# Electronic Health Information Exchange of Laboratory Data:
# An Epidemiologist's Perspective

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# **Disclaimers**

- No conflicts of interest to report

- Not a laboratorian

- Not an informatics expert

- Practical, applied epidemiologist

- Pediatrician

# **Objectives**

Using examples, discuss…

1) Pros and cons of the electronic exchange of lab data in public health

2) How electronic lab data exchange systems are used in Kentucky to benefit public health--- and the successes and challenges associated with some of those systems

# **Advantages of Electronic Health Data Exchange in Public Health**

- Speed

- Efficiency

- Accuracy

- Better access to more and bigger data sets

- Easier linkages between data sets

# **Disadvantages of Electronic Health Data Exchange in Public Health**

- Impersonal
- Often expensive, especially up-front system development costs
- Requires new skill set for public health professionals, e.g., IT vendor management
- Data "thinking" sometimes gets lost in data "mining"
- Questions of data sharing and ownership can become more complex

# Cultural Adaptation in PH & IT

- Change in attitudes and processes
- Human "connectors" between PH & IT; between laboratory, epidemiology, and environmental health--- can be helpful
- Speaking in a common language
- Understanding what each can bring to the table

- In investigations →

To identify cause of illnesses or threats, mitigate exposure, and prevent spread of illnesses

- In decision and policy making →

To determine trends and help answer big-picture population health questions

# Investigation example: Multi-State Salmonellosis Outbreak

- Salmonella is a genus of bacterium that causes disease in humans
- Gastrointestinal illness
- Typhoid fever
- Illness typically associated with eating raw or undercooked food
- Symptoms appear 12-72 hours after ingestion of a large dose (inoculum)
- Diarrhea, fever, abdominal cramps lasting 4-7 days

# Reported Salmonellosis Cases* in Kentucky 2008-2012
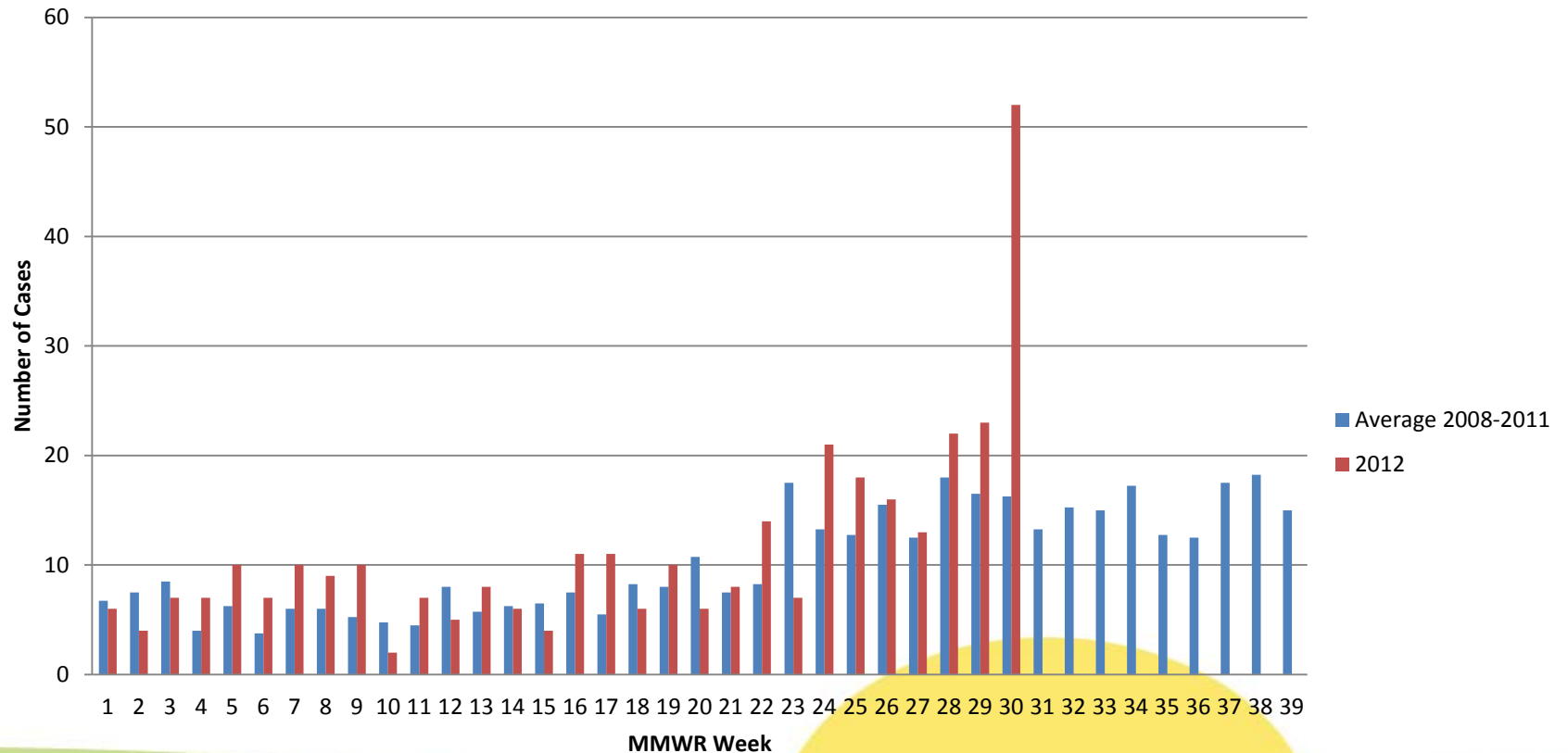
* Includes 2012 confirmed and non-confirmed cases

# Initial Investigation

– Regional increase in cases

– Anecdotally

- Common grocery store chains
- More cantaloupe consumption than expected

– Actions

- Spread awareness of possible salmonellosis outbreak
- Division of Laboratory Services prioritized Salmonella testing

# Laboratory Bacterial Testing

Increasing Detail

| | | |
|---|---|---|
| Species | Hospital/ Contract Lab | Salmonella enterica |
| Group | Hospital/ Contract Lab OR State Lab | Group B |
| Serotype | State Lab | Typhimurium |
| PFGE Pattern | State Lab | JPXX01.0324 |

# National Case Count
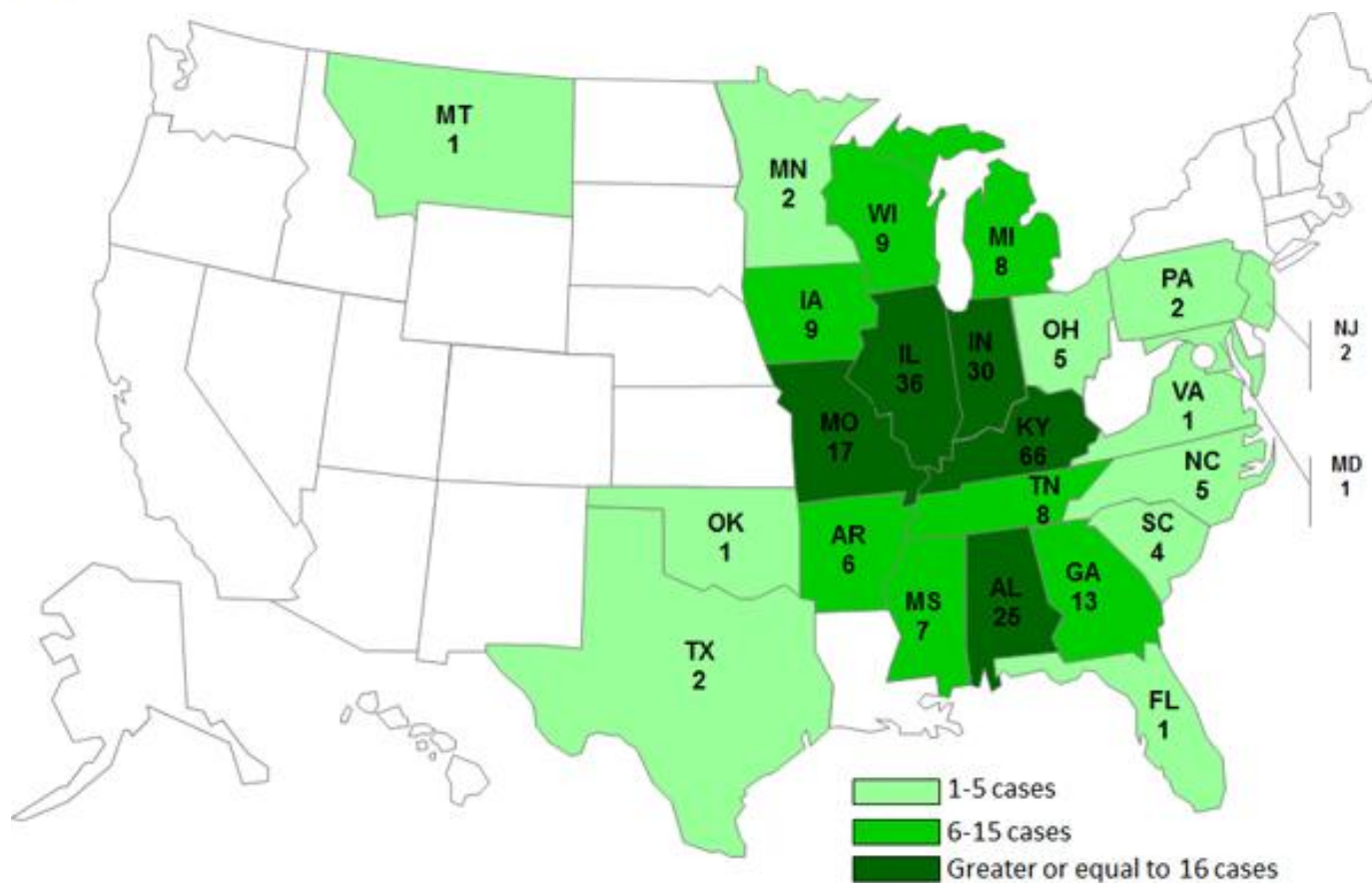
- 70 Cases of Salmonellosis Matching the Outbreak Strain
  - Three died
  - Average Age: 48 years
  - 73% Female
  - 75% Hospitalized

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# Cantaloupe Traceback Investigation

| Reported Grocery Stores | Pattern | |
|---|---|---|
| | Back-ground | 0324 |
| Grocery Chain 1 | 7 | 5 |
| Grocery Chain 2 | 6 | 4 |
| Other | 21 | 1 |
| Total | 34 | 10 |

- Grocery Chains 1 and 2
  - Reported by 9 of 10 patients with the outbreak pattern
    - 90%

  - Reported by 11 of 30 patients with background patterns
    - 37%

  - $\chi^2$ p < 0.01 for outbreak cases to shop at Chains 1/2 vs 'Other'

# Cantaloupe Traceback

- Identified single supplier for stores- Farm A
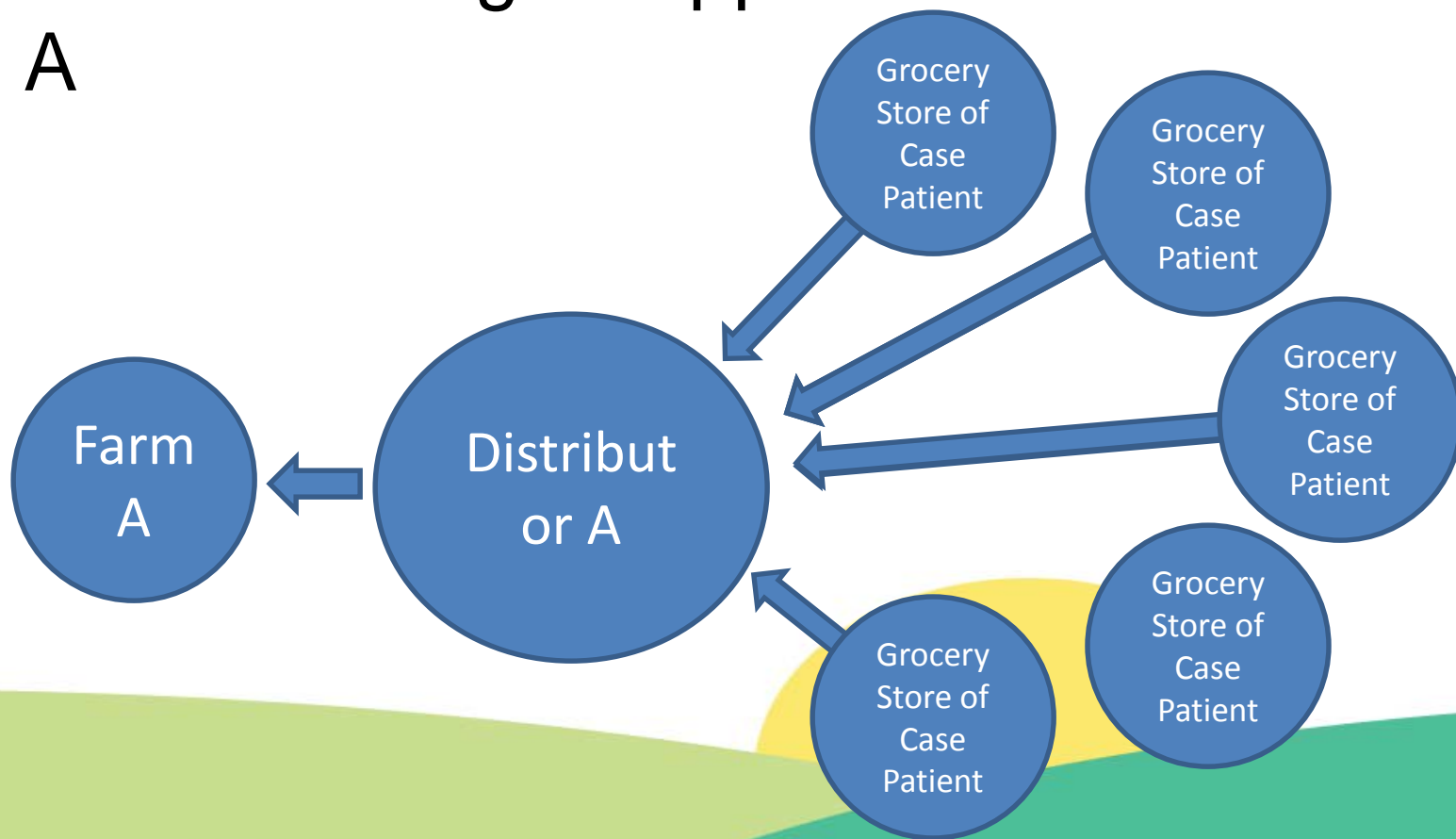
- National Electronic Disease Surveillance System
  - System provides info for developing line lists and epi curves
  - Large reference lab and some hospitals have automatic feeds into the system for electronic reporting of positive results
  - Smaller hospital labs and providers--- except for health departments--- do not
  - System is not designed to link cases or serve as outbreak management system

# Electronic Data Exchange: PulseNet

- PulseNet
  - Outbreak of Salmonella: 3 or more isolates with matching PFGE patterns or 2x baseline for common PFGE patterns
  - Images sent to CDC electronically
  - CDC assigns ID to isolate pattern
  - Plusses: Helps epidemiologists recognize connections between cases before "shoe leather" epidemiology might; more outbreaks recognized
  - Challenges: more outbreaks recognized, even some with no obvious link except a genetic

# **Population Health Examples**

- Using electronic data exchange to improve traditionally poor health outcomes, by establishing baselines and trends

- Health and wellness prioritized by the governor

- Under ACA, Medicaid was expanded and the state's own health benefit exchange, called kynect, created

- 640,000 estimated uninsured Kentuckians.

- By April, 413,410 (over 10% of the pop'n) enrolled through kynect; 75% reported not having health insurance prior to enrolling

# kyhealthnow  2019 Goals

- Reduce Kentucky's rate of uninsured individuals to less than 5%.
- Reduce Kentucky's smoking rate by 10%.
- Reduce the rate of obesity among Kentuckians by 10%.
- Reduce Kentucky cancer deaths by 10%.
- Reduce cardiovascular deaths by 10%.
- Reduce the percentage of children with untreated dental decay by 25% and increase adult dental visits by 10%.
- Reduce deaths from drug overdose by 25% and reduce by 25% the average number of poor mental health days of Kentuckians.

*http://governor.ky.gov/healthierky/kyhealthnow*

## Statewide Health Information Exchange

- Core components of the KHIE include: a master patient/person index; record locator service; security; provider/user authentication; logging and audits; clinical messages and alerts. The system includes patient demographics, lab results, radiology and transcription reports, historical patient diagnoses, medications, procedures, dates of services, hospital stays, reporting to the state immunization and cancer registries, reporting of **syndromic surveillance data and reportable labs/diseases**.  KHIE also offers a community record (virtual health record) for care coordination.

- First pilot hospital was connected in April 2010

- Statewide implementation began in January 2011

# Kentucky Health Information Exchange

## Participants

- 560 Signed Participation Agreements (Represents 1,875 Locations)
- As of April 7, 2014 KHIE had a total of 796 provider locations submitting live data and actively exchanging information. 80% of the hospitals are live on KHIE. (See map below)

# KHIE Successes & Challenges

- Successes
  - Meaningful use incentives have encouraged widespread participation
  - Interoperability with immunization registry and state lab's information management system

- Challenges
  - Patient-centric approach: great for clinical data access, but more difficult for population health data access
  - Trending; data are not static

# KY-CHILD

**K**entucky **C**ertificate of Birth, **H**earing, **I**mmunization and **L**ab **D**ata

- a Web-based application that allows patient demographics to be stored in a central database and shared among Kentucky's health and human services programs: electronic collection and submission of data related to certificates of live and still births, newborn vaccinations, and newborn metabolic and hearing screenings… and coming soon… neonatal abstinence reporting

# KY-CHILD Successes & Challenges

- Successes

  - Linkage of lab reports (newborn screening and microbiology) and IR records in the KY-CHILD system/Master database and then fed to KHIE

- Challenges

  – Reconciliation of many un-named baby records, including newborn screening and immunization data, after transfer from KY-CHILD to KHIE

  – Complexities related to ownership and data sharing rules and policies

# Summary

- Electronic data exchanges are valuable tool for public health professionals.

- To use the new tools, Public Health must adapt and communicate more effectively with Information Technology.

- New solutions for sharing health information electronically bring some new challenges.