



VA

U.S. Department
of Veterans Affairs

VA COVID-19 Shared Data Resource



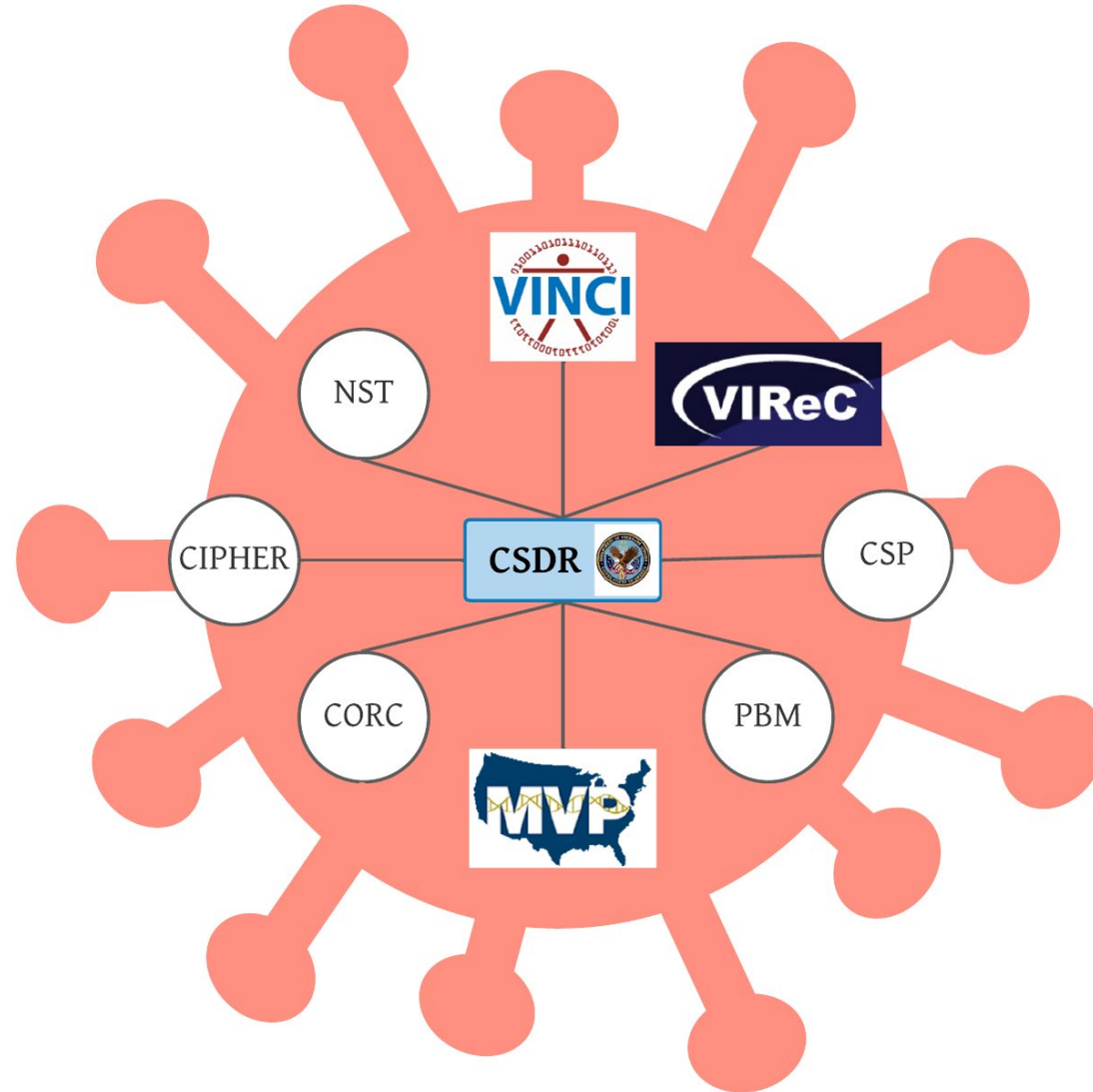
VA Informatics
and Computing
Infrastructure

Outline

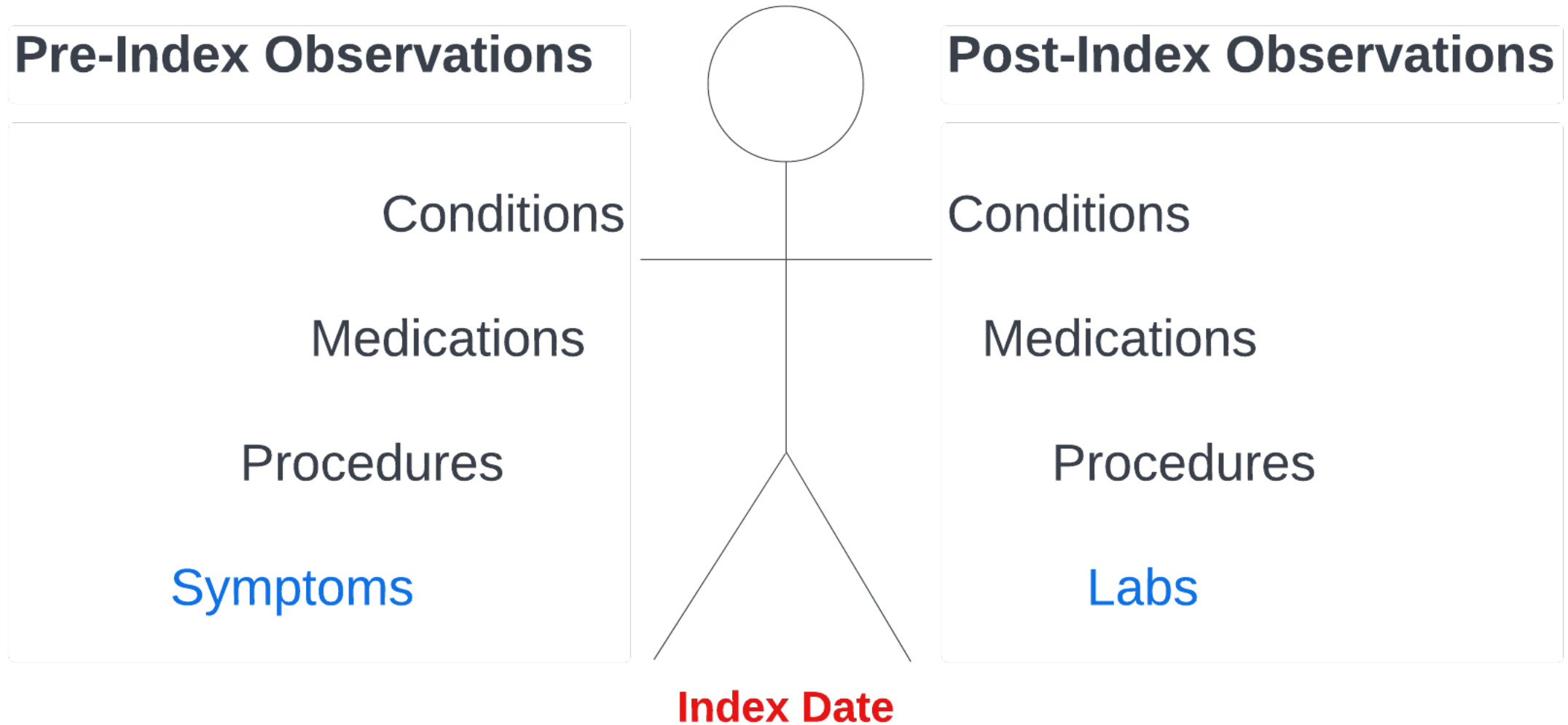
- Review the VA COVID-19 Shared Data Resource (CSDR)
- Introduction to Natural Language Processing (NLP)
- Current and upcoming CSDR phenotypes supplemented by NLP

Phenotype: any clinical condition or characteristic that can be queried from the EHR

Collaboration



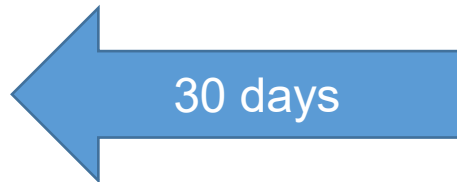
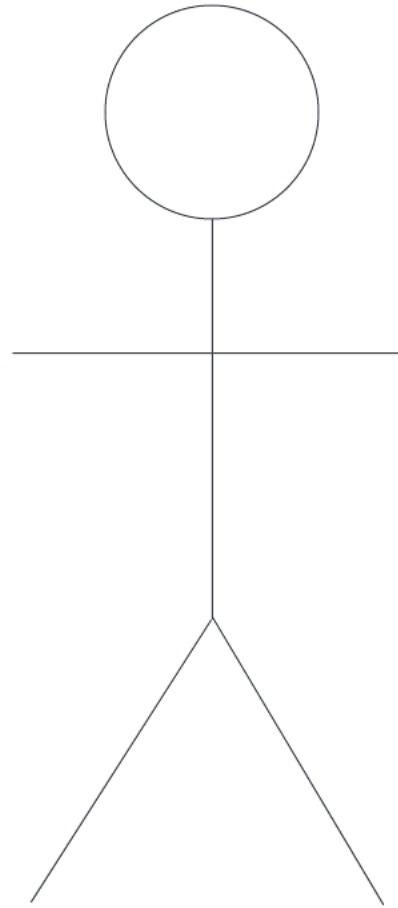
VA COVID-19 Shared Data Resource



VA COVID-19 Shared Data Resource

Pre-Index Observations

Post-Index Observations



Index Date

CSDR documentation and support

- Internal wiki pages
- Data access instructions
- Customer support
- Power BI reports
- [COVID-19:Shared Data Resource - VA Phenomics Library](#)



The screenshot shows the VA Phenomics Library interface. At the top left is the Department of Veterans Affairs seal. The user profile 'Vhaslcbowlea1' is visible in the top right, along with navigation links for 'Talk', 'Preferences', 'Watchlist', and 'Contributions'. A search bar contains the text 'Search VA Phenom'. The page title is 'COVID-19:Shared Data Resource'. The left sidebar contains a navigation menu with categories: Getting Started, Library, Data Resources, Partnerships, and Tools. The main content area displays a 'Contents [hide]' section with a numbered list of 11 items, including 'Important Notifications', 'Announcements', 'Overview', 'Phenotype Catalog curated for COVID', and various sub-sections under 'Getting Access to the VA COVID-19 Shared Data Resource' and 'VA COVID-19 Cases - VA National Surveillance Tool'.

COVID-19:Shared Data Resource

Contents [hide]

- 1 Important Notifications
- 2 Announcements
- 3 Overview
- 4 Phenotype Catalog curated for COVID
- 5 Learn how to use the VA COVID-19 Shared Data Resource
- 6 Getting Access to the VA COVID-19 Shared Data Resource
 - 6.1 National Surveillance Tool (NST) & CDW COVID-19 Tables
 - 6.2 VIREC/Medicare
 - 6.3 EPIC³
 - 6.4 Million Veteran Program (MVP)
 - 6.5 VA SEQFORCE / VA SECURE
 - 6.6 COVID-19 Observational Research Collaboratory (CORC)
- 7 Acknowledging the VA COVID-19 Shared Data Resource
- 8 VA COVID-19 Cases - VA National Surveillance Tool
 - 8.1 ORDCOVID_CaseDetail
 - 8.2 ORDCOVID_CaseDetailChangeLog
 - 8.3 ORDCOVID_CaseLabChem
 - 8.4 ORDCOVID_CaseLabChemChangeLog
 - 8.5 ORDCOVID_CaseDetailIssueLog
 - 8.6 ORDCOVID_CaseLabChemIssueLog
- 9 Data Dashboards
- 10 Acknowledgements
- 11 VA COVID-19 Dimension Tables - VA Informatics and Computing Infrastructure (VINCI)
 - 11.1 ORDCOVID.DimConditions
 - 11.2 ORDCOVID.DimLabs

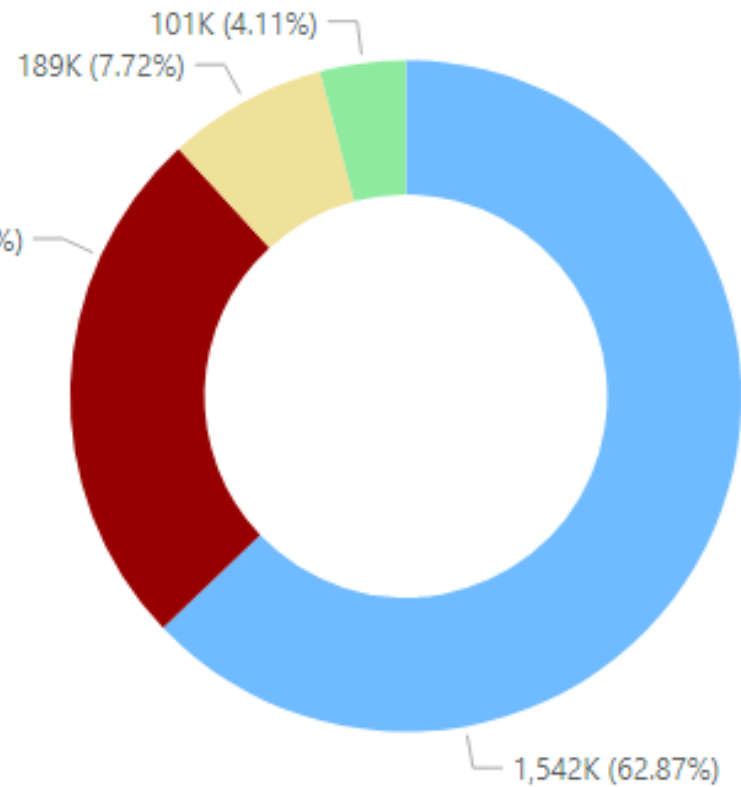
Cohort statistics

CaseDefinition

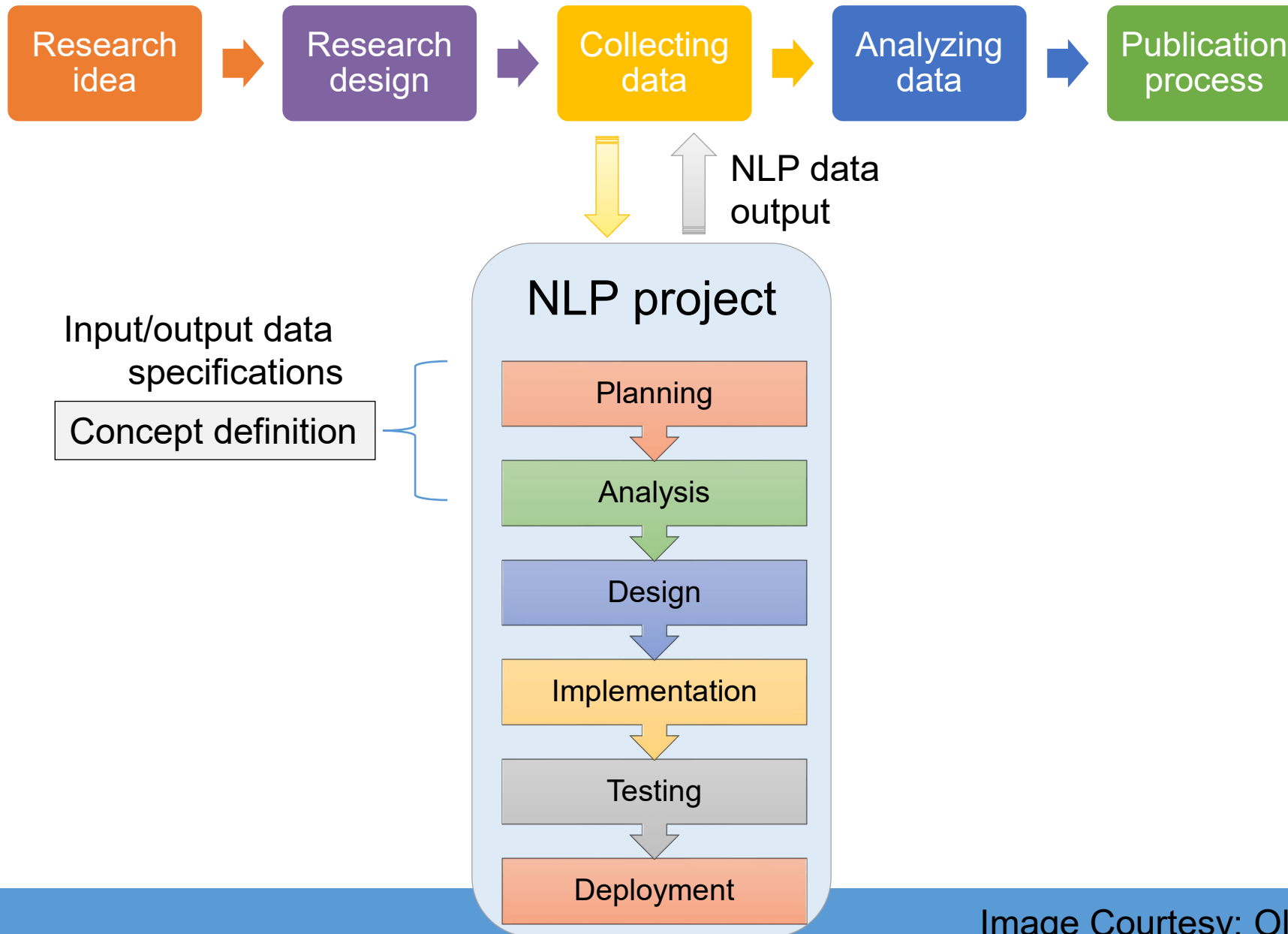
- VA Negative
- VA Positive
- VA Pending
- VA Canc/Indeterminate

Sex by EverPositive flag
As of Apr 26, 2022

Sex	EverPositive = 1 Patient Count (N = 622,706)	EverPositive = 1 Patient Percentage	EverPositive = 0 Patient Count (N = 1,616,351)	EverPositive = 0 Patient Percentage	OMOP* Patient Count (N = 9,472,496)	OMOP* Patient Percentage
F	117,169	18.82 %	279,288	17.28 %	1,443,468	15.24 %
M	505,489	81.18 %	1,336,759	82.70 %	8,028,551	84.76 %
Unknown	48	0.01 %	304	0.02 %	477	0.01 %



NLP project workflow



Phenotypes supplemented through NLP

- Vital signs
- Reason for stay
- Symptoms
- Mechanical ventilation
- Supplemental oxygen
- Menopause
- Negative COVID-19 tests

13 VA COVID-19 CDW Supplement Tables

13.1 [ORDCOVID_SupplementExtractedVitalSigns](#)

13.2 [ORDCOVID_SupplementReasonForStayText](#)

13.3 [ORDCOVID_SupplementVentilatorEvents](#)

13.4 [ORDCOVID_SupplementVentilatorSequences](#)

13.5 [Acknowledgements](#)

Vital Signs

- Patterson OV, Jones M, Yao Y, Viernes B, Alba PR, Iwashyna TJ, et al. Extraction of Vital Signs from Clinical Notes. Stud Health Technol Inform. 2015;216:1035.

```
VITAL SIGNS: Temperature 98.1, pulse 64,
respirations 20,
blood pressure 144/69, height 6'1",
weight 229 pounds, saturation O2 stats are 97
percent on room air.
```

```
VITALS:
T: 98.2
RR: 20
Pulse: 88
BP: 126/50
Weight: 217.2
Height: 66
BMI: 35.1
```

```
VITALS-
153/68-80-20-95.8
```

```
Physical Exam
Vitals 97.9 F [36.6 C]
70 in [177.8 cm]
229 lb [104.1 kg]
```

```
VS 152/94 98.3 85 16
```

```
VS 150-160/90-100 98-98.5 80-85 16-22
```

[-] [-] SORDCovid.SupplementExtractedVitalSigns
[-] [-] Columns
[-] PatientICN (varchar(25), null)
[-] EverPositive (bit, null)
[-] IndexDate (date, null)
[-] SourceTableName (varchar(25), null)
[-] PrimarySID (bigint, null)
[-] DocumentType (varchar(75), null)
[-] DocumentDateTime (datetime2(7), null)
[-] ExtractedTimeStamp (varchar(30), null)
[-] VitalType (varchar(25), null)
[-] VitalResultNumericValue (numeric(19,4), null)
[-] VitalResultValue (varchar(15), null)
[-] Unit (varchar(25), null)
[-] ProcessedText (varchar(115), null)
[-] SectionType (varchar(25), null)
[-] SpanStart (int, null)
[-] SpanEnd (int, null)
[-] NLPSystem (varchar(25), null)
[-] NLPProcessDate (date, null)
[-] RefreshDate (date, null)
[-] ReleaseDate (date, null)

Reason for Stay

- Inpatient.[AdmitDiagnosis]
- EDISLog.[PatientVisitReason]
- EDISDischargeDiagnosis.[DischargeDiagnosis]

	AdmitDiagnosis	Snippets	CUI	STR	STY	polarity	uncertainty	historyOf
1	n/v/d	nausea	C0027497	Nausea	Sign or Symptom	1	0	0
2	n/v/d	vomiting	C0042963	Vomiting	Sign or Symptom	1	0	0
3	n/v/d	dianhea	C0011991	Dianhea	Sign or Symptom	1	0	0

PatientVisitReason	Snippets	CUI	STR	STY	polarity	uncertainty	historyOf
Si, Detox, Fevers, SOB .	detoxification	C0150543	Detoxification procedure	Therapeutic or Preventive Procedure	1	0	0
Si, Detox, Fevers, SOB .	suicidal ideation	C0424000	Feeling suicidal (finding)	Finding	1	0	0
Si, Detox, Fevers, SOB .	fever	C0015967	Fever	Sign or Symptom	1	0	0
Si, Detox, Fevers, SOB .	shortness of breath	C0013404	Dyspnea	Sign or Symptom	1	0	0

ORDCOVID.SupplementReasonForStayText

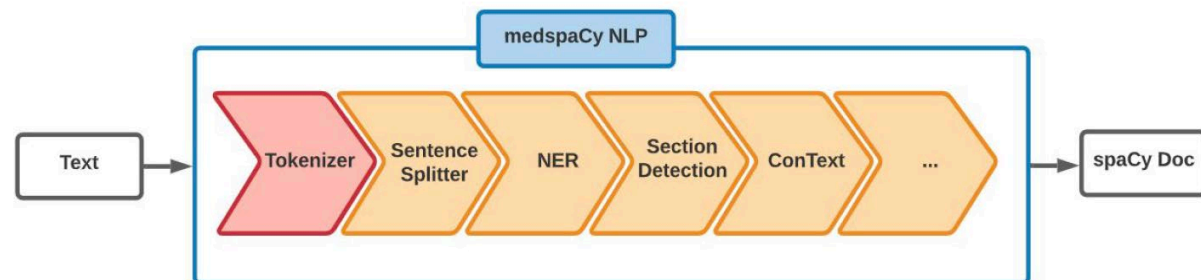
Columns

- PatientICN (varchar(50), null)
- EverPositive (bit, null)
- IndexDate (date, null)
- SourceTableName (varchar(25), not null)
- PrimarySID (bigint, not null)
- RowDate (datetime2(0), null)
- SourceColumnName (varchar(18), not null)
- SourceColumnValue (varchar(305), null)
- ProcessedText (varchar(500), null)
- Vocabulary (varchar(4), not null)
- Code (varchar(10), null)
- ConceptName (varchar(500), null)
- SemanticType (varchar(50), null)
- Polarity (int, null)
- Uncertainty (int, null)
- Conditional (int, null)
- Historical (int, null)
- NLPSystem (varchar(23), null)
- NLPPProcessDate (date, null)
- RefreshDate (date, null)
- ReleaseDate (date, null)

[COVID-19:ORDCovid PreIndexSymptoms - VA Phenomics Library](#)

COVID-19 Screening Template

Last updated April 14, 2022



Coronavirus Disease 2019 (COVID-19) Screen: << COVID_SCREEN >>

The patient reports that they do not have NEGATED_EXISTENCE a fever FEVER .

The patient reports that they do not have NEGATED_EXISTENCE a new or worsening cough COUGH or shortness of breath SOB .

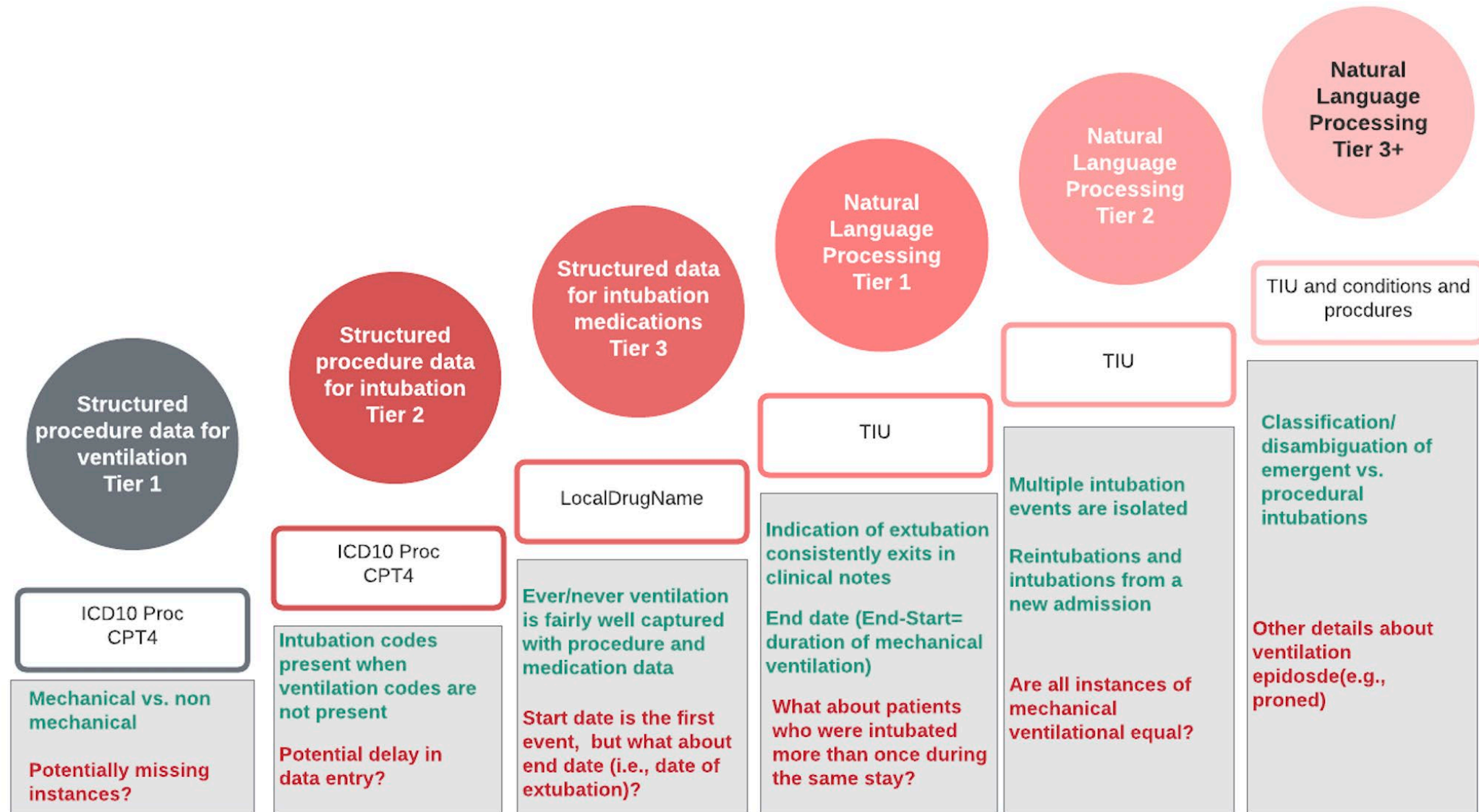
The patient reports they do not have NEGATED_EXISTENCE any flu-like symptoms COLDFLU .

Results: << RESULTS >> Screen is negative.

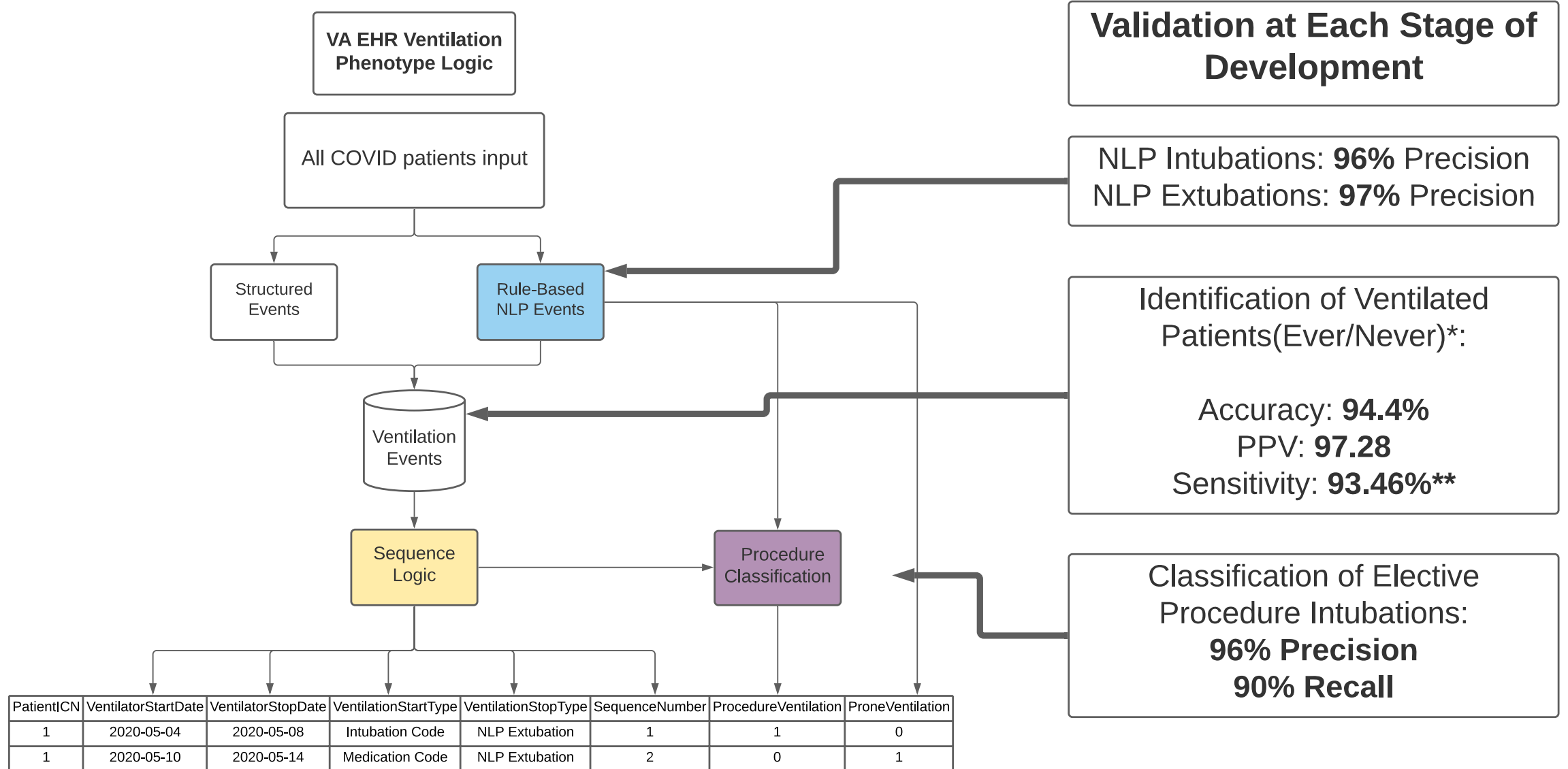
[COVID-19:ORDCovid PreIndexSymptoms - VA Phenomics Library](#)

F1 score: 0.964

Identifying the need for NLP – Mechanical Ventilation

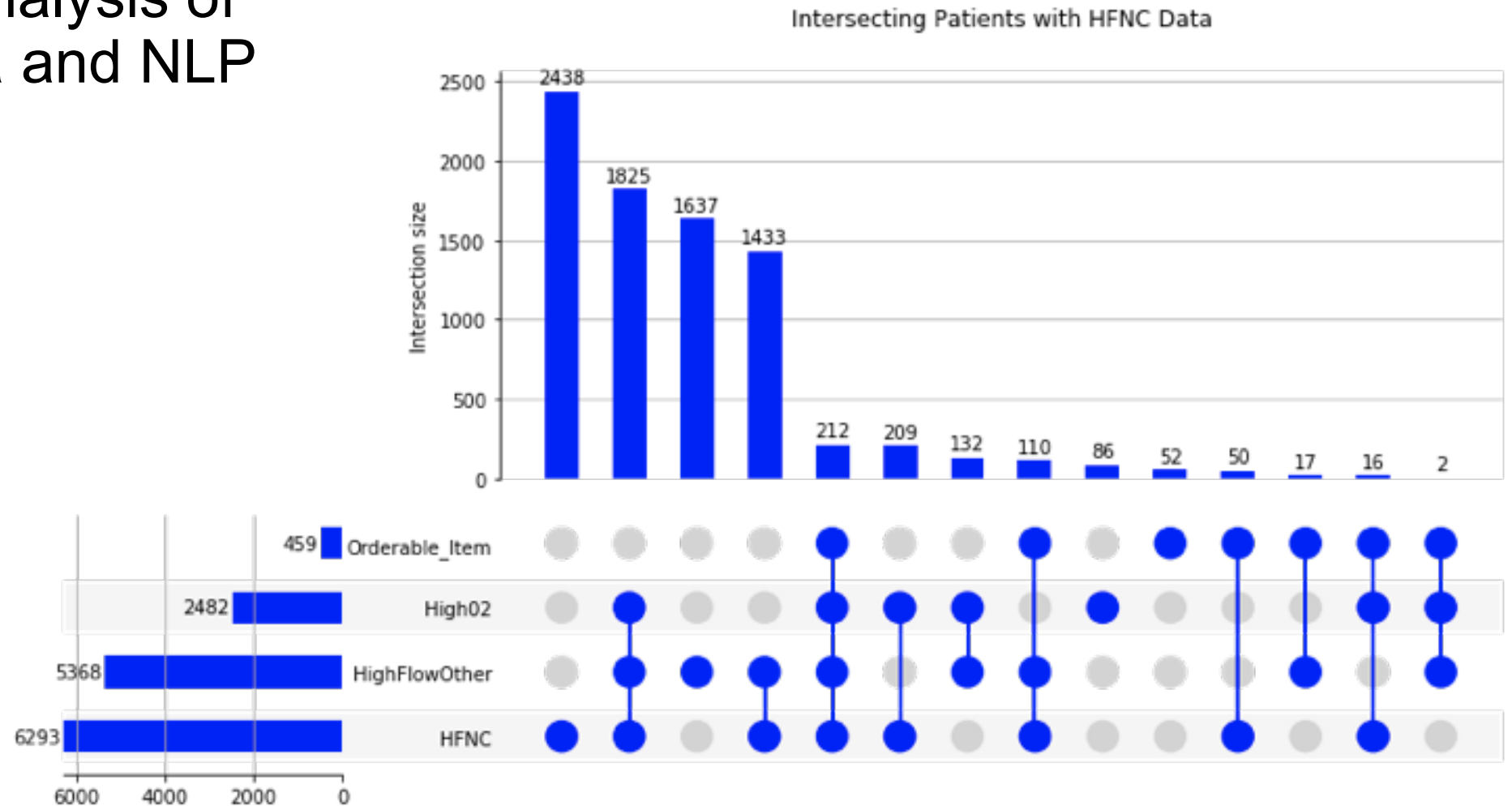


Mechanical Ventilation



Identifying the need for NLP - Supplemental Oxygen

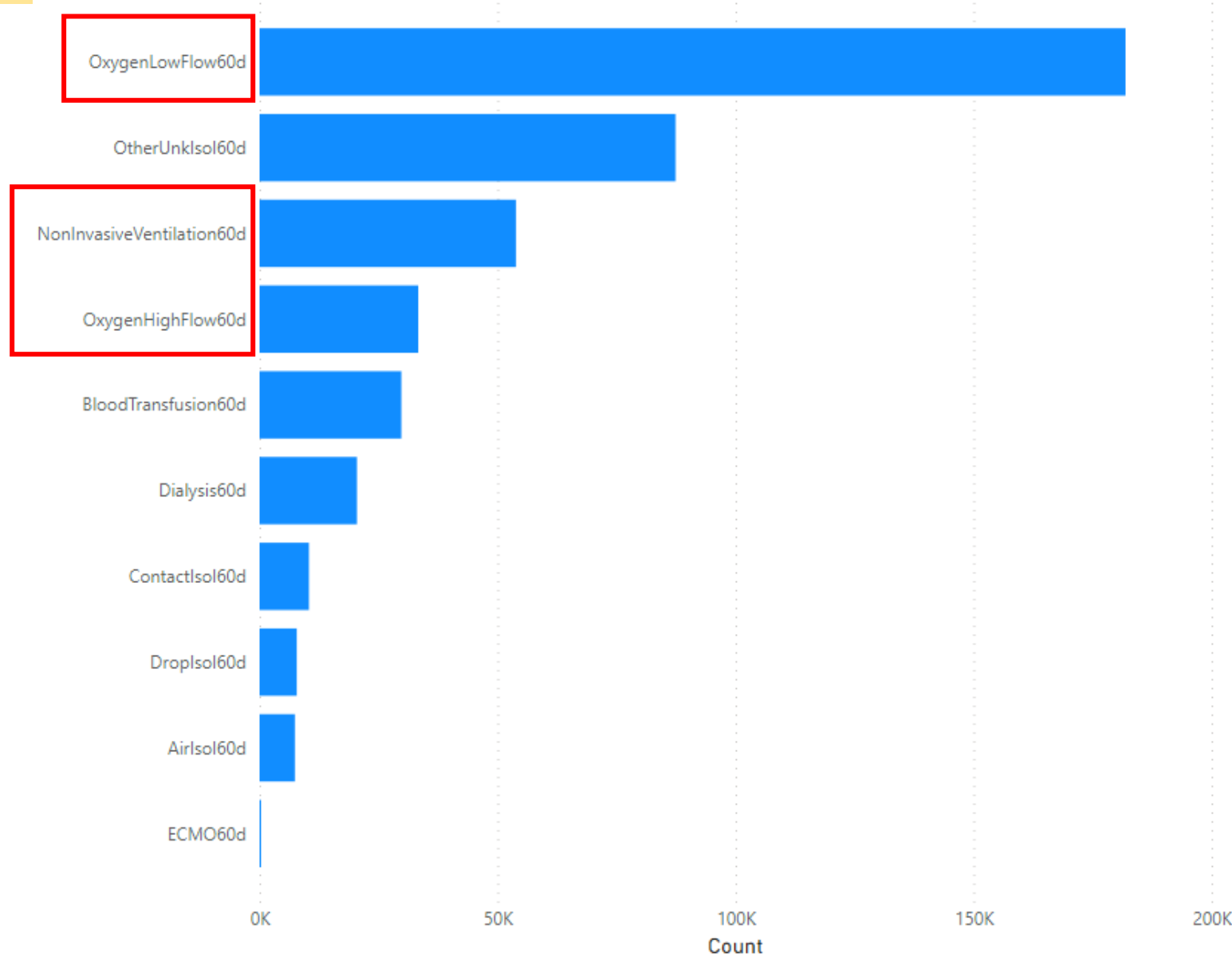
- Discrepancy analysis of structured data and NLP



Supplemental Oxygen

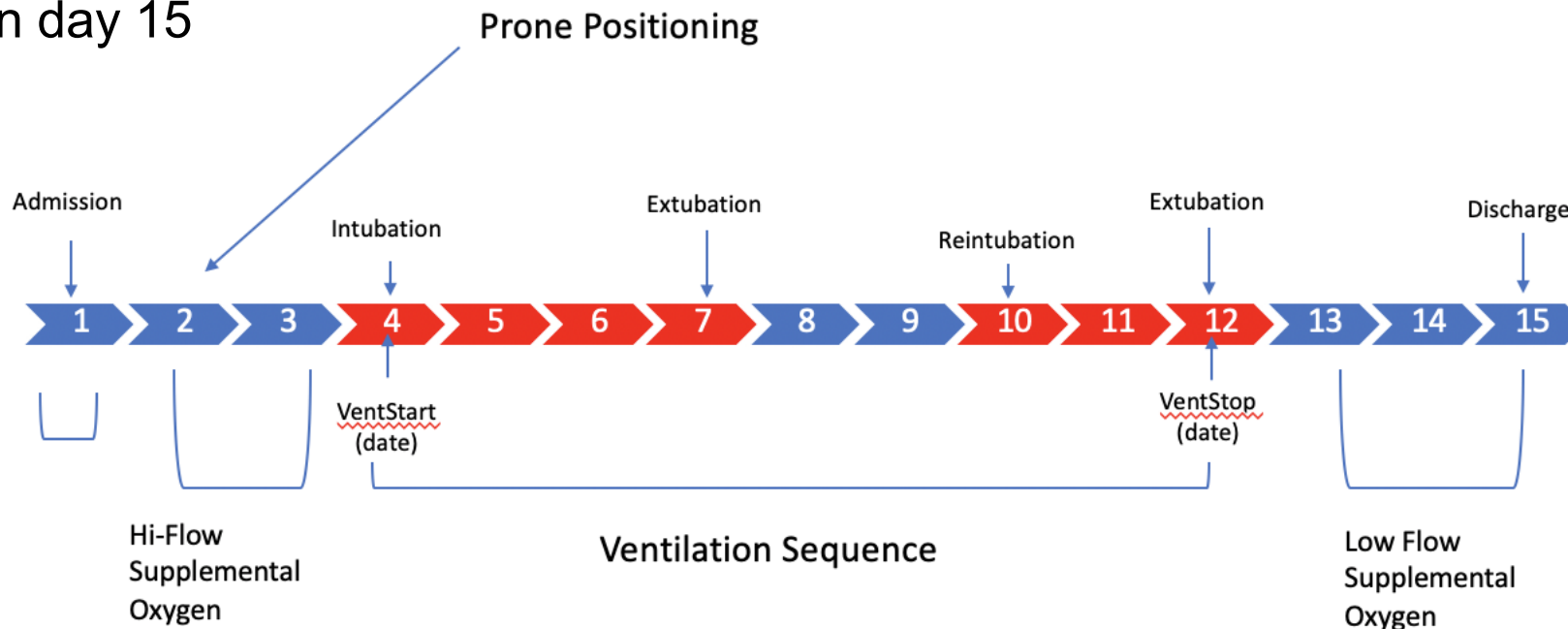
- Supplemental oxygen with high flow or low flow nasal cannula, or noninvasive ventilation
- Identified using a combination of structured vitals data and NLP
- Two concepts identified via NLP
 - Oxygen delivery device (“Pt currently on HFNC”)
 - LPM (“Patient’s SpO2 = 98% on 3 L O2”)
- [COVID-19:Oxygen Flow \(COVID\) - VA Phenomics Library](#)

Supplemental Oxygen – PostIndexProcedures



Hypothetical patient timeline

- Admitted into the hospital on day 1
- Placed in prone position on day 2 with supplemental oxygen
- Intubated and ventilated on day 4
- Successfully extubated on day 7
- Condition worsens on day 10 and they are reintubated
- Successfully extubated again on day 12
- Discharged on day 15



Menopause

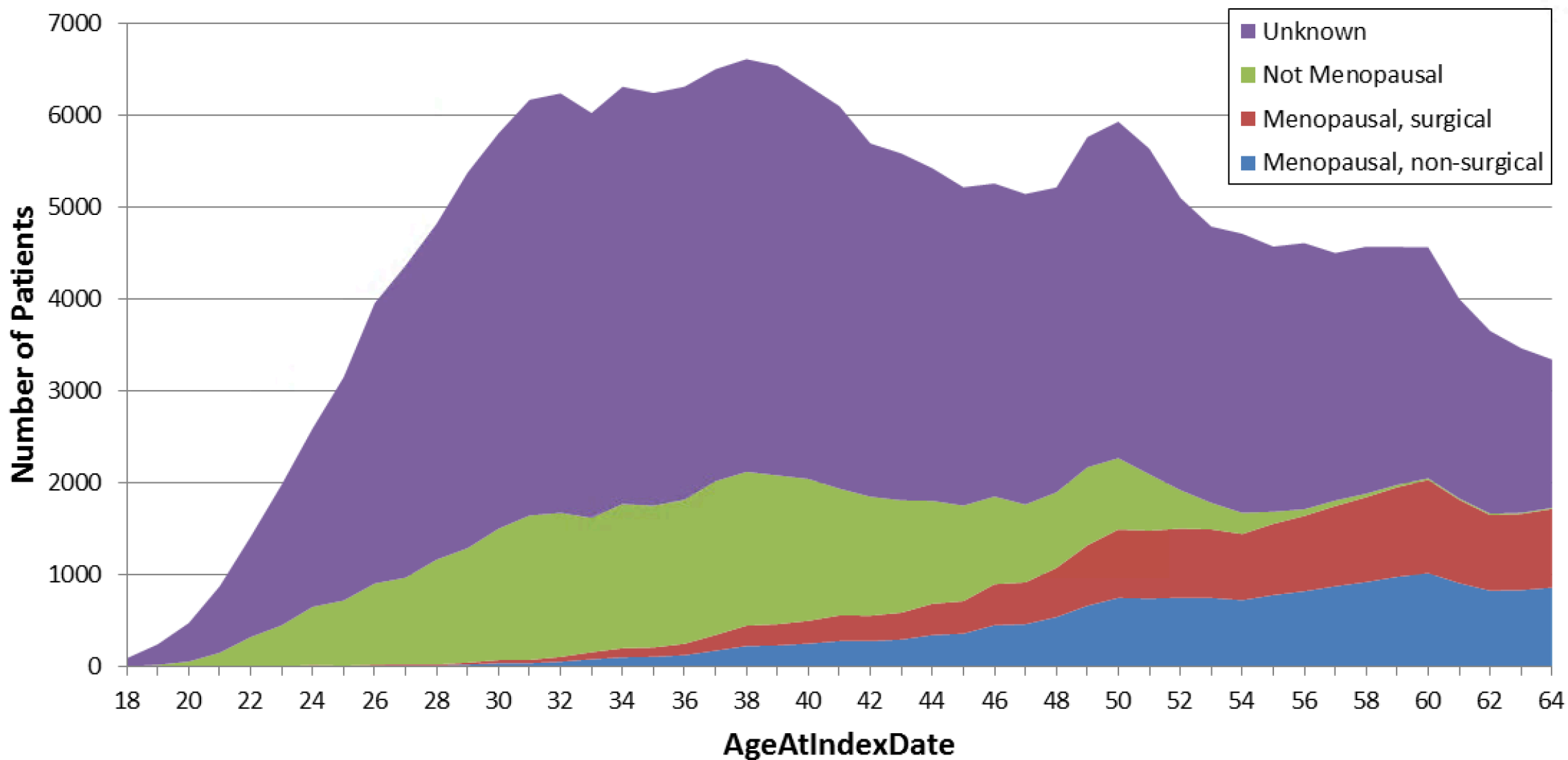
- Difficult to classify patients as pre- or postmenopausal on a certain date using structured data
 - Medication orders
 - Coded diagnoses
 - Surgical procedures
- Increased COVID-19 severity in men vs women
- Is there a difference in severity between pre- and postmenopausal women?

Menopause

- The system identifies concept-date pairs
 - Last menstrual period (LMP) date
 - Surgical procedure date
 - Menopause diagnosis date
- Examples
 - “LMP: Feb 15, 2021”
 - “Bilateral oophorectomy 3/2012”
 - “Premature menopause 2015”
- Patient classifications
 - Menopausal, surgical
 - Menopausal, non-surgical
 - Not Menopausal
 - Unknown
- Chart abstraction showed many patients had no documented evidence of menopausal status

Menopause

Patient Classification based on NLP Alone

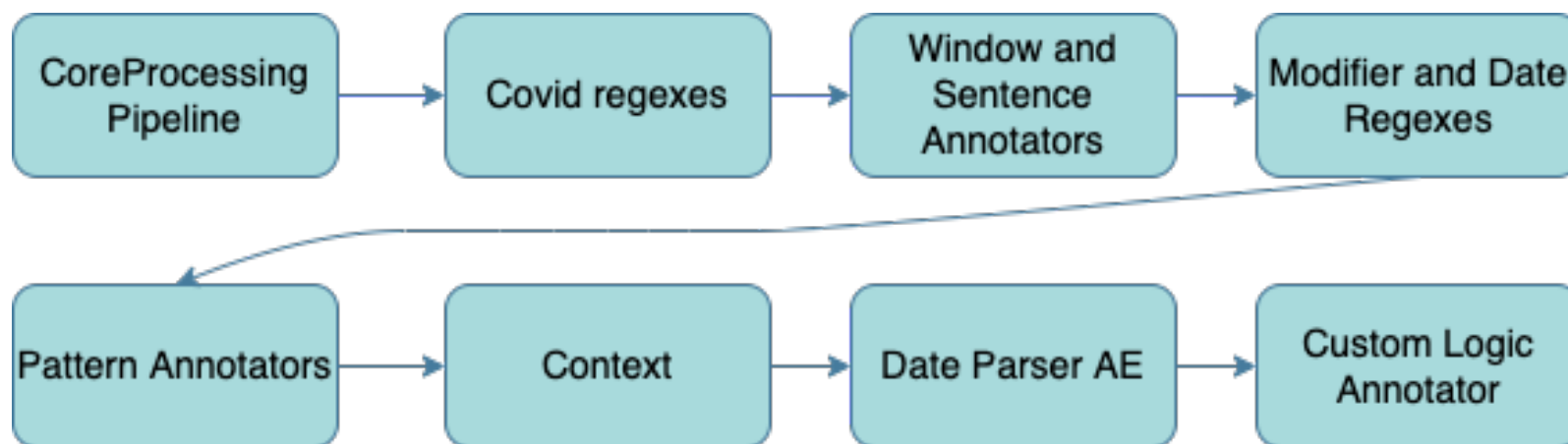


Negative COVID-19 Tests

- Veterans are tested for COVID-19 by VA and non-VA providers
- Previously developed NLP system identifies positive COVID-19 tests from non-VA providers, but not negative tests
- Purpose: identify negative COVID-19 test and test date in clinical notes

Negative COVID-19 Tests

- The minimum for output is a COVID-19 term and a negative result term
 - Test type, date, and outside location terms are output if present
 - Current requirement to be added to the CSDR: [COVID term] + [negative term] + [exact date]
- Date types
 - Exact date (“4/13/2021”)
 - Partial date (“4/13”)
 - Relative date (“yesterday”)



NLP system architecture of the NegCov pipeline

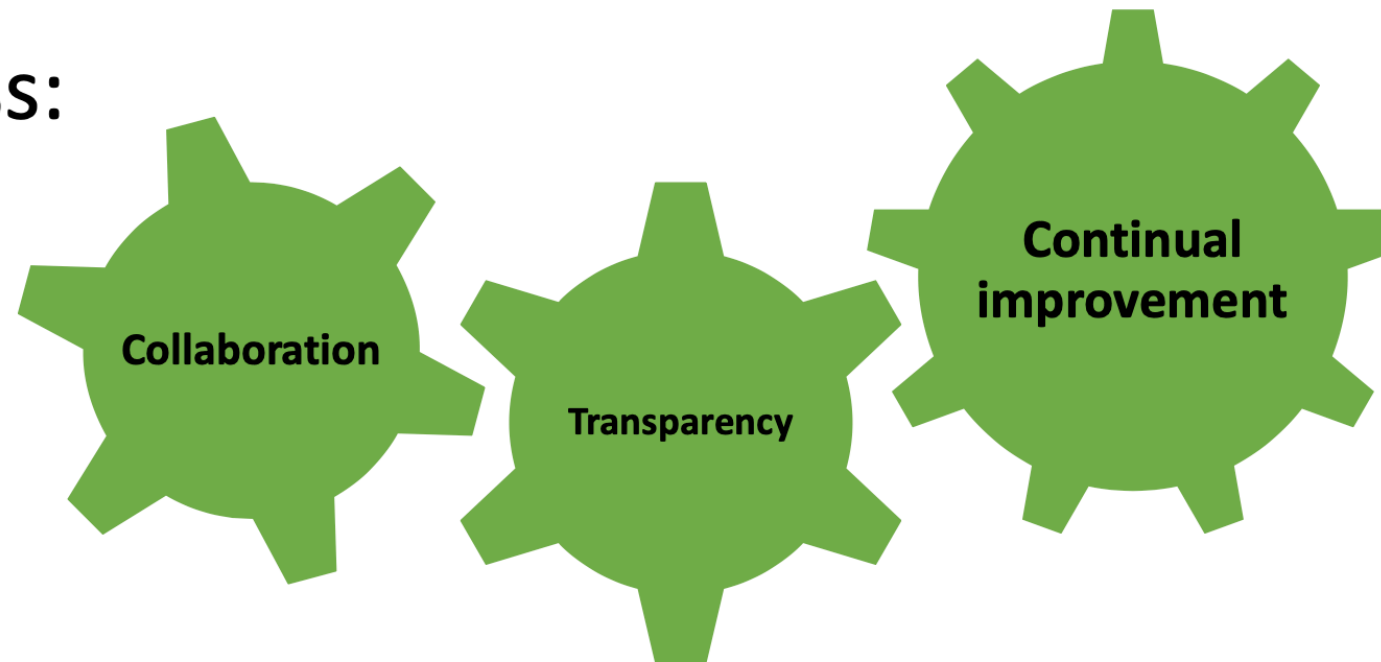
Negative COVID-19 Tests

- Identification of non-VA negative COVID-19 tests
 - Sensitivity: 97.5%
- Identification of a negative COVID-19 test with date
 - Precision: 90.5%
 - Sensitivity: 94.3%
- Limitations
 - Extracted date unrelated to COVID-19 test
 - Hypothetical test statement (“We will schedule procedure after patient tests negative for covid”)

Purpose of CSDR

- Goal:
 - Provide value as **quickly** and **consistently** as possible

- Process:



More Info, Help, Questions

- CSDR Wiki: [COVID-19:Shared Data Resource - VA Phenomics Library](#)
- Additional Trainings and Cyberseminars:
 - VINCI Central
 - HSR&D Cyberseminars
 - Introduction to NLP
 - Introduction to the COVID-19 Shared Data Resource
 - NLP and the CSDR – more detail on the ventilation phenotype
- Helpdesk: VINCI@va.gov