

Infectious Disease Update

**Satellite Conference and Live Webcast
Wednesday, April 17, 2013
9:00 – 10:30 a.m. Central Time**

**Produced by the Alabama Department of Public Health
Video Communications and Distance Learning Division**

Faculty

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Objectives

- **Identify the role of the health care and lay communities in outbreak investigations**
- **Describe the standard disease control precautions**
- **Name two outbreak investigations conducted by ADPH staff**

Objectives

- **Recognize the most accurate diagnosis, testing, treatment, and reporting of notifiable diseases**
- **Locate basic disease information and proper test methods at the ADPH website: www.adph.org/epi**

Objectives

- **Determine what diseases need to be reported, how they can be reported, and timeframes for reporting**
- **Identify notifiable disease reporters**

Infection Control Update 2013

OSHA Required Information

Standard Precautions

- **Hand washing – when to perform:**
 - After touching blood, body fluids, or contaminated items, whether or not gloves are worn
 - After gloves are removed, between patient contacts, and if necessary, when performing procedures on the same patient to prevent cross contamination

Standard Precautions

- **Hand sanitizers:**
 - May use if hands not visibly soiled
 - Not as drying as soap and water
 - Works better than soap and water at killing organisms
 - Use as directed on the product
 - Must be at least 60% alcohol

Standard Precautions

- **Gloves**
 - Wear when touching blood, body fluids, secretions, excretions, and contaminated items
 - Change between tasks and procedures on the same patient and after contact with materials that may contain a high concentration of microorganisms

Standard Precautions

- **Face protection**
 - Wear mask and eye protection, or face shield to protect mucous membranes of the eyes, nose, and mouth during procedures and patient-care activities that are likely to generate splashes or sprays of blood, body fluids, secretions, and excretions

Standard Precautions

- **Gown**
 - Wear during procedures and patient-care activities that are likely to generate splashes of blood, body fluids, secretions, or excretions or cause soiling of clothing

Standard Precautions

- Remove soiled gown as promptly as possible and wash hands to avoid transfer of microorganisms

Disinfection

- Describes a process that eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects
 - i.e., stethoscopes and exam tables
- Disinfectant ends with the suffix **cide** or **cidal** for killing action of the product

Disinfection

- Virucide, fungicide, bactericide, sporicide, and tuberculocide can kill the type of microorganism identified by the prefix

- http://www.cdc.gov/hicpac/Disinfection_Sterilization/6_0disinfection.html

Disinfection in Ambulatory Care

- Adequate disinfection to provide safe patient environment
- Risk the same as the hospital, the Spaulding classification scheme should be followed

Disinfection in Ambulatory Care

- Identify situations and areas where risk exists for transmission of pathogens to identify when disinfection is appropriate

- http://www.cdc.gov/hicpac/disinfection_sterilization/3_3inactivbioagents.html

CDC Guidelines for Disinfection in Healthcare Facilities, 2008

Object	Procedure (exposure time ≥ 1 m) °
Smooth, hard Surface ^{1,4}	K
	L
	M
	N
	O

K, Ethyl or isopropyl alcohol (70-90%)
 L, Sodium hypochlorite (5.25 G 15% household bleach diluted 1:500 provides >100 ppm available chlorine)
 M, Phenolic germicidal detergent solution (follow product label for use-dilution)
 N, Iodophor germicidal detergent solution (follow product label for use-dilution)
 O, Quaternary ammonium germicidal detergent solution (follow product label for use-dilution)
http://www.cdc.gov/hicpac/Disinfection_Sterilization/table_1.html

Human Immunodeficiency Virus (HIV)

- Retrovirus that attacks the immune system, resulting in impairment of the T-cell mediated immunity
- Loss of function of the T-cells results in the shut down of the immune system and causes patients to have opportunistic infections

Human Immunodeficiency Virus (HIV)

- This leads to the Acquired Immune Deficiency Syndrome (AIDS)

Hepatitis B and C

- Blood and body fluids transmission
 - Sex with an infected person
 - Sharing needles
 - Occupational needlesticks or sharps exposures
 - From infected mother to baby during birth

Hepatitis B and C

- There is a vaccine to prevent Hepatitis B
 - The vaccine is a yeast product (not blood) and is considered to be 96% effective

Hepatitis B and C

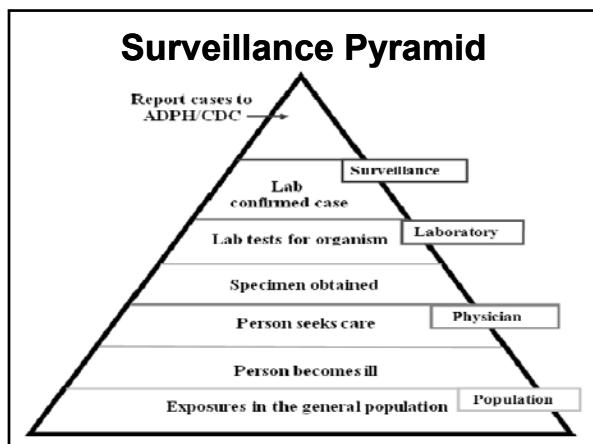
- There is no vaccine for Hepatitis C
 - There are some anti-viral medications available for treatment of some Hepatitis C patients, but treatment is usually only effective in 10 – 40% of those treated

Overview

- Outbreaks
- ADPH Programs
- Notifiable Disease Rules
- DETECT
- TEST
- REPORT

Epidemiology Mission Statement

- To protect the residents of Alabama through constant monitoring of the incidence and prevalence of communicable, zoonotic, and environmentally-related human disease



Outbreaks

- An outbreak is defined as illness in 2 or more people, from separate households, with a common exposure

Outbreaks

- ADPH Bureaus involved in outbreak investigation:
 - Bureau of Communicable Diseases (BCD)
 - Bureau of Clinical Laboratories (BCL)
 - Bureau of Environmental Health (BES)

2011 Outbreaks

- *Serratia marcescens*
- *Escherichia coli (E. coli)*, Shiga-toxin producing (*STEC*)
- *Salmonella*
- Norovirus

Bureau of Communicable Diseases

- Epidemiology
- HIV/AIDS
- Immunization
- Sexually-transmitted Diseases
- Tuberculosis

BCL Locations and Branches

- Montgomery
 - Clinical Chemistry
 - Metabolic
 - Microbiology
 - Respiratory
 - Sanitary Bacteriology/Media
 - Serology

BCL Locations and Branches

- **Mobile**
 - **Clinical**
 - **Environmental**

www.adph.org/bcl

Bureau of Environmental Services (BES)

- **Community Environmental Protection**
 - **Soil and Onsite Sewage**
 - **Indoor Air Quality and Lead**
 - **Solid Waste**

Bureau of Environmental Services (BES)

- **Food, Milk, and Lodging**
 - **Food and Lodging**
 - **Seafood and Shellfish**
 - **Milk**
 - **Quality Assurance**

www.adph.org/environmental

Epidemiology Division Branches

- **Analysis and Reporting**
 - **Infection Control**
 - **Healthcare-associated Infections***
 - **Infected Healthcare Workers Program***
- * Call 1 – 800 – 338 – 8374 and ask for Infection Control

Epidemiology Division Branches

- **Surveillance**
- **Toxicology**
- **Zoonotic**

Notifiable Diseases / Conditions

- **Purpose of Notifiable Diseases**
- **ADPH administrative code authorizes and requires reporting**
 - <http://www.alabamaadministrativecode.state.al.us/docs/hlth/index.html>

**Notifiable
Diseases / Conditions**

- **ADPH is exempt from HIPAA Privacy Rules**
– <http://www.cdc.gov/mmwr/pdf/other/m2e411.pdf>

Who Must Report

- **Physicians**
- **Dentists**
- **Nurses**
- **Medical Examiners**
- **Hospital Administrators**
- **Nursing Home Administrators**

Who Must Report

- **Laboratory Directors**
- **School Principals**
- **Day Care Center Directors**

Minimum Data Elements

- **Name disease or health condition**
- **Patient name**
- **Patient DOB**
- **Patient gender**
- **Patient address**
- **Patient phone number**

Minimum Data Elements

- **Date of onset, date of lab results, and / or date of diagnosis**
- **Reporter's name**
- **Reporter's phone number**

HIPAA

- **ADPH is a public health authority as defined by the Health Insurance Portability and Accountability Act (HIPAA) to collect or receive protected health information (PHI) for the purpose of surveillance, investigations, and interventions of notifiable diseases, without authorization of the patient**
<http://www.cdc.gov/mmwr/preview/mmwrhtml/m2e411a1.htm>

Notifiable Disease / Condition Awareness Campaign

- **DETECT**
 - Decrease Epidemiological Threats with Environmental Controls and Testing
- **TEST**
 - Take Epidemiological Specimens Today

Notifiable Disease / Condition Awareness Campaign

- **REPORT**
 - Rules for Every Provider and Organization to Report on Time

Immediate, Extremely Urgent

- Report to the State Health Department by phone or in person within four hours of diagnosis:
 - Anthrax
 - Botulism
 - Plague
 - Poliomyelitis paralytic

Immediate, Extremely Urgent

- Severe Acute Respiratory Syndrome – associated Coronavirus (SARS-CoV)
- Smallpox
- Tularemia
- Viral Hemorrhagic Fever

Immediate, Extremely Urgent

- Cases related to nuclear, biological, or chemical terroristic agents*

* Select agents:

<http://www.selectagents.gov/Select%20Agents%20and%20Toxins%20List.html>

Select Agents and Toxins

- **HHS Select Agents and Toxins**
 - Abrin
 - Botulinum neurotoxins
 - Botulinum neurotoxin producing species of Clostridium

Select Agents and Toxins

- Cercopithecine herpesvirus 1 (Herpes B virus)
- Clostridium perfringens epsilon toxin
- Coccidioides posadasii/Coccidioides immitis
- Conotoxins

Select Agents and Toxins

- Coxiella burnetii
- Crimean-Congo haemorrhagic fever virus
- Diacetoxyscirpenol
- Eastern Equine Encephalitis virus
- Ebola virus
- Francisella tularensis

Select Agents and Toxins

- Lassa fever virus
- Marburg virus
- Monkeypox virus
- Reconstructed replication competent forms of the 1918 pandemic influenza virus containing any portion of the coding regions of all eight gene segments (reconstructed 1918 influenza virus)

Select Agents and Toxins

- Ricin
- Rickettsia prowazekii
- Rickettsia rickettsii
- Saxitoxin
- Shiga-like ribosome inactivating proteins
- Shigatoxin

Select Agents and Toxins

- South American Hemorrhagic Fever viruses
 - Flexal
 - Guanarito
 - Junin
 - Machupo
 - Sabia

Select Agents and Toxins

- Staphylococcal enterotoxins
- T-2 toxin
- Tetrodotoxin
- Tick-borne encephalitis complex (flavi) viruses
 - Central European Tick-borne encephalitis

Select Agents and Toxins

- Far Eastern Tick-borne encephalitis
- Kyasanur Forest disease
- Omsk Hemorrhagic Fever
- Russian Spring and Summer encephalitis

Select Agents and Toxins

- Variola major virus (Smallpox virus)
- Variola minor virus (Alastrim)
- Yersinia pestis

Select Agents and Toxins

- Overlap Select Agents and Toxins
 - Bacillus anthracis
 - Brucella abortus
 - Brucella melitensis
 - Brucella suis
 - Burkholderia mallei
 - Formerly Pseudomonas mallei

Select Agents and Toxins

- Burkholderia pseudomallei
 - Formerly Pseudomonas pseudomallei)
- Hendra virus
- Nipah virus
- Rift Valley fever virus
- Venezuelan Equine Encephalitis virus

Immediate, Urgent

- Report to the State Health Department electronically, by telephone, facsimile or in person within 24 hours of diagnosis:
 - Brucellosis
 - Cholera
 - Diphtheria

Immediate, Urgent

- Haemophilus influenzae, invasive disease*
- Hepatitis A
- Measles (rubeola)
- Meningococcal Disease (Neisseria meningitidis)*
- Novel influenza A virus infections

Immediate, Urgent

- Pertussis
- Poliovirus infection, nonparalytic
- Rabies, human and animal
- Rubella
- Tuberculosis
- Typhoid fever
- Yellow fever

Immediate, Urgent

- Outbreaks of any kind
- Cases of potential public health importance

Standard, Notification

- Report electronically or in writing to the State Health Department within seven days of diagnosis:
 - Arboviral disease
 - Babesiosis
 - Campylobacteriosis
 - Chancroid

Standard, Notification

- Chlamydia trachomatis
- Cryptosporidiosis
- Dengue
- E. coli, shiga toxin-producing STEC, including O157:H7
- Ehrlichiosis/Anaplasmosis
- Encephalitis, viral

Standard, Notification

- Giardiasis
- Gonorrhea
- Hansen's disease (Leprosy)
- Hemolytic uremic syndrome (HUS), post-diarrheal
- Hepatitis B, C, and other viral
- Histoplasmosis

Standard, Notification

- Human Immunodeficiency Virus infection (including asymptomatic infection, AIDS, CD4 counts, and viral load)
- Influenza-associated pediatric mortality
- Lead exposure screening test result

Standard, Notification

- Legionellosis
- Leptospirosis
- Listeriosis
- Lyme disease
- Malaria
- Mumps
- Psittacosis

Standard, Notification

- Q Fever
- Salmonellosis
- Shigellosis
- Spotted Fever Rickettsiosis
- Staphylococcus aureus,
Vancomycin-intermediate (VISA)
- Staphylococcus aureus,
Vancomycin-resistant (VRSA)

Standard, Notification

- Streptococcus pneumoniae,
invasive disease*
- Syphilis
- Tetanus
- Toxic shock syndrome
- Trichinellosis (Trichinosis)
- Varicella
- Vibriosis

DETECT

- Surveillance
- Investigation
- Education
 - Patients
 - Staff
 - Facility Organizations

Year-round Surveillance

- Influenza-like Illness Network (ILINet)
 - Data
- Specimen-submitting Network (SpeciNet)
 - Specimens

Year-round Surveillance

- FSS investigates all notifiable diseases and outbreaks to determine if they meet the case definition to report to the CDC
 - Review labs
 - Call healthcare provider
 - Call patient
 - Document information in ALNBS

EPI Field Surveillance Staff (FSS)

PHA 1
Angie Borenstein, RN
(205) 268-2828
FY: 2008-2012

PHA 2
Cynthia Fisher, RN
(205) 268-2120
FY: 2008-2012

PHA 3
Dorinda Bragg, RN
(205) 268-2918
FY: 2008-2012

PHA 4
Stephanie Melton, MPH
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FY: 2008-2012

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Katie A. Crawford, RN
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Pam Stalder, RN
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T. Anderson, MPH
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FY: 2008-2012

Epidemiology Division
Phone: 334-700-8071
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Toll Free: 800-236-8878 (24/7)

http://www.adph.org/epi/assets/FSS_Web_Map.pdf

ALNBS

- Alabama National Electronic Disease Surveillance System (NEDSS) base system
- Lab test results electronically received from BCL, Labcorp, ARUP, Quest, ACL, Mayo, and several hospitals

ALNBS

- Any reporter or organization can have a NEDSS account for sending reports to ADPH

ADPH Guidelines

- Policy
 - Notifiable Disease Rules
 - HIPAA
- Protocols
 - Foodborne outbreak
 - Institutional outbreak

ADPH Guidelines

- Recommendations
 - Environmental Controls
 - Employee Health

TEST

- Methods
 - FDA and CLIA approved ≠ CDC recommended
 - Test Methods List on the Web site
 - Online lab assessment survey

TEST

- All appropriate notifiable disease specimens can be sent to the BCL, especially during cluster or outbreak situations

Talk to Your Lab

- Labs are not the only ones who need to report
- Do they submit all required data elements?
 - If not, we have to call you to get the information

Talk to Your Lab

- Do they use CDC recommended lab methods?
 - Antigen tests do not confirm many notifiable diseases

Bureau of Clinical Laboratories (BCL)

- BCL provides the highest quality service possible for the healthcare providers in an accurate and timely manner
 - Perform the requested lab test on the appropriate specimen

Bureau of Clinical Laboratories (BCL)

- Report lab test results
- Assure accuracy of testing performed following accepted procedures

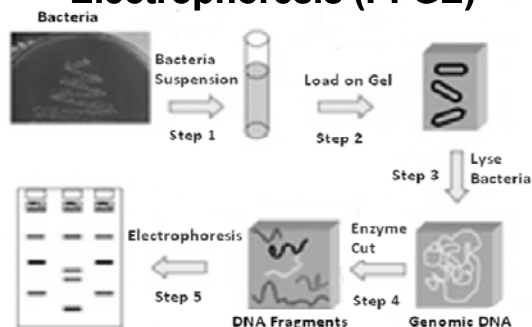
BCL

- Conduct tests for notifiable disease except for few, which are forwarded to CDC
- Providers can submit notifiable disease specimens for testing to BCL
- During outbreaks, send specimens directly to BCL

Sentinel Labs

- All hospital labs that test blood and urine
- Lab Response Network (LRN) Advanced
 - 46 hospital labs that conduct microbiology tests
 - BCL trains and equips

Pulse Field Gel Electrophoresis (PFGE)



PFGE Multi-state Clusters

- Four levels of activity
 - PFGE match recognized and PulseNet cluster name assigned
 - CDC Epidemiologist assigned to PulseNet cluster
 - CDC Epidemiologist requests additional questionnaires from affected states
 - Source identified

PFGE Multi-state Clusters

- Majority of PulseNet clusters are never solved
 - In 2012, AL had cases identified in 42 PulseNet clusters
 - Specific vehicles of transmission (food or animal) were suspected or implicated in 16 of them

REPORT

- Diseases
- Reporters
- Timeframes
 - Immediate, Extremely Urgent
 - Within 4 hrs of diagnosis (dx)
 - Immediate, Urgent
 - Within 24 hrs of dx

REPORT

- Standard
 - Within 7 days of dx
- How to report
- HIPAA

Case Definition

- **The CDC and Council of State and Territorial Epidemiologists (CSTE) determine national case definitions**
 - http://www.cdc.gov/osels/ph_surveillance/nndss/casedef/case_definitions.htm
- **Position Statement Archive page:**
<http://www.cste.org/?page=PositionStatements>

How to REPORT

- **Immediate, Extremely Urgent**
 - Within 4 hrs of dx
 - Phone: 1 – 800 – 338 – 8374
 - In person: County Health Department

How to REPORT

- **Immediate, Urgent**
 - Within 24 hrs of dx
 - Electronically: online, email, or fax
 - Phone: 1 – 800 – 338 – 8374
 - In Person: County Health Department

How to REPORT

- **Standard**
 - Within 7 days of dx
 - Electronically: online, email, or fax
 - In writing: mail green “REPORT Card”

Meaningful Use

- **The American Recovery and Reinvestment Act of 2009 (ARRA) enacted the Health Information Technology for Economic and Clinical Health (HITECH) Act to accelerate the adoption of health information technology**

Meaningful Use

- **ARRA offers incentives to eligible providers and hospitals to adopt “meaningful” health information technology**
 - Submit electronic data to ADPH immunization registries
 - Provide electronic submission of reportable lab results to ADPH

Meaningful Use

- Provide electronic syndromic surveillance data to ADPH

Objectives

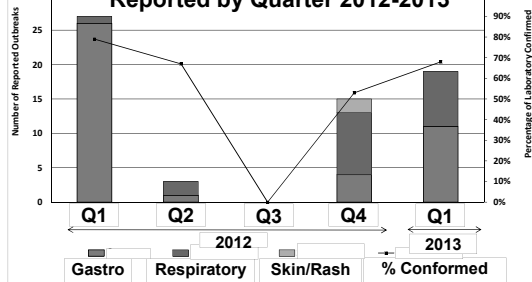
- Ensure the most accurate diagnosis, testing, treatment, and reporting of notifiable diseases
- Locate basic disease information and proper test methods at: www.adph.org/epi

Objectives

- Determine what diseases need to be reported, how they can be reported, and timeframe for reporting
- Identify notifiable disease reporters

Institutional Outbreaks

Percentage of Confirmed Pathogens Causing Institutional Outbreaks Reported by Quarter 2012-2013



Gastrointestinal Outbreak Background

- On October 21, 2013, approximately 70 individuals attended a high school athletic team dinner
 - 35 attendee’s became ill with gastrointestinal (GI) symptoms
 - Epidemiology Central Office initiated an outbreak investigation

Epidemiologic Investigation

- Field Surveillance Staff collected information on attendees' demographics, food consumption history, illness onset, and symptoms
- A case was defined as an individual who ate at the dinner and became ill with GI symptoms within 4-72 hours of exposure

Epidemiologic Investigation

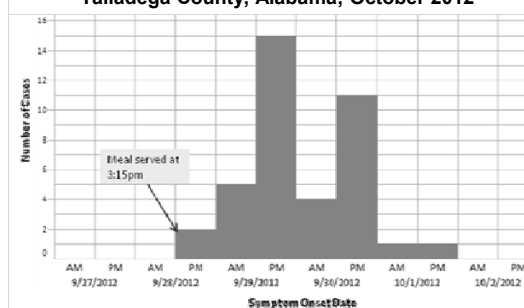
- Of the 58 individuals interviewed, 35 ill persons met the case definition and 23 non-ill were used as controls
- Six clinical specimens along with leftover chicken and rice were collected and submitted to the Bureau of Clinical Laboratories (BCL) for enteric pathogen testing

Results

- BCL identified *Salmonella* Braenderup in 4 of 6 stool specimens
- *Salmonella* was also isolated from rice and chicken samples
- Incubation ranged from 4 – 67.5 hours

Results

Epi Curve by Symptom Onset Date of a *Salmonella* Braenderup Outbreak at an Athletic Team Dinner, Talladega County, Alabama; October 2012



Conclusion

- In summary, a *Salmonella* Braenderup outbreak in association with a high school athletic team dinner
- Through our investigation, we were successfully able to identify the causative agent and identify source of infection

Conclusion

- Epidemiologic analysis did not implicate any food items as a source of contamination
- It is unclear how many items may have been contaminated and unknown which step of the food preparation process led to food contamination

***Escherichia coli* O157:H7 Outbreak Investigation**

Escherichia coli O157:H7

- On June 20, 2011 the Alabama Department of Public Health (ADPH) was contacted by East Alabama Medical Center (EAMC), Opelika, about two pediatric patients with symptoms of bloody diarrhea, fever, and abdominal cramps

Escherichia coli O157:H7

- Parents were interviewed and reported that children had been to the Opelika Sportsplex Splash Park
- In all, information on 91 individuals was gathered

Case Definition

- Individuals exposed to the Opelika Sportsplex and Aquatics Center on or after June 4, 2011 who experienced vomiting, diarrhea, or other gastrointestinal symptoms within 10 days of the visit

Objectives

- Determine the extent of the outbreak of *E. coli* O157:H7 infection
- Evaluate risk factors for *E. coli* and identify possible etiologies

Objectives

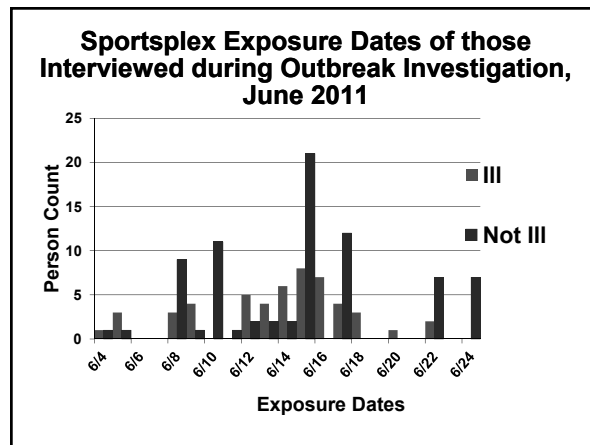
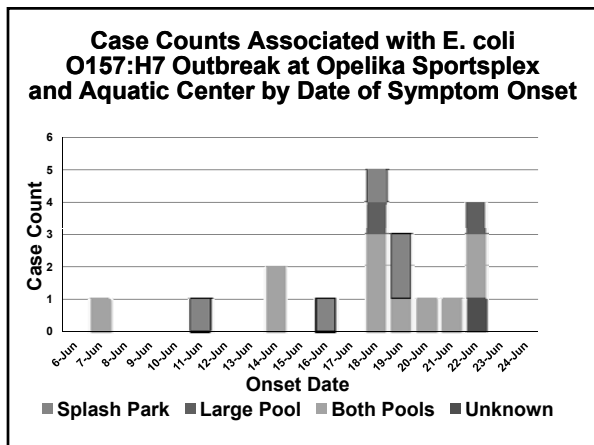
- Review procedures and practices at the Opelika Sportsplex and Aquatics Center to identify potential sources of contamination
- Mitigate and eliminate public health threat

Case Characteristics

	Case Definitions	Number
Confirmed	An individual meeting the case definition with a confirmed laboratory result of <i>E coli</i> O157:H7	6
Probable	An individual meeting the case definition in which no other known cause was identified	13

Case Characteristics

Number of Cases	19
Age(years)	
Mean	9
Median	6
Range	1-35
Gender	
Female	9
Male	10
Hemolytic-Uremic Syndrome Development	4
Deaths	0



Relative Risk

- The probability that a member of an exposed group will develop a disease as compared to an unexposed group

Relative Risk

Statistically Significant Exposures	Relative Risk	P-value (2 tailed)
Splash Park	4.41	0.04
Large Pool	3.58	0.009
12 – June	4.29	<0.001
14 – June	4.21	<0.001
16 – June	4.73	<0.001

Human and Environmental Samples E. coli O157:H7

- 6 samples received from ill patients were biochemically confirmed as E. coli O157:H7
- Genotyping analysis determined 2 separate DNA fingerprints (example to follow)

Human and Environmental Samples E. coli O157:H7

- Multiple water samples were obtained from locations around the Sportsplex, including the Splash Park, drinking fountains, hand sinks, large pool (lap pool), and hot tub
 - All samples were negative

Human and Environmental Samples E. coli O157:H7

- Samples taken were retrieved after water had been chlorinated
 - This may account for any contaminants in water being unable to culture for identification

E. coli Lab Results from Patients

- Each E. coli DNA fingerprint obtained from an isolate has 2 corresponding PFGE patterns, one for the XbaI pattern and one for the BlnI pattern (right and left respectively)
- The two on left are the XbaI and BlnI patterns from the E. coli isolates of confirmed cases A, B, D, and E

E. coli Lab Results from Patients

- The two on the right are from confirmed case C

Potential Sources of Contamination

- CDC recommends free chlorine levels between 1-3 parts per million and pH level between 7.2 - 7.8 for recreational swimming pools
 - Practices in ensuring water testing, and response may have been suboptimal

Potential Sources of Contamination

- Multiple instances of recently ill children returning to pools
- Chlorine and pH levels may not have been optimal on multiple occasions

Public Health Response

- Splash Park closure was recommended pending further investigation
 - The Sportsplex staff complied with the request and closed the Splash Park on June 20th

Public Health Response

- Daycares with attendees identified were notified and sent flyers with information on E. coli
 - In addition, news releases were distributed as needed

Public Health Response

- ADPH staff worked with the Opelika Sportsplex to ensure water testing was done daily and readings were taken
 - At least 9 visits were conducted from June 20th to June 30th

Public Health Response

- Conference calls with the Sportsplex operators stressed the need for proper monitoring of chlorine and pH levels, and appropriate action to take when chlorine and pH levels drop below CDC suggested standards

Public Health Response

- ADPH provided examples from CDC site regarding appropriate signage for swimming facilities in encouraging patrons to adhere to certain health standards