

Admitted - Integrating Inpatient Data

4:15PM EST | November 16th, 2021 | 2021 SyS Symposium

Moderator: Daniel Bedford – State of Wisconsin, Department of Health Services

Presenters:

Andy Walsh, PhD – Health Monitoring

Stacey Hoferka, MPH, MSIS – IL Dept of Public Health

Neha Shanker, PhD, MPH – NC Division of Public Health, NC DHHS



Council of State and Territorial Epidemiologists



Andy Walsh, PhD
Health Monitoring



Where'd My Data Go?

Syndromic Surveillance When EDs Are Empty

Andy Walsh, PhD
Chief Science Officer, Health Monitoring

November 16, 2021



Andy Walsh, PhD
Chief Science Officer, Health Monitoring

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A series of small, light blue navigation icons typically found in Beamer presentations, including symbols for back, forward, search, and other slide navigation functions.

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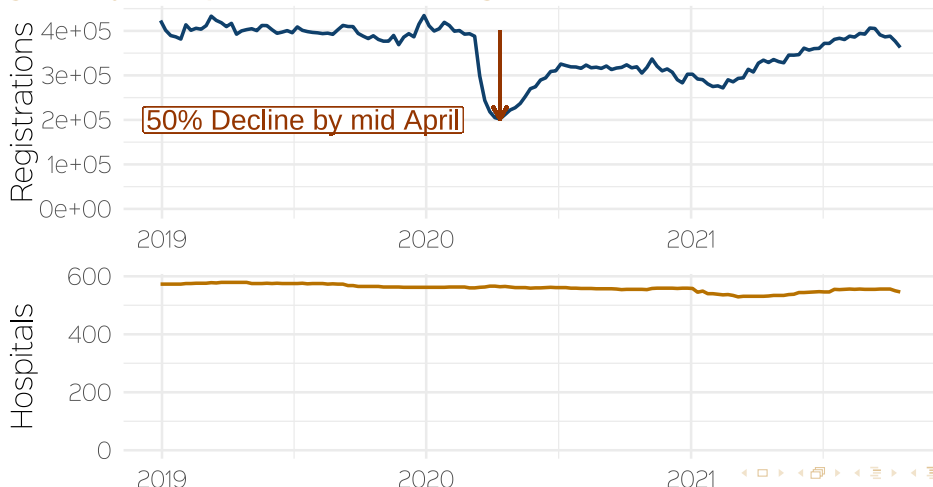
Changes in Healthcare Seeking

- Declines in Typical Sources
- Evolving Indicators of COVID-19

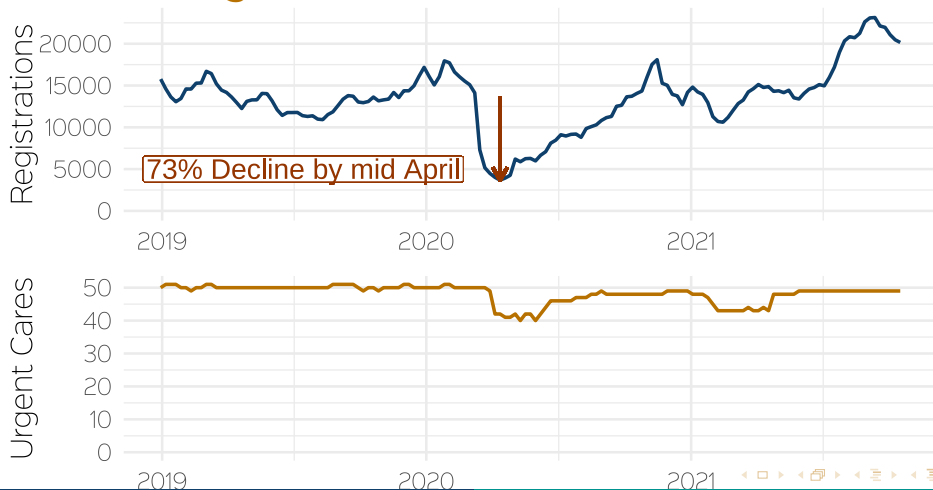
Digging into Inpatient Admissions

- Ventilator Usage
- ICU Occupancy
- Severity of COVID-19 Illness

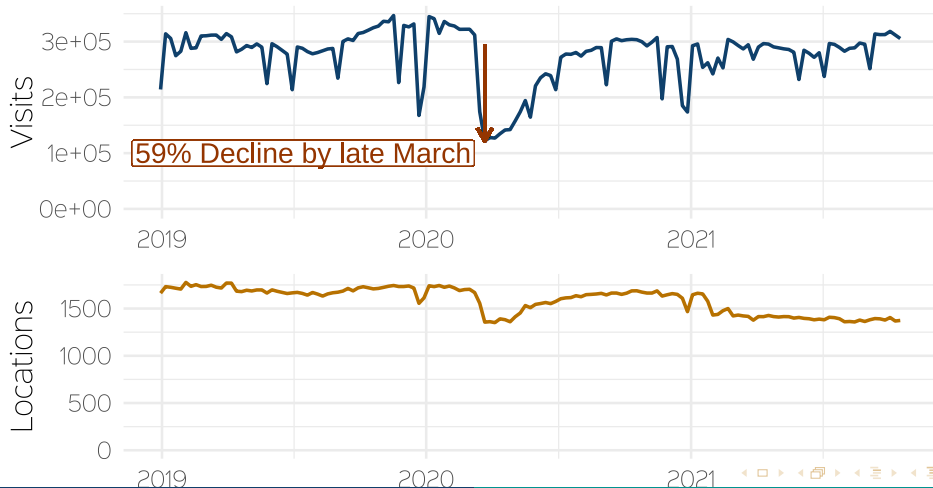
Emergency Department Registrations



Urgent Care Registrations



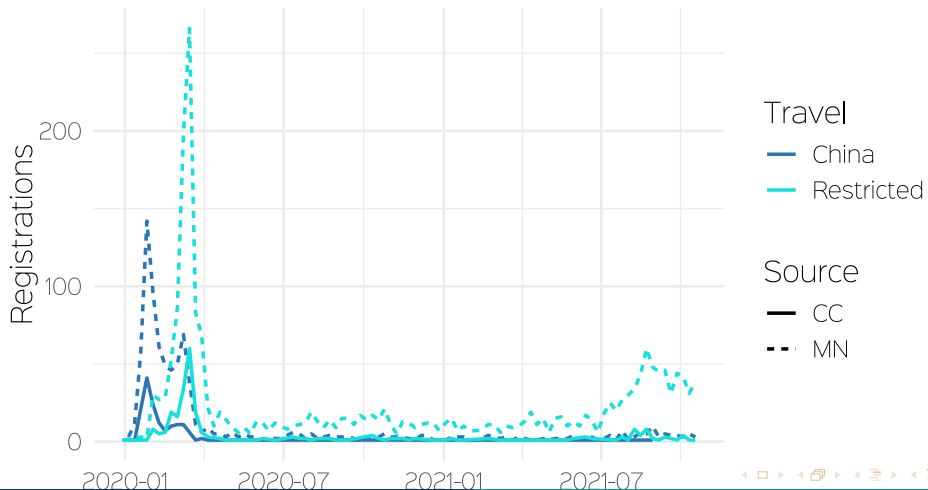
Physician Office Visits



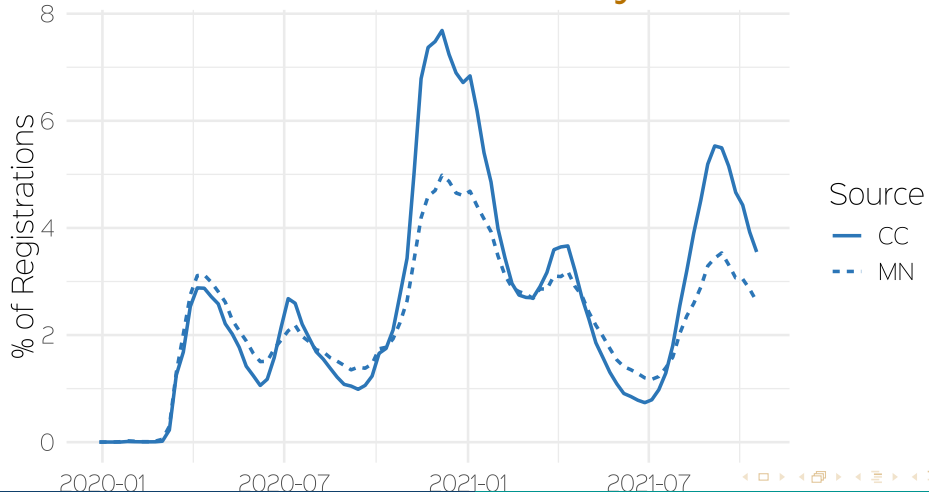
Percent Change in ED Volume



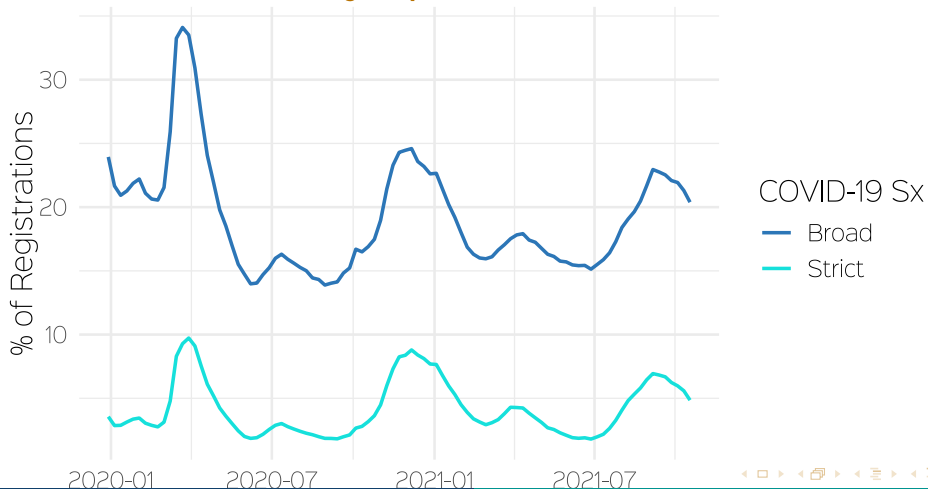
COVID-19 Patterns: Travel



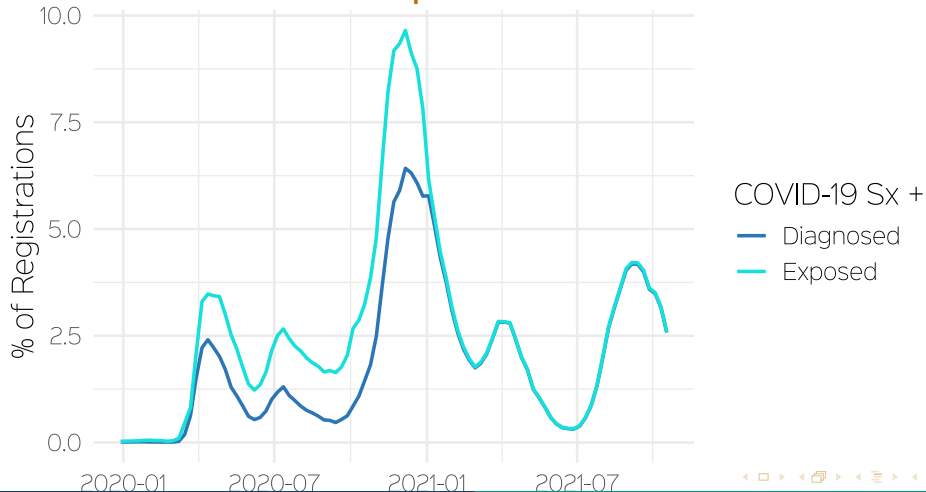
COVID-19 Patterns: Coronavirus by Name



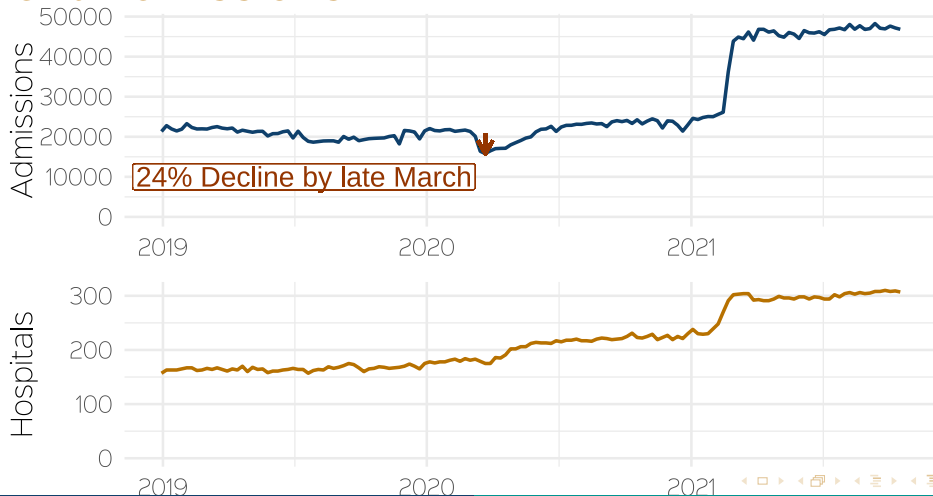
COVID-19 Patterns: Symptoms



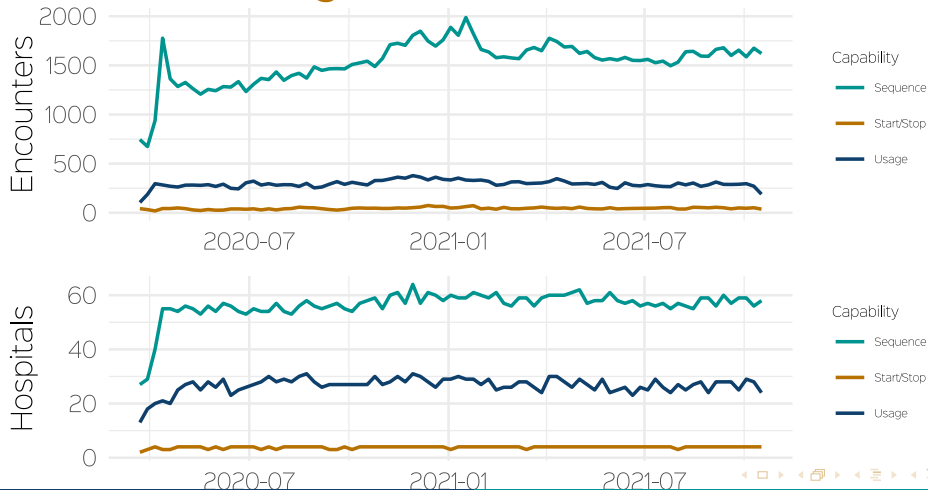
COVID-19 Patterns: Composite Criteria



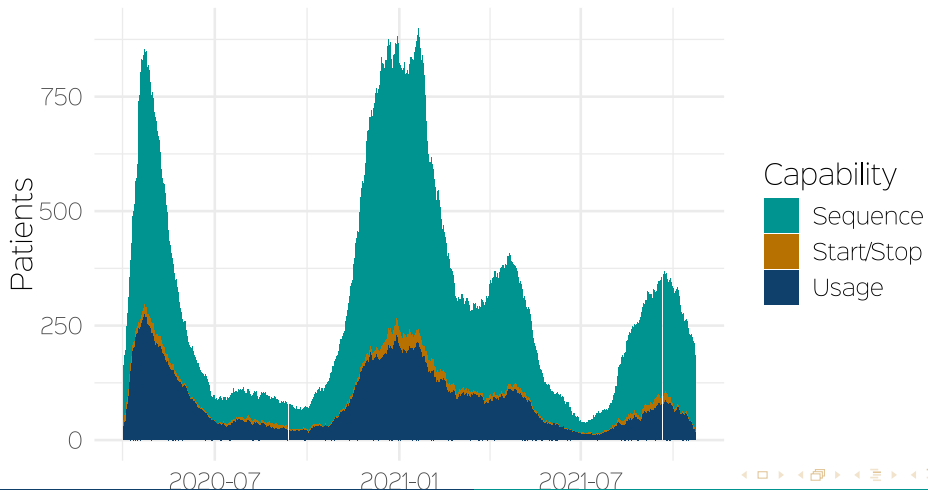
Inpatient Admissions



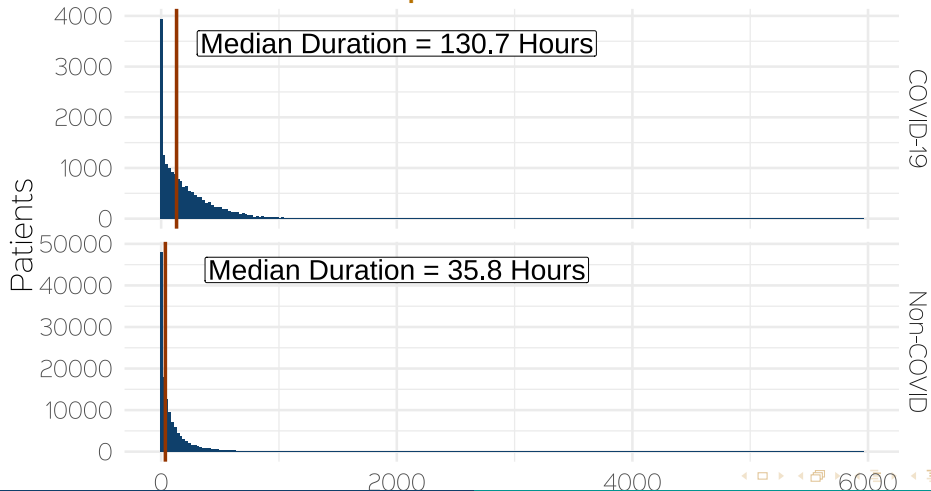
Encounters Initiating Ventilation



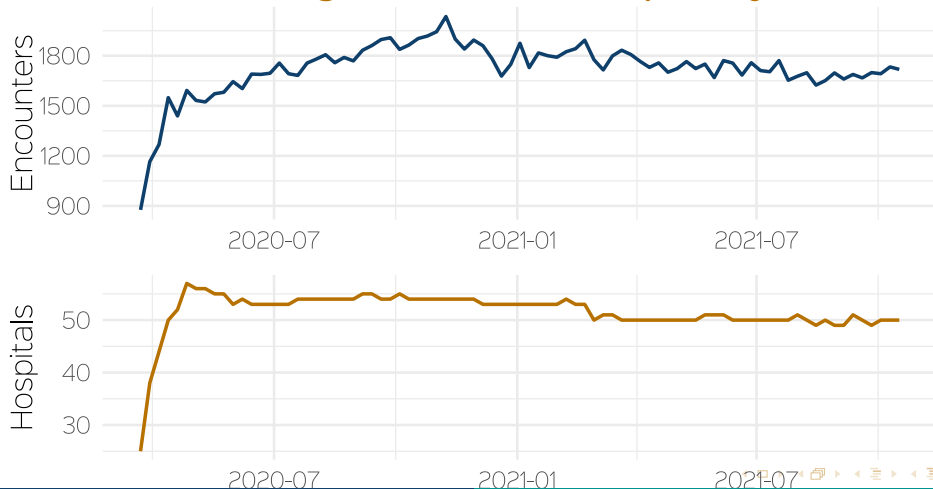
COVID-19 Patients on Ventilators



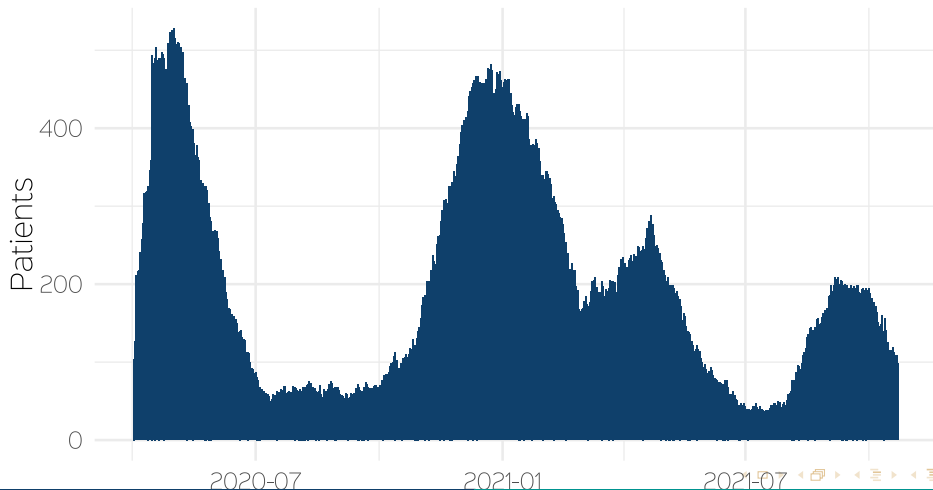
Ventilator Duration Comparison



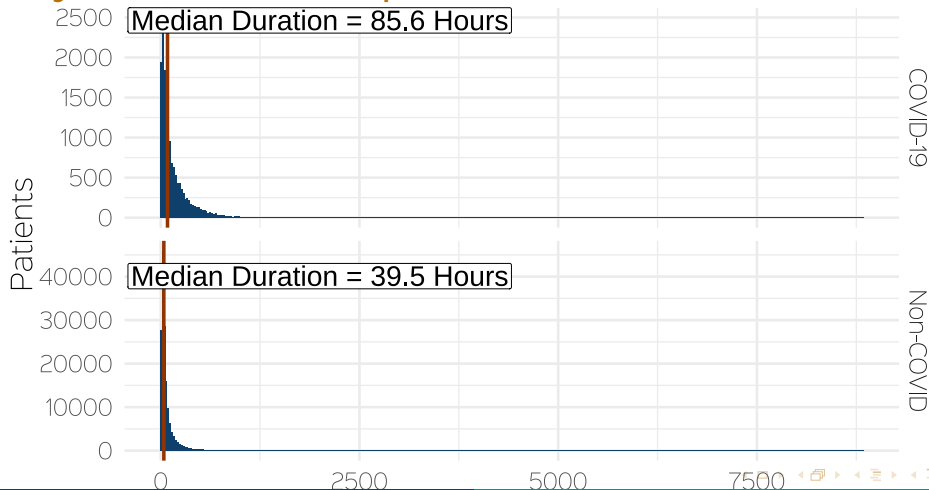
Encounters Initiating ICU Bed Occupancy



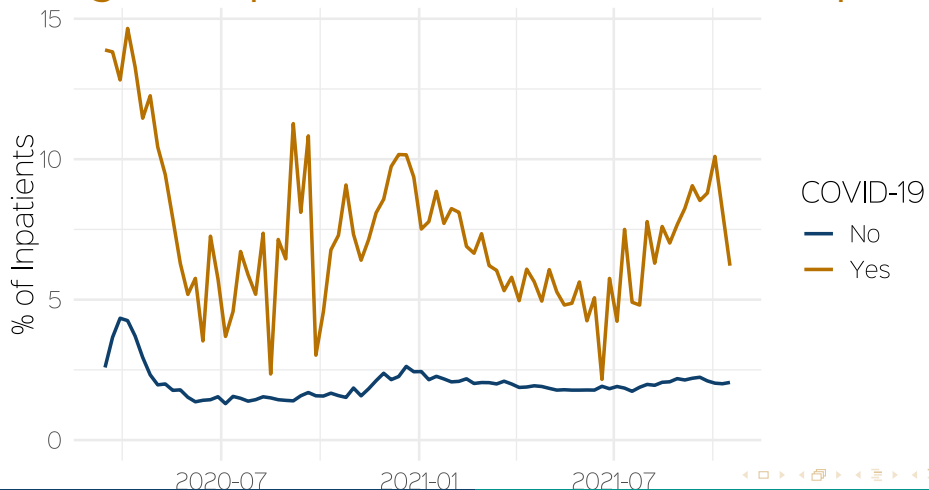
COVID-19 Patients in ICU Beds



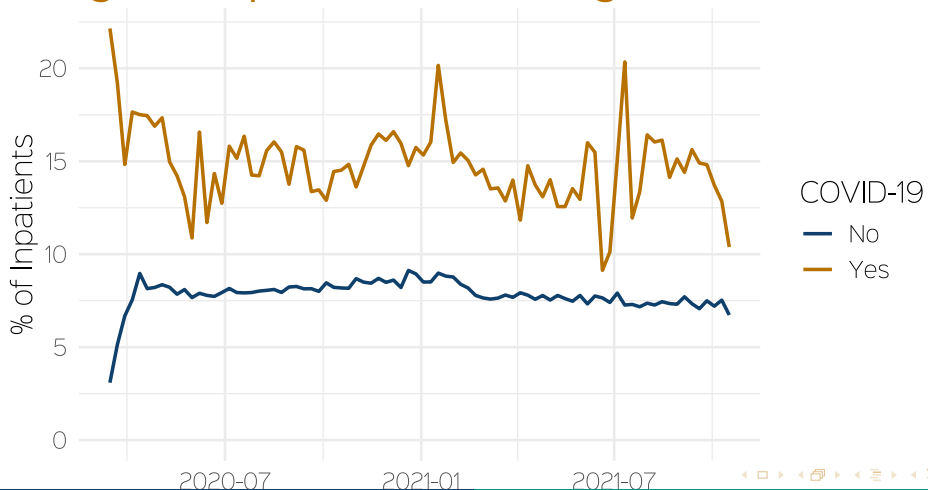
ICU Stay Duration Comparison



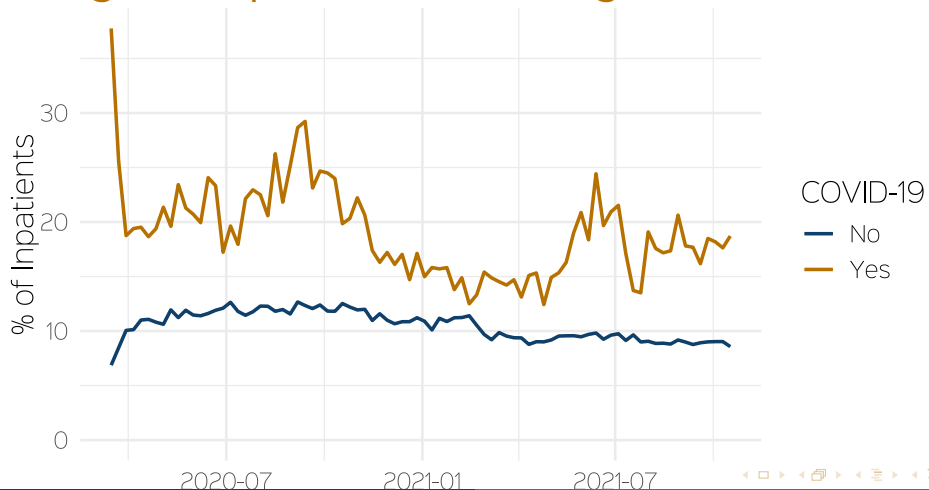
Percentage of Inpatients with Deceased Dispositions



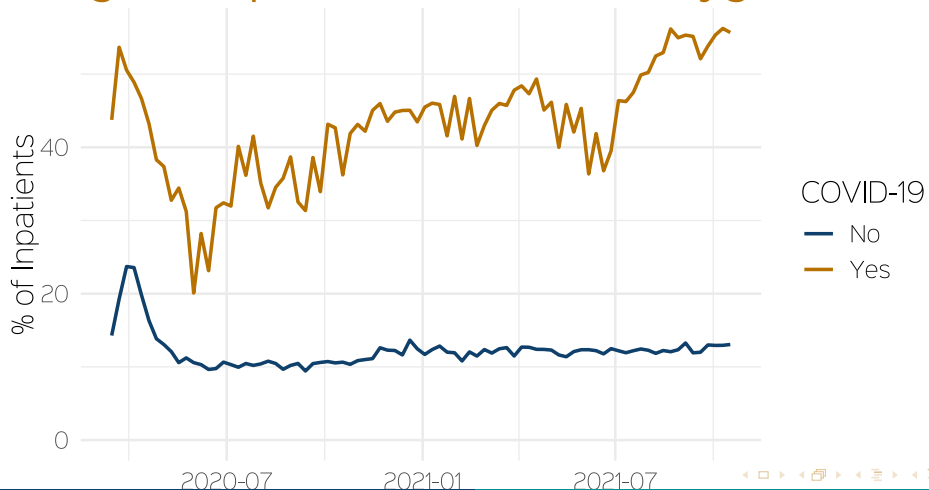
Percentage of Inpatients Needing Ventilators



Percentage of Inpatients Needing ICU Beds



Percentage of Inpatients with Low Oxygen Saturation



Discussion

- ▶ The COVID-19 pandemic caused short and medium term changes in healthcare-seeking behavior
 - ▶ ED Registrations dropped 50% and only fully returned to pre-pandemic levels recently
- ▶ Syndromic indicators of COVID-19 evolved several times throughout the pandemic
- ▶ Inpatient data was most consistently available
- ▶ Inpatient data provided real-time, automated estimates of:
 - ▶ Ventilator utilization
 - ▶ ICU utilization
 - ▶ Disease severity

Andy Walsh
Chief Science Officer, Health Monitoring
andy.walsh@hmsinc.com



Stacey Hoferka, MSIS
UNC Chapel Hill





Title

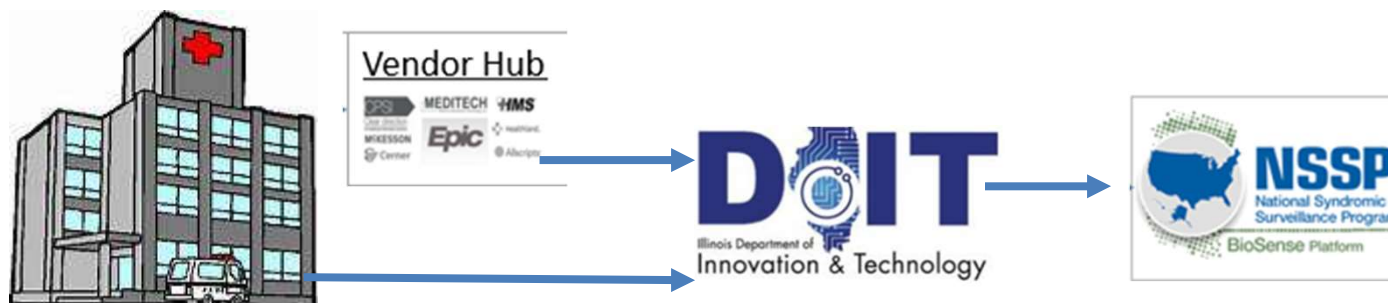
Stacey Hoferka, MPH, MSIS

Illinois Department of Public Health

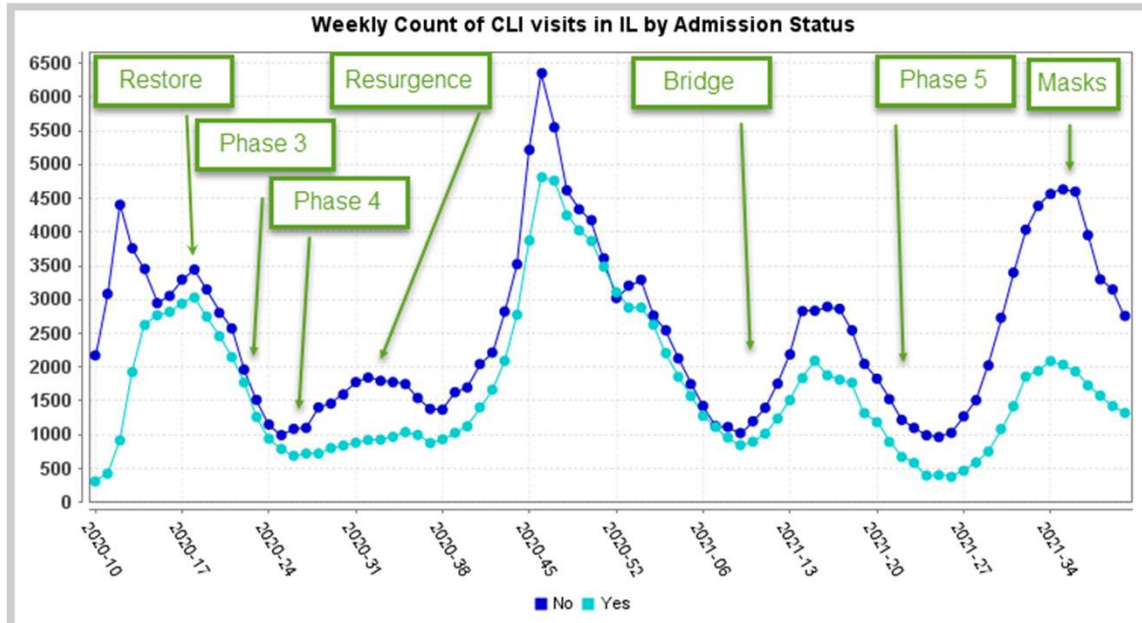
November 16, 2021

Illinois Syndromic Surveillance

- Syndromic Surveillance in Illinois is...
 - Emergency Department (since 2013) and Inpatient visits (since 2018)
 - Meaningful Use-Federal Incentive Program for providers, began 2012
 - 185 acute care EDs are sending data to IDPH; 93% are sending Inpatient data
 - About 15,000 Emergency visits/day and 4,000 Inpatient visits
 - Near real-time feeds every 15 minutes-many sites near real-time
 - Includes demographics (sex, race, ethnicity, age), ZIP code, **Chief complaint, Diagnosis**
 - Text processing + ICD-10 codes are grouped into syndromes
 - -Hospitals are mandated to report opioid overdoses within 48 hours
 - -Shared access with LHDs, IDPH, CDC, hospitals. Publicly on opioid dashboard



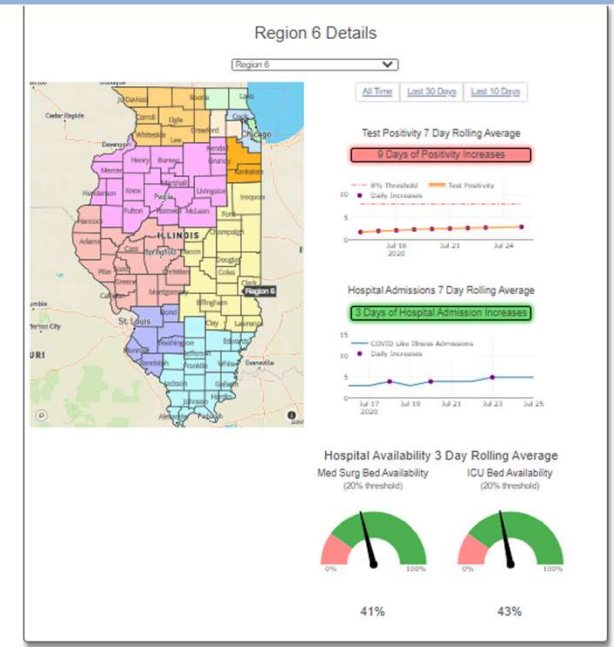
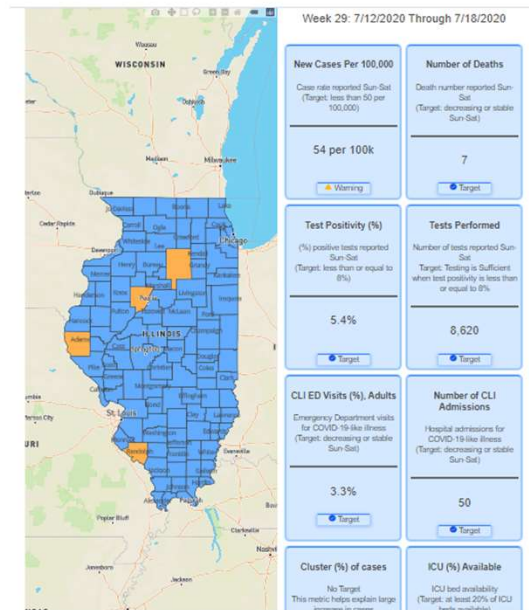
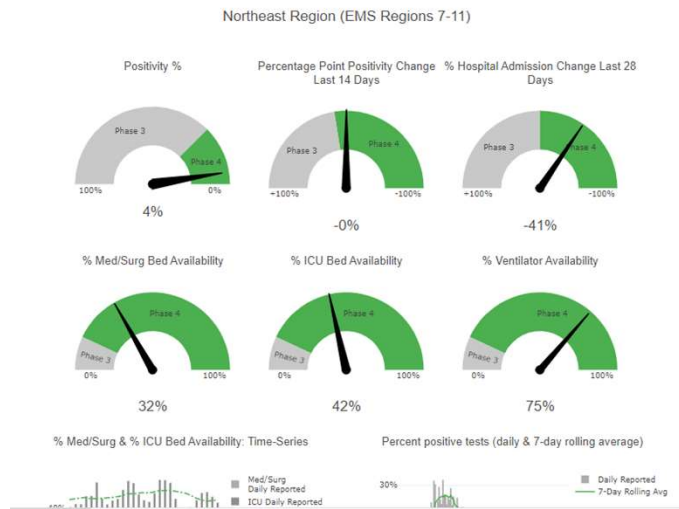
IL COVID-like Illness Trend and Mitigation Policies



- COVID data trends informed policy
- Hospital admission trends feed decision metrics
- CLI admissions consistently used for metrics

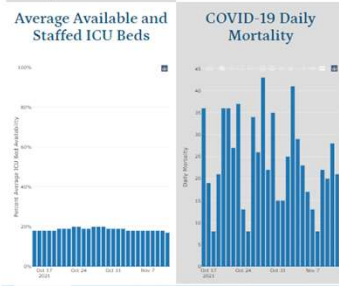
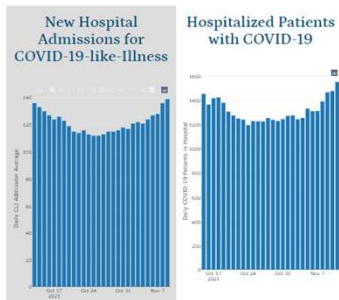
Initial SiP	Restore	County	Resurgence	Bridge to Phase 5
March 2020	4 regions Phased reopening CLI admissions Test + % Beds	Guidance 8 metrics Case rate Test + & # ICU % CLI (ED and IP) Deaths Outbreaks	11 regions Tiered mitigation CLI admissions Test positivity ICU beds	Statewide Vaccination rates CLI admission COVID in Hsp ICU beds Mortality Case rate

Visualizations of Metrics

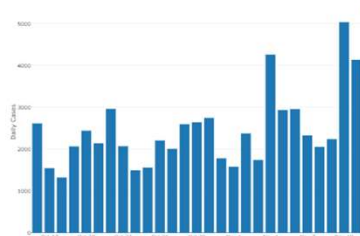


On June 11, 2021, Illinois moved into Phase 5 of the Restore Illinois Plan. IDPH will continue to track the vaccination rates and hospital capacity metrics and cases over 28-day monitoring periods. New evidence concerning variants, vaccine effectiveness or waning immunity could substantially and quickly increase COVID-19 hospitalizations and will be taken into consideration, in addition to the metrics being monitored.

Data are provisional and are updated daily. Data updated: 11/12/2021

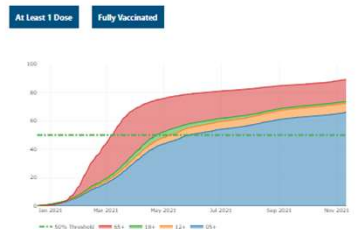


COVID-19 Daily Cases



The following vaccination data are pulled from I-CARE and do not reflect federal efforts to vaccinate Illinoisians. CDC reports the total number of people who reside in Illinois who have been vaccinated, including Illinois residents who have been vaccinated in other states.

Illinois Population Vaccinated With At Least 1 Dose



Methodology

Slide Updated 7/27/2020

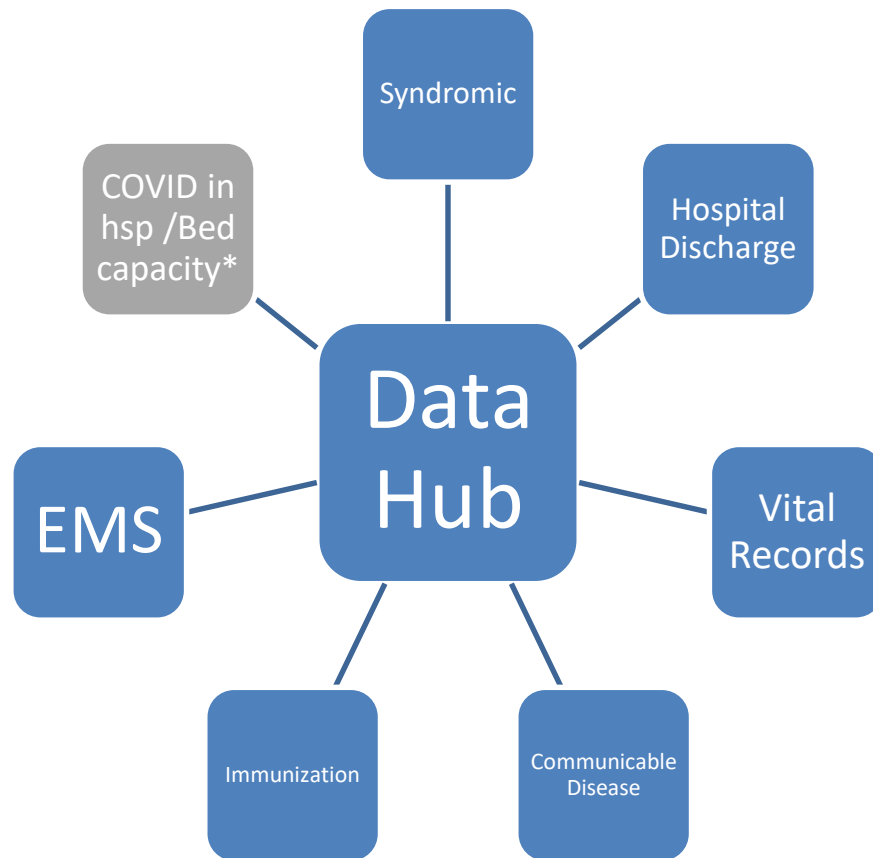
Inpatient Data –Uses / Benefits

- Daily monitoring – coverage across IL
- Inpatient data more consistent than ED visits –less health seeking behavior bias
- Automated, timely metric on hospital burden for near-real time trends
- Patient stratified analysis for demographics, spatial distribution
- Discharge status helped to clarify the disease burden and hospital stress points
 - Date of Discharge – most complete
 - Disposition less clear results
 - 60% complete
 - 20% still admitted
 - 20% incomplete
- Length of Stay analysis to pair with COVID in hospital snapshot
 - Validity testing comparisons to the COVID in hospital measures – EMS system
- “Who’s in hospital?’ analysis
- Established regional thresholds –using Summer 2020, each of 11 regions
- Pediatric hospitalization analysis associated with all causes
- Other respiratory causes – influenza and RSV especially important
- All causes of admission stresses

IDPH Data Hub

- Expanding, integrated technology platform
- API connections to multiple data sources
- MPI built off Hospital Discharge Data
- Also, existing deterministic match with Name and Date of Birth
- Probabilistic algorithms in test; move to production pending
- Originally developed for opioid response
- Prescription Monitoring Program (PMP) is planned

* Bed Capacity includes snapshot of daily number of COVID in hospital - Not person-level for linkage



Linkage Method

- Initially, January 2020-Match established for detecting visits from Persons of Interest
 - Alerts sent to IDPH and LHD staff
- All 2020-2021 admissions records are tested for matches to confirmed cases in the I-NEDSS data base
- Deterministic algorithm (FN, LN, DOB)
- File with IDs from each database shared with analysts
 - Local Health Department received file for internal analysis
- Note: Syndromic data in IL includes Name
 - Name is scrubbed before sending to NSSP
 - Name separated from other parsed data elements in HL7 message
 - Name is stored in a separate, encrypted database at IDPH

Linkage Results

Visits from 3/2020 to 4/2021

- 169 (91%) hospitals in IL had a match
- 184,140 admissions were linked to a COVID-19 case
- 109,936 (60%) were from unique cases
 - 32% had 2 or more admissions
- When onset was documented for a case, 76% had a visit within 14 days prior to onset
- median of 12 days for admission following onset.
- Those with a repeat visit, had a median of 32 days between onset and last admission

Limitations of Inpatient Data

- Incomplete coverage – Not intended as exact count of all admissions (93% of sites)
- Less history – 2018 growth / near complete Jan 2020
- ICU is a critical variable that is not captured consistently
- Pediatric numbers
 - low
 - Some pediatric hospitals not using syndromic for Promoting Operability – lowers incentive
- Matching to CD cases was not integrated into the I-NEDSS
- Data quality –
- Lag in diagnosis
 - Known issue
 - Compared daily change in admissions over time. CLI lag was larger than COVID diagnosis alone
- Dynamic System – Daily updates
 - Public release commits the value
 - Frozen view of data preferred
 - Updating counts is confusing
- Confidentiality
 - HIPAA protects against the release of data by Date of Admission
 - 7-day rolling average used

Other Uses of Inpatient Data and Linkage

- Total visits - Use
 - Categorizing all causes of visits to hospitals
 - Non-Covid, Injury, Mental Health, Chronic conditions
- XDRO - Linkage
 - Matching Inpatient data to eXtensively Drug Resistant Organism (XDRO) registry
 - Alerts Hospital Infection Control of Admissions that requires XDRO contact precautions
 - Initially hospitals established separate admission feed for matching
 - Leveraging syndromic is intended to reduce burden, multiple use of one feed
 - Challenges still identified for complete admission matches
 - Plans for using the alerting system to notify Long-term care sites
- Opioid /All Drug Overdoses - Linkage
 - Initially match Hospital Discharge to Vital records
 - Identify fatalities that had a prior non-fatal visit
 - Match 2018 overdoses to all prior visits
 - Analysis of pre-overdose causes for care
 - Planned match to PMP
 - Identify patients at increased risk for overdose
 - Incorporate overdose history into a patient record and provide to prescribing physician at Point-of Care



Neha Shanker, PhD, MPH
NC Division of Public Health, NC
DHHS



Identifying Potential Post-vaccination COVID Infections in NC Using HIE Data

NC Division of Public Health, NC

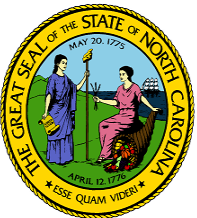
Neha Shanker, PhD, MPH

Lana Deyneka, MD, MPH

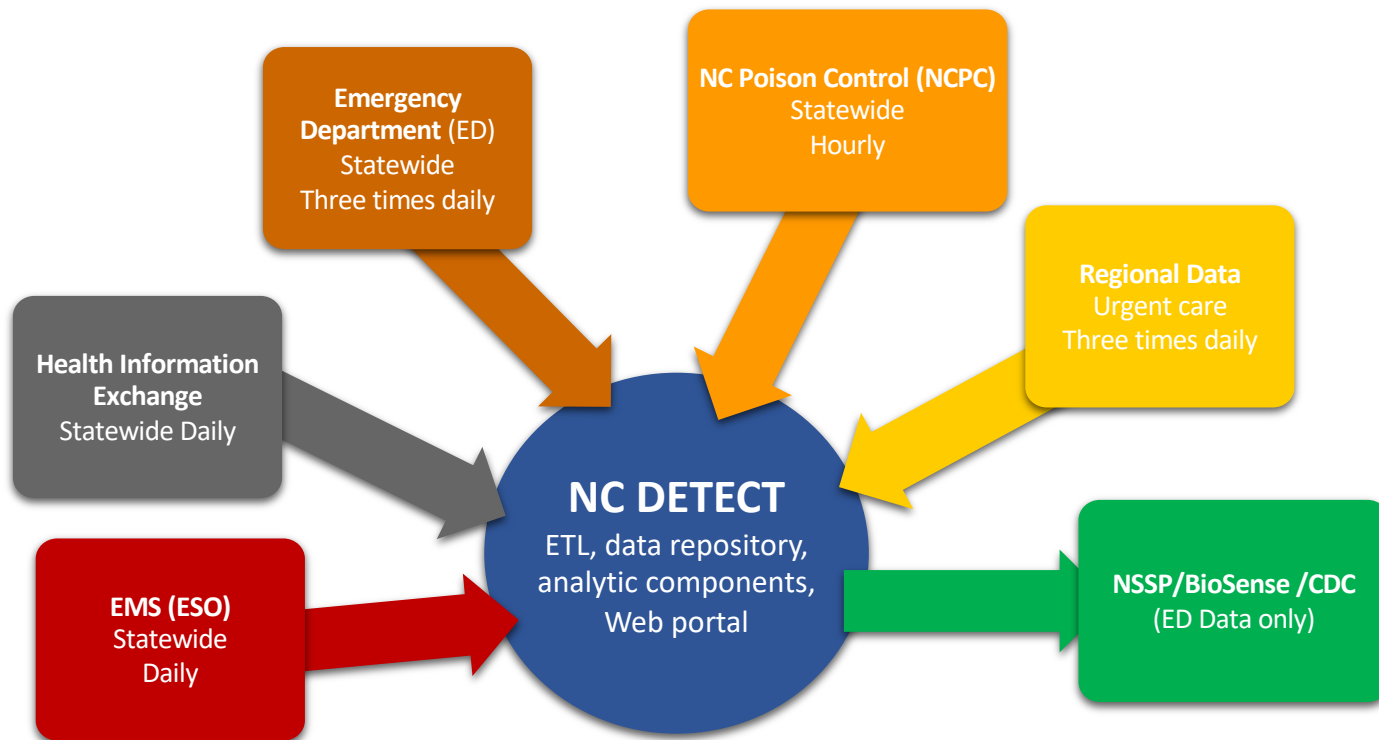
University of North Carolina at Chapel Hill,

Amy Ising, MSIS

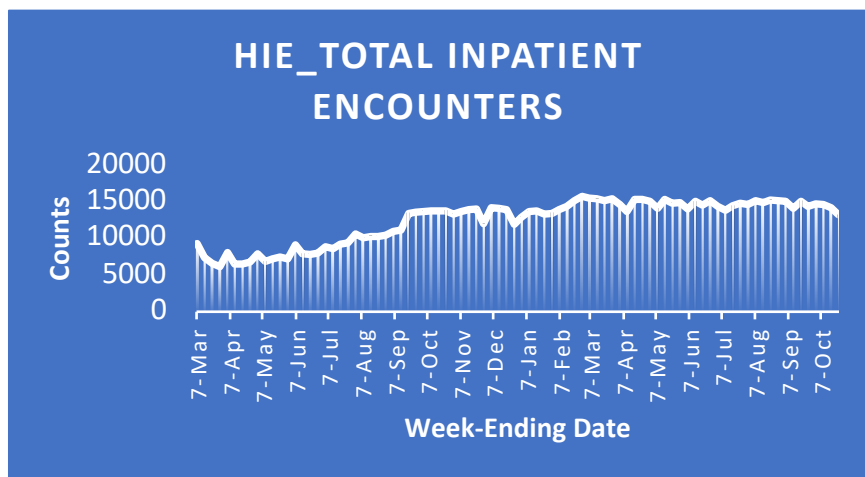
Dennis Falls, CISSP



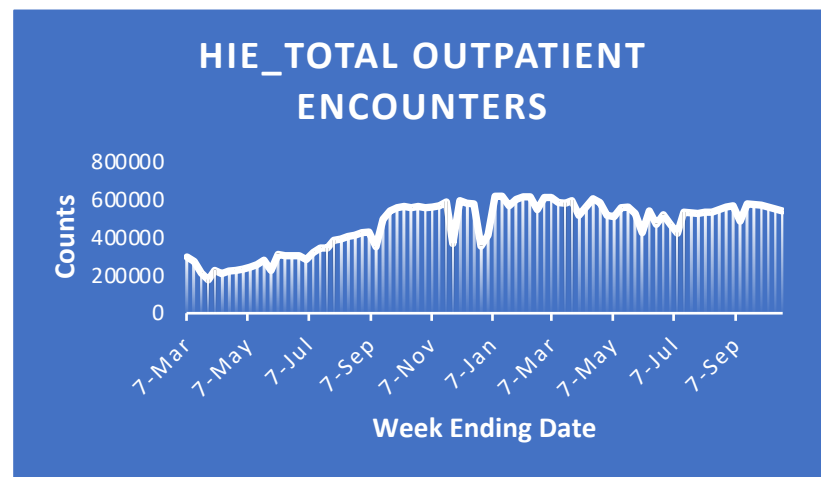
THE UNIVERSITY
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- NC HealthConnex receives data from participating healthcare facilities (inpatient & outpatient) via HL7 (ADT and CCD message types)
- As of December 2020, NC HealthConnex sends daily flat files to NC DETECT for encounters, diagnoses, medications, immunizations, problems, insurance, procedures for select practice types.
- Data elements include encounter date, encounter type (inpatient vs. outpatient), healthcare facility, patient age, sex, race, ethnicity, ZIP of residence, patient problems, medication history, immunization history, and encounter diagnoses.

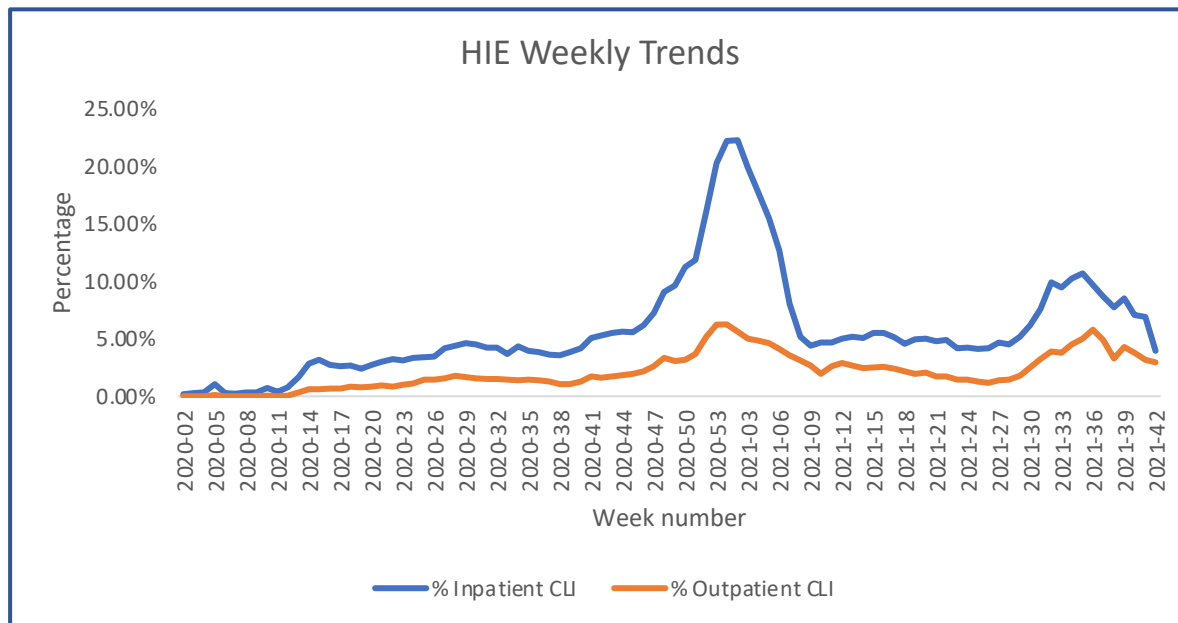


Over 4,000 inpatient encounters daily



Over 175,000 outpatient encounters daily

HIE Data Volume in NC DETECT



CLI Syndrome Definition:

ICD-10-CM Codes: B97.2% OR B34.2 OR
J12.81 OR J12.82 OR U07.1 OR U07.2
OR
Diagnosis code description: %COVID%
AND
Diagnosis Code: %COVID%

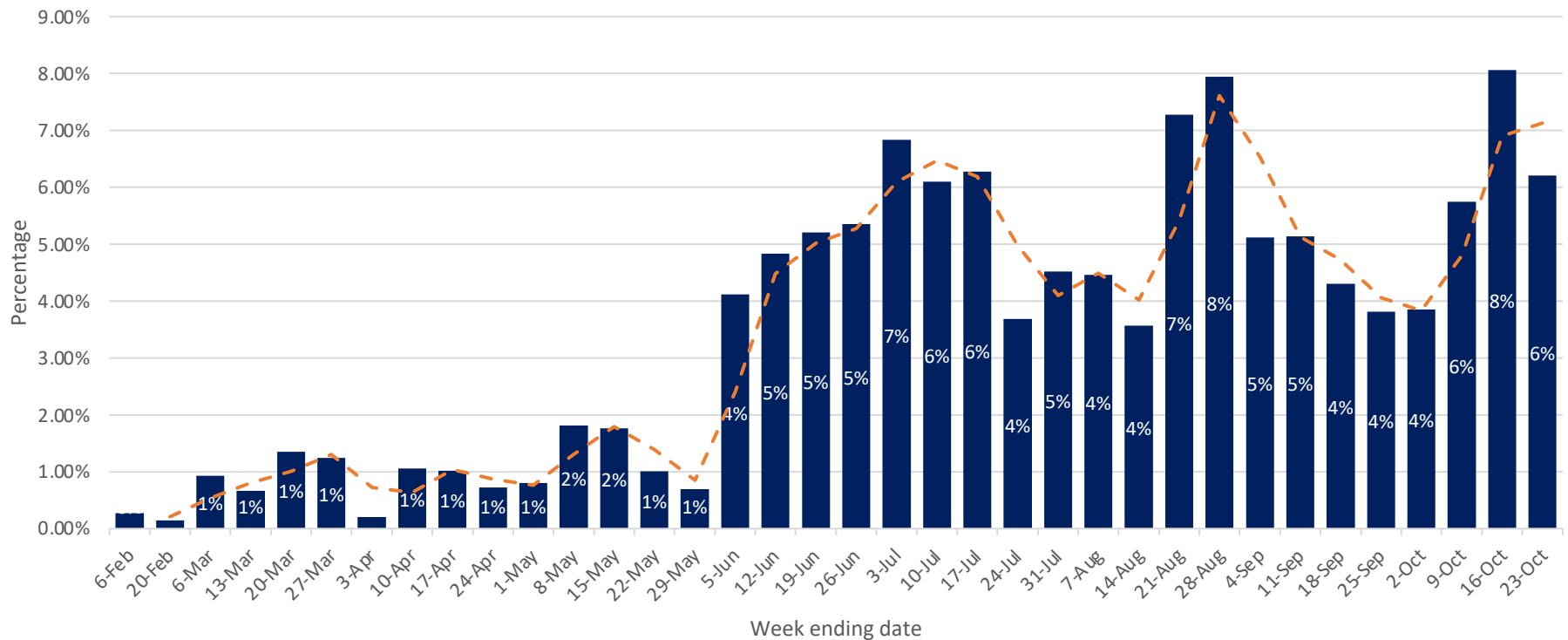
Identify encounters with COVID-related diagnosis (no keywords)
(B97.2*, B34.2, J12.81, J12.82, U07.1)

Among these encounters, identify those with at least one J&J vaccine or at least two Moderna / Pfizer vaccines where the COVID diagnosis is ≥ 14 days after max COVID vaccination date

Bin into COVID Post-Vax syndrome

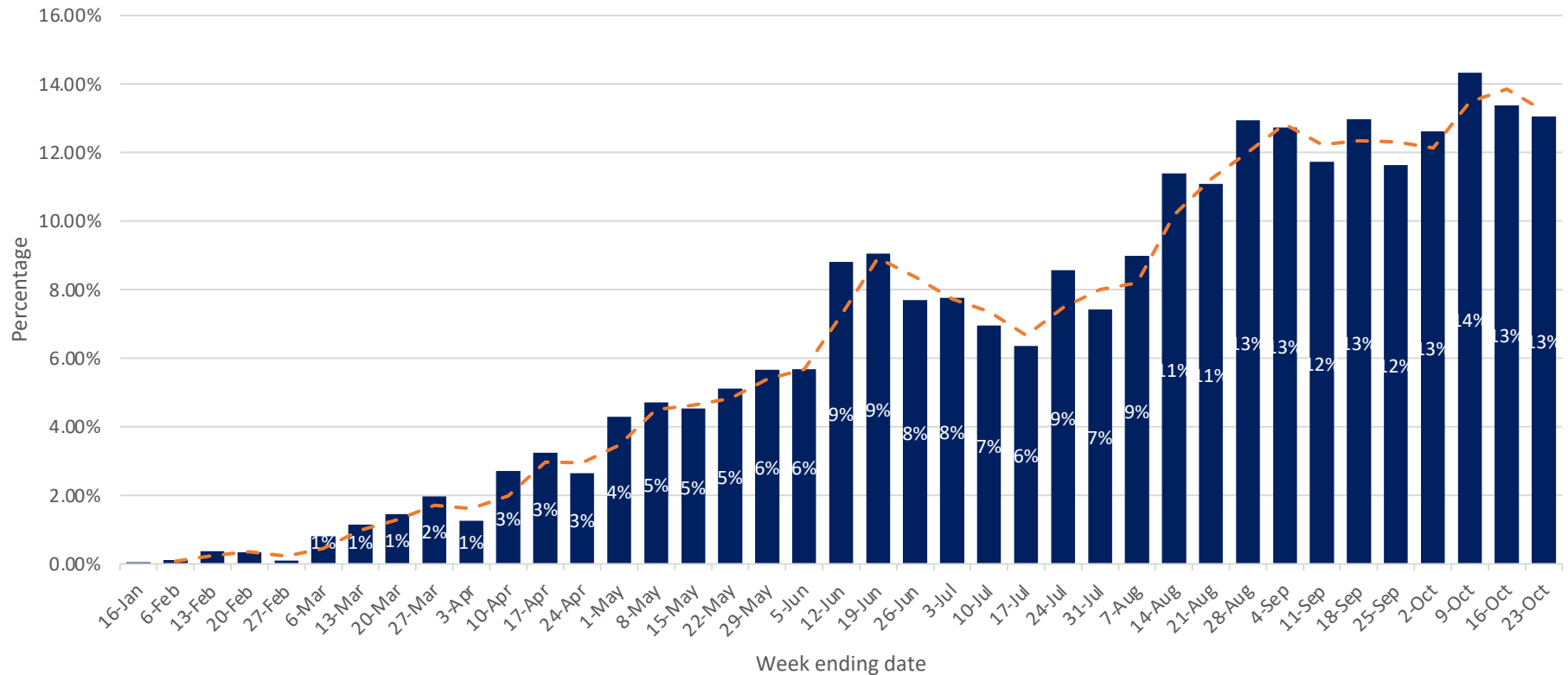
Covid Post-Vax trends

Covid Post-Vax_Inpatient Encounters_CLI Percent

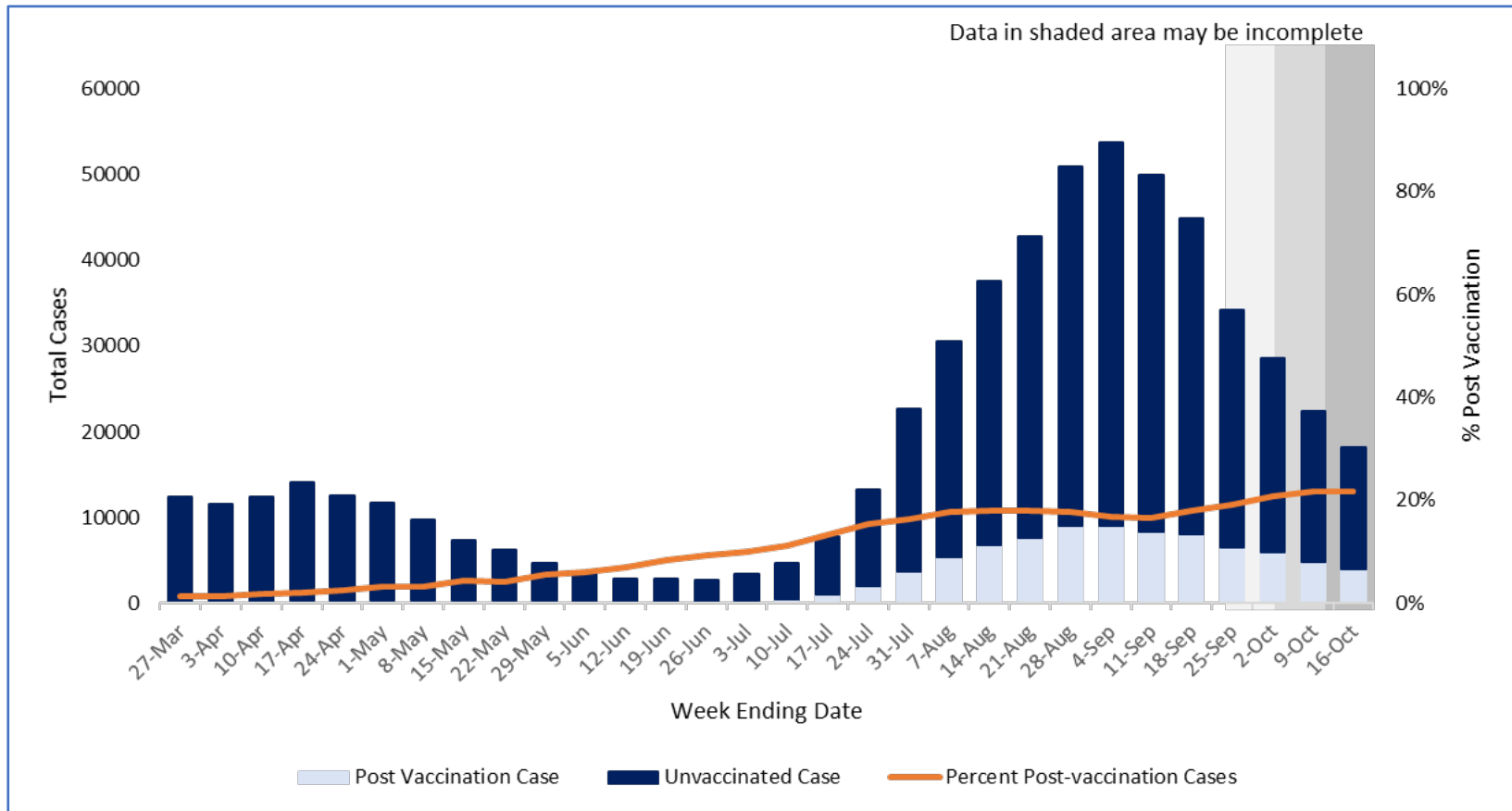


Covid Post-Vax trends

Covid Post-Vax_Outpatient Encounters_CLI Percent



Comparison with other data sources

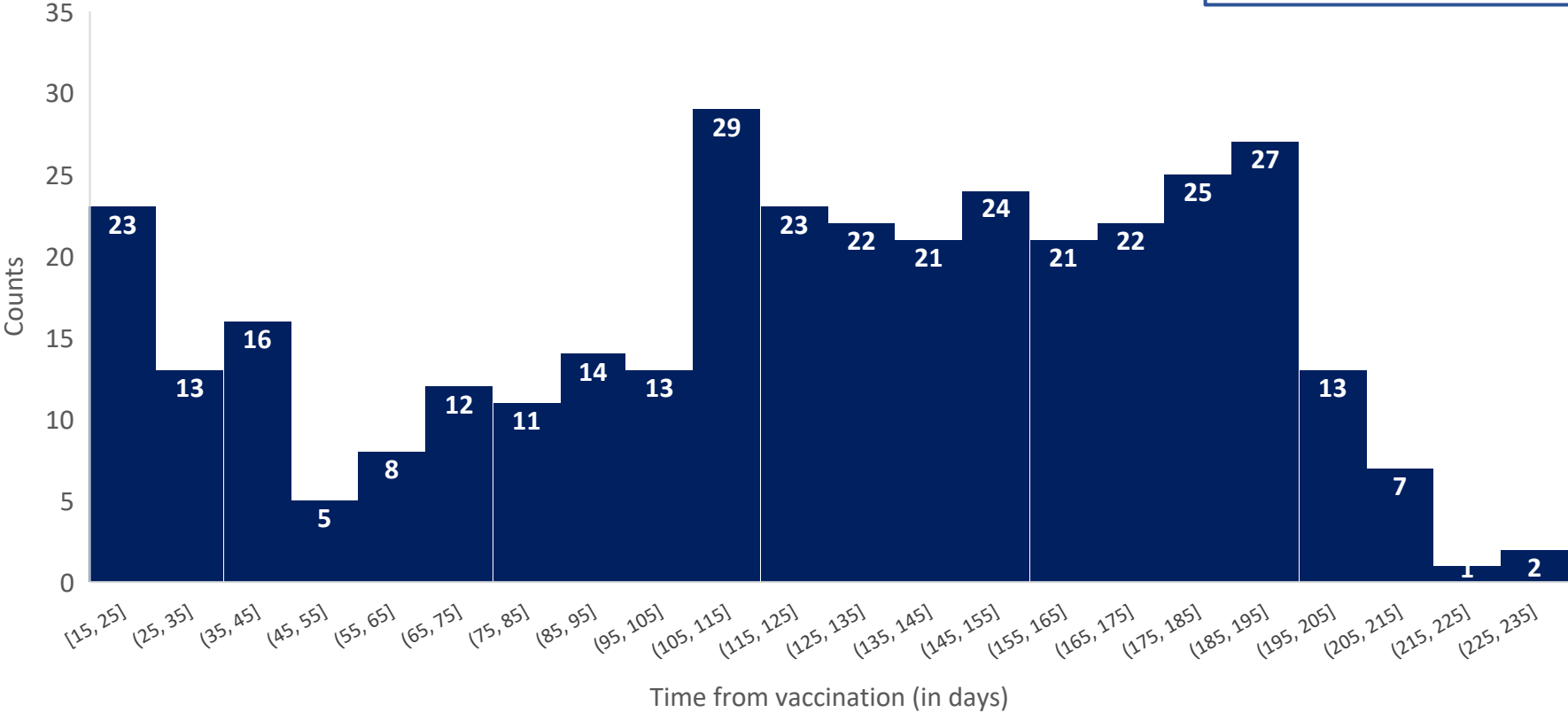


Source: NCEDSS

Time-based Analysis

Breakthrough Infection_Change in frequency with time_Inpatient

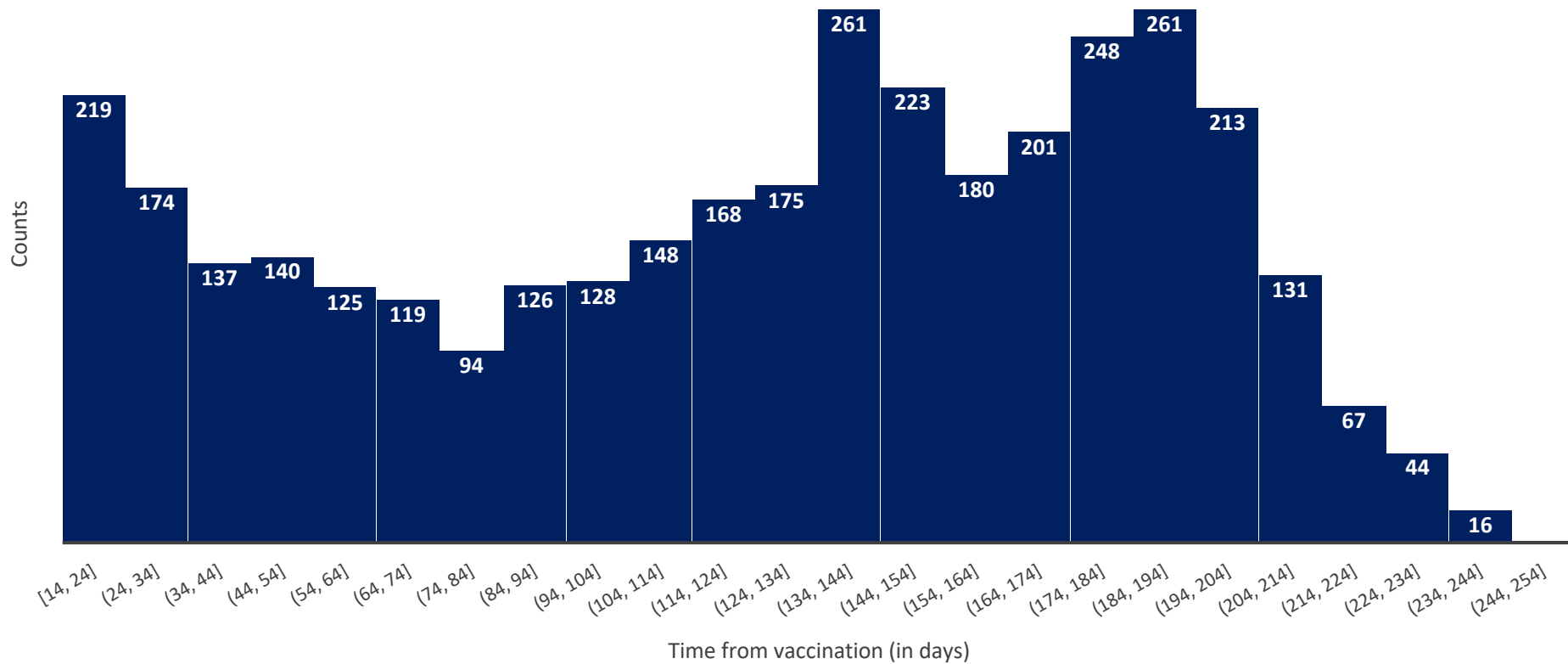
Average Number of Days: **122.8**
Maximum counts seen between **105-115** days post vaccination



Time-based Analysis

Breakthrough Infection_Change in frequency with time_Outpatient

Average Number of Days: **125.5**
Maximum counts seen between **134-144; 184-194** days post vaccination



Limitations

- Secondary EHR data from an HIE.
- Potential data quality issues related to date of immunization, date of COVID diagnosis, etc.
- Partial self-reporting of immunization – difficult to quantify.
- Not all facilities send ICD-10-CM codes to indicate a COVID diagnosis.
- Conclusions based on diagnosis only, without lab data confirmation.

Observations and Conclusion

HIE data:

- Shows post-vaccination COVID infection trends comparable to the trends identified in other surveillance systems.
- Shows promise in monitoring post-vaccination COVID infections.

Next steps:

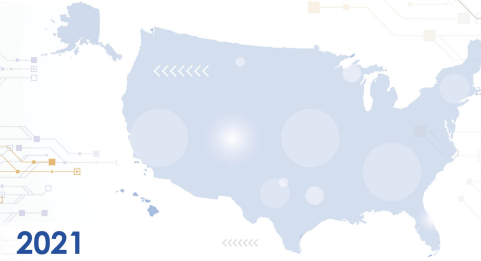
- Time-based analysis
- Comparison between different populations and age-groups.
- Analysis by vaccine type and comorbidities.
- Inclusion of booster doses in analysis of breakthrough infections.

Thank you

National Syndromic Surveillance Program

Community of Practice

Resources that Advance the Science and
Practice of Syndromic Surveillance



2021

Syndromic Surveillance Symposium

Week of November 15, 2021



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