National Syndromic Surveillance Program
Colorado North Central Region
(NSSP CO-NCR)

ESSENCE Training II

National View and Advanced Query

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ESSENCE Log-In and Data Access

- **Account:**
  - Activate your account
  - Your user names should be provided by AMC
  - Reset your password *EVERY 100 days*

- **Browser:**
  - Mozilla Firefox is recommended web browser for the use with ESSENCE
  - Compatibility is not guaranteed with other browsers

- **Please click here to log in:**
  - [https://essence.syndromicsurveillance.org/](https://essence.syndromicsurveillance.org/)

Yes! We can access full details!
• 10:00-10:15: Welcome and Log-in
• 10:15-10:45: NSSP CO-NCR Updates and ESSENCE quick review
• 10:45-10:15: Alert list and event list
• 10:15-10:30: Break Time

• 10:30-11:30: Chief complaint validation tool and weather data
• 11:30-12:00: Exercise!!

• 12:00-12:30: Lunch and Collaboration

• 12:30-1:45: Query portal and advanced query (Exercise!!)
• 1:45-2:00: Break Time

• 2:00-3:00: Algorithms, chief complaint processor, CCDD, and CCDD category
• 3:00: Wrap Up!

NSSP CO-NCR Partnership

Note: Children’s Hospital Colorado will assess their system and consider joining the project in the future.
Review ESSENCE I

- ESSENCE quick review
  - Weekly time series viewer
  - Stacked graphs
  - Detector comparisons
  - Configuration options
  - Stratification queries
  - Overlay
- Data detail page
- GIS Map
- Alert list
- Query examples
- Exercises

NSSSP Partners

*Source: CDC NSSP Updates 2017
Data Collection

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission Date and Time</td>
<td>ED admission date and time and used for data consolidation</td>
</tr>
<tr>
<td>*Patient Visit ID</td>
<td>Generated ID from Hospital</td>
</tr>
<tr>
<td>Chief Complaint</td>
<td>Free text; Information from patient and used for query and monitoring</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>ICD 10 and ICD 10; used for query and monitoring</td>
</tr>
<tr>
<td>Demographic Information</td>
<td>Includes age, gender, and race/ethnicity</td>
</tr>
<tr>
<td>Geographic Information</td>
<td>Includes Zipcode and county code but not street address</td>
</tr>
<tr>
<td>Triage Notes and Clinical Impression</td>
<td>Free text; additional information which supports query</td>
</tr>
</tbody>
</table>

Data and Information Sharing

- **Colorado Local Internal Data Sharing:**
  - Public health has full access
  - De-identified patient information
  - Data access is **not ready for hospitals**

- **National Data Sharing:**
  - Aggregated information
  - **No** facility name or patient ID
  - Across the whole country
  - Need data use agreement for more information

 Syndromic Surveillance
Electronic Disease Surveillance

Data Sources
- Absenteeism
- Radiology
- Diagnostic Labs
- Poison Control
- Prescriptions
- Chief Complaints and Diagnosis Information
- Nurse Call Center/Ambulance
- Over the Counter (OTC)
- Weather
- DoD

Epidemiologists perform review as needed
Epidemiologists check alerts, location, and facility
Epidemiologists gather additional data:
  - Surveillance Data
  - Lab reports
  - Facility reports
  - Verbal reports

Alert of the query is identified for a specific day/syndrome

Outbreak confirmed

Public Health Response

ESSENCE Function
- A system that lets practitioners monitor healthcare data for events that could affect the public’s health, conduct further analysis into events of interest, and share data and analysis.
- Key Functions:
  - Alert lists
  - Dashboards and ability to share
  - Ad hoc queries and ability to share
  - Overview time series graphs stratified by key variables
  - Interactive charts including table and crosstab builder
  - Self-defined alerts with adjustable statistics (myAlerts)
  - Bookmarks
  - Records of interest queries
  - Event communication system
  - Dynamic report templates
Data Quality Assurance – Data Quality

Query Portal

Query: See emergency visit data from Denver Health Hospital from April01-June30
Facility: CO_NCR-Denver Health
Patient Class: Emergency

What you can do in query portal:
1) Query data from different data sources and time
2) Put in subjects you are interested in seeing
3) More details will be provided in the future training
Query Portal-Chief Complaint Sub-Syndromes

Chief Complaints Based Syndrome Definitions

SUBSYNDROMES -> ASTHMA

Terms
ASTHMA (10)  BRONCHIATHMA (10)

Query Portal-Syndromes

Chief Complaints Based Syndrome Definitions

SYNDROMES -> FEVER

Terms
BLISTER (4)  BODY (2)  DENGUE (10)
ELVIREN (2)  FEBRILE (10)  FEVER (2)
FEELING (2)  FEVER (2)  FEVER (10)
HAY FEVER (10)  MALARIA (10)  QFEVER (10)
SCARLET FEVER (10)  HIGH (2)  HOT (4)
TEMPERATURE (3)  WARM (4)
Query Portal-Chief Complaints, Triage Notes, Clinical Impression

How to search key words in free text fields (Chief Complaint, Triage Notes, Clinical Impression):
^word: start with this phrase
^word$: exactly the same as the phrase
^fever^: all fever
^fever,or,*486^

Query Portal- Patients’ Historical Information

What history you can find in query portal:
1) Chief Complaint History
2) Discharge Diagnosis History
3) Disposition History
4) Patient Class History (including free text)
5) Has been in ED??
6) Calculated Patient Class
7) Trigger Event History

How to create a trend??
Query Results and Time Series - ED Counts

Time Series: ED visit counts, April 01 - June 30
Facility: CO_NCR-Facility
Patient Class: Emergency
Message from the chart: Why ED visits dropped from 300 to 100

What you can do here:
1) Investigate the trend
2) Interactive chart. You can see the expected value for each day.
3) More details will be provided in the future training

Query Results and Time Series - Weekly pop-up and stacked graph

What should I click to get these:
1) Weekly view: Make your query in query portal -> Click Time Series on the bottom -> ‘Submit’ to get weekly Time Series; when the new chart come up, you will be able to change the timeline
2) Stacked Graph: Make your query in query portal -> Click Time Series on the bottom - > choose what you want in ‘options for creating stacked graph’
3) Compare detectors: Make your query in query portal -> Click Time Series on the bottom -> choose what you what to compare in ‘detectors to compare’
What am I seeing here:

1) Overlay figure will be displayed. You can review and see if it needs any modification
2) Data Table: quick review from your “Original” Query, but not include the overlay
Map View Portal

- Size Bar for you to zoom in or out
- Report and animation
- Layers and label names

Save and Share your Queries

- Save Query
- Save Report Query
- Add to myESSENCE
- Create myAlert
- Share URL
Manage your Queries and Alerts

**Query Manager:**

**What is in the Query Manager:**
1) Saved Queries can be viewed as they were originally saved (Show) or with the start date end date shifted so that the end date = today using the Show (Today) link.
2) If you choose multiple saved queries, you can create a Multi-Series Time Series Graph.

**myAlerts**

**What is in myAlert:**
1) The most current alert
2) You can subscribe your alerts
3) You may not see anything now because there is no alert
Manage myESSENCE

What can you do here:
1) Manage all of your queries by adding different tabs
2) Share tabs
3) Difference between myESSENCE, Query Manager, and myAlert

Report Manager (Walk Through Example)

What should I click to make these happen:
1) Save your query to ‘save to Report Manager’
2) Under Report manager, click ‘Available Reports’, and ‘View Sample Template’
3) You will see a word document opening

What should I click to make these happen:
1) ‘Right Click’ on the Figure session which you can add your charts
2) Select ‘Format Picture’
3) Select ‘Alt Text’
4) In the Alt Text section, replace the SI_Death Query with the name of the query you want embedded
5) Save this word document on your desktop for now

What should I click to make these happen:
1) Go back to Report Manager - > Available Report - > Find the report you want - > Click ‘Run’!!!
2) You Made it!!!
Training Objectives

- Other data sources
- National View
- Algorithms
- Stat Table
- Advanced Query
- CC and DD Query
- Other New Updates
  1) Weather station data
  2) CCDD
  3) CCDD Category
     - Heroin
     - Mumps
     - Record of interest

NSSP ESSENCE Home
**Alert List - Summary Alert**

### How to interpret stars:
- **Top row:** alerts from the Region / Syndrome Temporal Alerts page
- **Bottom row:** concern levels discussed by users in the Event List
- **Gray stars:** there were either not enough or none strong enough to create a Summary Level alert

### Alert List - Region/Syndrome Alerts

#### Steps to check details:
- Every column can be sorted as you like
- Time series and data detail will display only when you have the access to their data
- Sort columns to find information you need
### Alert List-Hospital/Syndrome

**Temporal Alerts Summary**

<table>
<thead>
<tr>
<th>Alert Details</th>
<th>Hospital Name</th>
<th>Syndrome</th>
<th>Age</th>
<th>Sex</th>
<th>Syndrome Code</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert 1</td>
<td>Oxford Hospital</td>
<td>Syndrome A</td>
<td>35</td>
<td>M</td>
<td>SA0011</td>
<td>More details</td>
</tr>
<tr>
<td>Alert 2</td>
<td>Yale Hospital</td>
<td>Syndrome B</td>
<td>40</td>
<td>F</td>
<td>SB0022</td>
<td>Less details</td>
</tr>
</tbody>
</table>

**Steps to check details:**
- You will only see hospitals you have access to here.
- Check time series and data detail for more information.

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### Alert List-Zipcode/Syndrome Based Spatial Alerts

**Temporal Alerts Summary**

<table>
<thead>
<tr>
<th>Alert Details</th>
<th>Zipcode</th>
<th>Syndromes</th>
<th>Age</th>
<th>Sex</th>
<th>Syndrome Code</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert 1</td>
<td>12345</td>
<td>Syndrome A</td>
<td>30</td>
<td>M</td>
<td>SA0011</td>
<td>More details</td>
</tr>
<tr>
<td>Alert 2</td>
<td>56789</td>
<td>Syndrome B</td>
<td>40</td>
<td>F</td>
<td>SB0022</td>
<td>Less details</td>
</tr>
</tbody>
</table>

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**Last Updated:** May 25, 2017 10:59 AM
Alert List - Time of Arrival (ToA)

Event List

How to create an event and save your event:
1) Once you create an event, it will show up on the regional alert
2) You can choose one of many medical groups on the left side
3) Please define if this event is still open or not and also rank the alert status
Exercise-
ED visits related to motor vehicle crash

- July 01, 2016-Dec 10, 2016
- Use available data source and parameters to define your cases
- Pick hospitals and age groups
- Create Disease trend for your hospitals
- Download your time series chart
- Export the data detail table
- Create a pie chart or bar chart and export them as well
- Create an overlay: *alcohol and drunk*

Hint: search vehicle, injury, crash in chief complaint or other text field

Query Portal-National View

In the National View:
1) You can only see regional aggregated data and no data detail was returned
2) Data detail is limited
**Geography system**
1) Most regions are similar to the counties
2) But many patients have only zipcode but no county code
So ESSENCE aggregated zipcode to be the region. This is something need to know as the zipcode is not necessary alien with county
<table>
<thead>
<tr>
<th>Date</th>
<th>Query Portal-DoD</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/5/2017</td>
<td></td>
</tr>
</tbody>
</table>

### Query Portal-DoD

#### Data Source Definition
- **Parameters**
  - Date Range
  - Data Set
- **Available Data Fields**
  - Demographic
  - Geographic System
  - Facility
  - Performance
  - Health Region
  - Health System
  - Health Service
- **Data Source Options**
  - Remove Data Banners
  - Each Row as New Banner

#### Daily Data Counts
![Daily Data Counts Graph]

#### Daily Data Counts Details
- **Data Source Options**
  - Remove Data Banners
  - Each Row as New Banner

---

### Table

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6/5/2017</td>
<td>RASH 3 RASH APPEARS AS RED BLOTCHES DECREASES PAIN BUT IS ITCHY RASH ON RIGHT LEFT UPPER ARM LEFT FLANK</td>
</tr>
</tbody>
</table>
Query Portal-VA

Query Portal-Weather Station Data
Exercise- Asthma ED visits and the weather

- Sep01, 2016-Mar31, 2017
- Use subsyndromes to define asthma cases
- Overlay with minimum temperature from all Colorado weather stations

1) Are you interested in cases in your hospitals or patients who live in your jurisdiction?
2) Do you see more asthma related ED visits while temperature dropping?

**CCDD**

*How to search key words in free text fields (Chief Complaint, Triage Notes, Clinical Impression):*

1) Use bracket for a range or a possible number or letter:
   `^T40.1^`, `^T40.2^`, `^T40.1-2^`
   `^vomiting^`, `^vomiting^`

2) Use parenthesis for exclusion:
   `^andnot^`

3) Use parenthesis for 'and' function
   `^vomit^`, `^cough^`, `^and^`

4) Default operator
   `^vomit^`, `^fever^`

5) No space in between characters

6) Comma is everywhere!!

7) `^word^`: start with this phrase
   `^word$^`: exactly the same as the phrase
   `^fever^`: all fever

**Example:**

`^andnot^`, `^withdr^`, `^andnot^`, `^withdrawal^`, `^andnot^`, `^denies her[i][0][i][0]^`
CCDD Category

Search in Syndromes

**Difference between syndrome category and syndrome free text**

1. In the syndrome category, it only performs ‘OR’ function
2. There is no way to perform ‘and’ function in syndrome category
3. However, you can search ‘and’ in the syndrome free text search
4. `^,GI^,and^,fever,^`
What should I click to make these happen:

1) Tool Bar on the top -> Click “Overview Portal”
Exercise- Heat related syndrome and the weather

- June01, 2016-Aug10, 2016
- Data Source: Patient location
- Time Resolution: Daily
- Detector: Regression/EWMA/Poisson (Default)
- Use CCDD category or CCDD to define your cases: heat stroke/hot/T67/X30/and not W92
- Overlay maximum temperature data
- Patient Class=E
- Save this query and request the subscription of alert

Query Portal-Advanced Query

How to create an Advanced Query:
1) Choose the data source, time frame, and the algorithm
2) Create the query by selecting variable on the bottom
3) Click ‘and’ or ‘or’
4) Use (parenthesis) to group your query
Examples of AQT:
(Syndrome=GI and (Age0-4 or Age5-17)) or Syndrome=ILI

Why don’t we use AQT all the time?

Exercise-Marijuana in ED

- Please create this query in AQT
- June01, 2016-Aug10, 2016
- Data Source: Patient location
- Time Resolution: Daily
- Detector: Regression/EWMA/Poisson (Defult)
- Patient class=E
- Chief complaint inclusion: marijuana, mj, THC, edible, pot, cannabis, weed
- Chief complaint exclusion: mamba, denies marijuana, synthetic, spice
- Triage notes inclusion: marijuana, mj, THC, edible, pot, cannabis, weed
- Triage notes exclusion: mamba, denies marijuana, synthetic, spice
- Discharge diagnosis code inclusion: T40.7, F12.1, F12.2, F12.9
Algorithms-Overview

- Major Types of Algorithms in ESSENCE include:
  - Temporal:
    1) Linear Regression
    2) Exponential Weighted Moving Average (EWMA)
    3) Regression/EWMA/Poisson Switch
    4) Classical EARS C1/C2/C3
  - Spatial
  - Time of Arrival
  - Summary
    - Non-syndromic term-based alerting
    - Fusion of multiple evidence types

Source: JohnsHopkins APL
## Algorithms-Overview

<table>
<thead>
<tr>
<th>Algorithm</th>
<th>Purposes</th>
<th>Benefits</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear Regression</td>
<td>Remove the systematic behavior often seen in time series</td>
<td>Good for the seasonality and holidays</td>
<td>Not good for NOT seasonal behavior. Data quality needs to be very good.</td>
</tr>
<tr>
<td>Exponential Weighted Moving Average (EWMA)</td>
<td>More applicable for ED data from certain hospital groups and for time series with small counts</td>
<td>More commonly applied to rare syndromes</td>
<td>This algorithm applied to pure daily counts does not control for expected trends</td>
</tr>
<tr>
<td>Regression/EWMA/Poisson (Default)</td>
<td>You got everything covered!!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CDC EARS C1/C2/C3</td>
<td>Detect data aberrations</td>
<td>Simple and was widely used</td>
<td>Not always working well and not good for seasonal or holidays</td>
</tr>
<tr>
<td>Time of Arrival</td>
<td>Find unusual clusters related to ED visits by patients’ arrival time</td>
<td>Good for food poisoning</td>
<td>CDC doesn’t really use this method and this information is not available in NSSP CO-NCR</td>
</tr>
</tbody>
</table>

Source: JohnsHopkins APL

### Chief Complaint

- **Single word**
  - Chief Complaints
- **Short phrase**
  - Abbreviation
  - Detail information
  - Time of Arrival
  - Misspellings
  - Other Languages
- **Negation**
Chief Complaint Processor

**Chief Complaint**
- Vomiting
- NVD

**Syndrome(s)**
- GI

**Sub-Syndrome(s)**
- NVD, Vomiting
- NVD, Diarrhea, Nausea, Vomiting
- NVD, Vomiting

**Question**

Please contact **Yushiuan Chen** for any question:

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