

2022 Syndromic Surveillance Symposium

Program Packet



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Event Overview

The Council of State and Territorial Epidemiologists (CSTE), in collaboration with the Centers for Disease Control and Prevention's (CDC) National Syndromic Surveillance Program (NSSP), will virtually convene the **2022 Syndromic Surveillance Symposium** from **December 6-8, 2022**. The event will be held during the following dates and times:

- Tuesday, December 6, 2022: 12:30 – 5:00pm EST
- Wednesday, December 7, 2022: 12:30 – 5:00pm EST
- Thursday, December 8, 2022: 12:30 – 3:30pm EST

All events will be held on CSTE's Zoom platform. Instructions on how to join and session links are provided in the detailed agenda. All symposium materials, including the schedule and session links can also be found on Basecamp.

CSTE has partnered with Kahuina Consulting to help provide an engaging and interactive virtual forum for the syndromic surveillance community to exchange experiences, share best practices, and take away innovative solutions and strategies for advancing syndromic surveillance practice. Attendees will have opportunities to learn new skills from technical experts, from the basics to latest analytical techniques. There will also be a forum to discuss the future of the NSSP Community of Practice and increasing syndromic surveillance capacity at the state, local, and national levels. There will be opportunities to connect with colleagues informally throughout the symposium including three coffee break sessions and a virtual happy hour on Wednesday at the end of the day.

Session Types

Virtual Coffee Breaks and Networking: Optional short, informal opportunities during session breaks to meet new colleagues and discuss specific topics.

Breakout: Moderated presentations from several speakers addressing similar topics or themes with a short question and answer period.

Roundtable: Facilitated discussion around a central topic with audience participation and dialogue.

Daily Block Schedules

Tues, 12/6 12:30 – 5 pm ET | Weds, 12/7 12:30 – 5 pm ET | Thurs, 12/8 12:30 – 3:30 pm ET

Tracks	
Training	Step-by-step instruction to build user skills with NSSP tools.
Communicating and Sharing Syndromic Surveillance Track	Applying syndromic surveillance analyses in decision making across the health department, including expanded data visualizations and lessons learned over the years.
Surveillance and Syndrome Refinement Track	Syndromic surveillance applications to priority public health challenges with rapid, participatory syndrome development.
Expanding Quality Data Track	Onboarding quality data sources and validating methods to produce sound interpretations.

Daily Schedule												
Time (EST)	Day 1: Tuesday, December 6				Day 2: Wednesday, December 7				Day 3: Thursday, December 8			
12:30 – 12:45 pm	Logistics and Preview				Logistics and Preview				Logistics and Preview			
12:45 – 1:15 pm	Welcoming Remarks				Training Intro to Syndrome Definition Development	Breakout And the Oscar for Timely Use of SyS Data Goes to...	Breakout Action-Packed Applied SyS	Breakout Rising Stars and Query Debuts	Roundtable Protecting the Set: A Look Into Environmental Health Data	Roundtable Now Casting: Putting Clinicians in Supporting Roles	Roundtable Syndromic Surveillance Pre-Production: Asking the Right Questions	Roundtable Increased Aperture: Incorporating New Data Sources Into the SyS Conversation
1:15 – 1:30 pm	Opening Community Discussion				Coffee Break: Meet the CoP Core Committee		Coffee Break: SNOMED Q & A		Coffee Break: NSSP Mentoring Program: Input Session			
1:30 – 1:45 pm												
1:45 – 2:00 pm												
2:00 – 2:15 pm	Brain Break				Training Automated Reporting and Distribution in R	Breakout Creating a Buzz Around SyS Data	Breakout SyS CGI: Novel Methods for SyS Practice	Breakout COVID-19 and Monkeypox and Environmental Threats, Oh My!	Closing Community Discussion			
2:15 – 2:45 pm												
2:45 – 3:00 pm	Training SyS State of Mind	Roundtable Nominees for Best Current Health Threat: Using SyS for Monkeypox and Hepatitis Investigations	Roundtable Lights, Camera, Action! Promoting SyS Across Public Health	Open	Brain Break				Closing Remarks			
3:00 – 3:15 pm												
3:15 – 3:30 pm												
3:30 – 3:45 pm	Training ESSENCE 101	Coffee Break: Meet the CoP Data Quality Subcommittee		Coffee Break: Meet and Greet	Training Re-Onboarding Playbook: A Plan for Managing Vendor Changes and Maintaining Data Quality	Breakout Reel Talk – Using R for Data Sharing	Breakout The Pursuit of Validation	Training Using Laboratory Data with NSSP ESSENCE	Closing Remarks			
3:45 – 4:00 pm												
4:00 – 4:15 pm												
4:15 – 5:00 pm		Breakout Highlighting Success: SyS for Surveillance and Monitoring	Breakout Broadening Our Audience: Increasing Participation and Collaboration	Breakout Rolling! Ensuring High-Quality Data for Public Health Use	Training MUSES Open-Source Software for Pre-Syndromic Disease Surveillance	Roundtable Role Call: Quality Onboarding Considerations and Opportunities	Networking	Training Demonstration of the New NSSP Data Quality Dashboard				

Session Recordings and Slides by Track

Symposium Opening, Welcoming Remarks, Community Discussions, and Symposium Closing

Welcoming Remarks

[Recording](#)

Speakers:

- Janet Hamilton, MPH – CSTE, Executive Director
- Karl Soetebier, MAPW – CDC/NSSP
- Yushuan Chen, MPH – Division of Violence Prevention, CDC

Community Discussion: Unlocking New SyS Insights with Collaborative Relationships

[Recording](#)

Speakers:

- Victoria Troeger, MSPH – Montana Department of Public Health and Human Services
- Nick Hill, MPH – Great Plains Tribal Epidemiology Center
- Alana Vivolo-Kantor, PhD, MPH – Division of Overdose Prevention, CDC

Community Discussion: Turning Ideas into Action

[Recording](#)

Speakers:

- Rosa Ergas, MPH – Massachusetts Department of Public Health
- Andrew Farrey, BA, MPH – Kentucky Injury Prevention Research Center (KIPRC)
- Jade Hodge, MPH – Kansas Department of Health and Environment
- Anna Frick, MPH – Alaska Department of Health

Closing Remarks

[Recording](#)

Speakers:

- James Muncy, MPH – CSTE, Executive Director
- Karl Soetebier, MAPW – CDC/NSSP
- Anna Frick, MPH – Alaska Department of Health

Communicating and Sharing Syndromic Surveillance

Roundtable: Lights, Camera, Action! Promoting SyS Across Public Health

[Recording](#) | [Slides](#)

Description: Join members of the CoP Core Committee in discussing ways to promote the use of syndromic surveillance up to leadership and out to other public health programs.

Facilitators:

- Anna Frick, MPH – Alaska Department of Health
- Sara Chronister, MPH – Washington State Department of Health
- Caleb Weideman, MPH – Tennessee Department of Health
- Gabriel Ann Haas, MPH – Kansas Department of Health and Environment

Breakout: Broadening Our Audience: Increasing Participation and Collaboration

[Recording](#) | [Slides](#)

Description: Hear how jurisdictions are increasing participation and connecting with local partners to expand the reach of their syndromic surveillance program.

Moderator: Becky Lampkins, MPH - CSTE

Presenters:

- Lowrie Ward, MPH, CPH - Alaska Native Tribal Health Consortium, AK Native Epidemiology Center
- Anna Frick, MPH – Alaska Department of Health
- Heidi Jonson, MPH – Minnesota Department of Health
- Matthew Giljork, MSc – Olmstead County Public Health Services
- Scott Johnston, MPH – Kansas Department of Health and Environment

Breakout: And the Oscar for Timely Use of SyS Data Goes To...

[Recording](#) | [Slides](#)

Description: Learn about recent successes from jurisdictions in maximizing the utility of their syndromic data for public health action.

Moderator: Anna Frick, MPH – Alaska Department of Health

Presenters:

- Michael Coletta, MPH – InductiveHealth Informatics LLC
- Matthew P. Fallico, MSW – New York Department of Health
- Andrew Farrey, BA, MPH – Kentucky Injury Prevention Research Center (KIPRC)

Breakout: Creating a Buzz Around SyS Data

[Recording](#) | [Slides](#)

Description: Hear how new methods and applications of syndromic surveillance data are being used for behavioral health communication and action.

Moderator: Nimi idaikkadar, MPH – CDC/DDNID/NCIPC/DIP/DAB

Presenters:

- Tyler Bonnell, MPH – Washington State Department of Health Rapid Health Information Network (RHINO)
- Daniel Cornforth, PhD – Centers for Disease Control and Prevention
- Adan Oviedo, MPH – Georgia Department of Health

Breakout: Reel Talk: Using R for Data Sharing

[Recording](#) | [Slides](#)

Description: Learn how new innovations using R and R Markdown can be used to increase dissemination of syndromic surveillance data.

Moderator: Caleb Weideman, MPH – Tennessee Department of Health

Presenters:

- Roseric Azondekon, PhD, MPH, MS – Centers for Disease Control
- Sandra Gonzalez, PhD, MPH - Division of Public Health, Nebraska Department of Health and Human Services; College of Education and Human Sciences, University of Nebraska-Lincoln
- Christopher Austin, MS – Division of Public Health, Nebraska Department of Health and Human Services; College of Education and Human Sciences, University of Nebraska-Lincoln
- Jason Geslois, MPH, MAS, EMBA – Kansas Department of Health and Environment
- Lauren Gracy, MPH – Kansas Department of Health and Environment

Roundtable: Now Casting – Putting Clinicians in Supporting Roles

[Recording](#) | [Slides](#)

Description: Discuss the benefit of engaging clinicians in syndromic surveillance to improve data quality and surveillance activities.

Facilitator:

- Gabriel Ann Haas, MPH – Kansas Department of Health and Environment
- Kellie Wark, MD, MPH – University of Kansas Medical Center
- Adrienne Malik, MD – University of Kansas Medical Center
- Brittani Valentine, DO – University of Kansas Medical Center

Surveillance and Syndrome Refinement

Roundtable: Nominees for Best Current Health Threat – Using SyS for Monkeypox and Hepatitis Investigations

[Recording](#) | [Slides](#)

Track: Surveillance and Syndrome Refinement

Description: Learn how syndromic surveillance is being used to address health threats that have emerged over the past year.

Facilitators:

- Dylan E Johns, MS – ICF (CDC Contractor)
- Andzelika Rzucidlo, MPH – InductiveHealth Informatics
- Meredith Davis, MPH – Virginia Department of Health
- Jessica Shultz, MPH – Tennessee Department of Health

Breakout: Highlighting SucceSyS – SyS for Surveillance and Monitoring

[Recording](#) | [Slides](#)

Description: Hear how three health departments across the country are using syndromic surveillance to monitor ongoing public health concerns.

Moderator: Jessica Pavlick, DrPH, MPH – Georgia Department of Public Health

Presenters:

- Bridget J. Anderson, PhD – NYSDOH
- Hannah Collins, MPH – Seattle & King County Public Health
- Graham Crawbuck, MS – Washington State Department of Health
- Walaa Elbedewy, MBBCh, MPH, MPA – Georgia Department of Public Health

Breakout: Action-Packed Applied SyS

[Recording](#) | [Slides](#)

Description: Learn how syndromic surveillance can be used for public health action far beyond the traditional uses of outbreak surveillance and detection.

Moderator: Kathleen Rees, MSPH – Washington County Department of Health and Human Services

Presenters:

- Gabriel Ann Haas, MPH – Kansas Department of Health and Environment
- Sandra Gonzalez, PhD, MPH – Division of Public Health, Nebraska Department of Health and Human Services; College of Education and Human Sciences, University of Nebraska-Lincoln
- Osaremhen Ikhile, MPH – Tennessee Department of Health
- Darryl Clay Nevels, PhD, MS – Tennessee Department of Health

Breakout: SyS CGI: Novel Methods for SyS Practice

[Recording](#) | [Slides](#)

Description: Glimpse into the ways syndromic surveillance is used to detect threats before they even happen.

Moderator: Howard Burkom, PhD - Johns Hopkins Applied Physics Laboratory (JHUAPL)

Presenters:

- Daniel B. Neill, PhD – New York University
- Michael Sheppard, MS – CDC

Breakout: The Pursuit of Validation

[Recording](#) | [Slides](#)

Description: Hear about the development and validation of three revised queries.

Moderator: Amy Ising, MSIS – UNC Department of Emergency Medicine

Presenters:

- Abraham Ikejiofor, MPH – New York State Department of Health
- Stephanie Neal, MPH – Virginia Department of Health
- Nina Masters, PhD – CDC

Roundtable: Syndromic Surveillance Pre-Production – Asking the Right Questions

[Recording](#) | [Slides](#)

Description: Explore questions to be addressed before syndrome definitions begins and non-traditional uses of syndromic surveillance data.

Facilitator:

- David Atrubin, MPH – Florida Department of Public Health
- Jose Lojo, MPH – Philadelphia Department of Public Health

Expanding Quality Data

Breakout: Rolling! Ensuring High-Quality Data for Public Health Use

[Recording](#) | [Slides](#)

Description: Learn unique methods for optimizing data quality and improving outbreak detection

Moderator: James Muncy, MPH – CSTE

Presenters:

- Kelly Carey, MPH – CDC
- Howard Burkom, PhD – Johns Hopkins Applied Physics Laboratory (JHUAPL)
- Breanna Swan Hovey, PhD – Johns Hopkins Applied Physics Laboratory (JHUAPL)

Breakout: Rising Stars and Query Debuts

[Recording](#) | [Slides](#)

Description: Hear about states testing and using queries to broaden the reach of surveillance activities and improve detection capabilities.

Moderator: James Muncy, MPH, CSTE

Presenters:

- Amy Beeson, MD – Centers for Disease Control and Prevention (CDC)
- Jennifer White, MPH – New York State Department of Health
- Abigail Gates, MSPH – Centers for Disease Control and Prevention (CDC)
- Ashley Ryals, MPH – Georgia Department of Public Health
- Rana Bayakly, MPH – Georgia Department of Public Health
- Deen Gu, MHA – NC DHHS

Breakout: COVID, and Monkeypox, and Environmental Threats, Oh My!

[Recording](#) | [Slides](#)

Description: Learn how states are using syndromic surveillance for novel detection of traditional and non-traditional public health issues.

Moderator: Michael Coletta, MPH – InductiveHealth Informatics LLC

Presenters:

- Brittany Eziam, MPH – Tennessee Department of Health
- Emma Price, VMD, MS – New Jersey Department of Health, Centers of Disease Control
- Laura Fox, MPH – Arizona Department of Health Services
- Chelsea Langer, PhD, MPH – New Mexico Department of Health

Roundtable: Role Call: Quality Onboarding Considerations and Opportunities

[Recording](#) | [Slides](#)

Description: Discuss key elements of effective recruitment and onboarding.

Facilitators:

- Krystal S. Collier, BA – CDC NSSP Contractor
- Zachary Stein, MPH – CDC CSELS

Roundtable: Protecting the Set – A Look Into Environmental Health Data

[Recording](#) | [Slides](#)

Description: Discover how to effectively use environmental health data for public health action.

Facilitators:

- Emily Prezzato, MPH – Centers for Disease Control and Prevention (CDC)
- Angela Werner, PhD, MPH – Centers for Disease Control and Prevention (CDC)
- Chelsea Eastman Langer, PhD, MPH – New Mexico Environmental Public Health Tracking Program
- Henri Menager, MD, MPH – Kansas Department of Health and Environment

Roundtable: Increased Aperture – Incorporating New Data Sources into the SyS Conversation

[Recording](#) | [Slides](#)

Description: Discover how new data sources can be integrated with syndromic data to produce more comprehensive public health surveillance.

Facilitators:

- Edward Lockhart, PhD – Centers for Disease Control and Prevention (CDC)
- Stephanie Dietz, PhD – CDC/NSSP

Speakers:

- Neha Shanker, PhD, MPH – NC Division of Public Health
- Aaron Kite-Powell, MS – CDC/NSSP
- Krystal S. Collier, BA – CDC NSSP Contractor
- Kirk Bol, MSPH – Colorado Department of Public Health and Environment
- Richard Raines, MPH – Alaska Health Analytics and Vital Records
- Caprice Edwards, MS – NAPHSIS

Trainings and Demonstrations

Training: SyS State of Mind

[Recording](#) | [Slides](#)

Description: Prepare learners to look at public health surveillance through a SyS lens by (a) exploring the common data sources and methods that define SyS practice, and (b) querying data and crafting syndromes for many public health problems. By the end of the session, participants will be able to describe the general process to categorize records into syndromes, apply characteristics of SyS data when assessing SyS results, and distinguish between which public health issues are and are not well suited for SyS

Trainers:

- Alexa Meinhardt, MPH, CPH – Delaware Division of Public Health
- Zachary Stein, MPH – CDC CSELS
- Lowrie Ward, MPH, CPH – Alaska Native Tribal Health Consortium, AK Native Epidemiology Center

Training: ESSENCE 101

[Recording](#) | [Slides](#)

Description: An orientation for new users including 1) a brief introduction to syndromic surveillance and the NSSP and 2) an NSSP-ESSENCE step-by-step live demonstration highlighting how to navigate the tool and run, save, and share a query.

Trainer: Travis Lim, MS, MPH, DrPH – Johns Hopkins University Applied Physics Laboratory (JHUAPL)

Training: Introduction to Syndrome Development

[Recording](#) | [Slides](#)

Description: This training will be a demonstration of the basics behind syndrome definition development for syndromic surveillance as well as an overview of existing resources. Training will be in NSSP ESSENCE, but concepts will be applicable to other syndromic surveillance systems.

Trainer: Zachary Stein, MPH – CDC CSELS

Training: Automated Reporting & Distribution in R

[Recording](#) | [Slides](#)

Description: Explore several ways in which ESSENCE data are used today in automated reporting and distribution, and how packages like 'cronR' and 'officer' are used for custom automation cadence and building automatable presentation templates, respectively. Session will include a discussion on the advantages and disadvantages of competing packages, potential automation pitfalls, and recommendations for getting started.

Trainers:

- Jamison Crawford, MPA – CDC Contractor
- Jourdan DeVies, MS – CDC Contractor
- Katharina van Santen, MSPH – CDC Contractor

Training: Re-Onboarding Playbook: A Plan for Managing Vendor Changes and Maintaining Data Quality Over Time

[Recording](#) | [Slides](#)

Description: Provide a refresher on expectations and 'gold standard' requirements for onboarding and re-onboarding facilities as well as alternatives that may be available if the 'gold standard' is unable to be met due to limitation in hardware or electronic health record (EHR) capabilities.

Trainers:

- Sophia Crossen, MS – CDC NSSP Contractor, InductiveHealth Informatics LLC
- Krystal S. Collier, BA – CDC NSSP Contractor
- Emani McCullough, BASc – CDC NSSP Contractor, InductiveHealth Informatics LLC

Training: Using Laboratory Data with NSSP ESSENCE

[Recording](#) | [Slides](#)

Description: Demonstration to learn about the clinical laboratory data available inside of ESSENCE, best practices in using the data, additional resources for understanding clinical laboratory data, and ways to integrate syndromic surveillance with laboratory data.

Trainer: Stephanie Dietz, PhD – CDC/NSSP

Training: MUSES Open-Source Software for Pre-Syndromic Disease Surveillance

[Recording](#) | [Slides](#)

Description: In this training session, we provide an in-depth demonstration of the new Multidimensional Semantic Scan (MUSES) Open Source Software, a Python package developed by and freely downloadable from New York University's Machine Learning for Good Laboratory (wp.nyu.edu/ml4good).

Trainer: Daniel B. Neill, PhD – New York University

Training: Demonstration of the New NSSP Data Quality Dashboard

[Recording](#) | [Slides](#)

Description: This training session will demonstrate the new NSSP Data Quality Dashboard including an overview of the layout of the dashboard and a review of the features and functionality of the dashboard. Practical examples of how the dashboard can be used will be incorporated.

Trainers:

- Douglas Wirtz, MS – ICF (CDC Contractor)
- Natasha Close, PhD, MPH - InductiveHealth Informatics (CDC Contractor)

Virtual Coffee Breaks and Networking

Coffee Break: Meet and Greet

Description: Meet and network with syndromic surveillance colleagues across the country.

Facilitators: CSTE and Kahuina 2022 Syndromic Surveillance Symposium planning committee

Coffee Break: Meet the NSSP CoP Data Quality Subcommittee

Description: Meet the co-chairs of the CoP Data Quality Subcommittee and hear about ongoing work and opportunities to get involved.

Facilitators:

- Jade Hodge, MPH – Kansas Department of Health and Environment
- Andrew Farrey, BA, MPH – Kentucky Injury Prevention Research Center (KIPRC)

Coffee Break: Meet the NSSP CoP Core Committee

Description: Geared toward new community members, join the NSSP CoP Core Committee to learn how to become more involved.

Host:

- Anna Frick, MPH – Alaska Department of Health

Coffee Break: SNOMED Q&A

Description: Join the hosts for a brief summary of SNOMED followed by a chance for participants to ask questions about the coding system.

Hosts:

- Zachary Stein, MPH – CDC CSELS
- Scott Campbell, MBA, PhD – University of Nebraska Medical Center

Virtual Networkin

Hosts, meeting spaces, and topics will be shared with registrants the day of the networking session.

Coffee Break: NSSP Mentoring Program: Seeking Input

Description: Join members of CSTE and the CoP Core Committee to provide input on an NSSP mentoring program. Community members are encouraged to bring their questions and ideas about future program activities.

Hosts:

- Becky Lampkins, MPH – CSTE
- Yushiuan Chen, MPH – CDC

Coffee Break: NSSP CoP Syndrome Definition Subcommittee

Description: Join members of the CoP Syndrome Definition Subcommittee to discuss current group activities and future opportunities for growth.

Hosts:

- Rosa Ergas, MPH – Massachusetts Department of Public Health
- Sara Chronister, MPH – Washington State Department of Health
- Rasneet Kumar, MPH – Tarrant County Public Health

Abstracts

Day 1 – Tuesday, December 6, 2022

2:45 PM EST Roundtable: Nominees for Best Current Health Threat – Using SyS for Monkeypox and Hepatitis Investigations

Authors: Dylan E Johns, MS, Andzelika Rzucidlo, MPH, Meredith Davis, MPH, Girum Ejigu, MPH, Jessica Shultz, MPH, Kali Turner, MPH, Anna Bratcher, MSPH

Abstract Title: Investigating hepatitis cases of unknown origin in children using syndromic surveillance

In November 2021, CDC was notified of a cluster of children with hepatitis of unknown etiology evaluated at a single U.S. hospital. On April 21, 2022, following reports of an apparent uptick of similar cases in Europe, a health advisory was issued requesting providers to report pediatric cases of hepatitis of unknown etiology to public health authorities. On May 19, 2022, a call for participants was organized through the NSSP CoP Slack channel to help facilitate definition development and case finding across federal, state, and local public health agencies.

Public health community members shared their work in developing query definitions, dashboards, and other methods used to investigate potential cases. These tools were then used to evaluate syndromic surveillance data to highlight encounters which necessitated further investigation, both prospectively and retrospectively.

This roundtable will examine approaches for rapidly developing and evaluating syndrome queries for a poorly defined condition. It will also discuss the challenges and advantages of utilizing syndromic surveillance for investigating emerging public health concerns, with specific attention to how approaches may differ for case finding versus trend analysis.

Roundtable Objectives:

- Describe key considerations in pediatric hepatitis surveillance, including how approaches vary across the community and the state of hepatitis surveillance prior to the health advisory.
 - Provide insight and share strategies for rapid development and refinement of new syndromic surveillance queries. Discuss how approaches may differ for case finding versus trend analysis.
 - Highlight the use of syndromic surveillance queries, dashboards, and trend analyses for investigating emerging public health concerns.
-

Abstract Title: Utilizing Emergency Department Data for Surveillance of Monkeypox and Monkeypox-like Illness

Summary: On May 17, 2022, the U.S. confirmed its first case of monkeypox linked to the current outbreak. In response, the National Syndromic Surveillance Program (NSSP) team at CDC and local and state health departments began utilizing emergency department (ED) data to monitor visits of monkeypox and monkeypox-like illness.

To leverage ED data, CDC NSSP developed a syndrome definition for monkeypox using discharge diagnosis codes and chief complaint terms, and another using only discharge diagnosis codes. Additionally, two monkeypox-like illness queries were developed to monitor trends in symptoms of rash and of genital lesions.

CDC NSSP's queries were then utilized for trend analyses in a national dashboard and supplemental reports were shared with state and federal partners. State partners have modified and adapted monkeypox queries with chief complaint terms and discharge diagnosis codes to conduct general surveillance and case-finding in their jurisdictions. Understanding the collaboration between NSSP and its state partners can accelerate the process by which we create innovative syndromes and queries during public health emergencies.

Roundtable Objectives:

- Discuss the creation of queries for syndromic surveillance of monkeypox and monkeypox-like illness
- Highlight use cases of queries, standardized national dashboard, and trend analyses during the monkeypox response
- Discuss efforts, successes, and challenges in creating a query definition for surveillance and case-finding at the state and local level
- Distinguish benefits in using case-finding queries versus queries focused on monitoring trends

2:45 PM EST Roundtable: Lights, Camera, Action! Promoting SyS Across Public Health

Authors: Anna Frick, MPH, Sara Chronister, MPH, Caleb Weideman, MPH, Gabriel Ann Haas, MPH, Gabriel Ann Haas, MPH

Abstract Title: Getting the Word Out- Promoting the Use of Syndromic Surveillance with Other Program Areas

Note: This roundtable discussion will be complementary to the proposed roundtable entitled "Getting the Word Up: Promoting the use of Syndromic Surveillance with Leadership"

We all know the sky is the limit on what you CAN use syndromic surveillance for, but how do you get colleagues to dig in and start using it? This roundtable will provide a forum to discuss connecting your syndromic surveillance program to other programs

areas that may not know they need it yet. We'll discuss potential barriers we've all encountered before including a lack of familiarity with the data, limited epidemiology capacity, concerns about quality of syndromic data, and having traditional programmatic activities organized around slower, less timely data sources. We'll also go over some of the successful strategies we have used in our own syndromic programs such as pursuing funding opportunities that require using syndromic, providing client programs with pre-analyzed products, sharing success stories from other jurisdictions, hosting trainings, and signing data use or data sharing agreements. We will discuss facilitators and barriers other jurisdictions have identified, brainstorm solutions, and hopefully all leave with plans for next year's crop of success stories!

Roundtable Objectives:

- Identify program areas with potential to benefit from syndromic data
- Recognize common barriers to initiating and sustaining the use of syndromic surveillance with an existing program
- Discuss possible solutions to barriers
- Describe specific successful or failed projects as learning opportunities

Abstract Title: Getting the Word Up: Promoting the use of Syndromic Surveillance with Public Health Leadership

Note: This roundtable discussion will be complementary to the proposed roundtable entitled "Getting the Word Out: Promoting the use of Syndromic Surveillance with Other Program Areas".

This roundtable discussion will provide an opportunity for syndromic surveillance users at all jurisdiction levels—state, local, and tribal in particular—to share questions, success stories, and strategies for advocating for the use of syndromic surveillance to supplement broad scope of surveillance work conducted at public health agencies. The discussion will focus on how to advocate with stakeholders in public health leadership positions. Topics aimed at addressing the above objectives will include but are not limited to:

- How syndromic surveillance fits in the surveillance picture
- Pros and cons of permanent and/or grant-based funding for surveillance activities
- Getting invited to "flavor of the week" responses
- Standardizing language to describe data, caveats, limitations, etc.
- Choosing metrics to present to leadership

A discussion board tool (such as Jamboard) will be utilized throughout the discussion to allow for dynamic participation from all attendees. Facilitators will highlight non-verbal and organic co-occurring discussions that are relevant to the overall objectives of the roundtable.

Key Objectives:

- Identify surveillance use cases with potential to benefit from syndromic data
- Describe common barriers to integrating syndromic surveillance into existing surveillance practices and discuss approaches to overcoming them.
- Identify learning opportunities in successful or failed projects
- Build a workgroup to continue developing and consolidating best practices into a guide for jurisdictions

4:15 PM EST Breakout: Highlighting SucceSyS – SyS for Surveillance and Monitoring

Abstract Title: Utilization of Syndromic Surveillance (SS) for Case Finding During Polio Outbreak in New York State (excluding NYC), 2022

Authors: Bridget J. Anderson, PhD, Youjung Byun, PhD, MPH, Michele McClanaghan, RN, Charlene Weng, MPH, Yisen Zheng, MPH

A case of poliomyelitis was identified in Rockland County, New York in July 2022. The case presented with respiratory symptoms, fever, neck stiffness, and back pain progressing to include paralysis. Samples were tested as part of the evaluation for acute flaccid myelitis (AFM), and a stool sample tested positive for poliovirus.

In response, NYSDOH initiated several surveillance activities to detect other poliovirus cases, including creating a polio/acute flaccid paralysis (AFP)/AFM syndromic surveillance (SS) query. The NYSDOH SS registry is used by eligible hospital emergency departments statewide excluding New York City (NYC); currently 133 facilities are reporting.

NYSDOH queries SS for records with ICD-10 codes or text strings indicating a diagnosis, chief complaint, or symptomology indicative of polio/AFM/AFP. Retrospective to January 2022 and now prospectively, the resulting list of patients with possible indication of polio/AFM/AFP is reviewed. Duplicates are removed and new records appended to the cumulative list daily. SS data and electronic health records are reviewed to identify high-suspicion persons under investigation (PUI) for extensive review and poliovirus rule out testing. Active follow up is now limited to PUIs 35 years and younger, who are unvaccinated or under-vaccinated for polio and residing in counties with poliovirus detections in wastewater surveillance (WW). (<https://health.ny.gov/diseases/communicable/polio/wastewater.htm>)

A daily average of 25 new records are appended to the NYS suspected polio/AFM/AFP PUI roster. To date, 854 records have been reviewed. Of those, 40% of PUIs were residents of counties with WW detections and 73 met age restrictions. Four had a sufficiently high level of concern to request specimen for poliovirus testing at the NYSDOH Wadsworth Center; specimen was available for all. To date no additional poliovirus cases have been detected, including none of the 12 coded with the acute poliomyelitis ICD-10 code (A80).

Though SS has been effective in identifying suspected polio/AFM/AFP PUI PUIs, there

are limitations to this strategy. Care-seeking in facilities outside of the area of SS catchment area complicates the identification PUIs, particularly if specialized care is most accessible in an adjoining area outside of the SS coverage area (e.g., metro NYC hospitals). Medical coding issues were common and likely related to data entry errors as well as innate quality issues in voluntary surveillance systems. These coding issues resulted in many irrelevant records for review. Follow up is labor intensive and requires linkage to multiple data systems (e.g., immunization registries, lab reporting systems).

Abstract Title: Monitoring emergency department visits for heat-related illness in King County, WA, 2021-2022

Authors: Hannah Collins, MPH, Graham Crawbuck, MS, Jennifer Lenahan, MPH, Atar Baer, PhD

Background: Local health departments are tasked with surveillance for extreme heat events, which can be used to guide decision-making and resource allocation to mitigate health impacts. Emergency department (ED) data can be used to track health-related impacts of extreme heat in near-real-time. During a heat wave in 2021, Public Health – Seattle & King County (PHSKC) began using syndromic surveillance data to monitor demographic and clinical characteristics of those experiencing heat-related illness (HRI). Staff continue to use this system to identify populations at greatest risk and inform equitable strategies for responding to extreme heat events.

Methods: Washington State’s Rapid Health Information Network (RHINO) collects ED visit data from all non-federal hospitals in King County. We extracted data from RHINO and identified visits for HRI using a syndrome definition indexed in ESSENCE. Visits for conditions that may be exacerbated by extreme heat (e.g. renal failure) were identified using state or locally developed syndrome definitions. We compared the number and rate of visits for HRI between June 1-August 31 of 2021 and 2022. Data were analyzed by race and ethnicity, age, and patient zip code. We used Washington Office of Financial Management’s 2020 population estimates to assess disproportionate impacts by demographics.

Results: The number of days over 90 degrees Fahrenheit were similar in 2022 (n = 11) and 2021 (n = 8), but 2021 had more days over 100 degrees (2022: 0 days; 2021: 3 days). The number and rate of HRI visits differed by year; in June-August 2022 there were 248 ED visits for HRI in King County (120.7 per 100,000 ED visits). This was 66.4% fewer visits than in the same months of 2021 (737 visits; 387.5 per 100,000 ED visits).

There were notable differences in the distribution of HRI visits by race and ethnicity in both years. A disproportionate percentage of ED visits for HRI (9.3% in 2022; 10.6% in 2021) occurred among Black residents, who comprise 7.2% of the county's population. This trend was similar for visits among people identifying as American Indian or Alaska Native and Native Hawaiian or Pacific Islander. HRI visits occurred among all ages; however, people ages 60+ comprised 37% of those in 2022 and 49% in 2021, while only comprising 18% of the population. In both years, a larger number of ED visits for HRI

occurred in zip codes in South King County when compared to Seattle, North, or East King County.

During 2021's heat events, there were increases in visits for renal failure and drowning. No increases were noted for these same conditions during 2022's episodes of extreme heat.

Conclusion: Syndromic surveillance is an important tool for informing equitable public health response to extreme heat in real-time. As the health impacts of climate-related events continue to increase and local health departments have additional capacity, these data will continue to be important for preparedness and response.

Abstract Title: Role of Syndromic Surveillance in the Detection of Multisystem Inflammatory Syndrome in Children (MIS-C) Associated with COVID-19 in Georgia-March 2020 - August 2022

Authors: Walaa Elbedewy, MBBCh, MPH, MPA, Bernice Edward, MPH, René Borroto, BA, Jessica Pavlick, DrPH, MPH, Cherie Drenzek, DVM, MS

BACKGROUND: Multisystem inflammatory syndrome in children (MIS-C) can occur 2-6 weeks after SARS-CoV-2 infection. Georgia has one of the highest numbers of confirmed MIS-C cases in the United States. In May 2020, the Centers for Disease Control and Prevention (CDC) released a Health Advisory requesting MIS-C reports to better characterize this newly-recognized condition. Syndromic surveillance (SyS) utilizes existing electronic data to describe pre-diagnostic health indicators allowing for more timely surveillance. MIS-C became reportable in Georgia in May 2020. As a newly-identified syndrome, underreporting or delayed reporting may occur. Georgia Department of Public Health (DPH) evaluated using SyS and compared to notifiable reports to improve MIS-C surveillance in Georgia.

METHODS: We evaluated MIS-C notifiable and syndromic reports from 3/2020 to 8/2022. SyS was integrated into the MIS-C surveillance system in 10/2020. Using the DPH SyS module in the State Electronic Notifiable Disease Surveillance System (SendSS), suspect MIS-C cases were identified from urgent care and emergency department visits data with discharge diagnoses containing the term Multisystem Inflammatory Syndrome and the ICD 10 code M35.81 in ages <21 years. Other iterations of the term MIS-C and ICD codes were queried to capture additional cases. Suspect MIS-C cases (patients <21 years of age with fever, laboratory evidence of inflammation, multisystem organ involvement, and laboratory evidence of SARS-CoV-2 or exposure requiring hospitalization) identified through notifiable and syndromic surveillance were confirmed using CDC criteria. Data were accessed in SendSS and analyzed using SAS software (version 9.4).

RESULTS: We investigated a total of 709 MIS-C reports, confirmed cases accounted for 75.2%. Incidence of MIS-C in Georgia was 17.9/100,000 persons < 21 years, with 0 deaths.

SyS detected 425 suspect MIS-C reports (not necessarily the first/only report source to DPH) with positive predictive value of 58.9 %. Prior to integrating SyS, >99% of MIS-C cases were from a large pediatric hospital system. SyS has contributed to the identification of 77 confirmed cases from other hospitals through GA DPH SyS notifications or as a result of ongoing collaboration with hospitals due to previous MIS-C SyS notifications. In 2022, 82 SyS cases were detected, 32 were true positives of which 21 were first reports made to DPH (range 0-20 days before being reported in SendSS).

The geographic distribution of confirmed cases ranged from 1-78 cases for each of the 18 Georgia Public Health Districts. SyS detected MIS-C cases from 15 Public Health Districts.

CONCLUSION: SyS contributed to increased MIS-C case reporting by detecting cases that may have been delayed or not reported. SyS has helped strengthen collaboration with infection prevention specialists at hospitals. This allowed for timely reporting of cases to national MIS-C surveillance to better understand this syndrome.

4:15 PM EST **Breakout: Rolling! Ensuring High-Quality Data for Public Health Use**

Abstract Title: Optimizing Data Quality Using Facility Total Volume and Availability of Discharge Diagnoses for Year Over Year Trend Analyses

Authors: Kelly Carey, MPH, Michael Sheppard, MS

Background: The National Syndromic Surveillance Program (NSSP) onboarded over 1,300 new facilities nationwide to the Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE) system in the past four years. Each new facility increases the total visit volume from the time of on-boarding and has its own discharge diagnosis completeness patterns, which impacts the likelihood of a visit being classified into a chief complaint and discharge diagnosis (CCDD) category.

Methods: ESSENCE allows users to filter queries by facility-level data quality (DQ) metrics, which can help control for the effects of facility onboarding and visit reporting frequency over time. Two commonly used DQ filters are the emergency department visit coefficient of variation (CoV) and the average weekly discharge diagnosis informative percent (DDI). CoV measures total volume volatility over time and controls for facility onboarding and gaps in facility reporting. DDI measures the availability and quality of data available in the fields used to determine CCDD categories. A matrix was developed to visualize the impact of using different cut-points for DDI and CoV individually and in combination based on the number of facilities included in the denominator of a query. The matrix evaluates the number of facilities reporting at least one visit per week using CoV cut-points of 30, 35, 40, and 45, and DDI cut-points of 70%, 75%, and 80%. The most restrictive DQ combination is $CoV \leq 30/DDI \geq 80\%$ and the least

restrictive DQ combination is $\text{CoV} \leq 45 / \text{DDI} \geq 70\%$. An application programming interface (API) allows for the matrix cut-points to be user selected.

Results: Weekly ED visit volume ranged from 1.2-2.8 million visits per week from 2018 to 2022. Visits from 2022 are more likely to have a discharge diagnosis code (87% vs. 69%) and come from a more diverse set of facilities (4,026 vs 3,030 facilities) than visits from 2018. Implementation of the most restrictive DQ combination for the past three years stabilized the number of facilities reporting data per week to 1,850 facilities with a DDI greater than 80%. Facilities excluded from the most restrictive DQ combination ranged from 1,250 to 2,000 facilities per week with the percent of visits having an informative diagnosis code increasing from 50% to 75%. Implementation of the least restrictive filter combination over the past three years stabilized the number of facilities reporting data per week to 2,300 facilities with a DDI greater than 70%. Facilities excluded from the least restrictive DQ combination ranged from 1,000 to 1,500 facilities reporting data per week with the percent of visits having an informative diagnosis code increasing from 40% to 75%.

Conclusion: Applying data quality filters to control for consistent visit volume and availability of discharge diagnosis information reduces bias in trends due to onboarding and variability in reporting when comparing trends across multiple years.

Enhanced Cluster Detection Algorithm in Maryland ESSENCE for Targeted Public Health Interventions

Authors: Howard Burkom, PhD, Breanna Swan Hovey, PhD, Wayne Loschen, MS, Sharmin Hossain, PhD, MPH, Tim Dupree, PhD

Objective: To establish enhanced ESSENCE spatiotemporal cluster detection for timely identification of overdose hotspots to promote and assist coordinated public health interventions.

Introduction: Public health practitioners utilize spatiotemporal scan statistics for infectious disease cluster identification across large geographical areas over multi-day periods. Overdose clusters need not obey jurisdiction boundaries, and fixed regions convenient for data collection can be poor choices for cluster detection. The current spatial detector available in many ESSENCE installations was implemented in 2004 to replicate the purely spatial detection capability of the popular SaTScan software, but this detector was written for the original ESSENCE syndrome groups, for only single-day clusters, and with limited details or mapping capability. The recent addition of EMS call records in the (MDH) installation of ESSENCE and concerns for monitoring the burden of opioid overdose prompted a need within the web application for enhanced cluster detection and detailed inspection.

Methods: The Maryland Department of Health collaborated with the Johns Hopkins Applied Physics Lab to develop an enhanced spatiotemporal cluster detection mechanism built into the MD-ESSENCE platform for identification of significant clusters spanning multiple days. Also added is a novel Cluster Explorer feature that summarizes

the demographic and clinical features for any cluster alert of potential interest. The enhanced algorithm was validated using various scenarios by comparing its performance to the SaTScan space-time permutation (S-TP) method. Scenarios were formed with synthetic clusters by inserting case counts into authentic background data. Injected clusters were varied by case count, duration (days), and spatial extent. Separate scenarios were designed for common and rare outcome variables and for urban, suburban, and rural settings with varying background data scales.

Results: Based on a metric that tallied a detection if an algorithm yielded a significant cluster including any zip code with an inserted count, the sensitivity of the ESSENCE method was at least as high as that of ST-P on 10 runs of each scenario in study set of 113 test scenarios, with few exceptions. The Cluster Explorer feature was approved by MDH staff pending experience with live data.

Conclusions: The MDH ESSENCE cluster detection and visualization capability was designed for routine overdose surveillance in Maryland and proved suitable for that purpose. The above results have promising implications for use as an early warning indicator for other emerging public health threats and more rapid public health response.

4:15 PM EST Breakout: Broadening Our Audience: Increasing Participation and Collaboration

Abstract Title: Increasing Tribal Hospital Participation in Alaska's Syndromic Surveillance Program through Epidemiology Center Partnership

Authors: Lowrie Ward, MPH, CPH, Anna Frick, MPH

Background: Alaska is home to 229 federally recognized Tribes and over 150,000 Alaska Native or American Indian people (approximately 20% of the state's population). The Alaska Tribal Health System (ATHS) is a comprehensive system of health care that serves all Alaska Native and American Indian people in Alaska. ATHS is a network of tribal health consortia where the Alaska Native Tribal Health Consortium (ANTHC) serves as the hub. ANTHC is a non-profit tribal health organization (THO) providing comprehensive clinical and public health services.

The Alaska Department of Health has participated in NSSP since 2014. Historically, some of Alaska's Tribal Health Organization Emergency Departments participated in syndromic surveillance with the Alaska Section of Epidemiology (SOE) as part of their Meaningful Use incentives. Because of the unique healthcare delivery system in Alaska, rural and remote village clinics are often the front line; however, their data have not historically been included in syndromic surveillance. During COVID-19, ANTHC's Alaska Native Epidemiology Center (ANEC) identified syndromic surveillance data as a valuable way to track trends related to COVID-like illness and disaster-related behavioral health. ANEC and SOE recognized an opportunity for synergy and began to work together to share data and improve participation in syndromic surveillance. ANEC began to work

with the medical and analytic professionals at these facilities to illustrate the unique value of ESSENCE for THO leadership and staff.

Methods: ANEC partnered with the SOE to learn about syndromic surveillance and to receive facility-level access for THO hospitals, where permitted. In turn, ANEC created facility-level reports for participating Emergency Departments and provided technical assistance to staff at THO hospitals around the unique benefits of ESSENCE. Other THOs became interested and, in early 2022, Cerner worked with the ANTHC to onboard three new THOs to Syndromic Surveillance. The project included the Alaska Department of Health, the Alaska Health Information Exchange, the ANTHC Alaska Native Epidemiology Center, and representatives from all the THOs.

Results: Four new emergency departments and 14 outpatient clinics were added to the ESSENCE system due to this project. This has resulted in a larger proportion of the state's Alaska Native and American Indian population being included in syndromic data, and improved data coverage in several remote parts of the state. The new THOs have been provided with weekly reports, training, and technical assistance related to syndromic surveillance. Collaborative onboarding presented an opportunity to review medical records alongside ESSENCE data, ensuring data quality. It also allowed an in-depth discussion of the best options for onboarding remote village clinics, which was technically demanding.

Conclusion: Partnership with the ANTHC Alaska Native Epidemiology Center has improved the effectiveness of onboarding Tribal Health Organization facilities and increased access to valuable syndromic data related to Alaska Native and American Indian facilities and peoples. Because of the way Tribal Health Organizations provide care in villages and rural areas, currently participating Tribal Health Organizations are interested in onboarding clinics and their emergency departments in the future. Shared access to data improves confidence in the system and offers additional opportunities to use data for action.

Abstract Title: Minnesota's first state and local public health syndromic surveillance data sharing with Olmsted County Public Health Services

Authors: Heidi Jonson, MPH, Matthew Giljork, MSc, Nate Wright, MPH, Meaghan Sherden, MPH

Background: Beginning in August 2021, Olmsted County Public Health Services (OCPHS) in Southeast Minnesota became Minnesota's first local public health agency to access and utilize syndromic surveillance (SyS) data in ESSENCE. Through data sharing rules, OCPHS was able to analyze hospital data from participating hospitals and residents of their county from 2022 forward. Minnesota, in partnership with the Office of Vital Records, is also one of a handful of states sending mortality data to ESSENCE, which was also made available to OCPHS to provide a more comprehensive public health surveillance picture of health outcomes in Olmsted County. A SyS community of practice was established between the Minnesota Department of Health (MDH), OCPHS, and the

health systems within Olmsted County (i.e., Mayo Clinic and Olmsted Medical Center) in November 2021.

Methods: Data sharing rules were established by MDH, in consultation with OCPHS, along with training and resources for using ESSENCE. With access to the data, OCPHS focused on mental health and substance use (MHSU) conditions, which were two priority topics in Olmsted County's 2018 Community Health Needs Assessment. Using related syndrome definitions in ESSENCE, OCPHS created reports for each syndrome stratified by race, age, sex, insurance status, and zip code for Quarters 1 and 2 of 2022. Additionally, alerts were created to detect elevated visit counts and email notifications were sent to public health officials for further investigation. Additionally, with the mortality data, historical trends for MHSU-related conditions were analyzed for 2018 to 2022.

Results: OCPHS identified an increase in suicide deaths in Quarter 1 and Quarter 2 2022 compared to Quarters 1 and 2 from 2018 to 2021. Additional hospital data is needed to draw conclusions regarding trends in MHSU-related conditions from this data source. This project also provided MDH with experience and opportunity to establish protocols for sharing data with local public health as additional health system onboarding continues. This ensures the data will be shared back with local communities to inform their public health activities and responses, as well as provide them the tools to respond to local public health concerns in a timely and targeted manner.

Conclusion: Timely SyS data allows OCPHS and its community partners to identify and respond to potential public health threats in their community and invest resources to areas with the greatest need. OCPHS plans to expand its current monitoring to include monthly and annual frequencies, analyze differences in syndromes by selected demographics and facility factors, establish five-year baseline metrics for syndromes, and create alerts and notifications for each metric. Additionally, MDH is working with OCPHS to help expand their SyS system to include the Southeast region of Minnesota through a Minnesota Public Health Infrastructure Grant Award they received this year.

Abstract Title: Communicating Overdose Alerts to Local Jurisdictions in Kansas

Authors: Scott Johnston, MPH, Danielle Sass, MPH

Background: In 2021, the Kansas Department of Health and Environment (KDHE) developed a method for cluster analysis of drug overdose Emergency Department (ED) visits using syndromic data and combined it with a threshold-based spike analysis. These two analyses were used as a basis for alerting Local Health Departments (LHDs) to overdose ED visit anomalies. In the 12 months from September 2021 to August 2022, 13 alerts were been sent out to LHDs. This presentation will describe the criteria required for an LHD to be considered for an alert, the content included, and the process and lessons learned while evaluating and updating the alerts.

Methods: ED visits for drug overdose across five categories were pulled from ESSENCE on a monthly basis, and analyzed using both a temporal spike threshold method, and a temporal-spatial cluster analysis method. If a county had both a spike in ED visits for a category of drug, combined with a significant cluster for that same drug type, then an alert was identified. LHDs that were alerted were sent an email summary that contained information on cases by month, cluster information, and basic demographics. Additionally, the alert features several actionable steps that can be taken in response to the increase in overdoses. Invitations to meet with the alerted LHDs were extended by KDHE to solicit feedback on the alert, and to get updates on any actions taken. Meetings followed a semi-structured interview style where a series of questions were asked to prompt a conversation surrounding overdose in the jurisdiction, the response to the alert, and to get a better idea of how KDHE could improve the alert project and support the jurisdiction in their efforts to prevent overdose.

Results: Of the 13 alerts that were sent during this period, 8 separate LHDs were notified due to some receiving alerts in multiple months. Four meetings have been held so far with four separate LHDs. One additional meeting is planned with a fifth LHD. Throughout the twelve months, the format of the alert and included information changed to better communicate information, as well as to respond to feedback from LHDs.

Conclusions: Among LHDs that have been met with so far, all four have plans to expand partnerships. One LHD conducted a naloxone training in response, and two other LHDs plan to utilize data from the alert to support other interventions that are in the planning process. KDHE plans to continue this work in the coming year, evaluating processes along the way and improving the alerts in response to feedback. KDHE also plans to develop an overdose alert response toolkit for local jurisdictions to use as a resource for prevention and response strategies. Additionally, a dashboard that displays both the spike and cluster analysis results has been developed to be posted to the program website. This will allow LHDs that may not have received an alert to have access to the data for their county.

Day 2 – Wednesday, December 7, 2022

12:45 PM EST Breakout: And the Oscar for Timely Use of SyS Data Goes to...

Abstract Title: Successes, Solutions, and Similarities: Ways to Maximize Use of Timely Data

Authors: Michael Coletta, MPH, Alyaa Altabbaa, MPH

Background: For years health departments have struggled with how to take action on timely, but incomplete and messy syndromic data. Despite this difficulty, there are many excellent examples where epidemiologists have taken action in the face of uncertainty. What can we learn from these examples? This presentation will provide an overview of successful examples and will review these examples with the aim to extract best practice similarities across the examples presented.

Methods: Eight examples of syndromic surveillance in action were reviewed, and similarities highlighted. Best practices for putting data into action were identified from the similarities.

Results: Extracted eight best practices and commonalities across examples of putting timely data into practice and integrating with surveillance and response activities.

Conclusions: The flexibility of syndromic surveillance makes it an all-hazards capability. However, the diversity of examples can make it challenging to see the overlapping themes. These eight best practices should be considered as they can facilitate putting timely data into action. When timely data are put into action and integrated into public health surveillance, response, and evaluation – the health department is excelling at its charge of protecting public health. Through real world examples of timely surveillance data in action, this presentation identifies common factors that should be considered routine. Join this breakout session to challenge your organization to put these best practices to use in your jurisdiction.

Abstract Title: Using Syndromic Surveillance to Identify Gaps in Referrals to Medication for Opioid Use Disorder from Emergency Departments in New York State (Excluding New York City)

Authors: Matthew P. Fallico, MSW, Siobhán K. Loughman, MA, MPH, Charlene X. Weng, MS, Dina Hoefer, PhD

Background: The New York State Department of Health (NYSDOH) maintains the Electronic Syndromic Surveillance System (ESSS), an application that monitors emergency department (ED) visits daily to detect disease outbreaks and public health concerns such as drug overdoses (ODs). Cluster detection programs are run to flag unusual drug OD activity. Drug OD cluster alerts are disseminated to key stakeholders,

including the New York Medication for Addiction Treatment and Electronic Referrals (MATTERS) Program.

The MATTERS Program is NYSDOH's electronic referral platform to connect patients to medication for opioid use disorder (MOUD) from EDs. This platform allows providers to initiate MOUD in EDs and refer patients to community-based organizations for treatment. The MATTERS Program also offers program support, such as medication vouchers, transportation assistance, naloxone access, peer support, and telemedicine options to help retain patients.

Methods: NYSDOH developed a weekly Emergency Department Summary Alerts (ESDA) report to cross-check facilities with a high burden of drug overdose patients detected in ESSS against MATTERS data on facility onboarding status and recent referrals. The purpose is to identify gaps in service and contact facilities for initial onboarding or reengagement with MATTERS. The ESDA report contains a statewide map and a listing per county/facility of spike dates, zip codes, number of overdoses, onboarding status, number of referrals during spike period, number of referrals in last 30 days, and additional notes. This report is distributed to NYSDOH staff, Syringe Service Programs and NY MATTERS staff, as well as Regional Care Coordinators (RCCs) who work directly with facilities on MATTERS referrals and communities on opioid overdose prevention and response. RCCs review the report and determine next steps by using a rubric that evaluates the number of alerts in last 6 months and facility participation in MATTERS to recommend further action.

Results: 10 ESDA reports have been disseminated from 6/13/2022 to 9/5/2022. To date, 6 facilities were flagged for further engagement, and RCCs have begun to contact facilities to promote the program. Furthermore, the ESDA reports have been used to coordinate outreach in identified areas. The outreach activities include naloxone and fentanyl test strip distribution, crisis navigation and education on community resources.

Conclusion: ESDA reports have been a valuable new tool to identify gaps in referral services to MOUD at EDs throughout New York State and areas for increased outreach and prevention activities.

Abstract Title: Rapid Development and Deployment of Two Disaster-Related Syndrome Definitions in Kentucky

Author: Andrew Farrey, BA, MPH

Background: Kentucky has experienced two severe natural disaster events in the last nine months. Western Kentucky was struck by a deadly tornado the night of December 10, 2021, and eastern Kentucky experienced historic flooding from late July 2022 through early August 2022. In both instances, the Kentucky Department for Public Health requested assistance with developing and deploying syndromic surveillance queries to assess the state's post-disaster injury burden. Rapid detection and analysis of injuries related to each event were critically important in both instances, as the governor's office required real-time injury information to request appropriate Federal

Emergency Management Agency (FEMA) disaster response resources and direct existing state disaster response resources.

Methods: Following each disaster, initial queries available within Electronic Surveillance System for the Early Notification of Community-Based Epidemics (ESSENCE) and the National Syndromic Surveillance Program (NSSP) Community of Practice (CoP) Knowledge Repository were obtained and updated/adjusted to improve injury detection with event-specific terms (e.g., “candle factory,” since the western Kentucky tornado struck a candle factory) and additional ICD-10-CM and Systematized Nomenclature of Medicine (SNOMED) codes when necessary. ESSENCE data were queried using the updated syndrome definitions to detect injuries related to each respective disaster, and descriptive statistics were generated using R and RStudio.

Results: 296 tornado-related injuries were detected in Kentucky and Tennessee emergency department syndromic surveillance data from December 10 through December 29, 2021. 171 flood-related injuries and other flood-related patient encounters were detected from July 21 through August 15, 2022. The ESSENCE syndromes “exposure,” “GI (gastrointestinal [illness/symptoms]),” and “injury” were included in the flood-related injury surveillance report and displayed temporal patient encounter increases coinciding with the eastern Kentucky flooding.

Conclusion: Initial queries (tornado injuries, flood exposure) and reports were developed and disseminated within 48 hours following both the western Kentucky tornado and the eastern Kentucky flooding. Daily injury reports using the corresponding syndrome definitions were disseminated to state officials for several weeks following each natural disaster to inform and assist with emergency response planning. Though not perfect, syndromic surveillance data were able to provide timely disaster-related injury and patient encounter burden data in the affected areas to state officials.

12:45 PM EST Breakout: Action-Packed Applied SyS

Abstract Title: Initial Explorations into Long COVID using Syndromic Surveillance Data

Authors: Gabriel Ann Haas, MPH, Sandra Gonzalez, PhD, MPH, Muhammad Salman Ashraf, MBBS

Background: Long COVID involves a variety of new, returning or ongoing symptoms that people experience more the four weeks after getting COVID. Currently, there is no consensus for a clinical case definition, because symptoms and presentations have been broad. Research that has been done thus far to define symptoms has focused on either survey data or facility-based outpatient EHR data. However, there remains a need to understand the burden of Long COVID on healthcare systems at the state level, and to examine the types of symptoms that are contributing to emergency department visits.

Methods: ESSENCE data was pulled from June 2021 through June 2022 for Long COVID in both Kansas (KS) and Nebraska (NE). The syndrome definition for Long COVID included codes for post-COVID condition and history of COVID-19 as well as selected

free text. Odds Ratios were calculated to determine which symptoms were most overrepresented for Long COVID compared to visits for all other causes.

Results: Kansas and Nebraska saw a similar proportion of Long COVID to COVID-19 emergency room visits (KS 7.21%, NE 10.26%). Peaks in visits for Long COVID followed peaks in visits for COVID-19. Data was similar in both Kansas and Nebraska with Sleep Disorders being most overrepresented in the Long COVID group in both data sets. Of the symptoms examined, sleep disorders (KS OR=9.80, NE OR=7.84), irritable bowel syndrome (KS OR=7.56, NE OR=6.78), abnormalities of heartbeat (KS OR=6.74, NE OR=5.02), gastro-esophageal reflux disease (KS OR=5.73, NE OR=7.47), and malaise and fatigue (KS OR=6.17, NE OR=6.41) had odds ratio greater than 5 in both KS and NE data.

Conclusions: Syndromic surveillance data can be a useful tool to understand which Long-COVID symptoms are creating the largest burden on healthcare systems. It can help us to determine the context in which a code is being used, and consistency in presentations across jurisdictions can help lend credence to more ambiguous and poorly defined conditions. Finally, understanding what symptoms are creating the biggest burden can help providers prioritize research and management strategies for Long COVID moving forward, and provide ways to more reliably track syndrome-based trends over time.

Abstract Title: Syndromic Surveillance of Risk Factors for Violent Maternal Deaths (Homicide and Suicide) in Tennessee

Authors: Osaremhen Ikhile, MPH, Ibitola Asaolu, DrPH, MPH, Tina Evans, MPH, Rachel Heitmann, MS

Background: Pregnancy and postpartum period are critical period for women as they have an increased risk of dying violently by suicide or homicide. The Tennessee Department of Health's Prevention of Violent Maternal Death program routinely monitors outpatient data to assess risk factors for maternal homicide and suicide to inform statewide prevention and response efforts.

Objective: To describe the risk factors for homicide and suicide among Tennessee women of reproductive age using data from emergency department (ED) visits.

Methods: We analyzed risk factors for violent maternal deaths among women of reproductive age, 10-50 years from January 1st, 2022, to August 31st, 2022, using the CDC's Electronic Surveillance Systems for the Early Notification of Community-Based Epidemics (ESSENCE). We queried ESSENCE to include Chief complaint and Discharge Diagnosis Categories (CC and DD) for intimate partner violence (IPV), firearm injury and suicidal behavior.

Results: There were 226 IPV-related ED visits, 13408 suicide related ED visits and 430 firearm-related ED visits from January to August 2022 among women of reproductive age. The mean age of women presenting to the ED for IPV (31.5 years) and firearm-injuries (28.8 years) was higher than suicidal behavior (25.6 years). Most women

experiencing IPV resided in Shelby (48.9%), Davidson (8.9%), and Madison (7.1%) counties. Firearm-related ED visits were more common among residents of Shelby (38.4%), Davidson (13.3%), and Hamilton counties (4.9%). Lastly, patients who lived in Davidson (11.7%), Rutherford (7.4%), Shelby (7.3%), and Knox (7.2%) counties had the higher prevalence of suicidal behavior than women from other counties. The risk factors suicide-related visits among pregnant/postpartum women includes recent death of a relative and infant death, depression, pregnancy loss, recent sexual assault, homelessness, recent delivery, and relationship problems. The women reported the following means of suicidality: cutting, threatening of firearms, overdose on prescription and non-prescription medications.

Conclusion: Our results show that IPV, interpersonal problems, depression, and firearm injuries are risk factors for violent maternal death in Tennessee. Therefore, health, clinical, and community-based agencies should continue multifaceted efforts to prevent violent deaths including screening for depression and IPV at every clinical encounter; providing referral to manage and mitigate risk factors; implementing hospital-based violence intervention programs; training healthcare providers to screen for these risk factors; and providing treatment options for women with substance use disorder.

Abstract Title: Syndromic Surveillance to Identify Suicidal Behavior and Homelessness in Tennessee

Authors: Darryl Clay Nevels, PhD, MS, Ibitola Asaolu, DrPH, MPH, Brittany Willis, BS, Rachel Heitmann, MS, LaDonna Merville, BS

Background: Suicide is a leading cause of death in Tennessee. In 2020, 1,220 Tennesseans died by suicide resulting in a suicide rate of 17.7 per 100,000 people, which is 31% higher than the U.S. average. To reduce suicide, it is essential to address suicidal attempts, intentional self-harm, suicidal ideation, and other risk factors, including homelessness. Loss of employment, financial insecurity, and resulting homelessness are lingering effects of the Covid-19 pandemic. Therefore, it is imperative to understand how homelessness affects suicidality. The study examines the characteristics and associated risk factors of homeless patients presenting to EDs for suicidal behavior.

Methods: We queried ESSENCE to include Chief Complaint and Discharge Diagnosis Categories (CC and DD) for SDC Suicide-Related v1 and CC and DD Free Text using the keyword “homeless” to compare trends between 2021 (01/01 to 08/31) and 2022 (01/01 to 08/31). SAS 9.4 was used to describe the demographic characteristics of patients and identify trends in the data regarding population and demographic fluctuations at the state and county level.

Results: There was a 31% increase in suicide-related behavior associated with homelessness from 2021 (n=1669) to 2022 (n=2429). Across all 95 counties in the state, three metropolitan counties (Davidson, Knox, and Shelby counties) account for over half (55.5% in 2021; 52.8% in 2022) of suicidal ED visits related to homelessness. Our findings also indicate high proportions of suicidal behavior associated with

homelessness among individuals aged 18-44 years (60.5% in 2021; 58.9% in 2022), males (80.5% in 2021; 78.3% in 2022), and Whites (69.5% in 2021; 73.0% in 2022). Qualitative analysis indicates that major risk factors for affected populations include homelessness due to unaffordability, being removed from a residence due to domestic altercations, and limited access to rescue missions or community care facilities.

Conclusion: Suicide prevention initiatives should consider interventions for homeless individuals or those at risk for homelessness. In Tennessee, intervention should focus on metropolitan counties where more than half of suicidal patients who are homeless reside. Individuals and families often have limited housing options and leave their residences due to unaffordability and gentrification. Therefore, a holistic approach requires the implementation of affordable housing interventions including those that provide sustainable solutions to the deleterious effects of gentrification. Additionally, the results point to a need for improved access to physical/mental health resources and substance abuse treatment to prevent suicide as they are common risk factors identified in ESSENCE reporting. The benefit of real-time data monitoring provides quantitative spatial and qualitative risk factor information to identify where interventions and resources are most beneficial for individuals and communities across Tennessee.

12:45 PM EST Breakout: Rising Stars and Query Debuts

Abstract Title: Case Finding Using Syndromic Surveillance Data During The 2022 Monkeypox Outbreak In North Carolina

Authors: Deen Gu, MHA, Neha Shanker, PhD, MPH, Amy Ising, MSIS, Lana Deyneka, MD, MPH

Objective: The purpose of this study was to determine the ability of the North Carolina statewide syndromic surveillance system to retrospectively identify laboratory confirmed monkeypox cases from the 2022 monkeypox outbreak in North Carolina. Improved syndrome definitions may increase sensitivity and supplement traditional public health surveillance and laboratory reporting.

Methods: The North Carolina Division of Public Health collects a limited dataset of emergency department (ED) visit data, including chief complaint, triage notes, diagnosis codes, and basic demographics, from all 131 civilian, non-specialty emergency departments and 134 urgent care (UC) centers in NC. These data are processed and incorporated into NC DETECT, NC's statewide syndromic surveillance system.

Laboratory confirmed monkeypox cases from the state health department case database were used to deterministically match cases with ED and UC visits in NC DETECT. A case was matched to a visit using demographics data such as visit and specimen date, age, county, zip code, sex, a relevant diagnosis code or chief complaint, and additionally for ED visits: race and ethnicity. Next, we queried NC DETECT using various syndrome and diagnosis code definitions and then counted the number of confirmed cases identified within the queries.

Results: From June 22nd through September 10th, there were a total of 429 laboratory confirmed cases in North Carolina. Of these, 135 (31%) were deterministically matched to an ED or UC visit in NC DETECT.

Using the definition of fever, rash, and monkeypox terms and diagnosis codes, NC DETECT identified 43 of the 135 matched visits, for a sensitivity of 32%, after pulling a total of 4,734 records. Using the definition of STD, rash, and monkeypox terms and diagnosis codes, NC DETECT identified 51 of the 135 matched visits, for a sensitivity of 38%, after pulling 1,026 records.

Discussion: During the initial weeks of the monkeypox outbreak, standalone monkeypox terms and diagnosis codes were added to many existing syndromic definitions to increase sensitivity. A new definition using STD, rash, and monkeypox terms and codes was also created after anecdotal evidence showed that fewer than half of cases presenting to ED had fever and that most cases were occurring among homosexual men.

The updated syndrome definition did increase sensitivity and reduce the number of records being pulled, helping epidemiologists estimate ED and UC usage. This also confirmed the need for syndrome definitions to be regularly reviewed and updated. The ability to rapidly refine syndrome definitions in response to information from other sources, is an important feature of any surveillance system.

Throughout the outbreak, there were no signals from NC DETECT of an increasing number of visits matching STD, fever, and/or rash terms. This has given confidence to epidemiologists that community spread was not happening, and to date, evidence of such spread in North Carolina has not surfaced.

Abstract Title: Firearm Syndromic Definitions Assessment in Large Metropolitan Trauma Hospital in Georgia

Authors: Ashley Ryals, MPH, Rana Bayakly, MPH

Background: The Georgia Department of Public Health (DPH) uses the Centers for Disease Control and Prevention/National Center for Injury Prevention and Control (CDC/NCIPC) firearm syndrome definition version 2, to monitor firearm related injuries in Georgia. In 2021, the DPH Firearm Injury Surveillance Through Emergency Rooms (FASTER) team launched a series of assessments to validate the CDC/NCIPC firearm definition in a large metropolitan trauma hospital. The data is collected through the state's electronic notifiable disease surveillance system (SENDSS). The definition was uploaded to SENDSS before assessments began and includes all Georgia hospitals.

Methods: DPH incorporated the CDC/NCIPC firearm definition version 2 into the Georgia's syndromic surveillance system. Version 2 definition includes both chief complaint keyword searches and ICD-10 diagnosis codes. First, the FASTER team reviewed a random sample of cases reported from a major metropolitan hospital to

assess data accuracy and completeness. Based on the review it was determined that the definition was not specific. With the help of the DPH syndromic team, the FASTER team was able to update the definition to include additional keyword searches. Thus, allowing the FASTER team to identify only firearm injuries. The second review was conducted in collaboration with a hospital-based researcher where firearm related injury records were independently pulled and compared to DPH data for the same time frame and using the same definition. This comparison identified a 20% deficit in firearm related injury records from the DPH syndromic data. To further enhance data capture, two additional reviews were conducted in collaboration with the hospital staff and the informatics team in January and April 2022.

Results: In January 2022, 32 firearm related injuries were identified by DPH vs 48 cases identified by the hospital, among the 16 missed cases, 10 were duplicates. Adjustments were made by the hospital informatics team to the HL7 message on the nature of the missed cases. In April 2022, another pull was conducted by DPH and the hospital to assess the impact of the implemented changes. In April, 72 firearm related injuries were identified by DPH vs 80 cases identified by the hospital. Of the 8 missing cases identified, 4 were duplicates. Thus, increasing the firearm injury definition detection by DPH from 80% to 93% of the cases seen by the hospital.

Conclusions: Through the series of assessments and adjustments to the HL7 message, the FASTER team was able to improve data completeness and validate the CDC/NCIPC firearm definition. The FASTER team added the following to the current HL7 message from the hospital: 1) ICD-10 diagnosis field and triage notes in addition to chief complaint field; 2) increased hospital storage time for the reported syndromic data from 14 days to 90 days; and 3) identified hospital practice in processing unconscious patients that caused the missing and duplicate records. To date the FASTER team is working in collaboration with the hospital informatics team to electronically identify these cases and report them to DPH.

Abstract Title: Validation of a Syndromic Surveillance Query for Lyme Carditis – New York, 2017-2021

Authors: Amy Beeson, MD, Jennifer White, MPH, David McCormick, MD, MPH, Abigail Gates, MSPH, Grace Marx, MD, MPH

Background: Lyme carditis is a rare and potentially fatal manifestation of Lyme disease. Although Lyme disease is nationally notifiable, data on specific clinical manifestations are not collected systematically. We sought to use a novel syndromic surveillance query to identify patients with Lyme carditis in New York State (excluding New York City) during 2017-2021.

Methods: Using the National Syndromic Surveillance Program's BioSense Platform, we developed a query using a combination of diagnosis codes and chief complaint terms to identify emergency department visits related to Lyme carditis. We systematically reviewed and abstracted key information in each identified individual medical record

through New York's regional health information exchange system, requesting supplemental records when needed. Two physicians independently assigned a clinical case status (confirmed; probable; not a case) to each abstracted record; when adjudications differed, an infectious disease physician provided a final adjudication. Positive predictive value for the query was calculated and characteristics of cases and non-cases were described.

Results: The query identified 173 individuals. Records were available for review for 148 individuals. Among these, 37% (n = 55) were classified as confirmed, 18% (n = 27) as probable, and 45% (n = 66) as not a case. In total, we identified 82 cases of confirmed or probable Lyme carditis for which records were available; the positive predictive value of the query was 47%. Cases occurred in 28 of New York's 57 counties (excluding New York City); most (69%) occurred during May–September. Median age was 62 years for cases (IQR 33 – 73) and 67 years for non-cases (IQR 42 – 78) (p = 0.11); 29% of cases and 38% of non-cases were female (p = 0.27). Among cases, 77% had positive IgG or IgM immunoblots and 67% had second- or third-degree atrioventricular block.

Conclusion: Using a syndromic surveillance query, we detected 82 cases of Lyme carditis, a rare disease of public health importance. Syndromic surveillance using this query may provide a useful marker for Lyme-endemic states to use to detect changing disease patterns, including temporal or spatial clusters of severe Lyme disease manifestations.

2:00 PM EST Breakout: SyS CGI: Novel Methods for SyS Practice

Abstract Title: Pre-Syndromic Disease Surveillance for Improved Detection of Emerging Public Health Threats

Authors: Daniel B. Neill, PhD, Mallory Nobles, PhD, Ramona Lall, PhD, Robert W. Mathes, MPH

Background: Existing public health surveillance systems that rely on predefined syndromes are effective at monitoring known illnesses, but there is a critical need for innovation in "pre-syndromic" surveillance to detect bio-threats with rare or previously unseen symptomology. Multidimensional Semantic Scan (MUSES) is a data-driven, automated machine learning approach for pre-syndromic surveillance that learns newly emerging syndromes from free-text ED chief complaints, identifies localized case clusters among subpopulations, and incorporates practitioner feedback to distinguish between relevant and irrelevant clusters, thus providing personalized, actionable decision support.

Methods: MUSES eliminates the need for pre-defined syndromes by learning syndrome categories, including those that characterize rare or novel health threats and occur over a small number of cases, directly from free-text ED data. It consists of a novel, contrastive topic modeling approach to identify emerging patterns of keywords, and multidimensional spatial scan statistics to identify localized case clusters. This enables

detection of emerging threats which differentially impact certain spatial regions or demographic groups, or include unusual patterns of symptoms. MUSES uses a practitioner in the loop approach to incorporate user feedback, "zoom in" on relevant patterns, reduce false positives, and provide users with actionable insights based on their own criteria for what is relevant.

Results: Blinded evaluations by New York City's Department of Health and Mental Hygiene demonstrate that MUSES identifies more events of public health interest and achieves fewer false positives compared to a state of the art baseline, and that our Practitioner in the Loop approach is effective at focusing detection on clusters which are most likely to be relevant. We show the potential utility of MUSES for practitioners through retrospective analyses of data from NYC DOHMH including the initial spike of COVID cases in Mar-Apr 2020 and other detected events of public health interest.

Conclusion: MUSES builds upon new approaches for novel syndrome discovery, cluster detection, and learning from user feedback to offer an innovative pre-syndromic surveillance system that facilitates early detection and investigation of events of public health concern. Evaluation results demonstrate the power of our detection methodology for accurately identifying novel clusters that are meaningful and relevant to public health, substantially improving accuracy and specificity of detection as compared to the existing state of the art.

Acknowledgments: This presentation is a summary of a paper currently under review (Nobles, Lall, Mathes, and Neill, 2022). We thank the BCD Syndromic Surveillance Unit at NYC DOHMH for providing retrospective data and participating in blinded evaluations. This work was partially funded by NSF grants IIS-0916345, IIS-0911032, IIS-0953330, and the DHS Hidden Signals Challenge.

Abstract Title: Natural Language Processing Methods for Assessing Changes in Emergency Department Symptom Presentation Among Patients Diagnosed with COVID-19 in the US, January 2021–August 2022

Author: Michael Sheppard, MS

Background: With most COVID-19 cases in the US now due to the Omicron variant, a critical question is disease severity relative to the Delta and pre-Delta variants. Using National Syndromic Surveillance Program near real-time emergency department (ED) data, we applied natural language processing to the reported chief complaint text among ED visits with a COVID-19 diagnosis to assess characteristic symptoms across four dominant COVID-19 variant periods. Specifically, we sought to identify symptoms more strongly associated with periods aligning with predominance of the pre-Delta, Delta, Omicron 1 (BA.1.1.529 and BA.1.1), and Omicron 2 (BA.2, BA.2.12.12, and BA.5) time periods, overall and by age group, to assess evidence of evolving symptoms associated with emergence of the Omicron lineages.

Methods: ED records for patients with diagnosed COVID-19 were pulled from NSSP-ESSENCE from January 2021 to August 2022. ED records were binned into 4 periods

aligning with transitions in dominant circulating variants [pre-Delta: January 1–June 5, 2021; Delta: July 4–December 4, 2021; Omicron 1: December 19, 2021–March 5, 2022; and Omicron 2: March 20–August 27, 2022]. Weighted log odds (WLO) ratios comparing each variant group to all other groups were calculated for individual terms and adjacent word pairs from chief complaints to identify symptoms associated with each variant period. Sub-analysis was conducted by age group to assess if symptoms were consistent between age groups.

Results: Word pairs strongly associated with the pre-Delta period included “breath shortness” (WLO = 96.17) and “failure hypoxia” (WLO = 18.89). Symptoms most indicative of the Delta period included “smell taste” (WLO = 56.11) and breath cough (WLO = 27.03). Symptoms perceived as being less severe were indicative of the Omicron 1 period and suggested cold-like illness: “sore throat” (WLO = 50.86) and “nose runny” (WLO = 17.42). The Omicron 2 period was largely characterized by cold and flu-like symptoms co-occurring with fever: “fever vomiting” (WLO = 36.64), “fever sore” (WLO = 24.68), and “fever headache” (WLO = 23.47). More severe symptoms during the Omicron 1 and Omicron 2 periods were among children under age 12: “febrile seizure” (WLO = 8.95) and “laryngitis obstructive” (WLO = 4.52).

Conclusions: These findings suggest that the Omicron lineages are characterized by seemingly less severe and cold-like symptoms among persons presenting at EDs, supporting initial studies and anecdotal reports. However, a subset of children under the age of 12 years may still experience symptoms that are perceived to be more severe. Symptoms more strongly associated with recent lineages of the Omicron variant continue to suggest decreases in disease severity but may be more consistent with influenza-like illness. This method identifies terms and adjacent word pairs that are most meaningfully representative of variant time periods and provides timely indication of evolving symptoms to support surveillance.

2:00 PM EST Breakout: COVID-19, and Monkeypox, and Environmental Threats, Oh My!

Abstract Title: Supplementation of Passive Syndromic Surveillance Data Collection to Improve the Sensitivity of SARS-CoV-2 Related Hospitalization Reporting

Authors: Brittany Eziam, MPH, Caleb Wiedeman, MPH

Background: When passive syndromic surveillance data collection efforts fail to capture critical data, supplementation from additional data sources can be used to reduce data partiality. In the State of Tennessee, the integration of additional state-wide datasets with data collected through passive surveillance allowed for the identification of undocumented cases of hospitalizations due to SARS-CoV-2. Through patient record matching amongst the datasets, it was determined that the passive COVID-19 surveillance failed to capture some COVID-related hospitalizations.

Methods: Data from the Tennessee Hospital Association (THA) was paired with state laboratory results and vaccine administration reports to match the HL7 ADT (Admit,

Discharge and Transfer) messages from THA to patient records in the National Electronics Disease Surveillance System (NEDSS) Base System (NBS). The data supplementation process began by refining the original laboratory data to create a subset of the data that included all positive test results from a PCR or Antigen test with a specimen date on or after March 1st, 2020. The hospitalization data was then further subset to only include hospitalizations that were COVID-related. A unique function was created to flag mention of the word “COVID” or the ICD-10 code “U07.1” in admission, diagnosis, procedure, or discharge notes. After matching lab data with THA messages using a common Observation ID, the data was further subset to include cases that were hospitalized with a specimen date within an appropriate incubation period (14 days before hospital admission to 2 days after). Using each patient’s first name, last name, and date of birth, vaccination data was matched to the THA messages and used to determine the vaccination status of each patient at the time of specimen collection. Hospitalizations that occurred in patients who were fully vaccinated were flagged as COVID-breakthrough cases and their records were updated to reflect the breakthrough case status. Finally, NBS data was matched to the supplemental data using a common Case ID.

Results: The retrospective review of covid-related THA data from March 1st, 2020 to September 1st, 2021 identified approximately 5,100 unreported COVID-related hospitalizations. The additional cases were recorded, bringing the total number of covid hospitalizations in the State of Tennessee to over 29,000 in September of 2021. The code used to automate the dataset matching continues to run daily to identify additional cases through recognition of COVID-19 ICD-10 codes and patient notes in ADT messaging to prevent a backlog of unrecognized hospitalizations in the future.

Conclusion: The use of data from state-wide databases as a supplement for passive data surveillance allowed for the identification of previously undocumented COVID-related hospitalizations. The completeness of data reporting was improved by increasing the sensitivity of data surveillance using additional patient record matching.

Abstract Title: Evaluation of syndromic surveillance for monkeypox using ICD-10, chief complaint, and medical note classifiers as compared to laboratory confirmed cases in New Jersey

Authors: Emma Price, VMD, MS, Stella Tsai, VMD, MS

Monkeypox (mpx), a zoonotic viral disease first detected in Africa in 1970, is causing a widespread outbreak in the United States. In humans, mpx causes smallpox-like symptoms although the epidemiology of the current 2022 outbreak differs from those in the past. EpiCenter, NJDOH’s Syndromic surveillance, collects emergency department visit data from 79 acute care facilities, is used to track the patient concerns related to mpx using specific classifiers for chief complaints, ICD-10 and medical notes. To evaluate the effectiveness of the classifiers, we compared the mpx case characteristics detected by syndromic surveillance to the laboratory confirmed cases reported to NJ DOH. From May 1st 2022 to September 9th 2022, we compared counts and demographic

characteristics of mpox cases detected in EpiCenter and laboratory confirmed mpox cases in the Communicable Disease Reporting and Surveillance System (CDRSS). We used three different classifiers for mpox syndromic surveillance cases: patients with a mpox ICD-10 code, patients with mpox mentioned in the chief complaint, or patients with mpox mentioned in the medical notes. A fourth composed classifier included at least one of the three classifiers. Mpox cases within CDRSS were determined based on a positive orthopoxvirus test. The analysis resulted in 714 cases identified by either of the three classifiers and 610 laboratory confirmed cases. There were 195 cases with mpox ICD-10 codes, 352 cases with mpox mentioned in the chief complaint, and 331 cases with mpox mentioned in the triage notes. Syndromic surveillance cases had a lower proportion of males compared to laboratory confirmed cases; males comprised 82.6% (161) of cases with mpox diagnosis, 70.5% (248) of chief complaint classifier cases, and 64.2% (212) of triage notes classifier cases, compared to 98% (596) of laboratory confirmed cases. Syndromic surveillance cases (mean age = 33.6 years) had a greater proportion of patients in the younger and older age groups compared to the laboratory confirmed cases (mean age = 35.3 years). For all syndromic surveillance cases, the month of August had the greatest proportion of patients diagnosed compared to June for laboratory confirmed cases. This evaluation highlights differences in mpox case counts and demographics between syndromic surveillance system data from emergency departments and laboratory confirmed cases in New Jersey. These findings could be indicative of trends in public and provider concern throughout the mpox outbreak rather than true cases. Further work to refine classifiers could be helpful to detect true cases and associated characteristics.

Abstract Title: Exploring Use of Syndromic Data in Environmental Public Health Tracking

Authors: Laura Fox, MPH, Chelsea Langer, PhD, MPH, Victoria Clemons, MPH, Carol Trenga, PhD, MS, Wendy Blackman, MPH

Background: The CDC's Environmental Public Health Tracking Program (Tracking Program) tracks and disseminates environmental public health data to guide policy and practice. The Tracking Network has primarily relied on hospital discharge and emergency department (ED) visit data for its Nationally Consistent Data and Measures (NCDMs); however, these datasets are not available in near real time and rely on ICD-CM codes to define health conditions. In 2021-2022, ten Tracking Program jurisdictions joined a content workgroup to explore the use of syndromic surveillance (SS) queries as a supplemental data source.

Methods: The workgroup assessed the strengths and limitations of SS data by evaluating the data captured by National Syndromic Surveillance Program (NSSP)/Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) and comparing to the hospital discharge and ED visit data used to prepare the Tracking Network NCDMs. The workgroup examined heat-related illness (HRI) and asthma ED visit queries in 2018-2019, with the option to include 2020. For HRI, two ESSENCE queries were examined using (1) the chief complaint and discharge diagnosis (CCDD

“HRI v2” definition and (2) the ICD-10-CM T67, X30, X32, and not W92. For asthma, two ESSENCE queries were examined using (1) the CCDD “CDC Asthma v1” definition and (2) the ICD-10-CM J45. Analytic methods included calculating the positive predictive value (PPV), Pearson’s correlation coefficient, daily temporal trends between data sources, and examining demographic comparisons (age, sex, race, ethnicity).

Results: Results are presented for the seven states (Arizona, Kansas, Maine, New Hampshire, New Mexico, Oregon, and Vermont). The overall PPV values of “HRI v2” syndrome ranged from 60–84% for 2018–2020 (six states total). There was strong positive correlation for both the first ($r = 0.78\text{--}0.98$, $p < 0.001$) and the second ($r = 0.83\text{--}0.98$, $p < 0.001$) queries. The overall PPV of “CDC Asthma v1” syndrome for all states ranged from 87–97% (five states total). The correlation coefficient of the first ESSENCE query vs NCDM varied by state but was highest in 2020 for three states ($r = 0.67\text{--}0.85$). The same pattern was true when comparing the second ESSENCE query vs NCDM. Initial results indicate the CCDD “HRI v2” definition performs well for the states involved in this analysis, but the CCDD “CDC Asthma v1” definition does not closely align with Tracking NCDMs.

Conclusions: Further examination and refinement of each definition tailored to the needs and use cases of individual states should be explored. The workgroup plan to continue exploratory work comparing ESSENCE data and hospital discharge data sources by examining trends in ED visit rates, examining SS data where queries identify condition in chief complaint but lack condition-specific ICD-10-CM DD and examining trends in relation to climate data in the next Tracking Program grant cycle.

2:00 PM EST **Breakout: Creating a Buzz around SyS Data**

Abstract Title: Examining the Lethal Means Utilized for Non-Fatal Suicide Attempt Emergency Department Visits in Washington Before and During the COVID-19 Pandemic

Author: Tyler Bonnell, MPH

Background: Population suicidal behavior concerns emerged during the COVID-19 pandemic due to the stressors of COVID-19 mortality and mitigation efforts that disrupted daily life. While studies have identified increases in emergency department (ED) visits for suspected suicide attempts nationwide, little is known about the lethal means used for these attempts. This project sought to address this gap by identifying the lethal means used by individuals who received care for non-fatal suicide attempts at a Washington ED and investigating if the use of lethal means changed during the COVID-19 pandemic.

Methods: The Washington Rapid Health Information NetwOrk (RHINO) identified non-fatal suspected suicide attempt ED visits from 2019 to 2021 using the CDC Suicide Attempt Version 1 Chief Complaint and Discharge Diagnosis definition. We classified these visits by lethal means using ICD-10 CM codes for Firearms; Suffocation; Poisoning;

and Other. We identified terms and phrases unique to each lethal means category and searched additional free text fields of remaining visits to assign a lethal means classification. Total and lethal mean-specific visit counts and visit rates were calculated for four 4-week periods in 2020 and 2021 and compared to the same periods in 2019. Percent change in visits (PC) and visit rate ratios (VR) were calculated to assess the magnitude of change in suicidal behavior during distinct phases of the COVID-19 pandemic. Subgroup analyses were conducted to investigate changes by patient age, sex, and urbanicity of the patient's county.

Results: Of 7,691 total non-fatal suspected suicide attempt ED visits identified, 7,090 visits (92.2%) had at least one lethal mean classified with the most common being Poisoning (5,848) followed by Other (1,014), Suffocation (358), and Firearms (69). School age youth (12-17 years) experienced the greatest change in suicidal behavior with increases observed during five of seven pandemic time periods compared to the same periods before the COVID-19 pandemic. The most notable increases were observed during Winter 2021 for poisoning (PC: +65%, VR: 2.2 [1.8, 2.7]) and total suicide attempts (PC: +61%, VR: 2.1 [1.8, 2.6]).

Conclusions: This study is among the first to examine lethal means use for non-fatal suspected suicide attempts using syndromic surveillance. We observed pandemic-related changes in lethal means use for suspected suicide attempts, highlighting the need for quality mental health support during public health emergencies. Lethal means surveillance using syndromic surveillance data is feasible and, with further refinement, capable of supporting prevention stakeholders in responding to changes in the quantity and context of suicide-related behaviors.

Abstract Title: Factors other than disease severity shape hospitalization rates during COVID-19 surges

Authors: Daniel Cornforth, PhD, Adewole Oyalowo, MS, Laura Bull, PhD, Aaron Kite-Powell, MS

Background: An important metric that is used to infer disease severity is the fraction of individuals visiting an emergency department (ED) who then transfer to inpatient care, which we will refer to as "hospitalization rate". Despite the importance of hospitalization rates in assessing disease severity of emerging pathogens, it is not clear the extent to which hospitalization rate is impacted by factors outside of disease severity itself, such as hospital resource limitations.

Methods: Time series analysis was conducted on COVID-19 ED visit and hospitalization counts using data from two national data sources. The first data source was the National Syndromic Surveillance Program (NSSP), which provides near real-time data from approximately 72% of EDs in the country. The second was the HealthVerity COVID-19 cohort insurance claims dataset, from which we analyzed approximately 2.5 million ED visits.

We used the following criteria to define COVID-19 ED visits and hospitalizations from May 1, 2020 to May 28, 2022:

- For the NSSP data, we identified COVID-19 ED visits as those that matched the ESSENCE “CDC COVID-Specific DD v1” query with the HasBeenEmergency field set to “Yes”. Visits that included hospitalization were identified as those with the HasBeenAdmitted field set to “Yes”.
- For the HealthVerity data, we defined COVID-19 ED visits as those with a closed medical claim for ED services and a U071 diagnosis code on the same claim or a U071 diagnosis code on the same date as the ED visit. Hospitalizations were identified as inpatient stays with a U071 diagnosis code occurring 3 or fewer days after the patient’s COVID-19 ED visit.

Results: We found that hospitalization rate among COVID-19 patients visiting the ED typically decreased in the beginning of COVID-19 surges and then increased as ED COVID-19 visit volumes declined, yielding an overall Pearson correlation coefficient between ED COVID-19 visit volume and hospitalization rate of -0.51 in the NSSP dataset and -0.43 in the HealthVerity dataset. For example, in the NSSP dataset, the hospitalization rate decreased from 18.0% to 10.2% at the beginning of the Omicron surge, then increased to 28.9% as visit volume fell, and finally decreased again to 12.4%. Similar dynamics were seen in the HealthVerity insurance claims dataset.

Conclusion: Our work highlights a strong inverse relationship between ED visit volume and hospitalization rates, which suggests that factors other than disease severity have impacted hospitalization rates during the COVID-19 pandemic. Ongoing work is further exploring the impact of hospital resource limitations on hospitalization rate and other disease severity metrics during COVID-19 surges. Understanding the factors that impact disease severity approximations is essential to better assess disease severity associated with future public health threats.

Abstract Title: Leveraging Syndromic Surveillance to Identify and Communicate Firearm Related Injuries in Georgia

Authors: Adan Oviedo, MPH, Elizabeth Blankenship, MPH, Ashley Ryals, MPH, Rana Bayakly, MPH, Bill Williamson

Background: Georgia death, hospitalization and Emergency Department (ED) data show that for every fatal firearm-related death, at least 2.4 nonfatal serious firearm-related injuries occurred. However, no surveillance system exists to monitor ongoing firearm related injury trends. The Georgia Department of Public Health developed a web-based dashboard by leveraging the existing State Electronic Notifiable Disease System (SENDSS). The dashboard is a tool to disseminate state and county level firearm-related injury data to stimulate collaboration between DPH staff, internal and external

stakeholders for timely prevention and/or response to decrease the burden of firearm-related injuries in Georgia.

Methods: Using the CDC's firearm definition (Version 2), a combination of chief complaint text and discharge diagnosis codes from the active case reporting were utilized to create firearm syndrome case-definition in SENDSS for the years 2020-2021. These data were aggregated by demographics and geographic location into a surveillance dashboard utilizing Tableau (Version 2021.3.5) as a platform for the public facing webpage.

Results: In 2020 and 2021, Georgia's EDs from 145 hospitals reported a total of 11,619 firearm-related injuries meeting the newly created syndromic case definition from the 1,455,038 overall reported injuries. Of the total injury-related ED encounters, more firearm-related injuries were reported among African Americans (0.84%), rural counties (0.65%), males (1.14%), and patients 15-24 years of age (1.44%). In addition, firearm-related injury encounters experienced the highest temporal fluctuation between February (0.56%) and July (1.12%) of 2020.

Discussion: Sharing firearm-related injuries with partners and stakeholders as well as making data publicly available, improves the knowledge and understanding of firearm-related injury burden in Georgia and thus support evidence-based prevention and intervention strategies to reduce these injuries.

3:15 PM EST **Breakout: The Pursuit of Validation**

Abstract Title: Develop Cannabis Syndrome to Monitor New York State (NYS) Hospital Emergency Department (ED) Cannabis-Related Visits after Its Legalization for Recreational Adult-Use

Author: Abraham Ikejiofor, MPH

Background: New York State Department of Health (NYSDOH) Electronic Syndromic Surveillance System (ESSS) utilizes near-real time ED patient chief complaint and ICD-10 diagnosis data to monitor disease trends and outbreaks across the state. On March 31, 2021, Marijuana Regulation & Taxation Act (MRTA) was signed into law, legalizing adult-use of cannabis in NYS. As part of The Cannabis Surveillance Plan (CSP) aiming for multiple state agencies to provide a framework to monitor cannabis related metrics upon this policy change, ESSS was asked to develop a cannabis syndrome to monitor ED visits

Methods: Guided by CSP, NYS's cannabis surveillance aims to monitor ED visits under four categories: 1) Cannabis abuse and dependence; 2) Cannabis use; 3) Cannabis poisoning and adverse effects; and 4) Cannabinosis.

A query was created by SAS software run against NYS hospital ED (excluding NYC EDs) patient chief complaints and ICD-10 codes to identify cannabis-related ED visits one year after its legalization. The SAS coding schema contains three components. The 1st

component includes standalone terms or standalone ICD-10 codes. For example, free text in chief complaints such as 'Marijuana' or ICD-10 code F12 (cannabis related disorders) alone will result in a positive hit. The 2nd component contains a combination of a cannabis consumption term and cannabis slang term. Consumption terms are cannabis intake terms, and slang terms are their known street names. Thus, a combination of 'smoke' and 'weed' in patient chief complaint will return a positive hit. The 3rd component excludes known false positives in the results such as CBD (common bile duct, but not cannabidiol).

Results: 24,466 ED visits were identified as cannabis-related visits from March 21, 2021, to March 21, 2022. Among the total cannabis-related visits, ICD-10 codes alone picked up 23,237 (94%) of them, and cannabis related disorders (F12) accounted for 22,363 (91%). Category one cannabis abuse (F12.1) and cannabis dependency (F12.2) picked up 5,832 (24%) visits and 2,837 (11%) visits, respectively. Category two unspecified cannabis use (F12.9) picked up 13,694 (56%) visits. Category three cannabis poisoning (T40.7X1-6) and category four cannabinosis (J66.2) picked up 827 (3%) visits and 47 (0.002%) visits, respectively. Chief complaints alone picked up 1,104 (5%) of the total ED visits. Overall, false positives were less than 1%.

Conclusion: Cannabis related disorders were the main reason for a cannabis-related ED visit, among which unspecified cannabis use, cannabis abuse, and cannabis dependency were the top three reasons. Additionally, ICD-10 codes identified majority of related ED visits.

Abstract Title: In the Weeds with Definition Validation: Creating a Virginia Specific Stimulant Overdose Definition

Authors: Stephanie, Neal, MPH, Meredith Davis, MPH

Background: In Virginia during 2021, cocaine-involved and methamphetamine-involved fatal overdoses increased by 24% and 42%, respectively, compared to the previous year. This led to increased interest in non-fatal stimulant overdose emergency department (ED) visits. The Virginia Department of Health (VDH) sought to validate the CDC Stimulant v3 definition in Virginia ESSENCE and to incorporate stimulant overdose statistics in monthly overdose reporting.

Method: VDH applied the CDC Stimulant v3 definition to ED visits in Virginia ESSENCE during January - July 2021. Syndrome validation included five key steps: 1) initial manual record-level review; 2) review of stimulant overdose diagnosis codes; 3) literature review of clinical signs and symptoms of stimulant overdose; 4) modification of the CDC Stimulant v3 definition; 5) evaluation of the resulting Virginia-specific stimulant overdose definition using an adapted version of the Syndrome Definition Evaluation tool. Definition modification (step 4) and evaluation of the new definition (step 5) were iterative and occurred multiple times.

Results: Four main issues were identified and addressed during the validation process. First, some diagnosis codes used in Virginia for stimulant overdose were missing from

the CDC Stimulant v3 definition, so 24 codes were added to the Virginia definition. Second, stimulant and cocaine use/abuse/dependence codes were added as exclusion terms to address the high volume of non-overdose visits pulled in by free text in the diagnosis field. Third, intentional self-harm and suicide negation terms were added to the Virginia stimulant overdose definition to align with other VDH drug overdose definitions. Fourth, syntax was streamlined to better capture stimulant overdose key terms. Although VDH identified several possible key terms related to stimulant overdose (e.g., tachycardia, chest pain), ultimately these were not added due to overlap with other conditions. The final Virginia specific stimulant overdose definition captured 67% fewer visits in Virginia ESSENCE compared to the CDC Stimulant v3 definition. Most excluded visits were those mentioning stimulant use, abuse, or dependence but not overdose.

Conclusion: Validation and modification of the CDC Stimulant v3 definition in Virginia ESSENCE was an iterative process that ultimately resulted in a Virginia-specific stimulant overdose definition. This process highlights the importance of validating syndrome definitions with state specific data prior to use in routine surveillance and reporting activities. In addition to development of a Virginia specific stimulant overdose definition, review of the CDC Stimulant v3 definition in Virginia ESSENCE also prompted provision of feedback to CDC and updates to the VDH All Drug Overdose definition. Stimulant overdose data was successfully included in Virginia monthly overdose reports starting in February 2022.

Abstract Title: Revising the CDC Chickenpox query for improved case, outbreak, and time-trend detection

Authors: Nina Masters, PhD, Andzelika Rzucidlo, MPH, Tara Anderson, DVM, Mona Marin, MD, Jessica Leung, MPH

Background: Varicella (chickenpox) is a highly contagious febrile rash illness. Before the U.S. varicella vaccination program was implemented in 1995, varicella was a ubiquitous childhood disease, with an estimated annual 4 million cases, 13,000 hospitalizations, and 100–150 deaths. While vaccination has dramatically decreased disease burden, ongoing surveillance is needed to monitor the impact of the vaccination program and determine the burden from illness. Although varicella is nationally notifiable, only 39 states and D.C. currently conduct case-based surveillance. The CDC Chickenpox v1 query has been available in ESSENCE through the National Syndromic Surveillance Program (NSSP); however, it has not been validated, and, to our knowledge, is rarely used. We evaluated the query and revised the query to improve its utility for surveillance.

Methods: We initially evaluated the query by conducting a quantitative assessment of performance and comparing trends and counts to National Notifiable Disease Surveillance System (NNDSS) data. We then worked with six jurisdictions (AK; AZ; Polk County, FL; Marion County, IN; VA, WA) to pilot query revisions. Each of the diagnostic codes in the query was assessed with respect to necessity, sufficiency, and appropriateness for identifying a suspected varicella case and each chief complaint term

was evaluated for inclusion/exclusion. The query logic was modified to increase specificity and better match the case definition. Finally, we compared sensitivity and specificity of the v1 and revised queries against NNDSS data.

Results: Using national data from 1/2019–9/2021, 27,459 records were classified as ‘varicella’ using the v1 query compared with 11,133 records, with an older age distribution, in NNDSS during the same period. These findings indicated the existing query was likely nonspecific. To revise the query, we removed visits with herpes zoster, varicella vaccination and exposure, varicella antibody titers, other viral exanthems, molluscum contagiosum, and other generalized rash illnesses. After revision, the number of true positives stayed the same (case-finding was preserved) and false positives were greatly reduced. All jurisdictions piloting the revised query saw a reduction in the number of visits pulled in by the query, corresponding to an overall increase in sensitivity from 42.8% (v1) to 60.5% (v2). The revised query also resulted in a lower mean age of patients, ranging from a 1- to 8.4-year reduction.

Conclusion: The v2 query is more specific without compromising sensitivity and should be more useful than the original query for supplemental case finding, outbreak detection, and time-trend analysis. This collaboration was critical to improving the performance and utility of the query.

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3:15 PM EST **Breakout: Reel Talk: Using R for Data Sharing**

Abstract Title: Rnssp v0.1.0: A Signature R package for the National Syndromic Surveillance Program

Authors: Roseric Azondekon, PhD, MPH, MS, Michael Sheppard, MS, Kelly Carey, MPH

Background: The National Syndromic Surveillance Program (NSSP) is a collaboration among CDC programs, federal partners, and local and state jurisdictions who participate in an active community of practice (CoP). Various tools and analytical resources have been developed by the NSSP to assist our partners across the CoP. The Rnssp package continues this effort by improving analytic reusability, reproducibility, and the distribution of resources to support technical capacity building within the CoP. Examples include better options for managing user credentials, securing access to NSSP-ESSENCE APIs, and improving collaboration by distributing report templates.

Methods: For better credential management, our design takes advantage of object-oriented programming (OOP) principles in R defining a ‘Credentials’ class implemented via the R6 OOP system. An object of this class encrypts user credentials and serves as a handle to pull data from an API server.

To streamline analytic tools, we implemented a variety of anomaly detection and trend classification algorithms. To distribute report templates, our design philosophy consists of dynamically fetching R Markdown templates from a sister Github repository via various utility functions. Additional support is integrated to the package in the form of datasets, hands-on tutorials, and an online documentation.

Results: The Rnssp project is in its third development cycle. Its latest version, 0.1.0, was released on March 16, 2022. This release contains four anomaly detection functions (`alert_ewma()` and `alert_regression()`, `alert_switch()`, and `alert_farrington()`) and a trend classification (`classify_trend()`) function which uses binomial regression models to classify local trajectory of a time series. Rnssp contains two class definitions for storing encrypted user credentials information and user profile. Furthermore, the new release contains new functions for ICD-10 codes webscraping and wrapper functions to credentials class methods (`get_api_data()`, `get_api_response()`, and `get_api_tsgraph()`) for credential management. The biggest improvement in Rnssp 0.1.0 is the implementation of Rstudio addins which integrate user credentials management, facilitate Rnssp R Markdown templates management, and ease access to package and templates online documentations. Currently, Rnssp 0.1.0 contains US state, county, tribal, Human and Health Services Regions, Hospital Service Areas and territory shapefiles, and a dataset of stopwords that are routinely used across the CoP. As of August 31, 2022, 705 new users from 44 US states visited the package online documentation. A total of 10,925 event counts and 659 engaging sessions were also recorded.

Conclusion: The Rnssp package is an active development project with ongoing feedback from the CoP. Its steady adoption across the CoP is an indication of its impact as a toolkit and framework that users can extend to bring additional analytic utility to their public health surveillance practice.

Abstract Title: Using of R and R Markdown for the Development of a Syndromic Surveillance Injury Dashboard

Authors: Sandra Gonzalez, PhD, MPH, Christopher Austin, MS, Ming Qu, PhD

Background: Drug overdoses (ODs), motor vehicle crashes and suicide attempts are major public health burdens. Of these, ODs and motor vehicle crashes are among the main causes of unintentional injury death, emergency visits, and hospitalization in Nebraska (NE) and the US. The objective of this project was to create a dashboard to enhance the visualization and distribution of charts and tables displaying injury surveillance trends. Data on this dashboard will be automatically updated, thus providing a source of timely actionable information to support state and local injury prevention efforts.

Methods: An automated R script connects to a local instance of emergency department (ED) visits that creates datasets using corresponding ICD-10 codes for OD-related ED visits. R Markdown files are then generated that output statewide and local health

department (LHD) OD dashboards as sharable html documents. The displayed information is specific to each NE LHD region that includes monthly OD-related ED visit trends for total ODs, opioids, benzodiazepines, methamphetamines, cannabis, cocaine, barbiturates and psychodysleptics. Data is additionally displayed by discharge disposition category and by demographic indicators that includes sex, age group, race, and ethnicity.

Results: We have successfully completed the development of dashboard reports that enhances the visualization and distribution of charts and tables of OD-related ED visits. These dashboards are in a password-protected environment with user-restricted access. Dashboards are automated to generate reports at the end of the month for each LHD and statewide. This data is used by NE LHDs to drive decisions and to inform OD prevention activities.

Conclusions: Syndromic surveillance data can provide actionable information that can help support public health surveillance programs to monitor trends and identify spikes, and thus facilitate a timelier public health response. Using the OD dashboard as a template, we are currently working on the development of automated html reports to display NE LHD and statewide ED visits related to suicide attempts, falls and motor vehicle crashes. This dashboard will be a platform for NE injury surveillance, and a relevant part of the public health surveillance infrastructure improvement and modernization.

Abstract Title: Using R markdown to Develop a Comprehensive, Syndrome-based Dashboard for Public Health Practice in Kansas

Authors: Jason Geslois, MPH, MAS, EMBA, Lauren Gracy, MPH, Gabriel Ann Haas, MPH, Jane Hodge, BA, Scott Johnston, MPH

Background: Syndromic Surveillance (SyS) data is used across the Kansas Department of Health and Environment (KDHE) to inform a variety of programs, due to its broad scope and timeliness. Despite being an excellent data source for near real-time information, not every program in KDHE uses SyS data. This may be in part due to the depth of options and the amount of time it can take for staff to feel comfortable with analysis using the ESSENCE program.

Early in 2022, KDHE staff formed a team, sponsored by the CSTE Data Science Team Training program, to improve skills in data science for public health practice related to vulnerable populations. The team's goal was to develop an easily accessible tool that could be used by staff who are not experienced with the ESSENCE user interface (UI), to quickly analyze and visualize SyS data and learn more about the social and demographic factors associated with ESSENCE queries relevant to their work.

Methods: The authors created a customized, syndrome-based flex dashboard using R markdown. The dashboard was created utilizing API links within NSSP's instance of RStudio Workbench. Kansas adapted some aspects of the flex dashboard through

existing resources from NSSP. New visualizations and views of the data were also added as the dashboard was developed to suit the needs of different KDHE programs.

Results: An R script was developed which generates an adaptable dashboard displaying data in accordance with selected parameters. Tabs and views available in the dashboard include an overview with technical notes, a calendar-based heat map, bar charts and trendlines showing demographic characteristics, county and ZIP-code based maps, a network graph for co-occurring terms, increasing terms over time, and overlapping syndrome information. The dashboard displays data for selected query parameters without having to use the typical ESSENCE UI.

Conclusions: Using an API together with a script-generated flex dashboard to analyze and visualize SyS data quickly, can be a useful tool to share with other public health staff who may not know all the nuances of ESSENCE. This tool presents an intuitive way for those unfamiliar with ESSENCE to specify what they are looking to query, and the flex dashboard provides an output with comprehensive information that is specific to state-level needs. This tool can be used regularly to investigate specific public health situations and explore patterns related to distinct populations for a variety of emerging health threats. SyS users in Kansas can utilize the script to run their own analysis or KDHE staff can develop a pdf report version of the analysis as an alternative to the flex dashboard to distribute to external partners as needed.

4:15 PM EST Roundtable: Role Call: Quality Onboarding Considerations and Opportunities

Authors: Krystal S. Collier, BA, Zachary Stein, MPH – CDC CSELS, Kay-Ann Richards, MPH, Lakshmi Radhakrishnan, MPH, Corey Cooper, BA

By the end of the session, participants will be able to...

1. Understand how review of the NSSP Priority (1, 2, 3) data elements during the onboarding process supports ongoing surveillance capacity.
2. Discuss examples of onboarding challenges with sending and receiving Data Elements such as Chief Complaint, Diagnosis Codes, Admit Reason, Clinical Impression, and others.
3. Discuss examples of how different priority data elements support surveillance capacity.
4. Discuss moving beyond the basic data elements into use cases where unexpected data elements have helped surveillance.
5. Identify content of a job aid that would communicate how prioritized data elements sustain and modernize public health capacity.

Day 3 – Thursday, December 8, 2022

12:45 PM EST Roundtable: Syndromic Surveillance Pre-Production: Asking the Right Questions

Abstract Title: Thinking about Syndrome Definitions in Our Current Syndromic Surveillance Ecosystem

Authors: David Atrubin, MPH, Jose Lojo, MPH

Writing of syndrome definitions has become a fundamental part of conducting syndromic surveillance (SyS). In the early days of SyS in the United States, syndrome definitions relied on binning visits into categories based on a few key words in the patient chief complaint. Now syndrome definitions have become increasingly complex utilizing a combination of text-based terms and codes across multiple coding schema run against multiple data fields. SyS data are increasingly being used for purposes that extend beyond anomaly detection including case identification, production of surveillance data, and situational awareness (e.g., influenza/pandemic tracking and special event surveillance). Often these syndromic definitions are shared and used across many jurisdictions as well. This roundtable session will explore the relevant questions that should be asked before syndrome definition writing begins. Additionally, the roundtable will address the increasing use of SyS for surveillance data - in place of more traditional reportable disease data.

Discussion Questions

- In what ways should syndrome definitions differ when the results will be used for surveillance data vs case identification/anomaly detection?
- Does the required timeliness of the data dictate what syndrome definition you will use?

Roundtable Objective

- To establish a list of questions to be answered before beginning SyS syndrome definition writing

12:45 PM EST Roundtable: Now Casting: Putting Clinicians in Supporting Roles

Abstract Title: EMR-ing Health Threats: Can Clinician Engagement Enhance Syndromic Surveillance Practice?

Authors: Gabriel Ann Haas, MPH, Kellie Wark, MD, MPH, Adrienne Malik, MD, Brittani Valentine, DO

Given that Syndromic Surveillance is fed directly by timely and accurate EHR documentation by clinicians in hospital settings, there may be a role to enhance surveillance efforts through relationships with emergency department (ED) providers. Making them aware of Syndromic Surveillance might enhance the feedback loop between medicine and public health. For example, a clinician might reach out if they are

seeing something unusual, and we might share data back with clinicians to lower the threshold for certain diagnostics or help with resource determination for emerging health threats. If we notice a concerning trend, a provider may be able to provide more insight into what is behind the trend or what types of investigation might be most applicable. Timely detection and investigation of new health threats are key to resolution and prevention. Finally, If ED staff know what we are trying to track, they may also be more apt to use certain codes on language of interest. Survey data and conversations in Kansas suggest clinicians are largely unaware of the important role their documentation plays but are interested in learning more and would even be willing to improve the most pertinent parts of their documentation. In general, ED providers are highly invested in any initiative tied to education or prevention.

In this roundtable, we will first discuss the benefits increased engagement might have for syndromic surveillance practice. Attendees are encouraged to share their own experiences along with barriers they have encountered or concerns they have. Perhaps, outreach has been unsuccessful in the past or has been met with pushback from leadership? When might it be appropriate to contact clinicians, and when would it be inappropriate? Are there concerns about bothering providers, or interfering with normal operations? What types of communication may be most beneficial? Do coding or documentation practices differ from hospital to hospital? How might we educate clinicians about the impact of their documentation? Following this more high-level discussion, attendees will hear from KS about several success stories and conclude with a discussion about the best ways to make similar connections in their respective jurisdictions. Attendees will also hear from a provider in KS about their perspectives on syndromic surveillance and are encouraged to ask questions. Ultimately, this discussion will help lay the initial roadmap for engagement with clinicians whose data is represented in syndromic systems and determine what these relationships might look like moving forward.

Roundtable Objectives

- Discuss the ways in which clinician engagement might enhance surveillance efforts
- Discuss challenges, concerns, and barriers to clinician engagement & education
- Learn from Kansas and others about successes in engaging emergency department staff & hear thoughts from a physician about syndromic surveillance.
- Discuss the best ways to make connections with clinicians in your own jurisdictions

12:45 PM EST **Roundtable: Protecting the Set: A Look into Environmental Health Data**

Abstract Title: Using Environmental Health Data for Public Health Action: CDC Tracking Program

Authors: Emily Prezzato, MPH, Angela Werner, PhD, MPH

The National Environmental Public Health Tracking Network (Tracking Network) is a web-based public portal that processes, shares, and publishes public health, environmental, and exposure data. Utilizing the Tracking Network infrastructure, syndromic surveillance data can be visualized and analyzed alongside environmental health data and other relevant contextual information (e.g., population vulnerabilities, community characteristics) to inform public health actions.

Roundtable Objectives:

- Introduce the Tracking Network and demonstrate the display of syndromic Heat-related Illness data on CDC's Heat and Health Tracker.
- Discuss Tracking's interest in monitoring emerging threats.
- Discuss methods to use syndromic data to address emerging threats and environmental health concerns.
- Establish partnerships to expand the utility of national shared data to state level granularity.

12:45 PM EST Roundtable: Increased Aperture: Incorporating New Data Sources into the Sys Conversation

Authors: Edward Lockhart, PhD, Stephanie Dietz, PhD, Neha Shanker, PhD, MPH, Aaron Kite-Powell, MS, Lakshmi Radhakrishnan, MPH

Combined roundtable session: this roundtable discussion is intended to be an interactive conversation among panelists and attendees about the many ways emergency department data can be used alongside and/or in combination with other data, including mortality data. The main goal of this roundtable will be to give attendees examples of and lessons learned from integrating emergency department data with their other available data. Some specific examples include overlaying laboratory and emergency department data to examine respiratory disease trends, using wastewater data and emergency department data to find potential cases during an outbreak, and incorporating different datasets into ESSENCE for alerts and algorithm use.

This roundtable will provide the opportunity to discuss the different options jurisdictions use to route mortality data to NSSP. As a result, insights will come from this interactive experience allowing NSSP to develop a 'best practices' document for sites to route mortality data to its platform. From 2020 to 2021, The National Syndromic Surveillance Program (NSSP) completed a pilot to test and refine mortality data transmission, processing, and data governance standards. The activities of the pilot were critical to defining requirements necessary for transitioning mortality data from NSSP's staging environment to its live or production environment. At the conclusion of the pilot project, NSSP successfully added six jurisdictions to its live NSSP-ESSENCE platform therefore allowing surveillance activities ONLY for these sites. Moving forward, NSSP plans to continue to engage with its local and state partners as well as its frequent collaborators at the National Association for Public Health Statistics and

Information Systems (NAPHSIS) to streamline dataflow from jurisdictions/sites to NSSP. To better understand the challenges and successes for interested jurisdictions to route mortality data to NSSP, we propose an interactive and collaborative discussion around this important topic.

Roundtable Objectives:

- Give attendees examples of integrating emergency department data syndromic surveillance with other data.
- Discuss lessons learned around data integration.
- Hear from attendees about questions or barriers they face with data integration.
- Describe data routing activities and experiences for jurisdictional partners
- Share and understand unique partner experiences with mortality data routing mechanisms
- Develop a document for best practices on routing mortality data to NSSP ESSENCE.
- Discuss possible other data sources that could be integrated into NSSP ESSENCE.