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KHC Office Hours

June 25th, 2025

EMRging Health Threats: The Value of Syndromic Surveillance

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KANSAS MEDICAL SOCIETY Established 1859

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Today's Webinar Agenda

- Welcome – 5 mins
- Content Presentation 45 mins
- Q&A 5 Mins
- Closing Comments 2 mins

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Outline & Objectives

- What is Syndromic Surveillance (SyS)?
- How is SyS data captured?
- History of SyS data
- How does public health use SyS data?
- Disability syndrome definitions & Funding
- Call to action: what might collaboration look like?

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What is Syndromic Surveillance?

Near real time deidentified healthcare discharge data for the detection and rapid assessment of emerging health threats.

- The ability to search on free-text fields such as Chief Complaint or Triage Notes in addition to Diagnosis Codes allows for the monitoring of **'syndromes'**.
  - Useful for early outbreak detection!
- Data is usually available within 24 hours of the visit itself – allowing public health insight into 'current' community well-being.

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What is Syndromic Surveillance?

- Syndromic surveillance differs from traditional case-based surveillance which is reported after a diagnosis is made.
  - This helps to eliminate lag-time between when someone first falls ill and when public health is notified.

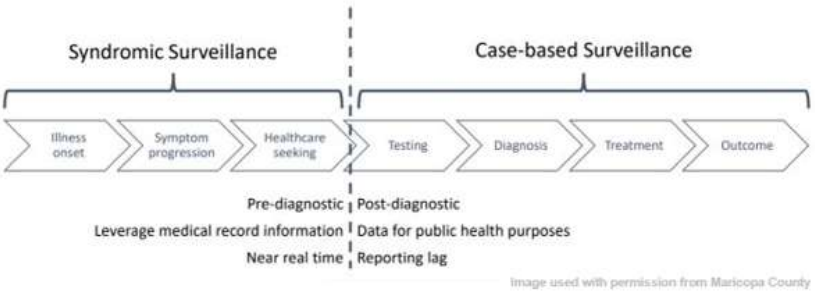

Image used with permission from Maricopa County

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How is Syndromic Surveillance Data Captured?

People seek treatment in a medical facility, such as emergency department or urgent care.

Medical facility sends de-identified data including chief complaint, diagnosis codes, patient characteristics, and location to state and local health departments or to data aggregators such as Health Information Exchanges.

DATA

Public health departments and Health Information Exchanges contribute data to the NSSP BioSense Platform.

CDC provides

- Analytic tools, services, and system infrastructure
- Funding to health departments
- Technical assistance and training
- Data analysis support
- Collaboration on specific projects

NSSP Community of Practice

- Conduct syndromic surveillance to monitor public health
- Share data via NSSP BioSense Platform
- Share knowledge
- Build skills via webinars, trainings, and workgroup participation
- Collaborate to develop methods and respond to emergencies

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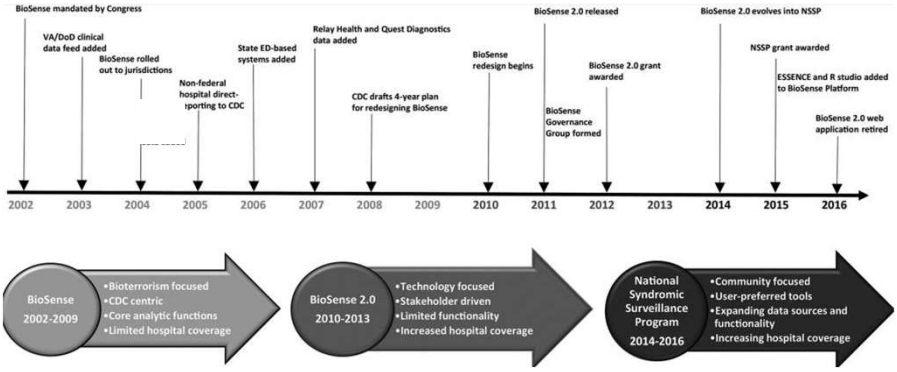
History of Syndromic Surveillance



- **Syndromic Surveillance (SyS) was initially a tool for early identification of outbreaks**
  - Developed in 2001 in response to bioterrorism
  - Has been used for regularly for surveillance of seasonal influenza.
- **State Adoption More Recently: KSSP began onboarding in 2012**
  - Recent CMS requirement for ED data to be sent to Biosense Platform starting 2022 as a part of promoting interoperability

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Kansas Syndromic Surveillance Program

KSSP
KANSAS SYNDROMIC SURVEILLANCE PROGRAM

- 126/136 Hospital Emergency Departments in production.
- ~98% of State's Emergency Departments visits submitted.
- Starting to receive Inpatient Data (four facilities).
- Shawnee and Johnson counties with Urgent Care Data.
- Also receiving mortality data and national laboratory data

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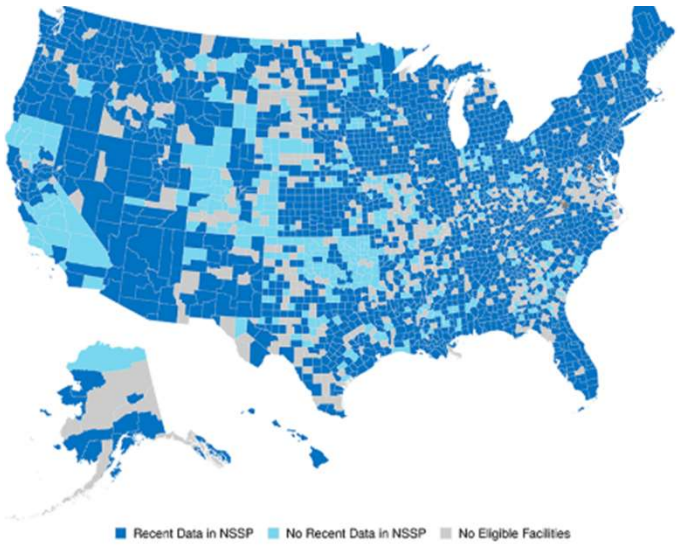
National Syndromic Surveillance Program

- **Nationwide coverage from all 50 states after remaining states began onboarding last year.**
  - Approximately 83% of Emergency Department visits submitted nationally.
  - Now receiving de-identified laboratory data from major national reference laboratories.

Non-federal Emergency Department Participation in NSSP



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What Information is Included?

Required Fields	Optional Fields	Not Included
Visit Date/Time	**Triage Notes**	**Patient Name or Contact Information**
Facility, MRN, Patient County (We never share facility names or line-level data when reporting)	**Problem List**	**Provider Name or Contact information**
Chief Complaint (CC) (Initial, and any changes made)	**Medication List**	**Full note** (No HPI or medical decision making)
Diagnosis Codes (DD) (Presenting, working, final)	**Procedure Codes**	**Provider to Provider communication**
Basic Patient Demographics Age (DOB), Sex, Race/Ethnicity	**Insurance Coverage**	
Syndrome Automatically categorized by software based on CC and DD	**Travel History**	
Other: Discharge Disposition, Smoking Status, Height and Weight	**Other:** Initial Vitals, Occupation,	

cdc.gov/nssp/biosense/new-facility/syndromic_data_element_priortization.html

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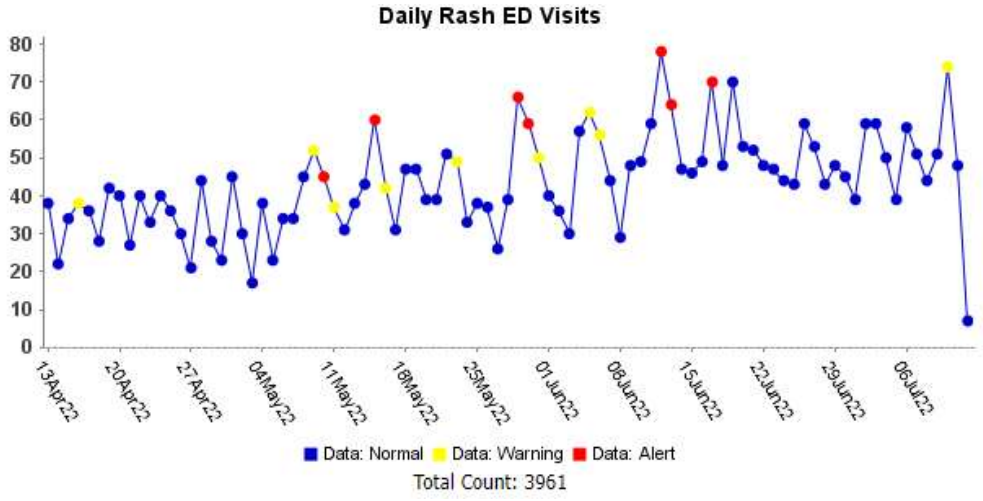
Sample Daily Time Series



The BioSense Platform allows me to set up alerts. ESSENCE can either alert me of every case, or alert me of a significant number of visits based on a rolling 30-day average.

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Sample Line Level Data (De-Identified)

Example Data Contents	
Date and Time of Visit	31May17 @ 1720
Facility Name	*Sample Hospital*
Chief Complaint	"Pt presents with chest pain on inhalation, hx of drug abuse including vaping"
Category (Syndrome)	ILI; Respiratory; Other
Discharge Diagnosis (ICD10)	J18.9 (Pneumonia, unspecified); F17.210 (Nicotine dependence)
Medical Record Number	123456
Age, DOB, Sex, Ethnicity	Female, 31, 1986-05-07, 2135-2 (Hispanic or Latino)
Initial Pulse Oximetry	96%
Discharge Disposition	01 (Discharged to Home/Self Care)

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Advantages & Disadvantages

Advantages

- Near- Real Time
  - Most data reported within 24 hours
  - Allows quicker interventions
    - Syndromes identified before diagnosis
      - Clusters of respiratory illness
- Situational Awareness
  - During and immediately following an event
- Ability to query Free-Text
  - Can provide additional relevant detail

Disadvantages

- Messy, Moving– 'Big Data'
  - Often requires cleaning and/or line level examination. Data is preliminary and subject to change.
  - Free-text queries vary in sensitivity and specificity
    - Potential for over or under-representation
- Diagnosis codes and level of detail in chief complaint vary from provider to provider.
  - Variable Data Quality
  - Spelling, Synonyms, False Positives

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What is Monitored using Syndromic Surveillance?

Beyond Outbreak Detection, Syndromic Surveillance can be used to monitor a wide variety of public health indicators in near real time including:

- Overall trends in ED visit volume
- Tracking and Differentiating Respiratory Virus Trends
  - Particularly important to see how influenza and RSV seasonality have been altered by COVID-19
- Mental Health and Suicide Related Emergency Department Visits
- Drug Overdoses
- Injury and Violence Surveillance (fireworks, e-scooters, domestic violence)
- Mass Gathering Surveillance
- Environmental Health Impacts (Heat, Cold, Air Quality, Weather Events)
- Case Finding and Scope Determination for New Health Threats
  - EVALI (Vaping Associated Lung Injury) or MIS-C (Post-COVID Multi-Inflammatory syndrome in kids)

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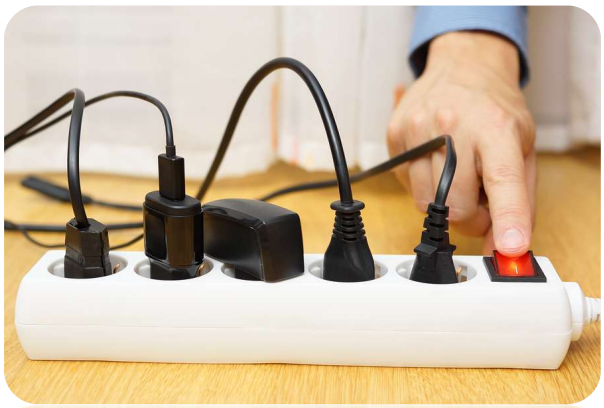
Syndromic Surveillance Data Source Expansion

- **New or Optional EMR variables (ODH, Travel, Triage Notes)***
- **Mortality Data**
- **Urgent Care Data***
- **Inpatient Data***
- **Laboratory Data**
- **Nationally Notifiable Diseases (NNDSS)**
- EMS Data
- **Poison Control Data**
- **Wastewater Surveillance**
- **Weather Data**
- School Absenteeism
- Purchasing Trends
- Internet Search Engines
- Social Media



Bolded- Available in KS, *Data is limited

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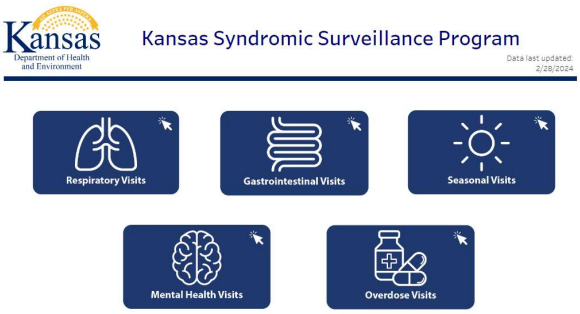
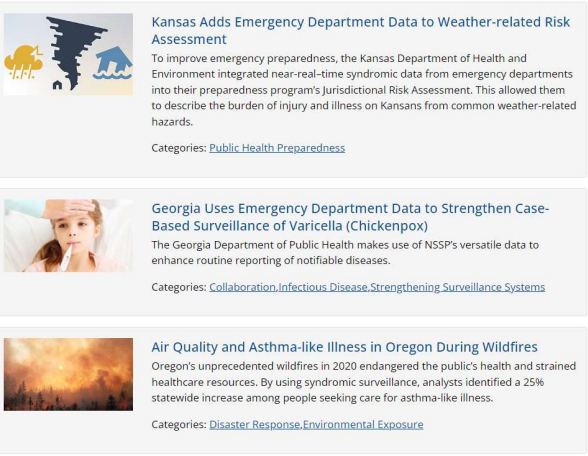
Syndromic Surveillance Dashboards & Reports

Kansas Syndromic Surveillance Dashboard
kshealthdata.kdhe.ks.gov/t/KDHE/views/SyndromicSurveillanceDashboardv8_3/LandingPage?%3Aembed=y&%3AisGuestRedirectFromVizportal=y



NSSP Syndromic Surveillance Success Stories:
cdc.gov/nssp/success-stories.html



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Finding Unreported Cases

When a health issue is new, providers may not identify or report every case. In new outbreaks timely reporting of the condition is often required to speed up public health investigations.

- Examples: EVALI, COVID-19 associated Multi-Inflammatory Syndrome, Pediatric Hepatitis of Unknown Origin, Carbon Monoxide, Rabies Exposures

- **In Kansas, syndromic queries helped identify unreported cases of EVALI by querying for severe lung injury in young adults.**
  - Can request full medical records for suspected cases
  - Active engagement with hospital infection prevention staff improves overall awareness

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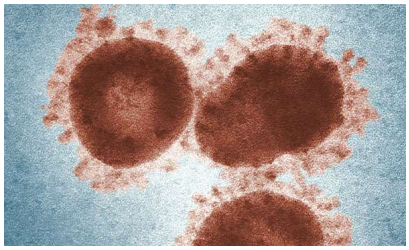
Recent Example Use Cases

Recent Examples include:

- EVALI (e-cigarette or vaping use-associated lung injury)
  - After a cluster of severe lung injury affecting teenagers in Wisconsin was reported, syndromic surveillance was initially used to determine the outbreak's scope and identify cases.

- Novel Coronavirus (COVID-19)
  - Respiratory and fever related visits were queried for mention of travel related terms. This helped identify potential cases coming in from overseas that may have been mistaken for another illness.
  - Since COVID-19 is no longer reportable, syndromic surveillance is used to monitor disease activity.



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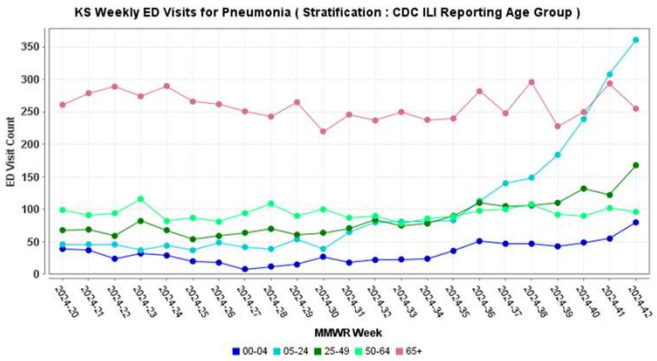
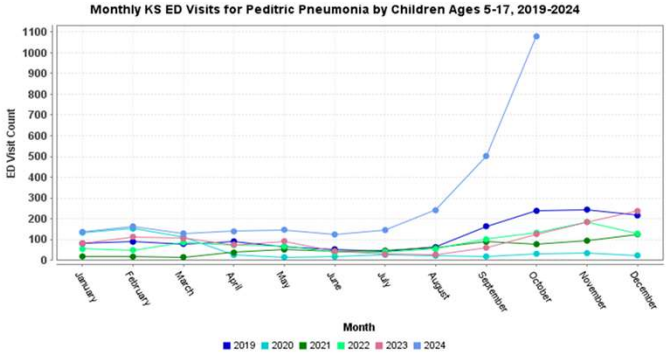
Recent Example Use Cases

Pediatric Pneumonia

- Last Fall, KSSP noted an unusual statewide increase in Emergency Department (ED) visits for pediatric pneumonia over previous years.
- A KS-HAN was sent out on October 26, 2024. and information was shared at the statewide public health webinar
- Syndromic data identified *Mycoplasma pneumoniae* as the likely culprit behind this rise in visits.





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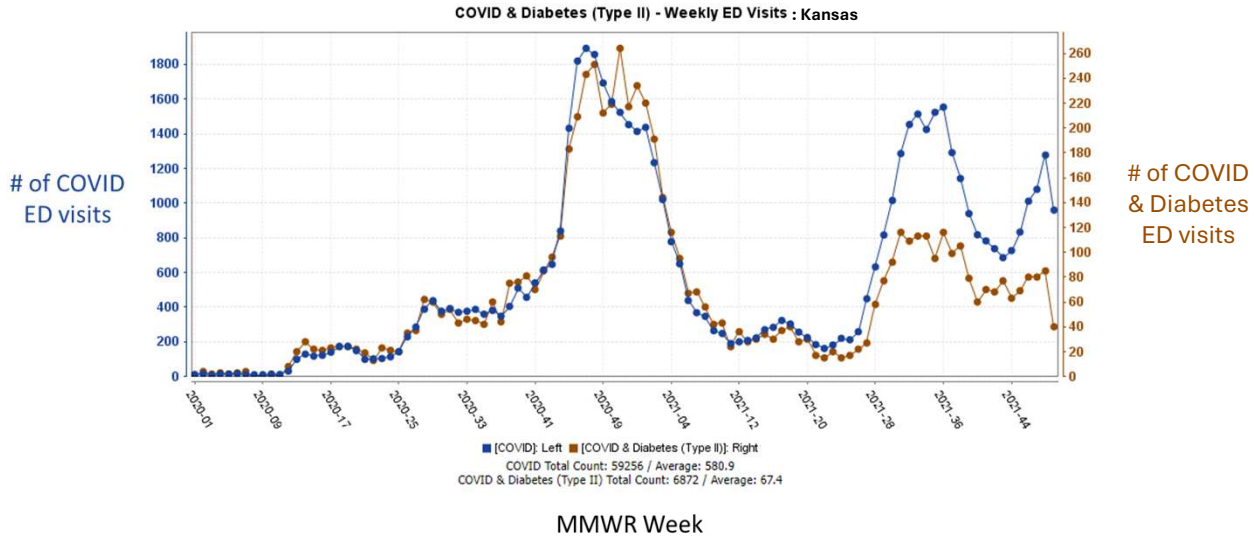
Overlapping Time Series



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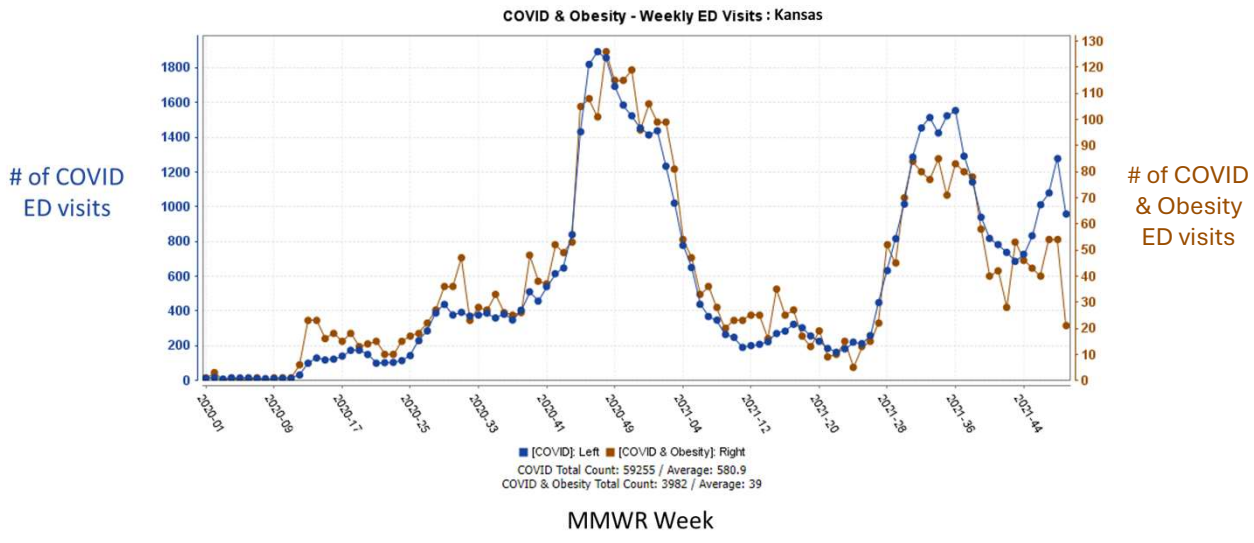
Overlapping Time Series



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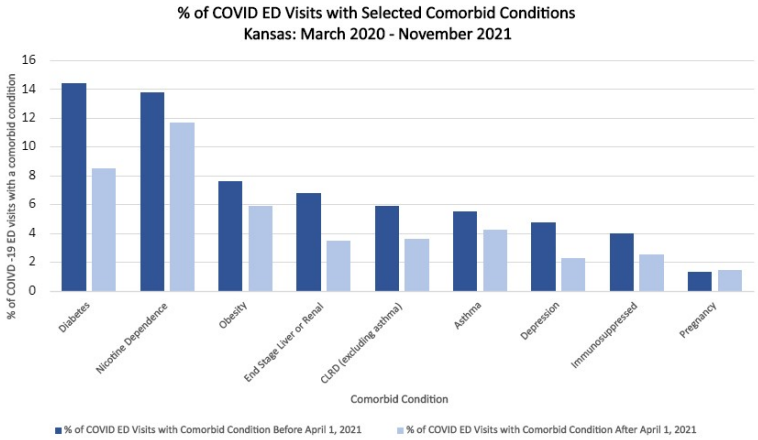
COVID-19 Comorbidities Over Time



Effect Size from largest to smallest (95% CrI)

- **65+ Age Group -16.59%** (-17.33, -15.8)
- **Diabetes -5.89%** (-6.41, -5.37)
- **End Stage Liver or Renal -3.31%** (-3.67, -2.96)
- **Depression -2.46%** (-2.76, -2.16)
- **CLRD (excluding asthma) -2.26%** (-2.60, -1.91)
- **Nicotine Dependence -2.08%** (-2.63, -1.53)
- **Obesity -1.69%** (-2.11, -1.29)
- **Immunosuppressed –1.49%** (-1.78, -1.2)
- **Asthma -1.33%** (-1.47, -0.77)

No Significant Change

- **Pregnancy +0.16%** (-0.03, +0.35)

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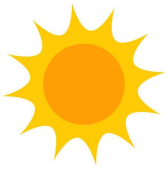
Current Example Use Cases

- Summer Hazards
  - Heat-related illness, vector-borne disease, fireworks, animal bites, outdoor play, tornadoes/storms



- Measles/Tuberculosis Outbreaks
  - Staff uses ESSENCE data to ensure there are no delays in reporting any suspect cases and to help track hospitalization status.
  - We are also monitoring for increases in toxicity related to Vitamin A and Methylene Blue as well as vaccine reactions.

- 2026 FIFA World Cup
  - KDHE is planning to conduct enhanced surveillance during the 2026 FIFA World cup for the rapid detection of any health threats.

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Healthcare Associated Infections

How can Syndromic Surveillance data be used for HAI?

- **HAI/AR dashboard in ESSENCE:**
  - CAUTI, CLABSI, Surgical Site Infections, Sepsis, C. diff
  - Mentions of LTCFs in CC or Triage Notes
    - Early on, this was used to identify COVID-19 Outbreaks
- **Could encourage physicians to include relevant diagnosis codes and context in the CC:**
  - Long Term Antibiotic Use, Recent Hospitalization, S/P procedure
- **Inpatient Data will provide more information about HAIs.**

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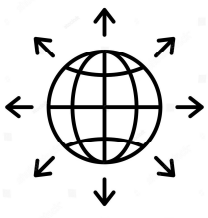
Why is ESSENCE Expanding?

- **ESSENCE is a Public Health Response Tool**
  - Having an integrated information system increases the value of syndromic surveillance to respond to public health emergencies.
  - Platform tools (query portal, alerts, overlays, table builder, stratification, graphs, API calls) can be applied to show different data sources side by side. This helps enhance Data Modernization.



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Laboratory Data

- **LabCorp, Quest, ARUP, and Aegis send HL7 messages directly to BioSense several times per day, except on Sundays for 167 conditions.**
  - **Benefits:** Receive orders in addition to results (% positivity, less lag, may help understand testing practices), ordering facility/specialty (can capture orders from vulnerable populations including orders from jails, nursing homes), test type (PCR vs, Antigen, is test being ordered correctly?), co-occurring pathogens, MyAlerts
  - **Caveats:** ELR redundancy, Labs would prefer their name is not shared unless combined with other lab data (such as with state public health lab data), hospital labs not included (better for some conditions than others), technical understanding necessary to build queries (combined tests, LOINCs, results), no unique patient identifier
  - **Potential Use Cases:** Alpha-gal & VBD test orders, Lead (applesauce), Environmental Toxins, H5N1 (influenza A sequencing), Mpox, Hepatitis testing practices, Substance Use & Drug Contamination, HAI/AR (C. diff, Cultures, Susceptibility, Co-Occurring Pathogens, LTCFs)
  - **Takeaway:** Can be redundant (ELR data), but it may be valuable when applied to the right use-case such as calculating percent positivity, understanding testing practice, or considering if something should be made reportable. Data will work better for some conditions than others and will require an understanding of testing practices within the state.

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Why is this Important to Clinicians?

Need to enhance feedback loop between medicine & public health for surveillance purposes

- Mayo Clinic survey of clinician public health engagement (Bornstein et al. 2021)
  - Respondents had a good knowledge of public health functions, but very few had a personal interaction with public health in the past two years or were aware of how to work with public health organizations in their community. Many rated their public health education in medical school as inadequate.
- Syndromic example: EVALI scope initially determined in ESSENCE from a provider tip-off. Timely public health investigation is key to resolution and prevention.
  - If clinicians are aware of how surveillance systems work, they may be more inclined to report or record something unusual.
  - Public health can share trends back with frontline clinicians

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How Clinical Documentation Impacts Surveillance

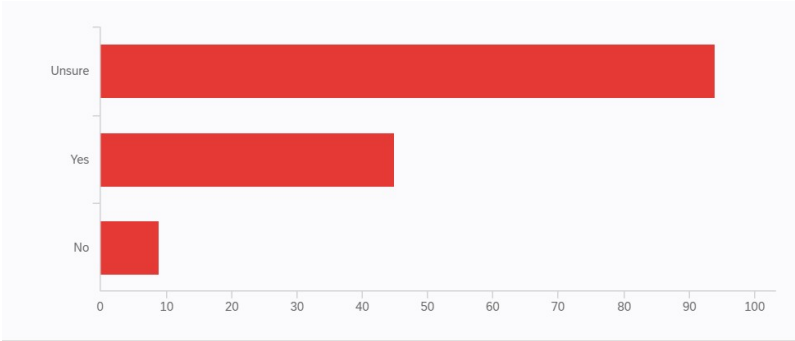
Syndromic Surveillance depends directly upon accurate and timely EMR documentation

- Degree to which clinicians are aware this system is in place at all, or that their documentation is monitored for public health, is largely unknown.
- Reliability of diagnoses based on clinician documentation often flawed (1-3).
- Billing codes perceived as negatively impacting day-to-day work, with perceived irrelevance to clinical care (4-5), No standardization of EHR entry (4).
- Transmission of contextual factors still relies on past surveillance tools (telephone, fax) --> **if clinicians are aware documentation is utilized for more than administrative billing purposes, they might be more apt to include key contextual or social factors.**

1. MacIntrye C et al Aust NZ J Public Health; 1997, 2. Peabody J. et al. Medical Care; 2004, 3. Farzandipour M. et al. Int J Inf Manage. 2010, 4. Watzlaf et al. 2007, 5. Butz et al. 2016

Have You Heard of Syndromic Surveillance?

Is the health department able to monitor de-identified Emergency Department or urgent care visit records for public health surveillance purposes?



More Survey Results

Perceived importance of being aware of public health surveillance trends

- **39% Always Important → 47% Frequently Important → 15% Sometimes**

Perceived importance of improving data quality for public health surveillance

- **28% Critically Important → 39% Very Important → 30% Moderately Important → 3% Slightly Important → 0% Not Important**

"If you knew your documentation and coding impacted public health action and outbreak detection, would you be more inclined to improve the most pertinent parts of your documentation?"

- **63% Yes → 35% Maybe → 2% No**

"If you knew specific codes or language were more likely to trigger an event of concern, would you be more apt to use those codes or language of interest?"

- **72% Yes → 26% Maybe → 2% No**

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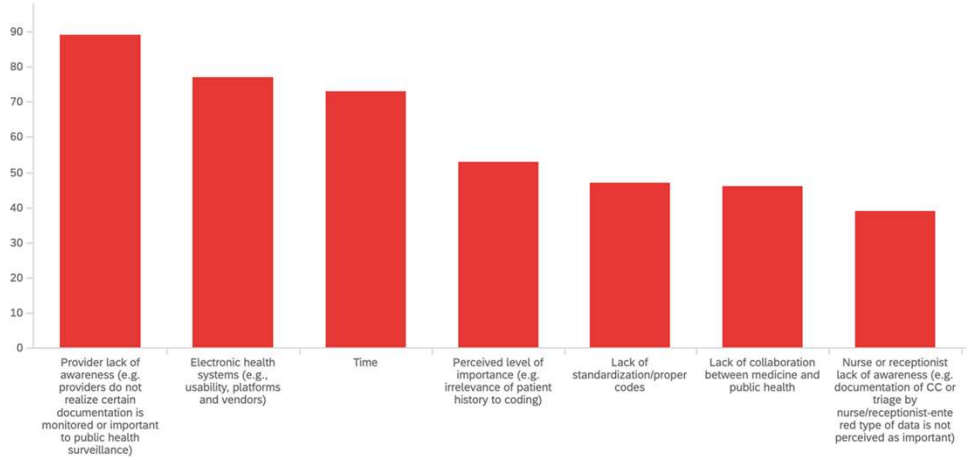
More Survey Results

Perceived barriers to improving documentation and coding as it relates to public health surveillance: **most important factor was provider lack of awareness** (perceived more important than time, EHR platforms, public health-healthcare collaboration, coding standardization)



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Contextual Information for CC or DD

- **Codes that aren't used as often and may be helpful for surveillance (F, R-Z)**
  - New codes also come out yearly on October 1st, or as needed for emerging health threats (Covid, Covid Sequalae, Monkeypox, etc.). Codes get very specific, but we usually see more broad application.

Factors influencing Current Health Status
(Nicotine Dependence, Obesity, Personal history or disability codes, Immunization status, Recent history of ____, Long term use of ____.)

Health Care Related Codes
Encounters for screening, immunization, S/P procedure, Recent Hospitalization, abnormal lab values

External Cause Codes Mechanism of injury, Environmental, Exposure, Circumstantial

Activity and Location Codes
Activity: Biking, Cooking
Location: Highway vs. Road, School, Spectator at an event, Kitchen

Social Determinants of Health Codes (SDOH)
Homelessness, Poverty, Job Loss, Stress, Conflict, high risk for ____, Problem related to living situation, Lack of Access to ____.

Similar Information can be included in the chief complaint if it makes more sense to list it there.

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Diagnosis Code vs. Free-Text

Diagnosis Code vs. Free-Text (CC & DD) in ESSENCE Data

- **Falls 65+:** Diagnosis Code captured **~65%** of visits captured by Falls 65+v1 query in 2021
- **Traffic Accidents:** Diagnosis Code captured **~45%** of visits captured by All Traffic Related V2 in 2021.
- **Fireworks:** Diagnosis Code captured **~25%** of visits captured by Kansas firework v3.
- **Weather:** Diagnosis Code captured **<10%** of visits captured by free-text queries.

Note: ESSENCE counts should be considered estimates and are more useful for assessing trends. Free-text queries have the potential to both overestimate and underestimate a problem without live level review. Definitions matter. As such, these percentages are very rough estimates. Still, this suggests at least some visits are being missed.

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What Could Collaboration Look Like?

- **We need to strengthen partnerships between medicine and public health!**
  - Public Health can do more to educate clinicians about codes/concerns of interest
    - Learning from clinicians about documentation practice helps us to understand where information is coming from, interpret data, write queries.
  - Local public health and clinicians can work to improve tracking of certain events.
    - Collaboration for active monitoring – use of a key word, codes.
  - Initially opens channels of communication to target surveillance efforts (tipoffs, inquiry)
    - An ED provider might contact KSSP about a concerning increase in _____.
  - Feedback loop to clinicians → lower threshold for certain diagnostics (e.g., flu testing, stool cultures, patient histories (vaping), resource determinations for substance abuse, mental health, social determinants of health, emerging issues.
  - Opportunities for applied public health research, academic-public health partnerships.

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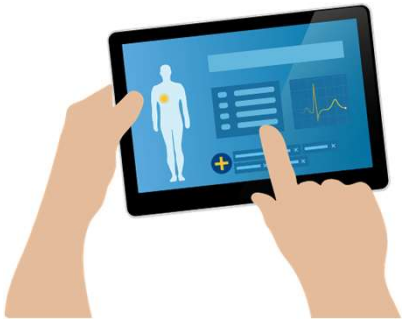
Hospital Outreach & Education

Ways to get involved:

- Join our quarterly KSSP stakeholder meetings to learn about program updates and learn about trending topics.
- Hospital users can get access to their own data after signing a data use agreement.
  - We can set up alerts for you and provide training on how to use the platform.
- E-mail KDHE.Syndromic@ks.gov to set up a visit or meeting and explore regional trends relevant to your facility.



To protect and improve the health and environment of all Kansans

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Kansas Syndromic: Sharing the ESSENCE

KSSP
KANSAS SYNDROMIC SURVEILLANCE PROGRAM

Thank you/Questions

Bureau of Epidemiology and Public Health Informatics
Kansas Department of Health and Environment

KDHE.Syndromic@ks.gov

Find more information and resources on our webpage
Search 'Kansas Syndromic Surveillance Program'

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Upcoming Education and Important Dates

- 7/1-2 CMS Quality Conference (Virtual)
- 7/15 KHC CAP Lunch and Learn - RHC Billing Basics
- 7/23 KHC Office Hours - Pharmacy Deserts
- 9/4-9/5 KHA Convention and Trade Show
- 10/23 Kansas Health Impact Conference - Topeka

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Questions?

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→ *Find contact info and more at:*
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