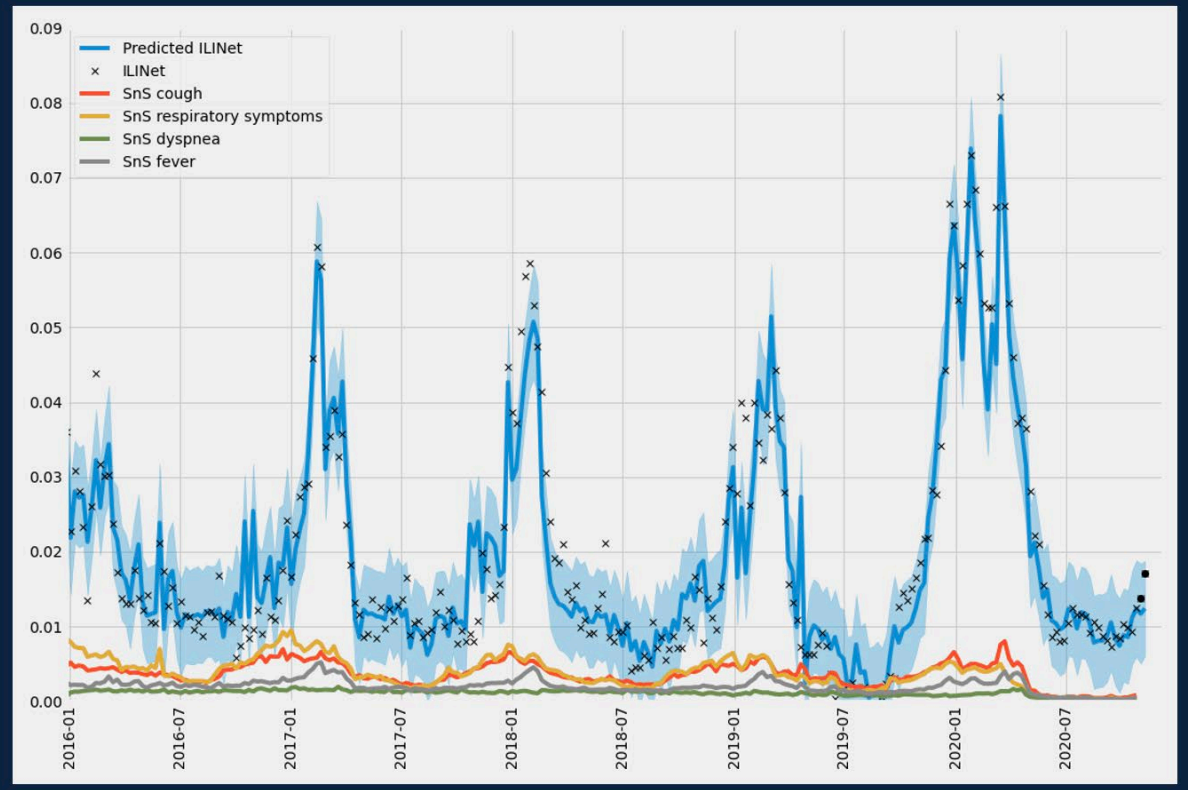
- Goal: develop a data-driven, global capability to nowcast, forecast, predict, and detect health security threats (e.g., pandemic influenza, novel coronavirus, anthrax, etc.) earlier
- Future goals include monitoring trends and better understanding of novel threats in real-time using federated Electronic Health Record (EHR) data, other novel data, and data analytics enabling decision makers to rapidly act and protect the population during a global health security threat



Notional Astute Canary™ Dashboard Mockup

Astute Canary™ Predictive Modeling
AC Nowcasting - Maryland





What now?

- Define opportunities and challenges for AI in medical and public health preparedness and response
  - Technical Innovation
  - Data and infrastructure
  - Use cases

Source: Prompted ChatGPT app GPT-4 DALL-E to “create a business process model for the emergency department” and requested a “conceptual illustration”

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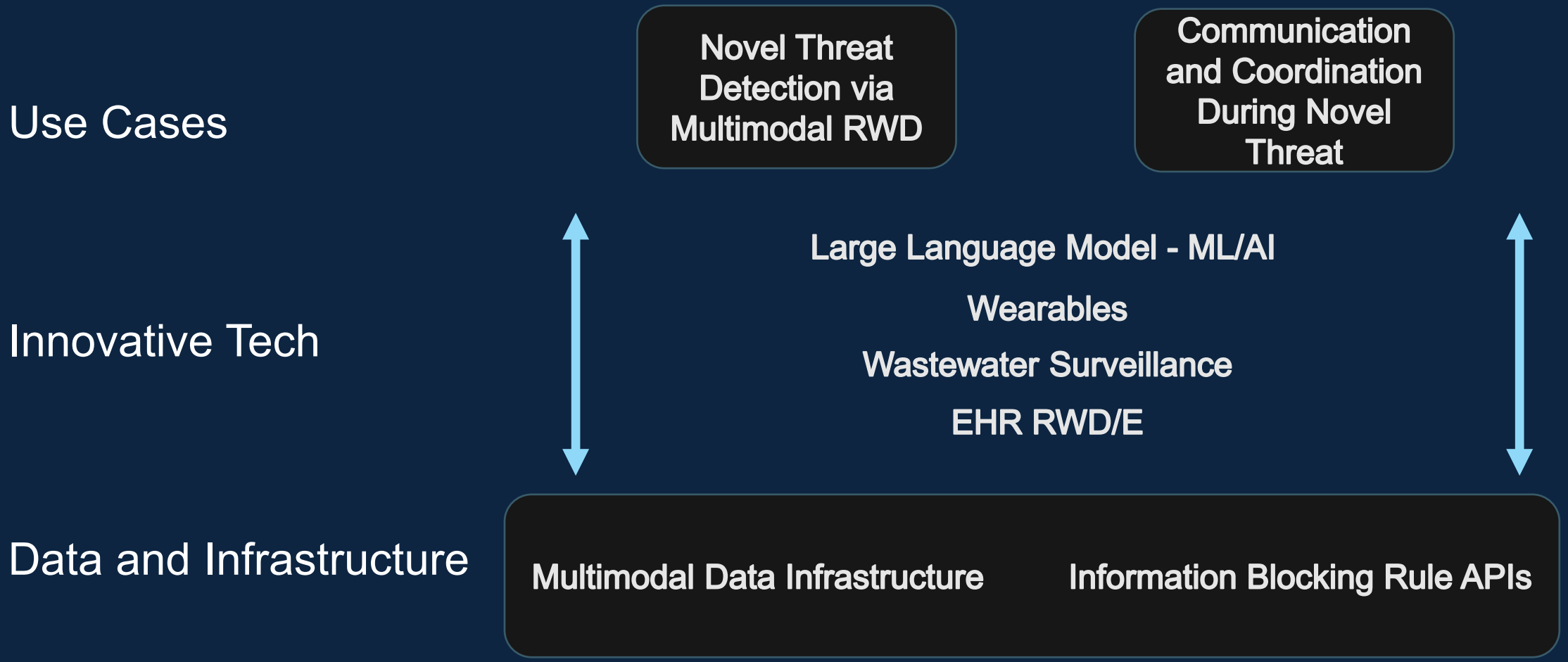

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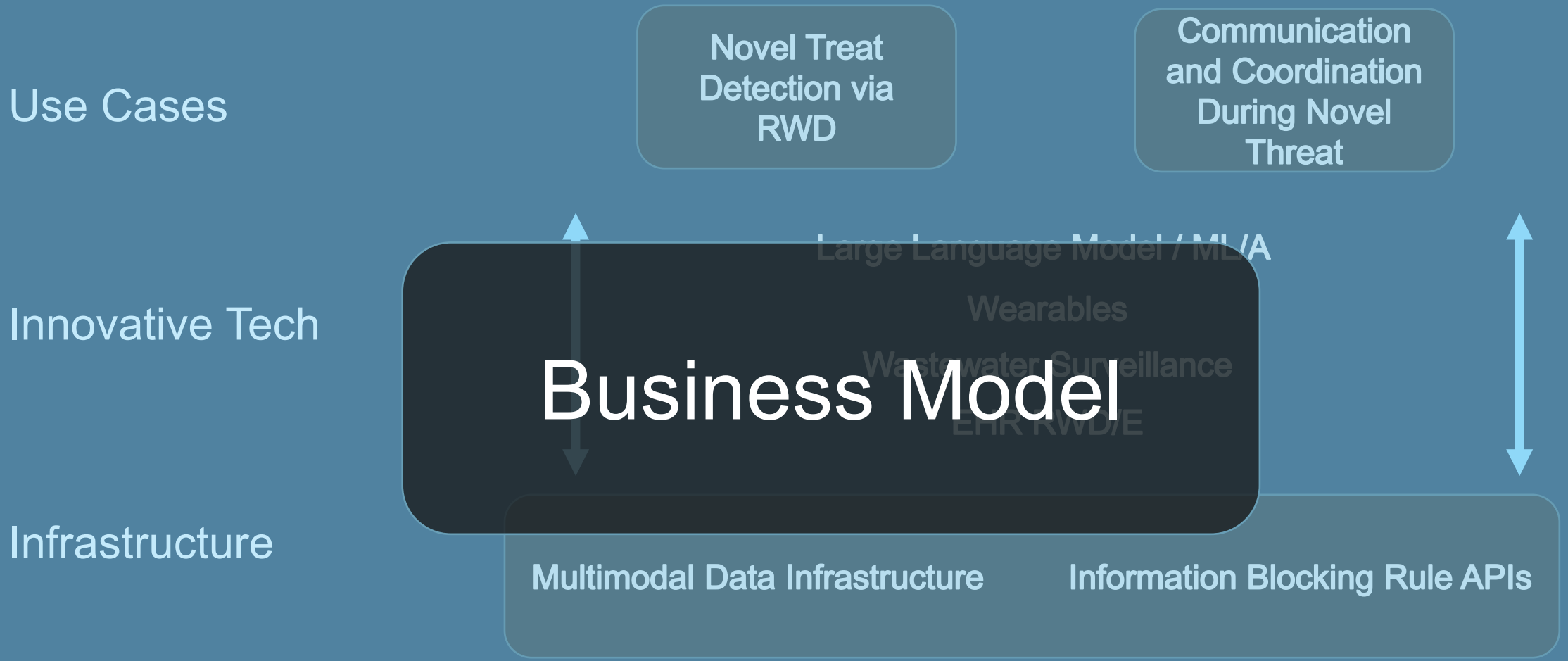

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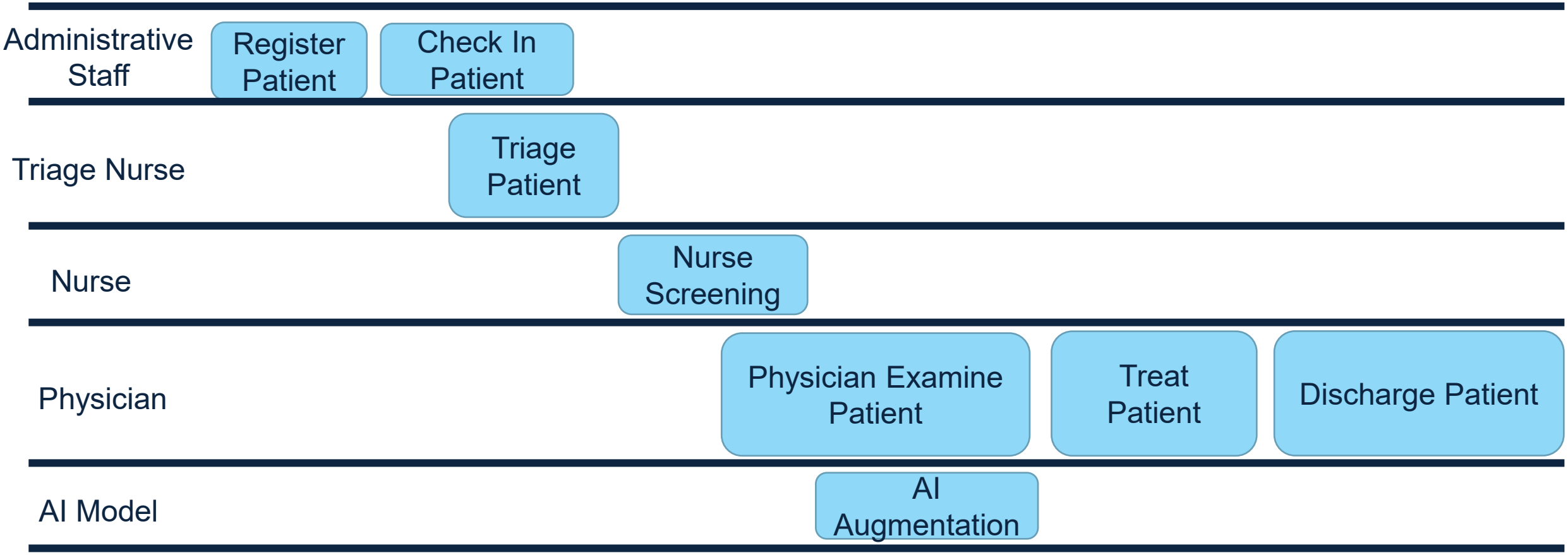
AI Use Case Process Modeling



Q&A

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