# Detection of prone positioning in hospitalized COVID patients using NLP

PRESENTER:

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BACKGROUND:

Awake prone positioning has been widely adopted in many centers during the COVID-19 pandemic, and was conditionally endorsed by organizations such as the World Health Organization and the Intensive Care Society. However, estimating the use of proning as a treatment is not possible with current structured data. We developed a natural language processing(NLP) tool to identify documentation of proning.

METHODS
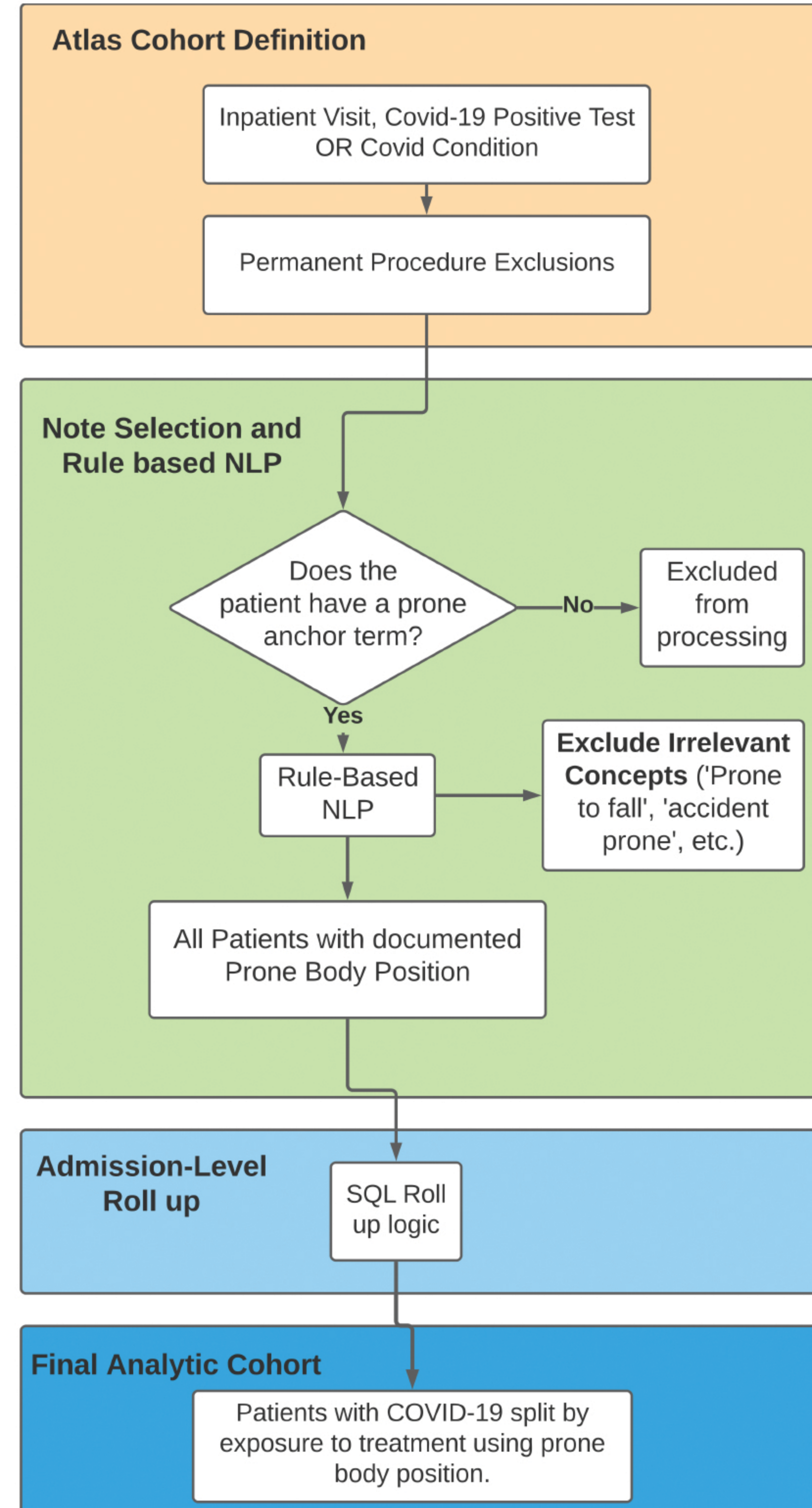
RESULTS

- 5,212 patients identified at the Department of Veterans Affairs (VA) from March 2020 – May 2021
- A preliminary external validation was completed using data from the Stanford Health system data warehouse. (STARR)

Awake prone positioning of COVID-19 patients is **novel and experimental, yet broadly adopted.** We used NLP to estimate its use in real world pandemic data.
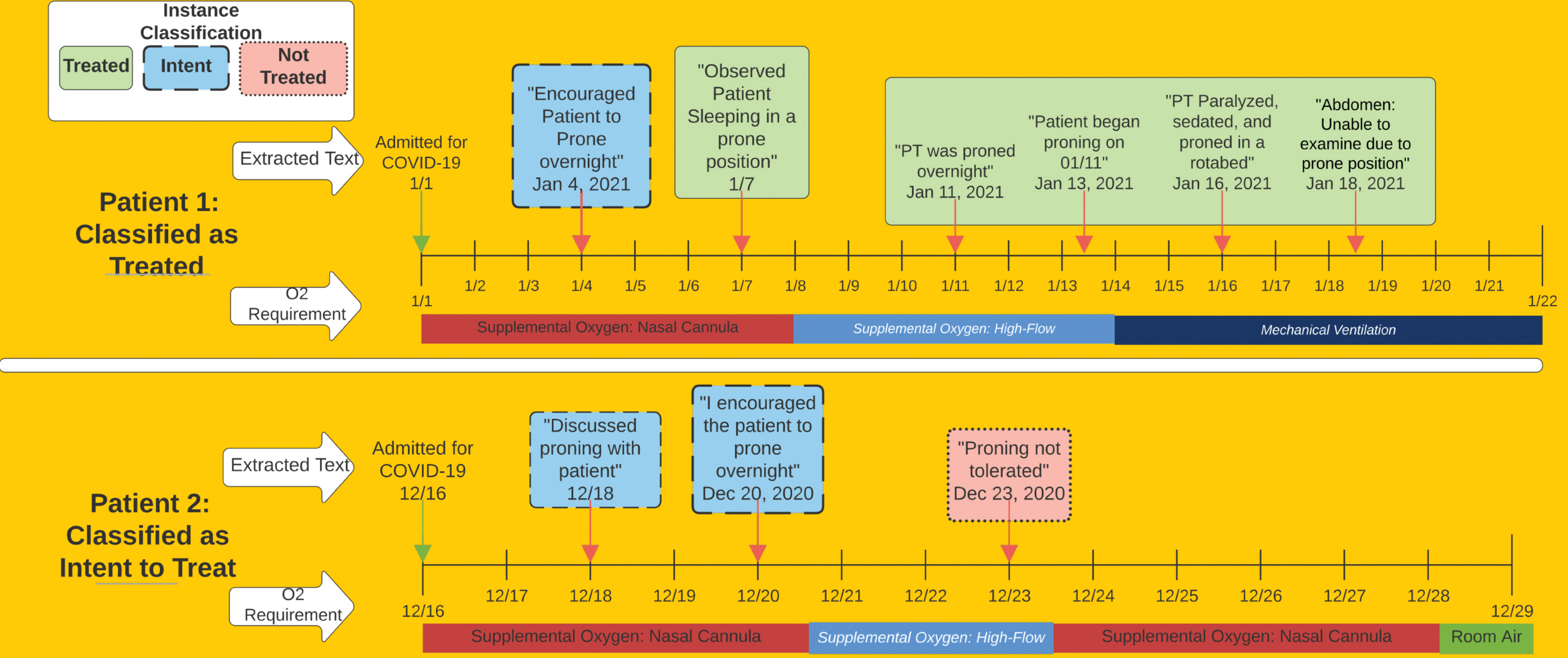

Full abstract and video

Concept Definition:

Clinical notes for COVID-19 patients were often found to contain recommendations regarding prone positioning in awake patients (e.g. notes indicating that proning was encouraged, or that education was provided). This reflects an 'intention to prone', regardless of the patient's subsequent exposure to prone positioning. To permit this flexibility in subsequent analysis, we decided to roll up all mentions of proning into three primary categories.

Instance Classification

- **Treated:** positive mention indicating the patient was exposed to prone positioning.
- **Intent to treat:** proning appears to have been encouraged, with no clear negation or indication as to its tolerability.
- **Not treated:** typically reflects an inability to prone, or intention to prone that is negated.

Simple Roll-up Admission Logic
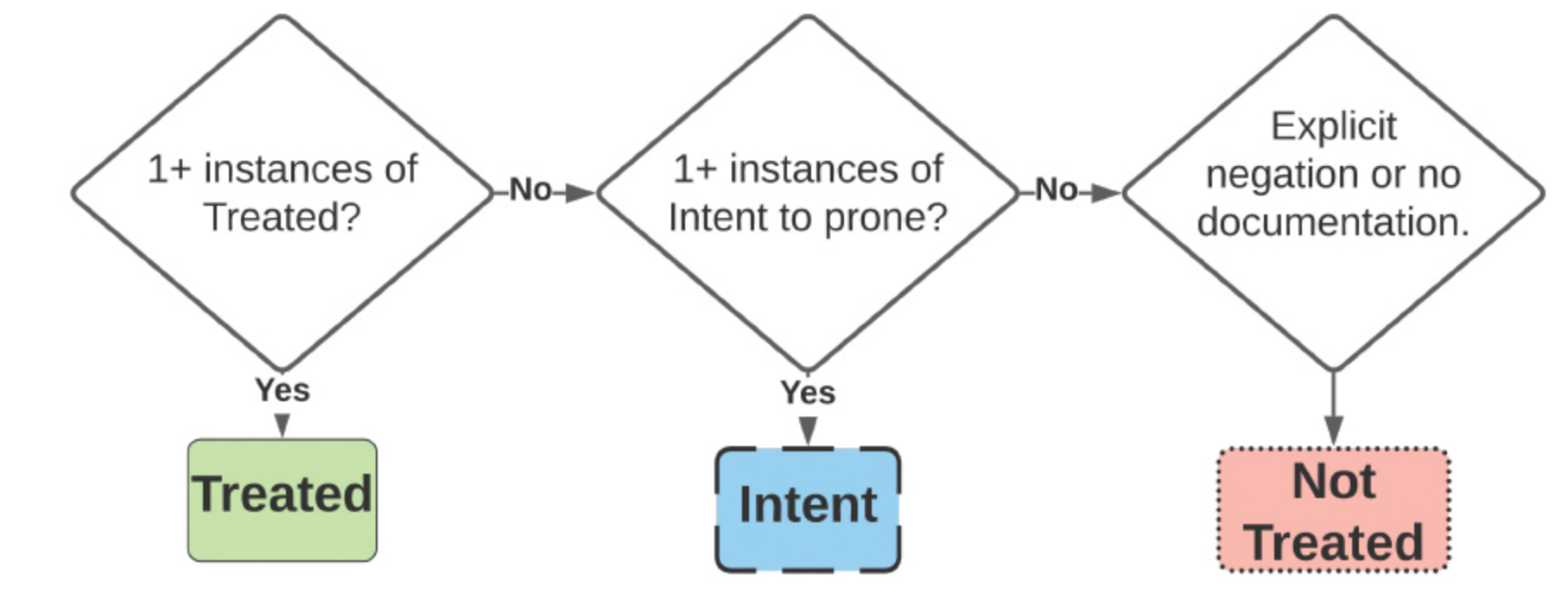
NLP Methods:

The NLP system was built using the Apache Unstructured Information Management Architecture Asynchronous Scaleout(UIMA-AS) and the libraries and tools contained in the VA Leo framework.

Validation

At an instance-level using VA data precision and inter-annotator agreement(IAA) were assessed showing a **precision of 94.6%** and an IAA **Kappa of 0.73**. After applying the admission-level rollup logic, 100 complete patient timelines were reviewed using VA data, and a preliminary validation of 40 patients was completed using Stanford STARR data.

	Sensitivity	Specificity	PPV
VA	84.09	94.64	91.28
STARR*	100.00*	50.00	85.71

* While the results were promising, this initial sample and validation was completed primarily to assess the feasibility and application of the algorithm on Stanford Data.

Patients:

5,212 patients identified at the VA as having received treatment from March 2020 – May 2021.

Distinct covid+ patients identified as being treated in a prone position: March 2020 - March 2021
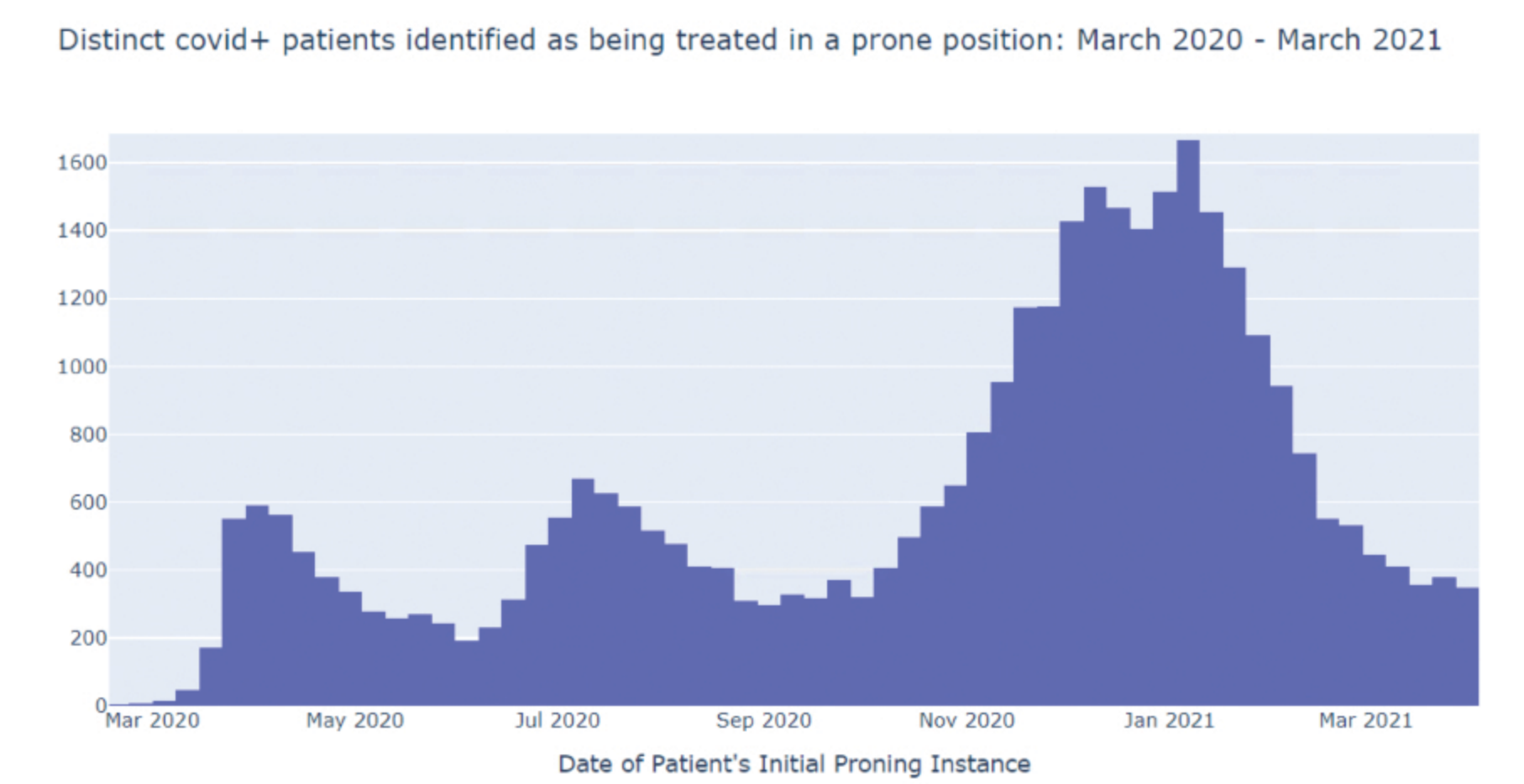
Future work:

The creation of this algorithm is an important first step towards understanding the incidence and utility of awake proning as a treatment of hypoxemic respiratory failure. Future work will focus on completion of multi-institutional proning incidence study through large scale deployment within the Stanford STARR cohort.

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