



Using Public Health-Focused EHR Decision Support in Primary Care Settings

ISDS Webinar Series:

Usage of Surveillance Information to Assist Clinical
Decision-Making

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NYC Department of Health & Mental Hygiene

January 29, 2013

Agenda

Current state of public health alerting

Integrating alerts into workflows via EHRs

Analysis of public health CDS integration

Discussion

Current state of public health alerting - Need

- Public health with numerous opportunities to guide clinical care:
 - Surveillance
 - Communicable diseases
 - Environmental risks
 - Treatment guidelines
 - Management of communicable disease
 - Vaccinations
 - Medication/vaccine recalls
 - Chronic disease
 - Incidence/prevalence data for communities



Current state of public health alerting - Challenge

- Existing mechanisms of information exchange
 - Health Alert Network
 - Fax
 - Email/Web
 - Literature
 - Mass media
- Primary Limitation - Not integrated into clinical workflow
- Provider must then be able to:
 - Integrate details of message
 - Apply message when clinically relevant
 - Recall specifics of message and act



THE CITY OF NEW YORK
DEPARTMENT OF HEALTH AND MENTAL HYGIENE

Michael R. Bloomberg
Mayor

Thomas R. Frieden, M.D., M.P.H.
Commissioner

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2007 Alert #29:

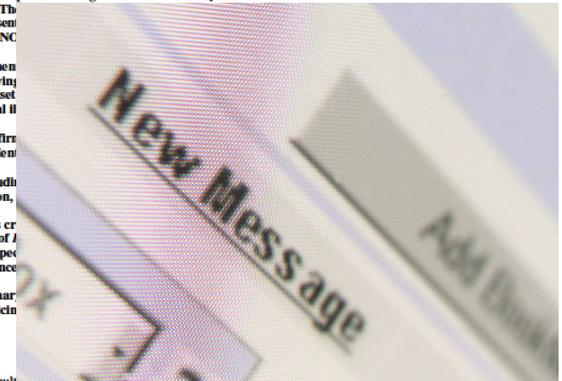
Multi-state *E. coli* O157:H7 outbreak associated with eating contaminated ground beef in counties surrounding New York City

- Federal, state, and local health agencies are investigating a multi-state outbreak of 25 cases of *E. coli* O157:H7 infection in eight states linked to eating Topps 100% Ground Beef Hamburgers. No confirmed cases associated with this outbreak have been reported among New York City residents as of September 28, 2007.
- DOHMH would like to remind healthcare providers that they must specifically request testing for Shiga toxin producing *E. coli* (STEC) in patients being evaluated for bloody diarrhea or hemolytic uremic syndrome (HUS). The sorbitol-MacConkey (SMAC) agar. Specimens sent without a specific request for *E. coli* O157:H7 testing may not be tested.
- DOHMH is requesting that Emergency Department physicians consider Shiga toxin producing *E. coli* (STEC) in the differential diagnosis for patients presenting with bloody diarrhea, diarrhea with fever, hemolytic uremic syndrome (HUS) or bloody diarrhea and a history of having Hamburgers in the 10 days prior to symptom onset their routine policy to test patients with diarrheal illness.
- Please immediately report all suspected and confirmed cases to the New York City Department of Health and Mental Hygiene.
- Send suspect and culture confirmed STEC (including STEC O157:H7) for confirmation, electrophoresis (PFGE).
 - Timely submission of STEC specimens is critical for the investigation of potential outbreaks of STEC.
 - Laboratories should send original stool specimens for STEC testing, even in the absence of a STEC O157:H7 positive result.

Please Distribute to All Clinical Staff in Pediatrics, Primary Care, Family Medicine, Laboratory Medicine

September 28, 2007
Dear Colleagues,

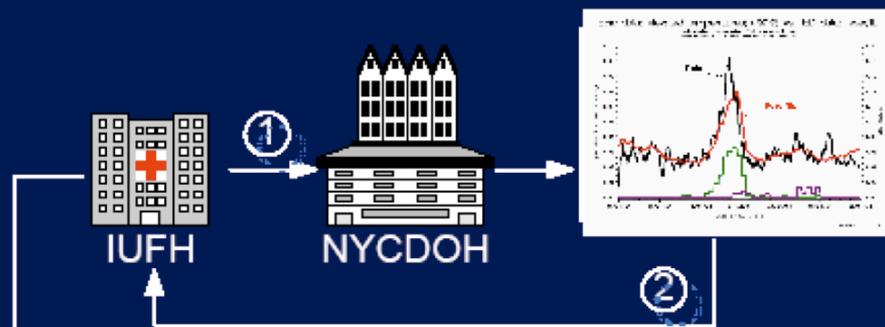
Federal, state, and local health agencies are investigating a multi-state outbreak of 25 cases in eight states linked to eating Topps 100% Ground Beef Hamburgers. No confirmed cases associated with this outbreak have been reported among New York City residents as of September 28, 2007. DOHMH receives an average of 25 *E. coli* O157:H7 case reports per year. DOHMH wishes to remind physicians to consider Shiga toxin producing *E. coli* (STEC) in the differential diagnosis for patients presenting with bloody diarrhea, diarrhea with fever, hemolytic uremic syndrome (HUS) or bloody diarrhea and a history of having Hamburgers in the 10 days prior to symptom onset.



Current state of public health alerting

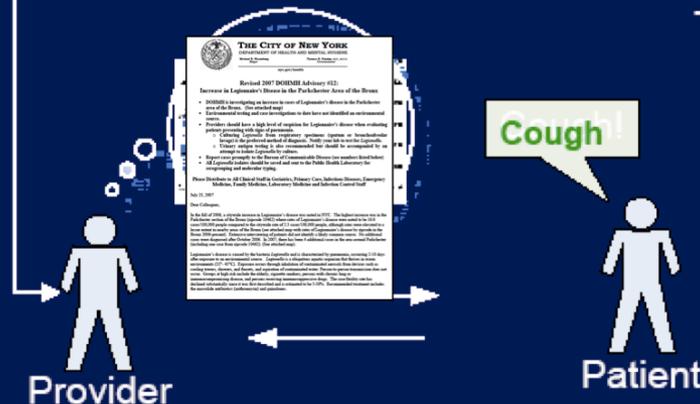


Step 1: EHR institution to public health agency – clinical encounters



Based on received disease reports, DOH sends alert to community re: increase number of Legionella cases in Parkchester section of Bronx

Step 2: Public health agency to EHR institution - epidemiologic awareness



Provider reads alert, typically outside of normal workflow, and must be able to recall content of alert in order to apply to the encounter

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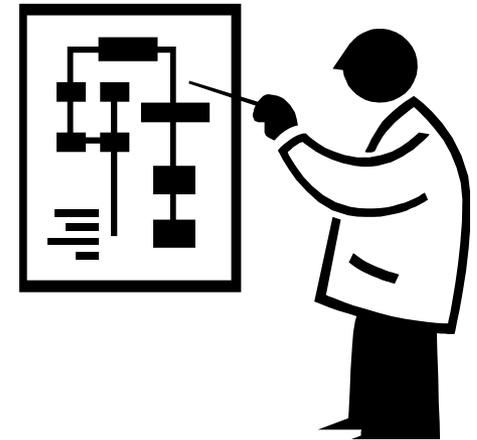
Integrating alerts into workflows via EHRs

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Integrating alerts into workflows via EHRs

- EHRs can facilitate integration of public health information
 - Alerts provide reminders when relevant
 - Associate with order sets to **facilitate**
 - Diagnosis
 - Treatment
 - Education
 - Coding
- Considerations for effective alert integration
 - Customizable alert functionality
 - Feasibility of defining alert using common EHR fields
 - Understanding of clinical workflows
 - Maximizing alert sensitivity/specificity



Integrating alerts into workflows via EHRs

- Public health CDSS alerting in NYC
 - Original funding: CDC Center of Excellence in Public Health Informatics
 - Implemented at Institute for Family Health
 - Network of CHCs in New York City
 - Implemented Epic EHR system in 2002
 - Several public health alerts implemented for outbreaks communicated by HAN
 - Three alerts for bacterial foodborne disease outbreaks communicated by DOHMH in 2006-2007
 - Salmonella (6/28/07) – puffed grain snack
 - E. coli O157:H7 (9/28/07) – ground beef patties
 - Salmonella (6/10/08) – fresh tomatoes



Integrating alerts into workflows via EHRs

- Alert triggering criteria
 - Chief complaint: “diarrhea” or “stomach ache”
 - ICD-9 encounter diagnosis: gastroenteritis, diarrhea, melena/bloody stool
- Order set association
 - Stool diagnostic tests (as requested by DOHMH)
 - Recommendation for supportive management (if *E. coli* O157:H7 suspected)
 - Patient education materials
 - Coding



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- DOHMH would like to remind healthcare providers that they must specifically request testing for Shiga toxin producing *E. coli* (STEC) in patients being evaluated for bloody diarrhea or hemolytic uremic syndrome (HUS). The medium of choice for isolation is sorbitol-MacConkey (SMAC) agar. Specimens sent for culture and sensitivity without a specific request for *E. coli* O157:H7 testing may NOT be tested for *E. coli* O157:H7.
- DOHMH is requesting that Emergency Departments and other providers test patients with diarrhea or bloody diarrhea and a history of having eaten ANY Topps brand Ground Beef Hamburgers in the 10 days prior to symptom onset for *E. coli* O157:H7 even if it is not their routine policy to test patients with diarrheal illness.
- Please immediately report all suspected and confirmed cases of STEC infection or HUS to the New York City Department of Health and Mental Hygiene (DOHMH).
- Send suspect and culture confirmed STEC (including *E. coli* O157:H7) isolates to the Public Health Laboratory (PHL) for confirmation, serotyping, and pulsed-field gel electrophoresis (PFGE).
 - Timely submission of STEC specimens is crucial to facilitate prompt recognition and investigation of potential outbreaks of *E. coli* O157:H7.
 - Laboratories should send original stool specimens (or broths) to PHL when patient are Shiga toxin positive, even in the absence of culture confirmation.

Please Distribute to All Clinical Staff in Pediatrics, Primary Care, Infectious Diseases, Emergency Medicine, Family Medicine, Laboratory Medicine and Infection Control Staff

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Federal, state, and local health agencies are investigating a multi-state outbreak of 25 *E. coli* O157:H7 cases in eight states linked to eating Topps 100% Ground Beef Hamburgers. No confirmed cases associated with this outbreak have been reported among New York City residents as of September 28, 2007. DOHMH receives an average of 25 *E. coli* O157:H7 case reports per year. DOHMH wishes to remind physicians to consider Shiga toxin producing *E. coli* (STEC) in the differential diagnosis for patients presenting with bloody diarrhea, diarrhea with fever, hemolytic uremic syndrome (HUS) or

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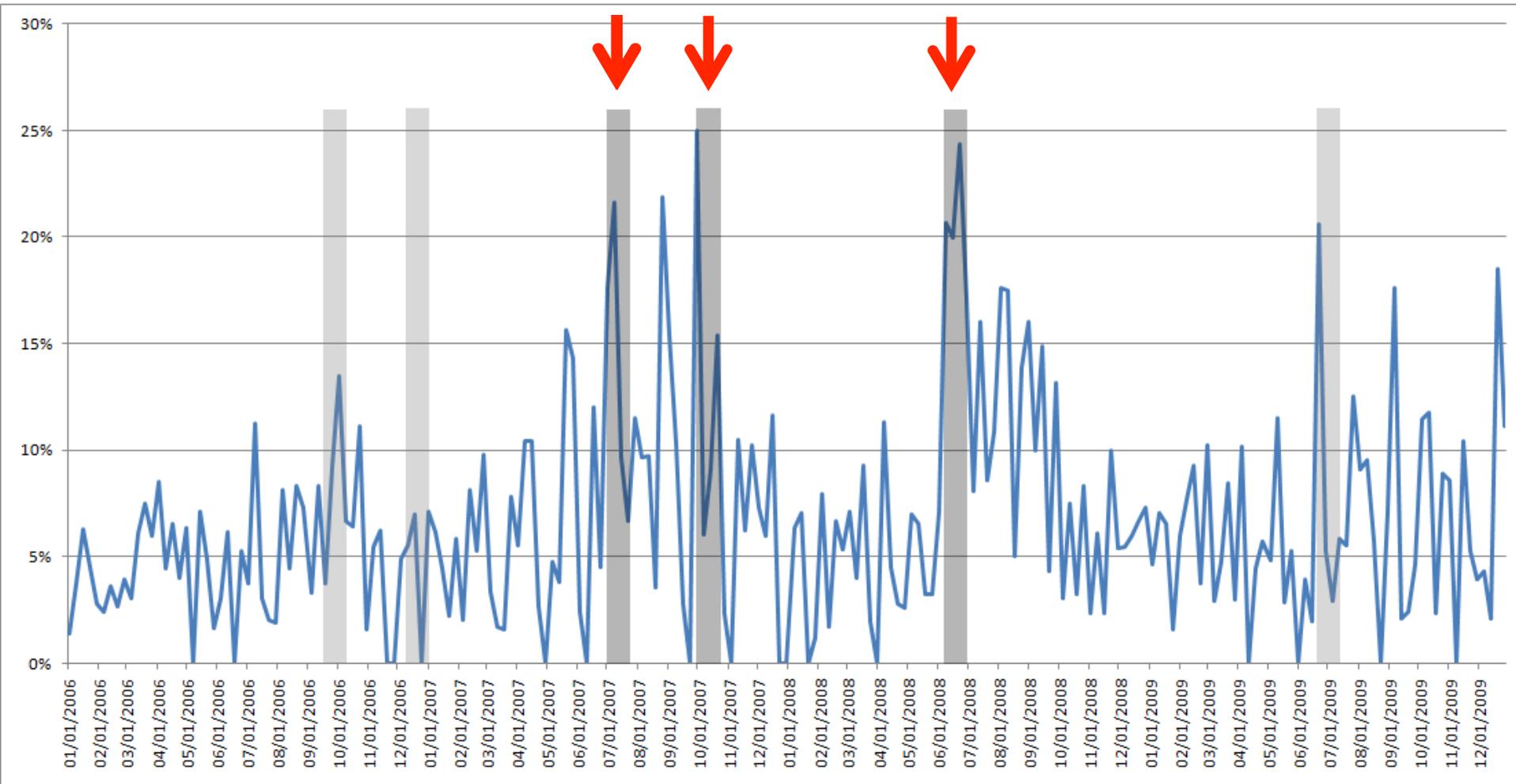
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Analysis public health CDS integration

- Objective: Measure the effect of public health alerting on diagnostic testing for GI-related outpatient encounters
- Methods:
 - Examined diagnostic testing for all GI-related outpatient encounters at the Institute for Family Health from 2006 through 2009
 - GI-related encounters defined by alert criteria (earlier)
 - Identified encounters temporally associated with foodborne disease outbreaks communicated through HAN (6 total), and the subset where CDS alert was developed (3)
 - Diagnostic testing defined as order for stool culture or Shiga toxin assay
 - Developed logistic regression model for diagnostic testing
 - Outcome – presence of diagnostic testing
 - Predictors – temporal association with foodborne disease outbreak, presence of CDS alert, season of year)

Analysis public health CDS integration



Analysis public health CDS integration

Initial Date	Disease Agent	Baseline	4-week post outbreak
9/15/2006	<i>E. Coli</i> O157:H7	153/3231 (4.7%)	22/228 (7.6%)
12/12/2006	<i>E. Coli</i> O157:H7	171/3410 (5.0%)	9/172 (5.2%)
6/28/2007	<i>Salmonella</i>	134/1896 (7.1%)	17/132 (12.9%)
9/28/2007	<i>E. Coli</i> O157:H7	130/1887 (6.9%)	21/141 (14.9%)
6/10/2008	<i>Salmonella</i>	145/2180 (6.7%)	31/147 (21.1%)
6/22/2009	<i>E. Coli</i> O157:H7	131/2251 (5.8%)	12/140 (8.6%)

Logistic Regression Model

CDS alert – OR=2.26 (95% CI 1.50-3.42)

HAN alert – OR=1.16 (95% CI 0.84-1.62)

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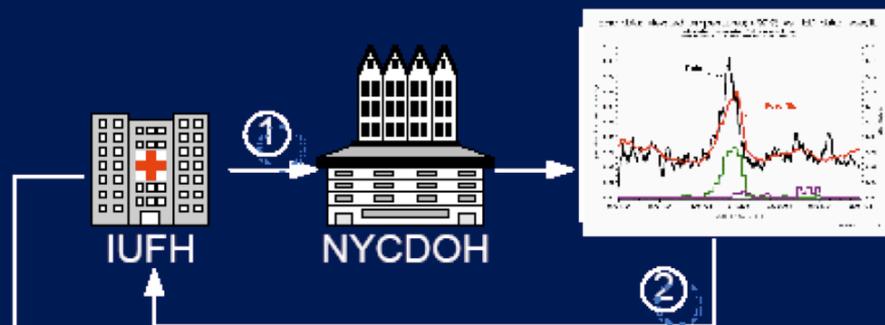
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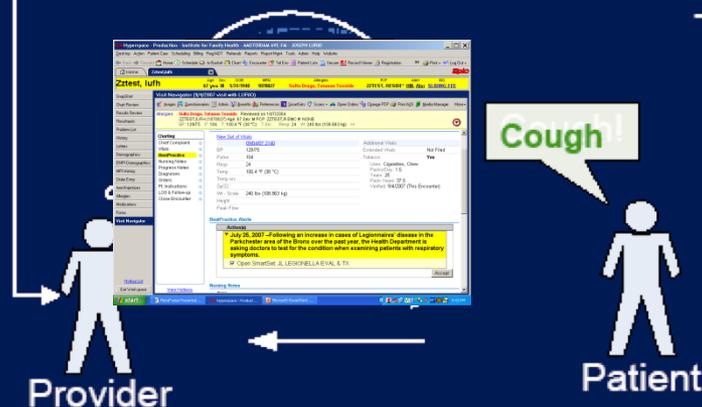


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Discussion

- Public health CDS - Value to clinical care and public health
 - Surveillance
 - Increase diagnostic testing in early outbreaks (Hennessy et al CID 2004)
 - Adverse drug events (Hinrichsen et al JAMIA 2007)
 - Treatment guidance
 - Appropriate antibiotic use in acute respiratory illness
 - Incorporating public health surveillance in decision making (Fine et al Ann Int Med 2011)
 - Disease epidemiology (chronic and communicable)
 - Incidence/prevalence in communities
 - Identification of emerging risk factors

Discussion

- Considerations for future implementation
 - Identify and collaborate with public health-minded outpatient providers on EHR
 - Ability to develop CDS in system
 - Balancing potential value with recognition of primary clinical function
 - Understanding clinical workflows
 - Maximizing specificity and sensitivity -- ‘alert fatigue’
 - When utilizing alerts – make actionable when feasible

Acknowledgments

- CDC (P01 HK000029)
- Study collaborators
 - Institute for Family Health (Joseph Lurio, MD; Michelle Pichardo, MPH; Rachel Berg, BA; Kwame Kitson, MD; Neil Calman, MD)
 - Columbia University (George Hripcsak, MD; Frances Morrison, MD)
 - DOHMH (Michael Buck, PhD; Farzad Mostashari, MD)